

# Graduate Catalog | 2022-2023



North Carolina Agricultural and Technical State University

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# Graduate Catalog 2022-2023

## The Graduate College



North Carolina Agricultural and Technical State University  
1601 East Market Street  
Greensboro, North Carolina 27411

[www.ncat.edu/tgc](http://www.ncat.edu/tgc)

## Table of Contents

|   |           |
|---|-----------|
| <b>Introduction .....</b>   | <b>10</b> |
| <i>Academic Calendar .....</i>                                    | <i>11</i> |
| <i>Catalog Policies and Disclaimers .....</i>                     | <i>11</i> |
| <i>Student’s Responsibility.....</i>                              | <i>11</i> |
| <i>The University of North Carolina .....</i>                     | <i>12</i> |
| <i>North Carolina A&amp;T State University .....</i>              | <i>15</i> |
| <i>Nondiscrimination Policy .....</i>                             | <i>17</i> |
| <i>The Graduate College.....</i>                                  | <i>18</i> |
| <i>Accreditation and Institutional Memberships.....</i>           | <i>19</i> |
| <i>Degree and Certificate Programs Offered .....</i>              | <i>21</i> |
| Doctoral Degrees .....  | 21        |
| Masters Degrees.....  | 22        |
| Post Baccalaureate Certificate Programs .....                     | 23        |
| Post Masters Certificate Programs .....                           | 23        |
| <b>Expenses and Financial Assistance .....</b>                    | <b>26</b> |
| <i>Tuition and Fees .....</i>                                     | <i>26</i> |
| <i>Auditing Courses .....</i>                                     | <i>26</i> |
| <i>Indebtedness to the University.....</i>                        | <i>26</i> |
| <i>Refunds .....</i>  | <i>26</i> |
| <i>Veterans.....</i>  | <i>27</i> |
| <i>Full time Faculty and Employees .....</i>                      | <i>27</i> |
| <i>Residence Status for Tuition Purposes .....</i>                | <i>27</i> |
| <i>FAFSA Application.....</i>                                     | <i>27</i> |
| <i>Federal Work Study.....</i>                                    | <i>28</i> |
| <i>Loans .....</i>  | <i>28</i> |
| <i>Scholarships and Fellowships .....</i>                         | <i>28</i> |
| <i>Graduate Assistantships .....</i>                              | <i>28</i> |
| <b>Academic Policies and Regulations.....</b>                     | <b>33</b> |
| <i>Graduate Admissions.....</i>                                   | <i>33</i> |
| Unconditional Admission .....                                     | 33        |
| Conditional Admission .....                                       | 34        |
| Satisfying conditional admission status .....                     | 34        |
| Non-Degree Seeking Admission.....                                 | 34        |
| Admission of Non-Degree Seeking Students to Degree Programs ..... | 34        |
| Deferral of Admission.....  | 34        |
| Readmission.....  | 34        |
| Application deadlines.....  | 35        |
| Application Requirements.....                                     | 35        |
| Processing Applications.....                                      | 36        |
| <i>Graduate Admissions Appeals.....</i>                           | <i>36</i> |

|  |    |
|--|----|
| <i>Enrollment, Residence, Leave and Withdrawal</i> .....                   | 36 |
| Full time enrollment.....  | 36 |
| Maximum Course Load .....  | 36 |
| Residence Requirement .....  | 37 |
| Continuous Enrollment/Registration.....                                    | 37 |
| Leave of Absence.....  | 37 |
| Withdrawal from the University .....                                       | 37 |
| <i>Graduation Requirements</i> .....                                       | 37 |
| Graduation and commencement dates .....                                    | 37 |
| Student’s responsibility to know university policies and regulations ..... | 37 |
| Applicable Graduate Catalog and program requirements .....                 | 38 |
| Plan of Study.....   | 38 |
| Change of Program .....  | 38 |
| Time Limitations.....  | 38 |
| Graduation requirements.....   | 38 |
| Application for Graduation and Graduation Clearance.....                   | 39 |
| <i>Course Numbering</i> .....  | 39 |
| Lower Division Courses .....   | 39 |
| Upper Division Courses.....  | 39 |
| Graduate Courses.....  | 40 |
| <i>Graduate Grades and Grade Point Average</i> .....                       | 40 |
| Responsibility for grades .....  | 40 |
| Types of grades .....  | 40 |
| Attempted Credit Hours .....   | 41 |
| Graduate Credit.....   | 41 |
| Grade Point Average.....   | 42 |
| Incomplete and IP Grades.....  | 42 |
| Change of Grade .....  | 42 |
| Course Repetition.....   | 42 |
| Failure to meet course requirements .....                                  | 42 |
| Failing to withdraw by deadline.....                                       | 42 |
| <i>Graduate Transfer Credits</i> .....                                     | 43 |
| <i>Academic Eligibility</i> .....  | 43 |
| Good academic standing.....  | 43 |
| Academic Probation.....  | 44 |
| Dismissal.....   | 44 |
| Readmission after Academic Dismissal.....                                  | 44 |
| Appeals .....  | 44 |
| <i>Thesis, Dissertation and Comprehensive Exam</i> .....                   | 44 |
| Theses and dissertations.....  | 44 |
| Thesis/Dissertation Research Topic.....                                    | 44 |
| Qualifying Examination.....  | 45 |
| Preliminary Examination .....  | 45 |
| Admission to Candidacy.....  | 45 |
| Thesis/Dissertation Defense.....   | 45 |
| Submission of Thesis/Dissertation.....                                     | 46 |
| Thesis/Dissertation Advisor.....   | 46 |
| Advisory Committee Role .....  | 46 |
| Advisory Committee Composition .....                                       | 47 |
| Committee Members from Other Institutions .....                            | 47 |
| Substitution of Committee Members .....                                    | 47 |
| Permanent Changes in Committee Members.....                                | 47 |
| Comprehensive Exams.....   | 48 |

|   |    |
|---|----|
| <i>Graduate Courses, Credits and Curriculum</i> .....                       | 48 |
| Semester Credit Hour.....   | 48 |
| Degree program .....  | 48 |
| Concentration.....  | 48 |
| Option .....  | 49 |
| Minimum credit hours for degree programs .....                              | 49 |
| Comprehensive Assessments .....   | 49 |
| <i>Graduate Certificate Programs</i> .....                                  | 49 |
| <i>Graduate Double Majors, Dual Degrees and Joint Degree Programs</i> ..... | 50 |
| Double Majors .....   | 50 |
| Dual Degree Programs.....   | 50 |
| Joint Degree Programs.....  | 51 |
| <i>Accelerated Bachelor's / Master's Program</i> .....                      | 51 |
| <i>Master's Degree Enroute to Doctoral Degree</i> .....                     | 52 |
| <i>Graduate Student Appeals</i> .....                                       | 53 |
| Grade appeals.....  | 53 |
| Appealing dismissal from program.....                                       | 53 |
| Termination of an assistantship.....  | 54 |
| Graduate Appeals Committee .....  | 54 |
| <i>Graduate Faculty</i> .....   | 55 |
| Full Members:.....  | 55 |
| Affiliate Members.....  | 56 |
| Review and Continuation of Graduate Faculty .....                           | 56 |
| <i>Graduate Program Coordinators</i> .....                                  | 56 |
| Appointment Process .....   | 56 |
| Responsibilities .....  | 56 |
| <i>Class Attendance</i> .....   | 58 |
| Instructor's Responsibility .....   | 58 |
| Student's Responsibility .....  | 58 |
| <i>Make-Up of Required Course Work</i> .....                                | 58 |
| <i>Student Religious Observance</i> .....                                   | 59 |
| <i>Add and Drop Period</i> .....  | 59 |
| <i>Withdrawal from an Individual Course</i> .....                           | 60 |
| <i>Withdrawal from the University</i> .....                                 | 60 |
| <i>Retroactive Withdrawal from the University</i> .....                     | 61 |
| <i>Cancellation of Course Registration</i> .....                            | 61 |
| <i>Student Immunization Requirement</i> .....                               | 61 |
| <i>Payment of Tuition, Fees and other Dues</i> .....                        | 61 |
| <i>Privacy of Student Records</i> .....                                     | 62 |
| Access to Student Records.....  | 62 |
| <i>Change of Name and Address</i> .....                                     | 62 |
| <i>Transcripts of Records</i> .....   | 62 |
| <i>Academic Dishonesty Policy</i> .....                                     | 63 |
| <i>Disruptive Behavior in the Classroom</i> .....                           | 63 |

|   |            |
|---|------------|
| <b>Graduate Degree Programs</b> .....   | <b>65</b>  |
| <b>COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCES</b> .....  | <b>65</b>  |
| <i>Agriculture and Environmental Sciences, PhD</i> .....  | <i>67</i>  |
| <i>Concentration: Food Science, Human Nutrition and Health</i> .....                                  | <i>67</i>  |
| <i>Concentration: Sustainable Agriculture and Environmental Sciences</i> .....                        | <i>68</i>  |
| <i>Concentration: Agribusiness and Applied Economics</i> .....  | <i>70</i>  |
| <i>Concentration: Sustainable Animal Production and Health</i> .....                                  | <i>71</i>  |
| <i>Concentration: Agricultural and Extension Education</i> .....                                      | <i>72</i>  |
| <i>Agricultural Education – Professional Licensure, MS</i> .....                                      | <i>73</i>  |
| <i>Agricultural Education – Professional Service, MS</i> .....  | <i>75</i>  |
| <i>Agricultural and Environmental Systems - Integrated Animal Health Systems, MS</i> .....            | <i>77</i>  |
| <i>Agricultural and Environmental Systems - Agribusiness &amp; Food Industry Management, MS</i> ..... | <i>78</i>  |
| <i>Agricultural and Environmental Systems - Natural Resources and Environmental Systems, MS</i> ..... | <i>79</i>  |
| <i>Food and Nutritional Sciences, MS</i> .....  | <i>80</i>  |
| <i>Certificate - Family and Consumer Sciences, PB</i> .....   | <i>81</i>  |
| <i>Certificate – Human Lactation, PB</i> .....  | <i>82</i>  |
| <i>Certificate – International Agricultural Development and Engagement, PB</i> .....                  | <i>83</i>  |
| <i>Certificate – Advanced Waste Management, PB</i> .....  | <i>84</i>  |
| <i>Certificate - Interdisciplinary Environmental Certificate Program (IECP), PB</i> .....             | <i>85</i>  |
| <b>COURSE DESCRIPTIONS: College of Agriculture and Environmental Sciences</b> .....                   | <b>87</b>  |
| <i>Agribusiness, Applied Economics &amp; Agriscience Education</i> .....                              | <i>87</i>  |
| <i>Agricultural Doctoral Program Core Courses</i> .....   | <i>93</i>  |
| <i>Natural Resource &amp; Environmental Design</i> .....  | <i>94</i>  |
| <i>Environmental Studies</i> .....  | <i>99</i>  |
| <i>Animal science</i> .....   | <i>99</i>  |
| <i>Family and Consumer Sciences</i> .....   | <i>102</i> |
| <b>COLLEGE OF ARTS, HUMANITIES AND SOCIAL SCIENCES</b> .....  | <b>109</b> |
| <i>English and African American Literature, MA</i> .....  | <i>110</i> |
| <i>Certificate - Technical and Professional Communication (TPC)</i> .....                             | <i>111</i> |
| <b>COURSE DESCRIPTIONS: College of Arts, Humanities, and Social Sciences</b> .....                    | <b>112</b> |
| English .....   | <i>112</i> |
| History and Political Science .....   | <i>117</i> |
| <b>WILLIE A. DEESE COLLEGE OF BUSINESS AND ECONOMICS</b> .....  | <b>119</b> |
| <i>Accountancy, MACC</i> .....  | <i>120</i> |
| <i>Business Administration - Accounting, MBA</i> .....  | <i>121</i> |
| <i>Business Administration - Human Resources Management, MBA</i> .....                                | <i>122</i> |
| <i>Business Administration - General Management</i> .....   | <i>123</i> |
| <i>Business Administration - Supply Chain Management, MBA</i> .....                                   | <i>124</i> |
| <i>Certificate - Supply Chain Management, PB</i> .....  | <i>125</i> |
| <i>Certificate - General Management, PB</i> .....   | <i>126</i> |

|  |     |
|--|-----|
| <i>COURSE DESCRIPTIONS: Willie A. Deese College of Business and Economics</i> .....        | 127 |
| Accounting and Finance .....   | 127 |
| Business Education .....   | 129 |
| Management.....  | 130 |
| Marketing and Supply Chain Management.....   | 133 |
| Economics.....   | 134 |
| Finance.....   | 134 |
| <i>COLLEGE OF EDUCATION</i> .....  | 135 |
| <i>Leadership Studies, PhD</i> .....   | 137 |
| <i>Rehabilitation Counseling and Rehabilitation Counselor Education, PhD</i> .....         | 139 |
| <i>Elementary Education K-6, MAEd</i> .....  | 143 |
| <i>Reading Education K-12, MAEd</i> .....  | 144 |
| <i>Master of Arts in Teaching - Biology Education, MAT</i> .....                           | 145 |
| <i>Master of Arts in Teaching - Business Education, MAT</i> .....                          | 147 |
| <i>Master of Arts in Teaching - Chemistry Education, MAT</i> .....                         | 149 |
| <i>Master of Arts in Teaching - Child Dev, Early Edu and Family Studies B-K, MAT</i> ..... | 151 |
| <i>Master of Arts in Teaching - Elementary Education K-6, MAT</i> .....                    | 153 |
| <i>Master of Arts in Teaching - English Education, MAT</i> .....                           | 155 |
| <i>Master of Arts in Teaching - Family and Consumer Sciences Education, MAT</i> .....      | 157 |
| <i>Master of Arts in Teaching - Health and Physical Education, MAT</i> .....               | 159 |
| <i>Master of Arts in Teaching - History Education, MAT</i> .....                           | 161 |
| <i>Master of Arts in Teaching - Mathematics Education, MAT</i> .....                       | 163 |
| <i>Master of Arts in Teaching - Special Education General Curriculum K-12, MAT</i> .....   | 165 |
| <i>Master of Arts in Teaching - Technology Education, MAT</i> .....                        | 167 |
| <i>Adult Education, MS</i> .....   | 169 |
| <i>Mental Health Counseling – Clinical, MS</i> .....                                       | 170 |
| <i>Mental Health Counseling – Rehabilitation, MS</i> .....                                 | 174 |
| <i>School Counseling, MS</i> .....   | 178 |
| <i>School Administration, MSA</i> .....  | 182 |
| <i>Certificate - Community College Teaching, PB</i> .....                                  | 184 |
| <i>Certificate - Marriage and Family Counseling, PB</i> .....                              | 185 |
| <i>Certificate - Rehabilitation Counseling and Behavioral Addictions, PB</i> .....         | 186 |
| <i>Certificate - Rehabilitation Psychology and Behavioral Medicine, PB</i> .....           | 187 |
| <i>Certificate - Vocational Evaluation and Work Adjustment, PB</i> .....                   | 188 |
| <i>Certificate - School Administration, PM</i> .....                                       | 189 |
| <i>COURSE DESCRIPTIONS: College of Education</i> .....                                     | 190 |
| Counseling .....   | 190 |
| Educator Preparation.....  | 198 |
| Leadership Studies and Adult Education .....   | 206 |
| <i>COLLEGE OF ENGINEERING</i> .....  | 214 |

|   |     |
|---|-----|
| <i>Computational Data Science and Engineering, PhD</i> .....                                      | 215 |
| <i>Computer Science, PhD</i> .....  | 217 |
| <i>Electrical Engineering, PhD</i> .....  | 219 |
| <i>Industrial and Systems Engineering, PhD</i> .....  | 221 |
| <i>Mechanical Engineering, PhD</i> .....  | 223 |
| <i>Bioengineering, MS</i> .....   | 226 |
| <i>Chemical Engineering, MS</i> .....   | 227 |
| <i>Civil Engineering, MS</i> .....  | 228 |
| <i>Civil Engineering – Systems Engineering, MS</i> .....  | 229 |
| <i>Data Science and Engineering, MS</i> .....   | 230 |
| <i>Data Science and Engineering – Systems Engineering, MS</i> .....                               | 232 |
| <i>Computer Science, MS</i> .....   | 233 |
| <i>Electrical Engineering, MS</i> .....   | 234 |
| Certificate – Autonomy, PB.....   | 235 |
| <i>Industrial and Systems Engineering, MS</i> .....   | 237 |
| <i>Industrial and Systems Engineering – Systems Engineering, MS</i> .....                         | 239 |
| Certificate – Data-driven Modeling and Analysis of Complex Systems, PB.....                       | 240 |
| <i>Mechanical Engineering, MS</i> .....   | 241 |
| <i>Mechanical Engineering – Systems Engineering, MS</i> .....                                     | 242 |
| <i>COURSE DESCRIPTIONS: College of Engineering</i> .....  | 243 |
| Chemical, Biological & Bioengineering .....   | 243 |
| Civil, Architectural & Environmental Engineering .....  | 247 |
| Computer Science .....  | 250 |
| Computational Data Science and Engineering.....   | 254 |
| Electrical and Computer Engineering.....  | 258 |
| Mechanical Engineering .....  | 271 |
| Systems Engineering.....  | 275 |
| <i>JOHN R. AND KATHY R. HAIRSTON COLLEGE OF HEALTH AND HUMAN SCIENCES</i> .....                   | 276 |
| <i>Social Work (Joint with UNCG), Ph.D.</i> .....   | 277 |
| <i>Social Work (Joint with UNCG), MSW</i> .....   | 279 |
| <i>Health Psychology, M.S.</i> .....  | 281 |
| <i>COURSE DESCRIPTIONS: John R. and Kathy R. Hairston College of Health and Human Services</i> .. | 283 |
| Social Work and Sociology.....  | 283 |
| Health Psychology .....   | 287 |
| <i>COLLEGE OF SCIENCE AND TECHNOLOGY</i> .....  | 292 |
| <i>Applied Science and Technology, Ph.D.</i> .....  | 293 |
| <i>Applied Mathematics, MS</i> .....  | 301 |
| <i>Biology, MS</i> .....  | 302 |
| <i>Biology – Industrial Biosciences PSM, MS</i> .....   | 304 |
| <i>Chemistry, MS</i> .....  | 306 |

|   |     |
|---|-----|
| <i>Information Technology, MS</i> .....   | 307 |
| <i>Chemistry – Applied Chemistry and Chemical Sciences PSM, MS</i> .....          | 308 |
| <i>Physics, MS</i> .....  | 310 |
| <i>Technology Management (TEMG), M.S.</i> .....                                   | 312 |
| <i>COURSE DESCRIPTIONS: College of Science and Technology</i> .....               | 313 |
| Applied Engineering Technology.....   | 313 |
| Applied Science and Technology.....   | 317 |
| Biology.....  | 320 |
| Chemistry.....  | 322 |
| Built Environment.....  | 325 |
| Information Technology.....   | 326 |
| Computer Systems Technology.....  | 327 |
| Mathematics.....  | 330 |
| Physics.....  | 333 |
| Graphic Design Technology.....  | 334 |
| <i>JOINT SCHOOL OF NANOSCIENCE AND NANOENGINEERING</i> .....                      | 336 |
| <i>Nanoengineering, PhD</i> .....   | 338 |
| <i>Nanoengineering, MS</i> .....  | 343 |
| <i>Certificate – Systems and Synthetic Biology, PB</i> .....                      | 346 |
| <i>Certificate - Micro and Nano Devices, PB</i> .....                             | 347 |
| <i>Certificate – Advanced Materials: Nanoengineering, PB</i> .....                | 348 |
| <i>Certificate - STEM Entrepreneurship, PB</i> .....                              | 349 |
| <i>COURSE DESCRIPTIONS: Joint School of Nanoscience and Nanoengineering</i> ..... | 350 |
| Nanoengineering.....  | 350 |
| <i>THE GRADUATE COLLEGE</i> .....   | 358 |
| <i>Post-Baccalaureate Certificate - Cybersecurity</i> .....                       | 359 |
| <i>Post-Baccalaureate Certificate – Data Analytics</i> .....                      | 360 |
| <i>COURSE DESCRIPTIONS: Graduate College</i> .....                                | 361 |
| Computational Data Science and Engineering.....                                   | 361 |
| Computer Science.....   | 362 |
| Computer Systems Technology.....  | 362 |
| Management.....   | 363 |
| Mathematics and Statistics.....   | 364 |
| The Graduate College.....   | 365 |
| Instructional Technology.....   | 366 |

## Introduction

Welcome to the Graduate Catalog! The Graduate College exemplifies North Carolina A&T State University's tradition of excellence in learning, discovery and engagement. We are proud of our unique approach to the graduate enterprise that comprises the combined efforts of an intercultural faculty and staff, a diverse student population, and an unparalleled research and learning experience. Our alumni are leading thinkers and innovators in a variety of fields, seeking to improve life for all in the 21st century and beyond.

In 2016, the US News and World Report published its rankings that listed North Carolina A&T as the top ranked public HBCU in the nation and ranked several graduate programs: Rehabilitation Counseling(58), Industrial and Systems Engineering (66), Joint Master's in Social Work with UNCG (78), Electrical Engineering program (139). The US News and World Report publication ranked the online master's program in Information Technology at 19<sup>th</sup> place and the online Graduate Education programs at 153<sup>rd</sup> place.

In a special report released in 2015, Money magazine ranked A&T among North Carolina's top ten colleges. In 2016, Money and Essence magazines ranked A&T as one of the top 10 colleges for African Americans. In 2016, A&T was also included in Money magazine's Best Colleges For Your Money list.

In the 2013 ranking of national universities by Washington Monthly magazine, North Carolina A&T State University has been ranked No. 33 overall and No. 2 in the category of social mobility. Washington Monthly rates schools overall based on their contribution to the public good in three categories: social mobility – recruiting and graduating low-income students; research – producing cutting-edge scholarship and PhDs; and service – encouraging students to give something back to their country.

Our state of the art research centers and facilities include the NASA Center for Aviation Safety, the NSF Engineering Research Center for Revolutionizing Metallic Biomaterials, the NOAA-Interdisciplinary Scientific Environmental Technology Center, the Center for Post-Harvest Technologies, the Interdisciplinary Center for Entrepreneurship and E-Business and the recently established Joint School for Nanoscience and Nanoengineering.

The Graduate College at North Carolina A&T State University offers 11 doctoral degree programs, 30 master's degree programs, one post-master's certificate program, and 17 post-baccalaureate certificate programs in collaboration with the following colleges: College of Agriculture and Environmental Sciences, College of Arts Humanities and Social Sciences, College of Business and Economics, College of Education, College of Engineering, College of Health and Human Sciences, College of Science and Technology, and the Joint School of Nanoscience and Nanoengineering. Currently, 15 graduate programs including one doctoral program, 10 master's programs and two post-baccalaureate certificate program have been approved for distance education. Details regarding all our programs of study are provided in this catalog. NC A&T also offers a variety of financial assistance options for graduate study.

We invite you to explore the catalog as well as our website for more information on our academic programs, research opportunities, admission processes, and financial assistance. Please don't hesitate to call us at (336)285-2366 or email us at [grad@ncat.edu](mailto:grad@ncat.edu) if you have any questions.

Best wishes.

Clay Gloster, Jr, PhD  
Dean, The Graduate College

## **Academic Calendar**

The University Calendar is subject to periodic revision. The updated academic calendars are available at [NCA&T Academic Calendar](#)

## **Catalog Policies and Disclaimers**

The *North Carolina Agricultural and Technical University Graduate Catalog* contains academic policies and regulations that relate to graduate courses, graduate degree programs and graduate certificate programs. The Graduate College staff will be responsible for interpreting policies and regulations stated in the Catalog as needed.

The University reserves the right to change any of the rules and regulations of the University at any time, including those relating to admission, instruction, and graduation. The University also reserves the right to withdraw curricula and specific courses, alter course content, change the calendar, and to impose or increase tuition and fees.

The requirements specified in this *Catalog* apply to students who commence their studies at North Carolina A&T State University during the 2017-2018 academic year and who remain in continuous enrollment at the institution until they graduate. If requirements are changed, students may elect to comply with the new requirements or to remain under the requirements by which they are governed at the time of the change. A student who elects to comply with the requirements of a newer catalog must do so by declaring such intent in writing at least one semester prior to graduation. This declaration must be approved by the academic department and the Graduate College.

Students who change their program of study are bound by the requirements of their new program of study that are in effect the semester they officially begin studies in the new program. Furthermore, students who are readmitted to the University are bound by the program and degree requirements in force at the time of readmission.

## **Student's Responsibility**

Each student is responsible for the timely completion of his or her academic program, for familiarity with the *Catalog*, for maintaining good academic standing, and for meeting all other degree requirements. Students are expected to assume academic and financial responsibility for the courses in which they enroll. While the student's advisor should be consulted regularly, the final responsibility remains that of the student.

A student is also required to have knowledge of and observe all regulations pertaining to campus life and student behavior. Each student is expected to participate in campus and community life in a manner that will reflect credibly upon the student and the University. All students are expected to abide by the Student Handbook.

Email is the official form of communication at the University; students are responsible for checking their [ncat.edu](mailto:ncat.edu) email regularly. Students are expected to also maintain their contact information including mailing address and telephone number with the Office of the Registrar.

## The University of North Carolina

The University of North Carolina is a multi-campus state university that encompasses 16 such institutions, as well as the NC School of Science and Mathematics, the nation's first public residential high school for gifted students. Chartered by the North Carolina General Assembly in 1789, the University of North Carolina was the first public university in the United States to open its doors and the only one to graduate students in the eighteenth century. The first class was admitted in Chapel Hill in 1795. For the next 136 years, the only campus of the University of North Carolina was at Chapel Hill. Additional institutions of higher education, diverse in origin and purpose, began to win sponsorship from the General Assembly beginning as early as 1877. Five were historically black institutions, and another was founded to educate American Indians. Some began as high schools. Several were created to prepare teachers for the public schools. Others had a technological emphasis. One is a training school for performing artists.

The 1931 session of the General Assembly redefined the University of North Carolina to include three state-supported institutions: the campus at Chapel Hill (now the University of North Carolina at Chapel Hill), North Carolina State College (now North Carolina State University at Raleigh), and Women's College (now the University of North Carolina at Greensboro). The new multi-campus University operated with one board of trustees and one president. By 1969, three additional campuses had joined the University through legislative action: the University of North Carolina at Charlotte, the University of North Carolina at Asheville, and the University of North Carolina at Wilmington.

In 1971 legislation was passed bringing into the University of North Carolina the state's ten remaining public senior institutions, each of which had until then been legally separate: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina Central University, the North Carolina School of the Arts (now the University of North Carolina School of the Arts), Pembroke State University (now the University of North Carolina at Pembroke), Western Carolina University, and Winston-Salem State University. In 1985 the NC School of Science and Mathematics was declared an affiliated school of the University; in July 2007 NCSSM by legislative action became a constituent institution of the University of North Carolina. All the schools and universities welcome students of both sexes and all races.

The UNC Board of Governors is the policy-making body legally charged with "the general determination, control, supervision, management, and governance of all affairs of the constituent institutions." It elects the president, who administers the University. The 32 voting members of the Board of Governors are elected by the General Assembly for four-year terms. Former board chairmen and board members who are former governors of North Carolina may continue to serve for limited periods as non-voting members *emeriti*. The president of the UNC Association of Student Governments or that student's designee is also a non-voting member.

Each of the UNC campuses is headed by a chancellor who is chosen by the Board of Governors on the president's nomination and is responsible to the president. Each university has a Board of Trustees consisting of eight members elected by the Board of Governors, four appointed by the governor, and the president of the student body, who serves *ex officio*. (The UNC School of the Arts has two additional *ex officio* members; and the NC School of Science and Mathematics has a 27-member board as required by law.) Each Board of Trustees holds extensive powers over academic and other operations of its campus on delegation from the Board of Governors.

In addition to its teaching role, the University of North Carolina has a long-standing commitment to public service. The UNC Center for Public Television, the UNC Health Care System, the cooperative extension and research services, nine area health education centers, and myriad other University programs and facilities reap social and economic benefits for the state and its people.

### ***Mission***

The mission of the University is shaped in large measure by the constitutional and statutory mandates by which public higher education is established and maintained. Article IX of the Constitution of the State declares:

Sec. 8. Higher education. The General Assembly shall maintain a public system of higher education, comprising The University of North Carolina and such other institutions of higher education as the General Assembly may deem wise.

Sec. 9. Benefits of public institutions of higher education. The General Assembly shall provide that the benefits of The University of North Carolina and other public institutions of higher education, as far as practicable, be extended to the people of the State free of expense.

This constitutional mandate for a public system of higher education is effected by Chapters 115 and 116 of the General Statutes. Chapter 115A, enacted in 1963, provides for a statewide network of community and technical colleges and institutes which offer two-year college transfer and technical and vocational programs. Chapter 116 of the statutes, as amended by the General Assembly effective July 1, 1972, provides in Section 3 that:

The board of trustees of the University of North Carolina is hereby redesignated, effective July 1, 1972, as the 'Board of Governors of the University of North Carolina.' The Board of Governors shall be known and distinguished by the name of 'the University of North Carolina' and shall continue as a body politic and corporate and by that name shall have perpetual succession and a common seal.

Section 4 of the statute provides for the University of North Carolina to be composed of the 16 public senior institutions in the state.

The Higher Education Reorganization Act of 1971, which placed those 16 institutions under one governing board, asserted the basic objectives and purposes for the University of North Carolina: to foster the development of a well-planned and coordinated system of higher education, to improve the quality of education, to extend its benefits, and to encourage an economical use of the state's resources.

Central to the process of strategic planning is the clarification of the overall mission of the University as a whole and the role and scope of the constituent institutions within that overall mission. As a part of the comprehensive mission review of 1992, the Board of Governors adopted a general mission statement for the University. This statement, with minor modifications, was given statutory status in 1995 when the General Assembly amended Chapter 116-1 of the General Statutes to include the following as the official mission statement of the University of North Carolina:

The University of North Carolina is a public, multi-campus university dedicated to the service of North Carolina and its people. It encompasses the 16 diverse constituent institutions and other educational, research, and public service organizations. Each shares in the overall mission of the University. That mission is to discover, create, transmit, and apply knowledge to address the needs of individuals and society. This mission is accomplished through instruction, which communicates the knowledge and values and imparts the skills necessary for individuals to lead responsible, productive, and personally satisfying lives; through research, scholarship, and creative activities, which advance knowledge and enhance the educational process; and through public service, which contributes to the solution of societal problems and enriches the quality of life in the State. In the fulfillment of this mission, the University shall seek an efficient use of available resources to ensure the highest quality in its service to the citizens of the State.

Teaching and learning constitute the primary service that the University renders to society. Teaching, or instruction, is the primary responsibility of each of the constituent institutions. The relative importance of

research and public service, which enhance teaching and learning, varies among the constituent institutions, depending on their overall missions.

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### **North Carolina A&T State University**

North Carolina Agricultural and Technical State University is a learner-centered community that develops and preserves intellectual capital through interdisciplinary research, discovery, engagement and operational excellence. The university's rich history dates back over 118 years. N.C. A&T was established as the A. and M. College for the "Colored Race" by an act of the General Assembly of North Carolina ratified March 9, 1891. It was in the fall of 1890, when the North Carolina General Assembly enacted a second Morrill Act that mandated a separate college for the colored race. (The College operated in Raleigh as an annex to Shaw University during the years 1890-1891, 1891-1892, and 1892-1893). A group of Greensboro citizens banded together to make a permanent home for the institution. Members such as Dr. DeWitt, a black dentist, C. Benbow and Charles H. Moore donated 14 acres of land for the site and an additional \$11,000 in cash that aided in construction of the buildings. This amount was supplemented by an appropriation of \$2,500 from the General Assembly. The plan was approved on March 9, 1891, and the first building was completed in 1893: the Agricultural and Mechanical College for the Colored Race (now North Carolina A&T State University) had found its new home.

In 1915 state legislators changed the college's name to The Agricultural and Technical College of North Carolina, and in 1967 elevated it to university status. N.C. A&T became a constituent university of The University of North Carolina in 1972.

Since its inception, A&T has maintained a tradition of excellence in education. Under the leadership of Dr. Harold L. Martin Sr., the university's current Chancellor, A&T continues to thrive as it sustains its rich legacy.

North Carolina Agricultural and Technical State University is a public, land-grant, doctoral research institution located in Greensboro, NC. The university is a member of the University of North Carolina system.

The university offers 117 undergraduate programs, 29 master's programs, and 9 doctoral programs. The academic programs are offered through the College of Agriculture and Environmental Sciences; College of Arts Humanities and Social Sciences; College of Business and Economics; College of Education; College of Health and Human Sciences; College of Science and Technology; College of Engineering; Joint School of Nanoscience and Nanoengineering; and the Graduate College.

A&T's outstanding student body is the primary strength of the university. Students are carefully selected from thousands of applicants annually. Once enrolled, they are taught and mentored by excellent faculty, the majority of whom have earned doctoral and other degrees from some of the nation's most prestigious graduate and professional schools.

A&T is among the top institutions to graduating the largest number of African-American engineers at the undergraduate, masters, and doctoral levels and psychology undergraduates in the nation. Through its nationally accredited AACSB College of Business and Economics, the institution is among the largest producers of African American certified public accountants. True to its heritage, North Carolina A&T is home to the largest agricultural school among HBCUs and the second largest producer of minority agricultural graduates. The institution was recently awarded a prestigious National Science Foundation's Engineering Research Center (ERC) grant for biomedical engineering and nanobio applications research.

The University has advanced to the forefront in the area of research, generating over \$60 million in research grants and contracts and more than \$6 million in appropriations for agricultural research and cooperative extension. It also generates contracts with major international companies, foundations, and federal agencies to secure funding to enhance academic programs and to provide student scholarships.

A&T is proud of its 40,000 alumni of record who occupy leadership positions across the country and around the world. These alumni spread the Aggie tradition throughout the nation, continuing to strive for excellence and to make their mark in society. Among its well-known successful alumni are the Rev. Jesse Jackson Sr., civil rights activist; U.S. Congressman Edolphus Towns (D-NY); retired Maj. Gen. Charles D. Bussey; retired Brig. Gen. Clara Adams–Ender; Ralph Shelton, founder of Southeast Fuels; Dr. Joe Dudley, Sr., founder of Dudley Products, Inc.; Alvin Attles, vice president of Golden State Warriors; former District Court Judge Lawrence McSwain; U.S. Congressman Jesse Jackson Jr. (D-ILL); former North Carolina Supreme Court Chief Justice Henry E. Frye; The Greensboro/A&T Four, Jibreel Khazan, Joseph McNeil, Franklin McCain and the late David Richmond; North Carolina legislator Alma Adams; Elvin Bethea, 2003 Pro Football Hall of Famer; Janice Bryant-Howroyd, founder and CEO of ACT 1 Group; Willie Deese, president, Merck Manufacturing Division; Donna Scott James, managing director, Lardon Associates LLC; Dmitri Stockton, president and CEO of GE Consumer Finance for Central and Eastern Europe; and the late astronaut Dr. Ronald E. McNair.

Twelve presidents/chancellors have served the university since its founding: Dr. John O. Crosby (1892-1896), Dr. James B. Dudley (1896-1925), Dr. Ferdinand D. Bluford (1925-1955), Dr. Warmoth T. Gibbs (1956-1960), Dr. Samuel DeWitt Proctor (1960-1964), Dr. Lewis C. Dowdy (1964-1980), Dr. Cleon Thompson Jr. (1980-1981, interim), Dr. Edward B. Fort (1981-1999), Dr. James C. Renick (1999- 2006), Dr. Lloyd V. Hackley (2006-2007, interim), Dr. Stanley Battle (2007- 2009) and Dr. Harold L. Martin Sr. (2009 – Present).

***Mission***

North Carolina Agricultural and Technical State University advances knowledge through scholarly exchange and transforms society with exceptional teaching, learning, discovery, and community engagement. An 1890 land-grant doctoral research institution with a distinction in STEM and commitment to excellence in all disciplines, North Carolina A&T creates innovative solutions that address the challenges and economic needs of North Carolina, the nation and the world.

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**Nondiscrimination Policy**

North Carolina Agricultural and Technical State University does not discriminate against employees, students, or applicants on the basis of age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, genetic information, veteran status,

or any other basis protected by law. For inquiries regarding non-discrimination policies, contact the Title IX Coordinator at [titleixcoordinator@ncat.edu](mailto:titleixcoordinator@ncat.edu)

North Carolina Agricultural and Technical State University supports the protections available to members of its community under all applicable Federal and state laws, including Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Sections 799A and 845 of the Public Health Service Act, the Equal Pay and Age Discrimination Acts, the Rehabilitation Act of 1973, and Executive Order 11246.

## **The Graduate College**

Graduate education at North Carolina Agricultural and Technical State University was authorized by the North Carolina State Legislature in 1939. The authorization provided for training in agriculture, technology, applied sciences, and other approved areas of study. An extension of the graduate program approved by the General Assembly of North Carolina in 1957 provided for enlargement of the curriculum to include teacher education, as well as such other programs of a professional or occupational nature as might be approved by the North Carolina Board of Higher Education.

On July 1, 1967, the Legislature of North Carolina approved regional university status for the institution and renamed it North Carolina Agricultural and Technical State University. The University awarded its first master's degree in 1941 to Woodland Ellroy Hall. Since that time, over 8,000 students have received advanced graduate degrees from the University. A significant number of master's graduates have gone on to earn doctoral degrees in their chosen disciplines, either at North Carolina A&T or at other universities.

The Graduate College coordinates and administers advanced programs and course offerings leading to 9 doctoral, 29 master's and 9 certificate programs in collaboration with the College of Agriculture and Environmental Sciences; College of Arts Humanities and Social Sciences; College of Business and Economics; College of Education; College of Health and Human Sciences; College of Science and Technology; College of Engineering; and the Joint School of Nanoscience and Nanoengineering. Degrees offered include PhD, MA, MAEd, MAT, MBA, MS, MSA, and MSW. The Graduate Catalog provides detailed information about our programs, some of which are available online. NCA&T also offers a variety of financial assistance options for graduate study.

The Graduate College has an integrated and intercultural faculty and student body and beckons students from all over the world. The Graduate College provides a foundation of knowledge and techniques for those who wish to enhance their career options or to continue their education in doctoral programs. While studying at this university, it is expected that graduate students will (i) acquire special competence in their chosen fields; (2) further develop their ability to think independently and constructively; (3) develop and demonstrate the ability to collect, organize, evaluate, create, and report facts that will enable them to make a scholarly contribution to knowledge about their discipline; and (4) apply new and existing knowledge so as to contribute to their professions and to humankind.

In 1994, the first doctoral programs were authorized at North Carolina A&T State University in the Electrical Engineering and Mechanical Engineering disciplines. The first set of doctoral students enrolled the same year. The University granted its first Ph.D degrees to Sidney Llewellyn Bryson (Electrical Engineering), Alfred L. Burress (Electrical Engineering) and Christopher Grace (Mechanical Engineering) in 1999. The PhD in Industrial and Systems Engineering was added in 2000. In 2001, Electrical Engineering student Yaxi Shen became the first female to receive the PhD degree. In 2003, Tracie Jamison (Electrical Engineering) and Mary Murdock (Mechanical Engineering) became the first African American females as well as the first Title III HBGI Fellows to receive doctoral degrees. In 2005, two interdisciplinary PhD programs in Energy and Environment Systems and in Leadership Studies were added. The PhD in Computational Science and Engineering was established in 2010. The UNC Board of

Governors approved the establishment of the PhD in Nanoengineering in 2011. The PhD in Rehabilitation Counseling was established in 2013. A year later, the PhD in Computer Science was approved in 2014. Currently, over 375 doctoral students are enrolled at the university; over 60% are in STEM disciplines. Since the establishment of its first doctoral programs, the university has awarded over 300 doctoral degrees.

In 2004, based on its production of doctoral degrees and research, North Carolina A&T qualified for Doctoral Research University status established by the Carnegie Foundation. This status was formally approved by The University of North Carolina Board of Governors.

Seventeen persons have served as dean of the Graduate School since its beginning in 1939. They are Dr. Wadaran L. Kennedy (1939-1951), Dr. Frederick A. Williams (1951-1961), Dr. George C. Royal (1961-1965), Mr. J. Niel Armstrong (1965-1966), Dr. Darwin Turner (1966-1969), Dr. Albert W. Spruill, (1970-1993), Dr. Meada Gibbs (1993-1996), Dr. Charles Williams (1996-1997), Dr. Melvin N. Johnson (1997), Dr. Thoyd Melton (1998-2000), Dr. Kenneth H. Murray (2000-2006), Dr. Thomas Hassell (2006-2006), Dr. William J. Craft (2007 -2009), Dr. Kenneth Murray (2009-2009), Dr. Alan Letton (2010 - 2011), Dr. Sanjiv Sarin (2011-2018), Dr. Clay S. Gloster, Jr. (2018-present).

### **Graduate Council**

The Graduate Council is responsible for formulating all academic policies and regulations affecting graduate students, graduate courses, and graduate curricula. The council consists of faculty, students and administrative representatives from graduate programs. The Dean of the Graduate College serves as chairperson of the Council.

### **Accreditation and Institutional Memberships**

North Carolina Agricultural and Technical State University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award baccalaureate, masters, and doctorate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of North Carolina Agricultural and Technical State University.

#### *Programs and their accrediting agencies:*

- American Chemical Society Certification Program – American Chemical Society
- Business and Accounting programs – AACSB International – Association to Advance Collegiate Schools of Business
- Child Development, Early Education and Family Studies – National Council for Accreditation of Teacher Education
- Computer Science – Computing Accreditation Commission, Accreditation Board for Engineering and Technology
- Construction Management – American Council for Construction Education, and National Association of Industrial Technology
- Didactic Program in Dietetics – Commission on Accreditation for Dietetics Education, American Dietetic Association
- Engineering: Architectural, Biological, Chemical, Civil, Electrical, Industrial and Systems, and Mechanical Engineering programs – Engineering Accreditation Commission, Accreditation Board for Engineering and Technology
- Family and Consumer Sciences – American Association of Family and Consumer Sciences
- Human Development and Services – Council on Accreditation for Counseling and Related Educational Programs, and Council on Rehabilitation Education
- Industrial Technology – National Association of Industrial Technology

- Journalism and Mass Communication – Accrediting Council on Education in Journalism and Mass Communication
- Landscape Architecture – American Society of Landscape Architects
- Media Program – Association of Educational Communications and Technology
- Music – National Association of Schools of Music
- School of Nursing – National League for Nursing Accrediting Commission
- Social Work – Council on Social Work Education
- Teacher education programs – National Council for Accreditation of Teacher Education, and North Carolina State Department of Public Instruction
- Theater Arts Program in Acting – National Association of Schools of Theater

*University membership in Professional organizations:*

- Accreditation Board for Engineering and Technology
- Accrediting Council on Education in Journalism and Mass Communication
- American Association of Colleges of Nursing
- American Association of Colleges for Teacher Education
- American Association of Collegiate Registrars and Admission Officers
- American Association of Family and Consumer Sciences
- American Association of University Women (graduates are eligible for membership)
- American Chemical Society
- American College Public Relations Association
- American Council for Construction Education
- American Council on Education
- American Library Association
- American Personnel and Guidance Association
- American Public Welfare Association
- American Society for Engineering Education
- American Society of Landscape Architects
- American Society of Mechanical Engineers
- Association of Educational Communications and Technology
- Associated Schools of Construction
- Association to Advance Collegiate Schools of Business International
- Association of American Colleges
- Association of College Unions International
- Association of Collegiate Deans and Registrars
- Association of Collegiate Schools of Architecture
- Association of Public Land Grant Universities Board on Human Sciences
- College Language Association
- Conference of Southern Graduate Schools
- Council on Accreditation for Counseling and Related Educational Programs
- Council of Graduate Schools
- Council of Historically Black Graduate Schools
- Council on International Education Exchange
- Council on Rehabilitation Education
- Council on Social Work Education
- National Association of Business Teacher Education
- National Association of College and University Business Officers
- National Association of College and University Food Service

- National Association of Industrial Technology, International Association of Technology Education
- National Association of Schools of Music
- National Association of Schools of Theatre
- National Association of State Universities and Land Grant Colleges
- National Association of Student Personnel Administrators
- National Commission on Accrediting
- National Consortium for Graduate Degrees for Minorities in Engineering and Science
- National Council for Accreditation of Teacher Education
- National Institutional Teacher Placement Association
- National League for Nursing
- North Carolina Association of Colleges and Universities
- North Carolina League of Nursing
- North Carolina Library Association
- North Carolina State Department of Public Instruction
- Southeastern Library Association
- Southern Association of Schools and Colleges, Commission on Colleges
- Southern Regional Education Board Council on Collegiate Education for Nursing
- Southern Universities Research Association
- University of North Carolina Exchange Program
- University of North Carolina Graduate Council

### **Degree and Certificate Programs Offered**

The Graduate College at North Carolina A&T State University offers 11 doctoral degree programs, 30 master's degree programs, and 18 graduate certificate programs in collaboration with the following schools and colleges: College of Agriculture and Environmental Sciences, College of Arts Humanities and Social Sciences, College of Business and Economics, College of Education, College of Engineering, College of Health and Human Sciences, College of Science and Technology, and the Joint School of Nanoscience and Nanoengineering. Currently, 11 graduate programs including one doctoral program, 10 master's programs and four post-baccalaureate certificate program are available through distance education.

In 2016, the US News and World Report published its rankings that included the following A&T programs: Rehabilitation Counseling was ranked 58<sup>th</sup>, Industrial and Systems Engineering was ranked 66<sup>th</sup>; the master's in Social Work (joint with UNCG) was ranked 78<sup>th</sup>; the Electrical Engineering program was ranked 139<sup>th</sup>. The US News and World Report publication ranked the online master's program in Information Technology at 19<sup>th</sup> place and the online Graduate Education programs at 153<sup>rd</sup> place. Furthermore, N.C. A&T is ranked #16 out of 26 programs in the Best Online Graduate Computer Information Technology Programs for Veterans, and #112 out of 156 Best Online Graduate Education Programs for Veterans.

A complete list of programs offered is given below.

#### **Doctoral Degrees**

- Ph.D. Agricultural and Environmental Sciences
- Ph.D. Applied Science and Technology
- Ph.D. Computational Data Science and Engineering
- Ph.D. Computer Science
- Ph.D. Electrical Engineering
- Ph.D. Industrial and Systems Engineering

- Ph.D. Leadership Studies \*
- Ph.D. Mechanical Engineering
- Ph.D. Nanoengineering
- Ph.D. Rehabilitation Counseling and Rehabilitation Counselor Education
- Ph.D. Social Work – Joint Program with UNC Greensboro

### **Masters Degrees**

- Accountancy, M.Acc.
- Adult Education, M.S.
- Agricultural and Environmental Systems, M.S. with concentrations in:
  - Integrated Animal Health Systems
  - Agribusiness & Food Industry Management
  - Natural Resources and Environmental Systems
- Agricultural Education M.S. with concentrations in:
  - Professional Licensure
  - Professional Service
- Applied Mathematics, M.S.
- Bioengineering, M.S.
- Biology, M.S. with concentrations in:
  - Biology
  - Industrial Biosciences (PSM)
- Business Administration, M.B.A. with concentrations in:
  - General
  - Accounting
  - Human Resource Management
  - Supply Chain Systems
- Chemical Engineering, M.S.
- Chemistry, M.S. with concentrations in:
  - Chemical Sciences
  - Developmental and Applied Chemistry (PSM)
- Civil Engineering, M.S. with a concentration in:
  - Systems Engineering
- Computer Science, M.S.
- Data Science and Engineering, M.S. with a concentration in:
  - Systems Engineering
- Electrical Engineering, M.S.
- Elementary Education, M.A.Ed.
- English and African American Literature, M.A.
- Food and Nutritional Science, M.S.
- Health Psychology, M.S.
- Industrial and Systems Engineering, M.S. with a concentration in:
  - Systems Engineering
- Information Technology, M.S.\*
- Mechanical Engineering, M.S. with a concentration in:
  - Systems Engineering
- Mental Health Counseling, M.S. with concentrations in:
  - Clinical
  - Rehabilitation
- Nanoengineering, M.S. with a concentration in:

- Synthetic Biology
- Physics, M.S. with a concentration in:
  - Atmospheric Sciences
- Reading Education, M.A.Ed.
- School Administration, M.S.A.
- School Counseling, M.S.
- Social Work, M.S.W. (Joint with UNCG)
- Teaching, M.A.T.\* with concentrations in:
  - Biology Education
  - Business Education
  - Chemistry Education
  - Child Development: Early Education & Family Studies Birth-K
  - Elementary Education
  - English Education
  - Family and Consumer Sciences Education
  - Health and Physical Education
  - History Education
  - Math Education
  - Special Education
  - Technology Education
- Technology Management, M.S. \* with concentrations in:
  - Six Sigma
  - Advanced Manufacturing
  - Construction Management

**Post Baccalaureate Certificate Programs**

- Advanced Certificate in Family and Consumer Sciences\* (CERT)
- Advanced Waste Management (CERT) – add-on
- Cybersecurity\* (CERT)
- Data Analytics\* (CERT)
- Data-Driven Modeling and Analysis of Complex Systems (CERT)
- Human Lactation (CERT)
- Interdisciplinary Environmental Certificate Program\* (CERT) with concentrations in:
  - Environmental Engineering
  - Environmental Sciences
  - Environmental Justice
  - Environmental Health and Safety
- International Agricultural Development and Engagement (CERT)
- Marriage and Family Counseling (CERT) – add-on
- Rehabilitation Counseling and Behavioral Addiction (CERT) – add-on
- Rehabilitation Psychology and Behavioral Medicine (CERT) – add-on
- Vocational Evaluation and Work Adjustment (CERT) – add-on

**Post Masters Certificate Programs**

- School Administration

\* Approved online programs

**Distance Education: A&T Online**

N.C. A&T's Extended Campus administers A&T Online and works in close cooperation with the academic colleges and Instructional Technology Training and Development (ITTD) to support delivery of accredited online courses, certificates and degree programs to students seeking convenient and cost-efficient opportunities to complete their education. Online learners receive the same stimulating, academically rigorous programs as on-campus students. The Online Learner Support Commons provides digital resources, services and support to help distance learners thrive in the online environment. Support includes Student Navigators available for live online learning assistance with academic services, technology and Blackboard, our online learning management system.

Effective Fall 2022, the University offers 28 distance education programs, comprised of 10 undergraduate degree programs, 10 master's degree programs (with 12 concentrations), one (1) doctoral program, and seven (7) certificate programs as listed below. For more information and a current list of DE programs, please visit [online.ncat.edu](https://online.ncat.edu).

*Graduate degree programs:*

- i. Agricultural Education, M.S.
- ii. Business Administration, M.B.A.
- iii. Civil Engineering, M.S.
- iv. Computer Science, M.S.
- v. Data Science and Engineering, M.S.
- vi. Electrical Engineering, M.S.
- vii. Industrial and Systems Engineering, M.S.
- viii. Information Technology, M.S.
- ix. Leadership Studies, Ph.D.
- x. Teaching, M.A.T.
  - o Biology Education
  - o Business Education
  - o Chemistry Education
  - o Child Development
  - o Elementary Education
  - o English Education
  - o Family and Consumer Sciences
  - o Health and Physical Education
  - o History Education
  - o Mathematics Education
  - o Special Education
  - o Technology Education
- xi. Technology Management, M.S.

*Certificate programs:*

- i. Cybersecurity (post baccalaureate)
- ii. Data Analytics (post baccalaureate)
- iii. Family and Consumer Science (advanced)
- iv. Family Financial Planning
- v. Interdisciplinary Environmental Certificate Program (post baccalaureate)

- vi. International Agricultural Development and Engagement (post baccalaureate)
- vii. Occupational Safety and Health

### **Summer Sessions**

Extended Campus: Summer Sessions expands the university's capacity to deliver courses for traditional and post-traditional students, including visiting and non-degree seeking students, by offering educational opportunities during the summer in compact sessions.

Summer Sessions features several convenient sessions of varying lengths: two five-week sessions (Summer I and Summer II); one two-week intersession; and one 10-week dual session. Students may enroll in a maximum of seven (7) credit hours in each five-week session and the dual session, and one three-credit hour course during the intersession. Students may select from over 700 course offerings, including on-campus and online options.

Summer Sessions helps bridge the academic year by creating a continuous flow of learning opportunities for the university and the community-at-large while spurring the advancement and enhancement of lifelong learning. With summer classes, students may better stay on schedule for degree completion, thus promoting higher graduation rates, or accelerate their program timeline to graduate early.

### **Continuing Education**

Extended Campus: Continuing Education is a catalyst for transformative partnerships and lifelong learning opportunities for non-credit, contract credit and other flexible learning opportunities that extend our reach beyond the Greensboro campus. In collaboration with academic and industry partners, Continuing Education offers in-person and online certificate programs, courses, conferences, professional development programs, workshops and seminars for the working adult and lifelong learner, as well as educational youth camps. These offerings extend the resources of the university to the community in accessible formats and help the professional community stay abreast of cutting-edge knowledge and practices.

Continuing Education Units (CEUs) may be awarded for successful completion of non-credit activities. The office maintains permanent transcripts of all CEUs earned.

## **Expenses and Financial Assistance**

North Carolina A&T State University is a publicly supported institution. Tuition and other required student fees meet only a part of the total cost of education of students enrolled. For each full-time student enrolled in an institution of the University of North Carolina, the State of North Carolina appropriates significant amount of public funds.

### **Tuition and Fees**

Tuition rates are based on whether or not the student is a resident of North Carolina. Tuition rates for non-residents are significantly higher than that for a resident. Tuition and fees for Distance Education students are billed separately. Furthermore, student enrolling in courses in summer courses are billed at the Summer School rates.

Tuition and fees are subject to change without prior notice. For an updated listing of tuition and fees, see the University Treasurer's website ([click here](#)).

North Carolina A&T State University provides billing statements electronically through its Online Payments system. Students and Authorized Users will receive an email notification each time that a new billing statement is available. Payments must be submitted by the scheduled due date to avoid cancellation of classes.

### **Auditing Courses**

A part-time student must pay all fees, including tuition, which would be charged to a student taking the course for credit. A full-time student is not required to pay additional fees for auditing. A change from credit registration to audit will not be permitted after late registration ends. An auditor is not required to participate in class discussions, prepare assignments, or take examinations.

### **Indebtedness to the University**

A student may not be permitted to attend classes or final examinations after the due date of any unpaid obligation. If special financial arrangements have been made, failure to comply with these arrangements as stipulated will result in the student forfeiting his/her privilege to receive special financial arrangements for deferments in the future.

Students are required to pay for any loss or damage to University property cost due to abuse, negligence, or malicious action at replacement, in addition to being subject to disciplinary action for such loss or damage.

Diplomas and transcripts are withheld until the student has paid in full all fees and charges due to the University.

### **Refunds**

A student is entitled to a refund when the account is overpaid and a credit balance is created. A student must officially withdraw from courses and, as appropriate, withdraw from the University by the posted deadline to avoid academic or financial responsibility. A student who withdraws from the University may be entitled to a partial refund of tuition and fees based on date of withdrawal; the refund schedule is available from the Treasurer's office.

Students who are awarded Federal Financial Aid and choose to withdraw will also be subject to the "Return of Title IV Funds Policy". In such cases, the Financial Aid office recalculates eligibility of Title IV funds. This may result in an unpaid balance due to the university. For details, students are referred to the Financial Aid office.

## **Veterans**

Meeting the needs of students who receive educational benefits from the U.S. Department of Veteran Affairs is a high priority for the Office of Veteran and Disability Support Services at North Carolina A&T State University. Our Veteran Support Services office is committed to providing services and educational benefit programs for all eligible enrolled U.S. Veterans, National Guardsmen, Reservist and their eligible dependents. Students receiving veterans benefits are advised to consult the Veteran Support Services office or visit their website ([click here](#)).

## **Full time Faculty and Employees**

All permanent employees who are regularly scheduled to work at least 30 hours each week, and have met their probationary period, are eligible to participate in the Tuition Waiver Program (TWP). The purpose of the TWP is to provide an opportunity for eligible employees to take a course and have the tuition and fees waived at North Carolina A&T State University or any of the other 15 constituent institutions of the University of North Carolina. Participation is voluntary. Tuition waiver is allowed for an academic year of fall semester, spring semester, and the summer sessions that follow, or courses taken as distance education. During the period from the fall semester through the second session of summer school, no more than two (2) waivers or two (2) classes may be approved. The Treasurer's Office should be consulted for more information.

## **Residence Status for Tuition Purposes**

The basis for determining tuition charge is whether a student is a resident or a non-resident for tuition purposes. Initial classification as either a resident or non-resident for tuition purpose is based on information provided on the application for admission. If a student chooses to petition a reclassification of his or her residence status for tuition purposes they must complete and submit the Residence and Tuition Status Application along with all required supporting documentation to the Office of Undergraduate Admissions no later than 10th day of the term for which they wish to be considered.

Residency decisions are based on North Carolina statutes (G.S. 116-143.1). The residency classification officer reviews each application on an individual basis using the guidelines provided within these statutes. Additional information regarding residency may be found in the University of North Carolina System Policies and Resources page click [here](#).

## **FAFSA Application**

Students may apply for need-based and some non-need-based financial aid by completing the Free Application for Federal Student Aid (FAFSA). Students should complete this form immediately after January 1. There is no processing fee and all graduate students are encouraged to complete the application. Students can submit the FAFSA on the Web (<http://www.fafsa.ed.gov>) or mail the form to the Federal Processing Center. North Carolina A&T State University school code is **002905**. The University's priority deadline for receipt of the FAFSA is **March 15th**; however, students who miss the deadline are still encouraged to complete and mail the FAFSA as soon as possible.

A financial aid award will not be offered until a student is admitted to the University. Therefore, it is important that the admission procedure be completed as soon as possible. A student enrolled as a "Post-baccalaureate Studies (PBS)" student is not eligible to receive Federal and State financial aid unless enrolled in a Teacher Certification Program. All students must re-apply for financial assistance each academic year and separately for summer school.

## **Federal Work Study**

The Federal Work-Study program provides students with an opportunity to work part-time to assist with educational costs. The program consists of jobs on and off campus for community service opportunities. Eligible students must be enrolled at least part-time, eligible to receive federal aid and have demonstrated financial need as determined by the FAFSA application. For more information, students are referred to the Financial Aid office and to their website (click [here](#)).

## **Loans**

The Financial Aid Office administers loan programs and disburses the funds through the Federal Direct Loan Program to Graduate Students. The Financial Aid Office will determine if you are eligible for this loan based on information reported on the FAFSA.

Students are notified of the amount of aid received through the award notification. The award notification indicates the gross amount of the loan for the fall and spring semester and/or summer sessions. The student's account and bill indicate the actual amount received. For more information on the terms and conditions of federal loan programs, students are advised to consult the Financial Aid office and their website.

## **Scholarships and Fellowships**

The majority of scholarships and fellowships at NC A&T State University are awarded through the academic department. Students are strongly urged to contact their academic department for additional scholarship information. Students receiving an outside scholarship should forward a copy of the notice to the Student Financial Aid Office. The scholarship will be included in the student's award and may cause an adjustment to the current award package. All scholarship checks should be made payable to North Carolina A&T State University and mailed to the Treasurer's Office. The check should include the student's name and social security number.

## **Graduate Assistantships**

Graduate assistantships are available to graduate students who have been admitted to a graduate degree program at A&T, maintain full time status, are in good academic standing, and are making satisfactory progress toward their degrees. Graduate students who have completed their course work requirements and are working on their thesis or dissertation with less than full-time course load may be eligible for teaching and research assistantship in their final semester. The types of graduate assistantships are described below.

### Graduate Teaching Assistantship (GTA):

A GTA will possess the minimum qualifications established by Southern Association of Colleges and Schools Commission on Colleges (SACS-COC): Graduate teaching assistants: master's in the teaching discipline or 18 graduate semester hours in the teaching discipline, direct supervision by a faculty member experienced in the teaching discipline, regular in-service training, and planned and periodic evaluations." (SACS Guidelines of Faculty Credentials, 2006). With the proper credentialing by the SACS Liaison, a GTA may prepare course content, provide instruction and prepare assignments for students in lower division undergraduate courses. A&T faculty members oversee all GTA duties. General duties include:

- Instruction in a classroom setting;
- Instruction in recitation sections;
- Conducting help sessions and holding office hours to advise students with class assignments;
- Assisting with laboratory setup;
- Proctoring examinations;
- Grading papers, exams, laboratory reports, and homework; and
- Other duties pertaining to the instructional mission of A&T.

### Graduate Research Assistantship (GRA):

They conduct research in an area relevant to their major course of study under the direction of a faculty member. The research normally supports the faculty advisor's research and is supported by external funding. The research work generally leads to the student's thesis or dissertation. Research assistants supported through a research grant/contract assist faculty members in the completion of contracted research. They may be required to also contribute in the preparation of reports for continuing projects and proposals for new grants. General duties include:

- Setting up research laboratories and experiments;
- Performing experiments, calculations, and analyzing the results; and disseminating new knowledge orally or in written publications;
- Reflecting on the state of the field and proposing new research problems;
- Attending conferences to present results and collaborate with other researchers;
- Training and supervising less experienced research personnel;
- Publishing research results in conferences, journal papers and research reports; and
- Assisting in the preparation of new proposals.

### Graduate Administrative Assistantship (GAA):

Graduate Administrative Assistants (GAAs) perform administrative responsibilities to support the operations of various university functions. Their duties may be unrelated directly to teaching or research. GAAs may be employed in academic and non-academic settings to provide staff, office and general duties. A reference to "Graduate Assistant" or to "GAs" includes members of all three types of assistantships or any one type, unless stated to the contrary.

### Eligibility:

Graduate Teaching Assistants: A student is eligible to hold a Graduate Teaching Assistant (GTA) position if a student is enrolled full time in that semester, is in good academic standing, and has a cumulative Grade Point Average (GPA) of 3.0 or higher on all graduate courses. A Graduate Teaching appointment may also be determined by additional criteria including communication skills and adequate preparation in the subject area. Graduate Teaching assistants are evaluated every semester to maintain their assistantship. Graduate Research Assistants Eligibility for Graduate Research Assistantship (GRA) is established by the director/principal investigator and/or the academic department. The recipients of research assistantships will be selected by the faculty member who directs the laboratory or research project.

Preference will be given to students who demonstrate qualifications for the position as demonstrated by (a) completion of courses related to the topic of the research, (b) prior research experience, or (c) research interests consistent with the project. Preference may also be given to doctoral students. Graduate Assistants near completion Graduate students who have completed their course work requirements and are working on their thesis or dissertation with less than a full-time course load may be eligible for teaching and research assistantship in their final semester. Generally, a master's student is expected to graduate within 2 years and a doctoral student is expected to graduate within 4 years of the beginning of his/her graduate course work for that degree. Non-resident Alien Students In accordance with federal immigration laws, international students may not exceed 50 % FTE appointments and must not work more than 20 hours per week. Eligibility exclusions Students in the following categories may not receive a graduate assistantship appointment:

- Non-degree seeking or transient students
- Non-resident alien students whose immigration status does not allow employment in United States; and
- Undergraduate students.

### Appointment

North Carolina Agricultural and Technical State University provides equal employment opportunities for all persons regardless of race, religion, color, national origin, gender, age, disability, veteran status, political affiliation, genetic information, sexual orientation or sexual identity.

All assistantships are generally made for an academic year (9 months). A separate appointment for summer term can be made depending on the source and availability of funding and approval of the supervisor.

Notification of awards should be in the form of a contract (the template will be created by the Graduate School) from the academic unit, and should state that the appointment is contingent upon approval by the appropriate budget official, dean and provost, and/or continuation of funding. The notification letter should contain information about the appointment period, compensation, expected duties, teaching and research load, review and renewal procedures, and tuition waivers if any.

### Renewal and Reappointments

Students must reapply for each additional year of graduate assistantship support. Continuation of graduate assistantship support from year-to-year or semester-to-semester is not guaranteed. Renewal of support is based on a number of factors including: (a) satisfactory progress toward degree completion, (b) satisfactory completion of prior assistantship responsibilities, and (c) availability of resources.

### Termination

A Graduate Assistantship may be terminated before the expiration of its designated term due to loss of funding, for cause, for academic delinquency, by written notice, and by voluntary mutual agreement.

- *Loss of Funding.* A graduate assistantship may be terminated due to a loss, reduction, or reallocation in appropriation, grant, contract, gift, or other funds with which to support the appointment.
- *Cause.* The following are examples of sufficient cause for removal: incompetence, inefficiency, wanton carelessness or neglect of duty, violation of research ethics, violation of safety protocols, insubordination, and repeated or extended absence.
- *Academic Delinquency.* Not making satisfactory academic progress toward a degree or is otherwise not in good academic standing.
- *Voluntary Agreement.* With the agreement of the University, an appointment may be terminated by the voluntary written resignation of the GA.

### Payment options

Payment will be made in accordance to the procedures dictated by the salary administration, human resources and financial aid offices.

### Compensation

In accordance with the Office of Management and Budget (OMB) requirements, the University's Equal Employment Opportunity (EEO/AA) Statement (<http://www.ncat.edu/hr/policies/index.html>) and EEO/AA certification in the Federal Government's System for Award Management (SAM.gov), compensation for Graduate Assistants must be treated the same under like circumstances. This principle requires the University and its academic units to hire graduate students doing similar kinds of work through the same mechanism at similar rates, including pay scales and tuition charges. Equal compensation is mandated by the following: the Equal Pay Act of 1963, Title VII of the Civil Rights Act of 1964, the Age Discrimination in Employment Act of 1967, and Title I of the Americans with Disabilities Act of 1990. Therefore, the University must pay equal compensation to Graduate Assistants

who perform jobs that require substantially equal skills, effort and responsibilities, and that are performed under similar working conditions within the University.

Graduate Assistantships are based on degree level (Master's or Doctoral), progression in the graduate program, and academic discipline. Pay rates may vary by student experience, funding source, discipline, and responsibilities of the appointment. The University will set the minimum and maximum salary scale for all categories of assistantships. The salaries will be competitive and ensure fairness.

Departments should monitor their pay practices for consistency to ensure that individuals are paid in accordance with the published pay scales and in accordance with the legal requirements cited above. For example, all GRAs with similar skills, effort and responsibilities in a PhD program in the same discipline shall be paid the same.

#### Tuition Remission

A Graduate Assistant may be eligible for tuition remission or reduction, as well as payment of required fees. The funds associated with GTA tuition remission are allocated to the academic schools and colleges. Allocation to individual students is managed by the schools/colleges.

#### Evaluation

Each department is responsible for determining procedures for review and evaluation of graduate assistants and for informing GAs of these procedures. The process of evaluation may vary by departments, and may include written assessment of work by an individual faculty member, classroom visitation by designated faculty members, and written student evaluations. The results of reviews and evaluations should be discussed with the GA concerned.

#### Training

All graduate assistants are required to undergo training as specified by the Graduate School.

- All new teaching assistants are required to attend instructional workshops during the week before classes began in the fall or spring semester.
- Before assuming teaching assistant duties that require contact with students, a non-native, non-primary-English-speaking graduate student must be certified as proficient in oral and written English.
- Graduate Research Assistants are required to receive lab safety training (laser safety, chemical hazard safety, etc.) before working in any lab. Graduate Research Assistants will be required to undergo training in research ethics, conflict of interest, responsible authorship, intellectual property rights, publications and patent policy, and other topics mandated by federal and state regulations.

#### Administration

A graduate assistantship represents financial support to qualified graduate students to allow them to provide services to the university while continuing to focus their effort on completing their degree programs. All assistantships must be recommended by a senior university administrator (member of the Chancellor's Cabinet or a Dean). All assistantships must be funded from approved university accounts with adequate funding in the assistantship line item. Personal funds cannot be used to support assistantships.

The Graduate College will administer all assistantships and will be responsible for post audit reports to track and monitor compliance with these policies, adherence to fiscal regulations, etc.

### Code of Conduct

A Graduate Assistant's teaching, research, and administrative activities are subject to the ethical precepts and codes of the academic profession, the laws of the State of North Carolina regarding its employees, the laws of the United States, and University policies governing institutional obligations. Violation of any of these requirements constitutes a basis for disciplinary action in accordance with procedures set forth in the University's policies. In their interactions with students, faculty, and all other members of the university community, GAs are expected to conduct themselves with professionalism, ethics, sensitivity and thoughtfulness.

## **Academic Policies and Regulations**

### **Graduate Admissions**

Graduate education is intended to develop specialized skills, knowledge and expertise in a particular discipline. Therefore the graduate admission process is designed to collect credentials regarding the applicant's academic preparation, intellectual ability, experience, and motivation to undertake a rigorous academic program of study. Admission of graduate students is the responsibility of the Dean of the Graduate School with the advice and assistance of the Graduate Council and of the graduate faculty members of the departments, programs, and curricula authorized to offer graduate degree programs. The application materials for each prospective student receive individual attention and are reviewed by the Graduate Coordinator in consultation with the admission committee consisting of graduate faculty within the intended program to identify whether the applicant's background matches the intended program of study. The program coordinator submits a recommendation based on a holistic review of each application. This review includes the applicant's academic qualifications, the applicant's interest and experience relative to the program, and the capacity of the program. The applicant's academic qualifications are judged on a number of criteria that may include grades on individual courses, overall grade point average, accreditation status of prior colleges/universities attended, standardized test scores, language proficiency, strength of recommendation letters, and additional criteria specified by the academic program. Each program weighs each of these criteria differently. The applicant's interest and experience relative to the program is assessed through the personal essay, history of prior research and work experience, clinical skills, and in some cases, through personal interviews. The academic program determines its capacity for admitting new students based on its current resources and enrollment of continuing students in the program. After receiving a recommendation from the program coordinator, the Graduate School reviews the application file to ensure that the appropriate procedures have been followed. This process ensures that all applications to graduate degree programs undergo two levels of review prior to an admission decision. Applicants who are offered admission will be selected on the basis of the University's analysis of the applicant's qualifications for satisfactory performance in the specific college, school, department, curriculum, or other program to which the applicant seeks admission. Admission to the University also requires satisfactory evaluation of campus safety related responses.

NCA&T considers all applications for graduate admissions without regard to race, ethnicity, color, gender, gender identity, sexual orientation, national origin, disability, veteran's status, age, religion, or creed.

Types of Admission: Students are admitted to the Graduate College in three categories: unconditional, conditional, or non-degree seeking. The minimum criteria for each type of admission are listed below. However, satisfying minimum admission requirements does not guarantee admission. Admissions decisions are based on a competitive evaluation and may be limited for such reasons as capacity constraints. Specific requirements for admission to each graduate program may be more restrictive and are subject to change.

### **Unconditional Admission**

Unconditional admission may be granted to an applicant who possesses:

- a. A bachelor's degree from an accredited four-year college or university as determined by a regional accrediting agency, or from selected international colleges/universities including three-year colleges and universities in Europe participating in the Bologna Process;
- b. Satisfactory cumulative Grade Point Average (GPA) in previous college work. A graduate degree, or at least 12 credit hours of graduate coursework taken post-baccalaureate while in graduate status, may supersede the undergraduate record in evaluating credentials for admission;

- c. Satisfactory evaluation of standardized test scores, recommendation letters, application essay, and other factors as specified by the intended program of study; and
- d. English language proficiency.

### **Conditional Admission**

Conditional admission may be granted when the Graduate College determines the student has not met the requirements for unconditional admission. This may be due to the lack of accreditation of the prior college/university, minimal relevance of previous education/degree to proposed program of study, or lack of academic strength as demonstrated by previous GPA or test scores. Conditionally admitted students will be subject to admission conditions that may include one or more of the following:

- a. Pass examinations to demonstrate knowledge in specified areas;
- b. Take specified undergraduate and/or graduate courses to improve his/her background. This will increase the total credit hours required beyond what is published in the catalog;
- c. Conditionally admitted students will be dismissed without a probationary period if the conditions placed on their admission have not been met within the prescribed time period.

### **Satisfying conditional admission status**

The Graduate College grants full graduate standing when all requirements of the conditional admission are met. All admission conditions must be satisfied during the first twelve (12) attempted credit hours. The student must also maintain a satisfactory academic record (3.0 GPA) on all course work taken in a graduate classification.

### **Non-Degree Seeking Admission**

Non-Degree Seeking or Post Baccalaureate Studies (PBS) admission is available for those who want to take courses for personal enrichment, professional growth, or certification requirements. However, at the discretion of the academic department, PBS students may apply up to twelve (12) credit hours to any certificate or degree program to which they are admitted in the future, subject to the Graduate Transfer Credits policy. Some academic departments restrict their courses to degree-seeking students only. Admission as a PBS student requires an application, application fee and undergraduate degree transcript. The PBS option is not available to international students on F-1 visa. Furthermore, all forms of financial assistance including federal financial aid are not available for PBS students.

### **Admission of Non-Degree Seeking Students to Degree Programs**

Students who are currently or have previously been enrolled as non-degree seeking students (PBS) and wish to obtain a graduate degree must formally apply to the graduate program with a new application, application fee and required documentation.

### **Deferral of Admission**

An admitted student may submit a written request to the Graduate College to defer admission to a future semester. Admission deferrals may be requested for a maximum of one year. The Graduate College must approve this request. A student's admission may be rescinded if the student does not enroll in the semester in which he/she received admission and does not receive approval of deferral.

### **Readmission**

A student must reapply for admission if his/her enrollment has been terminated for any reason including non-compliance with the continuous registration policy. A student must also reapply if he/she does not enroll in the semester for which he/she was admitted and has not received a deferral of admission. In such cases, the student must submit the complete application packet including the application fee as if applying for the first time. However application materials submitted within one year prior to readmission may be transferred to the new application.

## **Application deadlines**

Two types of deadlines apply as follows.

- a. Priority Deadline is the date by which complete applications must be submitted to receive priority review for merit based graduate awards and for admission to space constrained graduate programs. Applications received after the priority deadline will be given consideration based on availability of funds and/or space in the program.
- b. General Deadline is the date by which all application materials including original documents must be received by the Graduate College for admission decision. Some academic programs have earlier deadlines, in which case the complete application must be submitted by the posted departmental deadline.

## **Application Requirements**

All applicants must apply using the online admission portal that is accessible from the Graduate College's website. The application and admission process consists of a departmental evaluation based on the application, recommendation letters and unofficial copies of transcripts and other materials followed by a final review of all original documents by the Graduate College. All programs require the graduate admission application, application fee, transcripts, and a personal statement. Most programs also require recommendation letters. Many programs require standardized test score and/or resumes. Some programs have additional requirements such as an on-campus interview. The Graduate College maintains program specific requirements. All documents submitted to the Graduate College will be retained and will not be returned to the applicant nor released to a third party, except as legally required. A general list of application documents is set out below.

- a. Application for admission to the Graduate College;
- b. Application fee;
- c. Official academic transcripts from previously attended colleges and universities. International transcripts require an external evaluation from WES or ECE as determined by the Graduate College. Applicants who enrolled at North Carolina A&T State University after 1988 are not required to submit their original North Carolina A&T transcript;
- d. Recommendation letters preferably from faculty or professionals who are familiar with the applicant's work;
- e. Standardized graduate test scores as appropriate for intended program. The scores must be officially issued and current (no more than five years old);
- f. Personal statement of interest in the program, as required;
- g. All applicants are required to demonstrate proficiency in English. Applicants receiving any degree from an accredited U.S. college or university or from a college or university located in a country with English as an official language and the language of instruction in higher education (a list of countries is maintained by the Graduate College) will not require additional documentation. Otherwise, a satisfactory TOEFL (<http://www.ets.org/toefl>), IELTS (<http://www.ielts.org>) or PTE Academic (<http://pearsonpte.com/PTEAcademic/Pages/home.aspx>) score is required. TOEFL, IELTS and PTE Academic scores must be officially issued and are reportable for a period of two years from the date of the exam;
- h. Satisfactory criminal background check if requested by the Graduate College;
- i. International applicants are required to provide A&T with verification that the required funds are available to support the proposed program of study by submitting the Financial Guarantee Form to the International Students and Scholars Office. The applicant must also provide information regarding current visa status;
- j. Additional requirements as specified by the academic program.

## **Processing Applications**

Applicants must ensure that all of the required materials are submitted. When The Graduate College receives a completed application and the application fee, an admission record is created for the applicant and their application is made available to the program of interest. The Graduate Program Coordinator(s) (GPC) and the graduate program faculty review the completed files of all applicants in accordance with the Graduate College's guidelines for final admission or denial decisions. GPCs will submit their recommendations to The Graduate College.

The Graduate College reviews the departmental recommendations and, in cases where The Graduate College concurs with an admission decision, requests official transcripts. Once the official transcripts are received and verified, The Graduate College posts the final admission decision. When The Graduate College denies a program's recommendation for admission, the program has the option of supplying further justification to The Graduate College. However, The Graduate College has the final decision.

## **Graduate Admissions Appeals**

An applicant to any graduate program who has been denied admission may appeal the University's decision but only on the grounds that the denial was based on a violation of the University's published admission policy or that it resulted from a material procedural error in the admissions process. The appeal must be in writing, must set forth with specificity the grounds for the appeal, and must be submitted to the Dean of the Graduate College within 30 days after the appellant has received the letter communicating the University's decision.

Upon receipt of the appeal, the Graduate College Dean will consider the recommendations of the Admissions Committee of the Graduate Council and will communicate his or her decision in writing to the applicant-appellant within thirty (30) calendar days of receipt of the appeal. The Dean may consult the appropriate program coordinator, department chair and/or academic school/college Dean in arriving at a conclusion. If the Graduate College Dean's decision is in favor of the applicant, the applicant will be admitted to the next available term. After hearing the Dean's decision, the applicant may appeal to the university Provost within two weeks of receiving the decision.

Appeals must be received prior to the term for which the applicant is seeking admission. If there is insufficient time to complete the appeal process before the beginning of the term for which the applicant seeks admission, the Dean of the Graduate College may decline to review the appeal.

## **Enrollment, Residence, Leave and Withdrawal**

### **Full time enrollment**

A graduate student is considered to be enrolled full-time when registered for a minimum of nine (9) semester credit hours during a regular fall/spring semester. If a student is full time in the previous spring semester and is registered for the following fall semester, he/she is considered to be full time in the summer. Otherwise, a student is considered to be enrolled full-time in each summer session if he/she is registered for a minimum of six (6) credit hours. During the semester of graduation, registration in any number of credit hours will be considered full-time enrollment. Students seeking federal financial aid must adhere to the enrollment requirements prescribed by the University's financial aid office.

### **Maximum Course Load**

No more than 15 credit hours may be taken in any fall or spring semester and no more than seven (7) credit hours may be taken in any summer session without the written permission of the graduate program coordinator and/or department chair and the dean of the Graduate College.

### **Residence Requirement**

The residence requirement for a graduate program is met when a student has earned at least 60% of the required degree credits for his or her program through enrollment in courses offered by North Carolina A&T State University. If the program is offered as part of a consortium, then a student should earn at least 60% of the required degree credit for his or her program through enrollment in courses offered by A&T or any of the universities in the consortium.

### **Continuous Enrollment/Registration**

Graduate students must continue to register each semester (except summer terms) until all degree requirements are completed. Graduate students who have completed all degree requirements do not need to be registered for any courses, during the semester they graduate. All degree requirements would include thesis or dissertation completion and comprehensive exam if applicable.

### **Leave of Absence**

In special circumstances, a student in good academic standing may request a leave of absence from his/her program of study. The student must notify the graduate program coordinator, department chair and Dean of the Graduate College. The request should be made at least one month prior to the semester involved. The request should be endorsed by the student's graduate advisory committee, program coordinator and/or department chair, and the Graduate College. The time that the student spends on an approved leave of absence will be included in the maximum time allowed to complete the degree.

### **Withdrawal from the University**

A student who wishes or is asked to leave the University at any time during the semester shall complete and file official withdrawal forms. The forms must be completed and submitted to the Office of the Registrar. Failure to execute and file these forms in a timely manner will result in a student incurring the penalty of receiving an "F" for each course in which he or she was enrolled during the semester in question.

Any N.C. A&T employee may enroll in graduate studies to pursue an advanced degree. Where there is a perceived conflict of interest, it must be resolved through approval by the immediate supervisor, department chair or dean, who is responsible for ensuring that no conflict of commitment, conflict of interest, unethical or improper actions, or privileges are incurred in this process. Tuition waivers must be approved through the established processes.

### **Graduation Requirements**

#### **Graduation and commencement dates**

Graduate students will be awarded their degrees or certificates on four official graduation dates each year: June, August, December and May. These dates coincide with the end of the fall and spring semesters and twice during the summer session. Formal commencement exercises are held at the end of the spring and fall semesters. Any student who graduates during summer sessions is eligible to participate in the December commencement.

#### **Student's responsibility to know university policies and regulations**

It is each student's responsibility to be knowledgeable of the published academic regulations and requirements set forth in the Graduate Catalog, its revisions, university policies and regulations, and specific requirements of the academic programs. The student is also responsible for compliance with announcements published by the department, Graduate College, Registrar, Provost and other university offices. Lack of knowledge of regulations and requirements does not excuse the student from complying with academic regulations and meeting the requirements.

### **Applicable Graduate Catalog and program requirements**

The Graduate Catalog provides general information only and does not constitute an irrevocable contractual agreement between a student and North Carolina A&T State University. A student may expect to earn a degree in accordance with the requirements of the curriculum described in the official Graduate Catalog in effect when he or she first enters the university, or in any subsequent catalog published while he or she is a student. The student may elect to follow a newer catalog with the approval of his/her department chair. However, the time limitation for graduation as indicated later in this policy will not be extended. The specific curricular requirements are stated in the student's Plan of Study. The University reserves the right to make changes in curricula, degree requirements, course offerings, or academic regulations at any time when, in the judgment of the graduate faculty, the Chancellor, and/or the Board of Trustees, such changes are in the best interest of the students and the University. When that occurs, the revised catalog will apply to new students.

### **Plan of Study**

All graduate students are required to file a Plan of Study by the end of the second semester after admission to a program of study. Failure to submit the Plan of Study will prevent the student from enrolling in classes for his/her third semester. The Plan of Study is established in consultation with the advisor, graduate coordinator and/or department chair. The Plan of Study is based on the Graduate Catalog requirements but may be structured to meet the specific needs of the student. The Plan of Study may be amended at any time before the student applies for graduation with the approval of the advisor, graduate coordinator and/or department chair. A student's Plan of Study must be approved by his/her advisor and chairperson. Responsibility for meeting all academic requirements for a selected program rests with the student.

### **Change of Program**

After a student has been admitted to a degree program, he/she may petition to change degree programs using the appropriate form available from the Graduate College. The student must be in good academic standing to change their degree program and may do so after the completion of at least one semester. The completed form must be approved by the Department Chairs of the old and new programs. The petition to change programs must include a new Plan of Study for the new program and should be submitted and approved prior to the start of the effective semester. A student who petitions successfully for transfer to a new degree program must complete the new program requirements in force at the time of the change of program. Any courses credited from the old program must meet the time frame requirements for completion of the new program. This process of changing programs only applies to changing from one program to another in a related discipline at the same degree level. It cannot be used to change academic status or degree level.

### **Time Limitations**

The master's degree program must be completed within six (6) successive calendar years. Doctoral programs must be completed within ten (10) successive calendar years. Normally, this time limit will apply even if a student changes his/her program of study. When the program of study is interrupted because the student has been drafted into the armed services, the time limit shall be extended for the length of time the student has been on active duty, if the candidate resumes graduate work no later than one year following his/her release from military service. A student may petition for an extension of the time limits under extenuating circumstances, for example, a long term illness.

### **Graduation requirements**

Students intending to graduate must comply with all graduation requirements stated below:

- Have an approved Plan of Study filed in the Graduate College at least one semester prior to graduation

- Have transfer of credits, if any, approved and noted on Plan of Study at least one semester prior to graduation
- Conditionally admitted students must have been approved for unconditional status at least one semester prior to graduation.
- Submit the Report of Doctoral Dissertation Committee or Thesis Committee (as appropriate)
- Resolve prior semester incomplete grades
- Be in good academic standing
- Pay required tuition and fees and any other pending payments
- Meet all requirements specified on the Plan of Study with an overall Grade Point Average of 3.00 or higher
- Apply for graduation by the posted deadline

### **Application for Graduation and Graduation Clearance**

The University requires a non-refundable \$60 Graduation Fee when applying for graduation. The application for graduation must be made by the posted deadline (see for example, [University Academic Calendar](#)). Students who fail to apply by the application deadline may apply for graduation by the extended deadline on payment of an additional \$20 late fee. The University cannot ensure that the names of late filing applicants will appear in the Commencement Program. The fee is assessed for students once the first step is completed.

A student who applies for graduation but is unable to complete degree requirements in the current semester must withdraw the graduation application by the posted deadline. The student will be required to reapply for graduation in a later semester and pay the graduation fee again.

The student's diploma will be mailed to the address provided on the graduation application. Regalia and other academic paraphernalia is ordered from the University Bookstore. For information on ordering click [here](#).

### **Course Numbering**

#### **Lower Division Courses**

**100-199** level courses are intended primarily for freshmen. Upper division students may enroll in these courses. Graduate students may enroll in these courses with their advisor's approval, but they are not available for graduate credit.

**200-299** level courses are intended primarily for sophomores. Certain classes are closed to freshmen who lack the designated prerequisites or whose majors are outside the unit offering the course. This information is available in the *Undergraduate Bulletin*, or from the student's academic advisor. Upper division students may enroll in these courses. Graduate students may enroll in these courses with their advisor's approval, but they are not available for graduate credit.

#### **Upper Division Courses**

**300-399** level courses are intended primarily for juniors. Prerequisites and other restrictions should be noted before registration. Graduate students may enroll in these courses with their advisor's approval, but they are not available for graduate credit.

**400-499** level courses are intended primarily for seniors and include capstone courses, study abroad, etc. Prerequisites and other restrictions should be noted before registration. Graduate students may enroll in these courses with their advisor's approval, but they are not available for graduate credit.

**If undergraduate and graduate courses need to be co-listed, then this can occur between 400- and 600-level courses. Undergraduates may take 600-level courses with senior status and a minimum 3.25 GPA or above.**

### **Graduate Courses**

**600-699** courses are master's level courses open to all graduate students. Undergraduate students may take these with senior status and a minimum 3.25 GPA or above, or in special cases as part of an accelerated bachelors-master's program.

**700-799** courses are master's level courses open to all graduate students.

**800-899** courses are doctoral level courses open to all graduate students.

**900-999** courses are doctoral level courses open only to doctoral students.

Each graded and non-graded course will be assigned to a faculty member. In particular, non-graded courses such as Special Topics, Seminar, Independent Study, Thesis, and Dissertation will associate a separate section with each faculty member.

### **Course Prefixes**

Prefixes will contain no more than four alpha characters. Departments should consult with the University Registrar when establishing courses which will require a course prefix other than the departmental abbreviations.

## **Graduate Grades and Grade Point Average**

### **Responsibility for grades**

A student's performance in a course must be evaluated resulting in a course grade by the instructor of record assigned to the course. The only exception is when the instructor is not available due to illness or termination from employment. In this event, the department chair or dean shall request the change of grade.

A request for a change of grade must be initiated by the instructor of record assigned to the particular course, or the department chair when the instructor is no longer with the university. The request must be approved by the instructor's department chair and dean. The only exception to an instructor's involvement in seeking a change of grade is when a grade appeal results in a change of grade. In this event, the department chair or dean shall request the change of grade.

The registrar will contact the instructor and department chair (or dean if there is no department chair) to confirm that the change of grade originated from the instructor who signed the change of grade form.

Each instructor who assigns grades has the responsibility to implement grading procedures that are fair and equitable, and to provide a reasonable evaluation of the student's performance in the course. The instructor is expected to inform all students at the beginning of the semester of the means to be used to determine grades in each course or section. This information must be included in the instructor's course syllabus.

### **Types of grades**

The following grades may be awarded in graduate courses.

### Graded courses

This section provides a list of all grades that may be awarded for graded courses, that is, courses that are taken both for credit and for a letter grade. Letter grades A, A-, B+, B, B-, C+, C and F correspond to a specified grade point value. The student's Grade Point Average (GPA) is calculated by adding quality points for all courses where the quality points for a course equal the grade point value times semester credit hours. Some grades do not have associated quality points and are not included in GPA calculation.

- A (Excellent); 4.0 points
- A-; 3.7 points
- B+; 3.3 points
- B (Average); 3.0 points
- B-; 2.7 points
- C+; 2.3 points
- C (Below average); 2.0 points
- F (Failure); 0 points
- AU (Audit); not included in GPA
- I (Incomplete); not included in GPA
- CR (Transfer Credit); not included in GPA
- CE (Credit by Examination); not included in GPA
- W (Withdrawal Voluntary); not included in GPA
- WM (Withdrawal, Medical); not included in GPA
- WA (Withdrawal, Administrative); not included in GPA

### Non-Graded courses

Certain courses are non-graded or taken for credit only. These include Continuation/Residency, Dissertation, Internship/Field Experience, Project, Seminar, Supervised Research, Supervised Teaching, and Thesis. The following grades may be awarded for courses that are non-graded or are taken for credit only. The grade for a non-graded or credit-only course will have no effect on the student's grade point average.

- S (Satisfactory)
- U (Unsatisfactory)

Additionally, the following examinations, if required in the program, are recorded as either being Satisfactory (or completed) or Unsatisfactory (not completed): Comprehensive Examination, Qualifying Exam, and Preliminary Exam.

The S or U grade for a non-graded or credit-only course or for a required examination will have no effect on the student's grade point average. However, courses with a required course with an S/U grade must be completed with a grade of S. A student with a grade of U in a required course will not have fulfilled his/her Plan of Study and will not be permitted to graduate. Similarly, required examinations must be passed before a student is permitted to graduate.

### **Attempted Credit Hours**

All courses taken, irrespective of grade, are included in calculating attempted credit hours. Furthermore, all courses in which a grade of C or higher or a grade of S is earned are included in calculating earned credit hours.

### **Graduate Credit**

Only courses numbered 600 or higher can be counted toward completion of graduate degrees or certificate programs. Grades for courses taken for graduate credit while an undergraduate at North Carolina A&T State University, in Post Baccalaureate Studies (PBS) classification, or transferred from other universities must have a grade of “B” or better to be transferred. “B-” is not a “B” or better.

### **Grade Point Average**

To determine the Grade Point Average for a term, first determine the total quality points earned in the term by multiplying the number of grade points awarded for each course by the course’s assigned number of semester credit hours and add the resulting quality points earned for each course in the term. Then divide the total quality points earned in the term by the number of semester credit hours attempted (for courses that award letter grades) in the term. All courses numbered 600 or higher taken in a graduate classification or for graduate credit as an undergraduate are included in the graduate GPA.

### **Incomplete and IP Grades**

Students cannot graduate with an “I” grade on their transcript. “I” grades must be resolved during the next semester after taking the course. Otherwise, a grade of “F” or “U” will be automatically assigned. When a grade of “I” converts to “F”, this may result in an action of probation or dismissal for the semester in which the conversion takes place, even if the student is not registered for the semester in which it converted.

### **Change of Grade**

A change of grade, if any, must be made within one year from the date the original grade was received.

### **Course Repetition**

All graduate students may repeat special courses designated for continuation or repetition, i.e. Special Topics, Continuation and Residency, Thesis, Dissertation, etc. In this case, degree credit is given for each attempt and all attempts are included in the GPA calculation. All other courses may be repeated only once as indicated below.

Masters students may repeat all other graduate courses only if the initial attempt resulted in a failure. Additionally, the student must have the approval of the graduate program coordinator, department chair, and Dean of the Graduate College. Degree credit for repeated courses will be given only once, but the grade assigned for each enrollment shall be permanently recorded. The higher grade of both attempts will be used for calculating the overall GPA. If a student fails a second time, he/she may be dismissed from the degree program.

Doctoral students may repeat all other graduate courses only if the initial attempt resulted in a grade of “C”. Degree credit for repeated courses will be given only once, but the grade assigned for each enrollment shall be permanently recorded. The higher grade of both attempts will be used for calculating the overall GPA.

### **Failure to meet course requirements**

A student who stops attending a course and/or fails to meet course requirements without officially withdrawing from the course may be assigned a grade of “F” or “U”.

### **Failing to withdraw by deadline**

Students who withdraw from the University prior to the published deadline to withdraw from the University shall receive a “W” in all classes enrolled. Failure to execute and file these forms in a timely manner will result in a student receiving an “F” or “U” for each course in which he or she was enrolled during the semester in question.

## **Graduate Transfer Credits**

This policy applies to course credits transferred from other institutions. The University is not obligated to accept any courses for transfer credit. However, provided the student meets the residency requirement, the graduate program coordinator and/or department chair may recommend up to 40% of the required credit hours for a degree program at North Carolina A&T State University be accepted for transfer credit from another institution, subject to approval by the Dean of the Graduate College. The limitations on transfer credits are as follows:

1. For a course to be transferred, it must have been earned at a regionally accredited, or otherwise approved, university with a grade of “B” or higher (“B-” is not equivalent to a “B”). Courses that have been graded on a Pass/Fail or Satisfactory/Unsatisfactory basis will not be accepted for transfer.

Although the credit for a course may transfer, the grade will not be used to calculate the cumulative Grade Point Average (GPA) at North Carolina A&T State University except when the course is a consortium course. The number of semester credit hours transferred from courses taken in a quarter system will be two-thirds of the quarter hours.

2. With the approval of the academic department and the Graduate College, graduate level credit hours may be credited to a graduate program at NCA&T provided the total number of credit hours transferred do not exceed 40% of the total degree requirements at NCA&T. Credit hours transferred may not have been used to fulfill requirements of any previous earned degree at another institution. However, subject to approval by the academic department and the Graduate College, up to 24 credit hours of graded course work from a previous earned master’s degree may be approved for transfer credit towards a post-baccalaureate doctoral program.
3. A maximum of 12 credit hours taken while a student is in non-degree seeking or Post Baccalaureate Studies (PBS) status may be credited to a degree program.
4. The request must include an official copy of the transcript and published course descriptions along with the request.
5. Transferred courses must be graduate-level courses relevant to the graduate degree being sought. Each graduate program will recommend transfer credits based on an evaluation of the course description and whether the course was taken within the last five years.

## **Academic Eligibility**

### **Good academic standing**

To maintain good academic standing and to meet the requirements for graduation, a student must demonstrate acceptable performance in course work after being admitted to a graduate program. This requires a minimum cumulative Grade Point Average (GPA) of 3.00 or higher in all graduate course work.

Furthermore, good academic standing requires satisfactory progress in the overall graduate program. The student’s advisor or graduate advisory committee may render judgments as to whether satisfactory progress is being made toward the degree, taking into account all aspects of academic performance and promise, not necessarily course work alone. Departments may recommend termination of a student's graduate status at any time if the student is not making satisfactory progress toward the degree. Examples of unsatisfactory progress may include, but are not limited to, inadequate GPA, inadequate research and/or research skills, failure to obtain satisfactory grades in required courses for the program, or failing the candidacy, comprehensive, or final oral examination.

### **Academic Probation**

Any student who, in their current program, has either (i) attempted 18 or fewer credit hours and received a semester GPA of less than 3.0 or (ii) attempted more than 18 credit hours and received less than a 3.0 cumulative GPA will be placed on academic probation.

- A student on academic probation with 18 or fewer attempted credit hours will be required to earn a semester GPA of 3.0 or higher by the end of the next regular (non-summer) semester to return to good academic standing
- A student on academic probation with more than 18 attempted hours will be required to improve his/her cumulative GPA to 3.0 or higher by the end of the next regular (non-summer) semester to return to good academic standing.
- Students on academic probation may not enroll in more than 9 semester credit hours.

### **Dismissal**

A student who is placed on probation after attempting 18 credit hours and who fails to improve his/her cumulative GPA in his/her current academic program to 3.0 or higher by the end of the probationary period, that is, by the end of the next regular (non-summer) semester, will be dismissed. Additionally, a doctoral student who receives a grade of “F” in a course will be dismissed from his/her current academic program.

Departments may also recommend dismissal of a student at any time if a student:

- is conditionally admitted and fails to meet the conditions of his/her admission;
- is not making satisfactory progress toward the degree, for example, inadequate progress on research projects, failure to obtain satisfactory grades in required courses, or failing the candidacy, comprehensive, or final oral examination;
- receives an “F” grade in a required course;
- fails to maintain continuous registration without an approved leave of absence;
- fails to complete program requirements in the maximum allowed time for the degree; or
- is guilty of ethical misconduct or violates the North Carolina A&T State University’s Student Handbook.

### **Readmission after Academic Dismissal**

A student who is dismissed for academic reasons will be eligible to submit a new application for admission to a degree or certificate program after one academic year and may be admitted only upon the recommendation of the major department chair or graduate coordinator and with the approval of the Dean of the Graduate College.

### **Appeals**

An academically dismissed student may appeal the decision according to the process outlined in the Graduate Student Appeals policy.

### **Thesis, Dissertation and Comprehensive Exam**

#### **Theses and dissertations**

A thesis or dissertation presents the results of the student’s original investigation in the field of major interest. It must represent a contribution to knowledge, be adequately supported by data and be written in a manner consistent with the highest standards of scholarship.

#### **Thesis/Dissertation Research Topic**

The thesis/dissertation research topic must be approved by the thesis/dissertation advisory committee. Students whose research involves human subjects, animals, biohazards, or radiation

must have their research proposals approved by the appropriate compliance committee before beginning their research.

### **Qualifying Examination**

The Qualifying Examination is given to assess a doctoral student's competence in a broad range of relevant subject areas. Only students with unconditional admission status and in good academic standing may take the Qualifying Examination. A student may not register for dissertation credits before passing the Qualifying Examination. A student may be permitted to attempt the Qualifying Examination at most twice. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. A student not recommended for re-examination or who fails the exam on a second attempt will be dismissed from the doctoral program. While it is expected that the student takes the Qualifying Exam during his/her first year, he/she must take the exam before the end of three semesters or 27 attempted credit hours. A student who fails on the first attempt must retake the exam and pass it in the following semester, but no later than the end of the first four semesters or 36 attempted hours. The results of the qualifying exam will be communicated by the department to the Graduate College within 30 days from the date of the exam.

Each program will offer the qualifying examination at least once each semester (fall/spring) through a process administered by the graduate coordinator. The program handbook and website will clearly publish the exam format including subjects tested, number of questions from each subject, time allowed for each question and total exam duration, whether the exam is open book or closed book, written or oral, and passing score. Consequences of failing one or more parts of the exam will be clearly mentioned. All students taking the exam in the same academic year will receive the same exam format; therefore, any changes in the exam format will be published at least one year in advance.

### **Preliminary Examination**

The Preliminary Examination is conducted by a doctoral student's dissertation committee and is an oral defense of the student's dissertation proposal. Only students with unconditional admission status, in good academic standing, and a confirmed dissertation advisor may take the Preliminary Examination. A student may be permitted to attempt the Preliminary Examination at most twice. A student who wants to retake the Preliminary Examination must apply to retake the Preliminary Examination by the posted deadline. At least one full semester must elapse before the re-examination. A student not recommended for re-examination or who fails the exam on a second attempt will be dismissed from the doctoral program. A student who has not passed the Preliminary Exam by the time he/she has attempted 45 doctoral credit hours will be dismissed from the program. The results of the preliminary exam will be communicated by the department to the Graduate College within 30 days from the date of the exam.

Each program will offer the preliminary examination at least once each semester (fall/spring) through a process administered by the graduate coordinator. The program handbook and website will clearly publish the exam format including material tested, exam duration, whether the exam is open book or closed book, written or oral, and passing score. Consequences of failing one or more parts of the exam will be clearly mentioned. All students taking the exam in the same academic year will receive the same exam format; therefore, any changes in the exam format will be published at least one year in advance.

### **Admission to Candidacy**

A doctoral student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary Oral Exam.

### **Thesis/Dissertation Defense**

The thesis/dissertation defense is conducted by the student's thesis/dissertation committee and is an oral defense of the student's final thesis/dissertation and is scheduled after the thesis/dissertation is completed.

Copies of the thesis/dissertation must be presented by the student to his or her faculty advisor for review by the examining committee no later than one week prior to the defense of the thesis/dissertation. The examination may be held no earlier than one semester (or four months) after admission to candidacy. The results of the defense must be submitted by department to the Graduate College within 24 hours. Failure on the examination may result in dismissal from the program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the program.

### **Submission of Thesis/Dissertation**

After the thesis/dissertation has been successfully defended, the thesis/dissertation must be approved by each member of the student's thesis/dissertation committee. The student must submit the approved thesis/dissertation to the Graduate College by the deadline posted on the academic calendar, and must conform to the Graduate College's formatting guidelines for theses and dissertations. Prior to or at the time of submission, the student must complete and sign the Non-Exclusive Distribution Agreement granting North Carolina A&T State University a limited, nonexclusive, royalty-free, license to reproduce the thesis or dissertation in electronic form and make it available to the general public at no charge, subject to the embargo choice/publishing restrictions of the student. This form should be delivered to the Graduate College along with the original copy of the signature page bearing signatures of committee chair, department chair and/or dean of the school.

### **Thesis/Dissertation Advisor**

All students in graduate programs must have a graduate advisor who is a member of the graduate faculty in the student's major program. In the case of doctoral programs and master's programs requiring theses and/or final oral examinations, the thesis/dissertation advisor is the chair or co-chair of the thesis/dissertation committee and serves as the graduate advisor. It is the student's responsibility to reach mutual agreement with a thesis/dissertation advisor and, in consultation with the advisor, to select a thesis/dissertation committee consisting of graduate faculty members.

Master's student: A student pursuing a master's thesis should reach agreement with a full member of the graduate faculty to serve as his/her thesis advisor by the time he/she has attempted 18 credit hours. The Graduate Coordinator or Department Chair approves and submits the advisor and committee names on the student's Plan of Study by the end of the second semester to the Graduate College for final approval. A student who is unable to reach agreement with any qualified faculty member to serve as his/her advisor by the time he/she has attempted 18 credit hours may be approved to graduate under a non-thesis option; this will require a revised Plan of Study and approval by the graduate coordinator/department chair and the Graduate College.

Doctoral student: A doctoral student should reach agreement with a full member of the graduate faculty to serve as his/her dissertation advisor by the time he/she has attempted 27 credit hours. The Graduate Coordinator or Department Chair approves and submits the advisor and committee names on the student's revised Plan of Study by the end of the third semester to the Graduate College for final approval. A student who is unable to reach agreement with any qualified faculty member to serve as his/her advisor by the time he/she has attempted 27 credit hours will be dismissed from the program. In this case, the student may submit a new application for admission to another program at North Carolina A&T State University or may transfer to another institution.

### **Advisory Committee Role**

The primary function of the committee is to advise the student in all aspects of the educational program and to monitor and evaluate that student's progress toward the degree. The student is expected to meet with committee in formal sessions at appropriate intervals to critically assess the student's progress; such meetings may be requested by the student or by any member of the committee.

The advisory committee is responsible for the following aspects of the thesis or dissertation and the related or associated research experience:

- approval of the subject matter and methodology of the thesis or dissertation research;
- approval of the organization, content and format of the thesis or dissertation according to NCA&T guidelines;
- review of and comment on drafts of various sections of the thesis or dissertation, including (a) the quality of data and evidence, (b) logical reasoning, and (c) the editorial, linguistic and bibliographic quality;
- evaluation of the thesis or dissertation as a basis for certification that the student has fulfilled the requirements of the degree for which he or she is a candidate; and
- encouragement of and advice to the student and review of manuscripts based on the thesis or dissertation research for publication in the scholarly literature of his or her field.

### **Advisory Committee Composition**

The advisory committee for a master's thesis is composed of at least three members of the Graduate Faculty, including the committee chair. At least two committee members must be Full or Associate members of the graduate faculty. The student's advisor serves as chair of the committee and is a Full member of the graduate faculty. The advisory committee for a doctoral dissertation is composed of at least four members of the Graduate Faculty. At least three committee members must be Full or Associate members of the graduate faculty. The student's advisor serves as chair of the committee and is a full member of the graduate faculty. The Advisory Committee is selected by the student in consultation with his/her advisor. The members of the committee must be approved by the graduate coordinator or department chair. The Graduate College verifies the eligibility of faculty to serve on advisory committees when the Plan of Study is submitted. The Graduate College will appoint an additional external committee member for all doctoral dissertation committees. The Graduate College faculty representative serves on the doctoral dissertation committee with all the rights and responsibilities of any other member. In addition, the Graduate College faculty representative also represents the Graduate College to (i) protect the interest of the University by ensuring that the dissertation meets the highest academic standards, (ii) provide assurance that appropriate procedures are followed; and (iii) provide an 'outside' point of view by sharing expertise with a new perspective or theoretical vantage that might not otherwise be available.

### **Committee Members from Other Institutions**

At most one of the required committee members may be selected from an external institution. If such a committee member is from another university, he/she must have graduate faculty status at his/her home institution; the program coordinator or department chair will provide evidence to the Graduate College before the appointment is approved. If the external committee member is from a non-academic organization, the appointment will be considered, and if appropriate, approved by the Graduate College after receiving a request and copy of the CV from the program coordinator or department chair. In all cases, it should be made clear to that person that he or she will be expected to participate in the comprehensive oral examinations.

### **Substitution of Committee Members**

Under extenuating circumstances, it may be necessary for a member of a graduate advisory committee to have a substitute at committee meetings or the exam. The substitution of a committee member on an oral examination must be requested in writing by the program coordinator or department chair and approved by the Graduate College in advance of the examination.

### **Permanent Changes in Committee Members**

- **Changes before Preliminary Examination.** Should the student, in consultation with his/her advisor, wish to change any of the committee members, he/she must submit a revised Plan of Study with the new members, indicating that this change has been approved by the advisor and by the graduate coordinator or department chair.
- **Changes after Preliminary Examination.** Changes in committee membership after the preliminary exam requires signatures of both outgoing and incoming committee members and the student, as well as justification for the committee change. Approval by the Graduate College is required before holding any examinations.
- Disagreements within the committee or between the student and a committee member over the quality of a student's performance are not grounds for reconstituting the committee.

### **Comprehensive Exams**

Students enrolled in a graduate program may be tested by a comprehensive examination to determine the student's knowledge and skills in a general subject area or a concentration. The comprehensive examination date will be announced by the departmental graduate committee chairperson at the beginning of the semester. This examination will be administered to the enrolled student by an examining committee of the department.

- a. Eligibility to sit for the examination will be determined by the departmental graduate committee and the results of the examination will be forwarded to the Graduate College no later than 30 days prior to the end of the semester.
- b. Students may only take the comprehensive examination twice. After the second failure, the student will be dismissed from their academic program.
- c. All graduate students who take their comprehensive examination must be enrolled in the program.

## **Graduate Courses, Credits and Curriculum**

### **Semester Credit Hour**

The unit of academic work is the semester credit hour defined as one 50-minute lecture period (or at least two periods of laboratory or field work) per week throughout one fifteen week semester. Summer sessions are shorter in duration; however, the contact hours each week are increased proportionately. Online or blended courses will have the same learning outcomes as those delivered in traditional classroom instruction. Because learning in online and blended courses may not be quantified in terms class meeting time, emphasis is placed upon evidence of student learning.

### **Degree program**

A comprehensive course of study in a given disciplinary area identified by a unique CIP (Classification of Instructional Programs) code that leads to a master's or doctoral degree. The Registrar will maintain a unique major code for each degree program. Curriculum proposals for all graduate degree program should be submitted to the Graduate Council, the Teacher Education Council (if teaching licensure option is included), and then to the Faculty Senate for approval. Students are formally admitted to a degree program. The name of the degree and the discipline appears on the student's plan of study, diploma and transcript.

### **Concentration**

A graduate degree program may offer concentrations within the major field of study that reflect areas of specialization. A concentration within a degree program is defined by a coordinated set of courses representing a minimum of 18 credit hours. All concentrations within a degree program share a common core consisting of at least 9 credit hours. Furthermore, all concentrations require the same total credit

hours for graduation. The Registrar will maintain a unique major code for each concentration within a degree program. Curriculum requests for all graduate degree concentrations should be submitted to the Graduate Council, the Teacher Education Council (if teaching licensure option is included), and then to the Faculty Senate for approval. Students are formally admitted to a concentration within a degree program. The name of the concentration appears on the student's plan of study and transcript, but not on the diploma.

### **Option**

Options represent various pathways for a student to complete a degree program. All options will require the same total credit hours for graduation. Curriculum requests for all options within a graduate degree program should be submitted to the Graduate Council, the Teacher Education Council (if teaching licensure option is included), and then to the Faculty Senate for approval. A student is not admitted into an option. The option appears on the student's plan of study, but neither on the transcript nor the diploma.

### **Minimum credit hours for degree programs**

The following minimum graduate credit hours are required for each type of graduate program. Individual programs may require a higher number of credit hours to fulfill disciplinary accreditation requirements.

- a. Masters programs: 30 credit hours beyond bachelor's degree including at least 6 credit hours of thesis research for thesis-option
- b. Doctoral programs: 60 credit hours beyond bachelor's degree including at least 12 credit hours of dissertation research.

### **Comprehensive Assessments**

Graduate programs may require students to successfully complete a comprehensive assessment. The assessment may include a comprehensive examination (written and/or oral), a research project, thesis, dissertation, capstone course, portfolio, internship, field experience and/or equivalent. For details, students are referred to program/department handbooks.

### **Graduate Certificate Programs**

A graduate certificate program in a non-degree program that requires at least 12 credits. A graduate certificate program may be Post-Baccalaureate (if admission is offered after completion of a bachelor's degree) or Post-Master's (if admission is offered after completion of a master's degree). The catalog information should clearly indicate whether a certificate is a (i) stand-alone certificate, (ii) add-on certificate to a complementary degree program or (iii) a continuing education/professional development certificate. The Registrar will maintain a unique code for each certificate program. Curriculum requests for all PB (Post-Baccalaureate) and PM (Post-Master's) certificate programs should be submitted to the Graduate Council, the Teacher Education Council (if teaching licensure option is included), and then to the Faculty Senate for approval. The name of the certificate appears on the transcript. A student may be admitted independently to a stand-alone certificate program or to a continuing education/professional development certificate program. However, an add-on certificate can only be pursued after admission to a degree program.

Post-baccalaureate and post-masters certificate programs are designed to provide specialized graduate level training in a focused area. The minimal criteria are:

- All courses comprising the certificate program must be at a level acceptable for graduate credit, i.e. a course numbered at 600 or higher.
- The minimum number of semester credit hours required for a certificate may vary from program to program, but must consist of at least 12 semester credit hours.
- Courses required by the certificate program must be taught by members of the graduate faculty.
- Admission requirements of the School of Graduate Studies must be met by an applicant.

- A student may be admitted to the School of Graduate Studies for a certificate program without being admitted to a degree program. A student may subsequently apply for admission to a degree program for which the certificate credit hours constitutes some portion of total requirements, subject to the Graduate Transfer Credits policy.

## **Graduate Double Majors, Dual Degrees and Joint Degree Programs**

### **Double Majors**

A graduate student enrolled as a double major may earn two degrees at North Carolina A&T State University by enrolling concurrently in two separate but related programs of study, both at the master's level. Note that a master's degree student continuing on for a Ph.D. is not considered a double degree major.

Double degree programs must balance structural efficiency with individual program integrity. At least 18 credit hours must be unique to each program. Students in double degree programs will have to comply with the requirements of both degree programs as stated in the double degree agreement.

A student must apply to and be accepted by both programs before officially beginning the double degree program. In a practical sense, this means that a student should either be accepted by both programs at the same time or be accepted to the second program by the end of the second semester in the first degree program. Double degrees will not be awarded after the curricular requirements for both programs have already been met without initial application.

Double degree proposals must be approved by the proposing departments and schools/colleges. In addition to the sharing of courses, proposal materials should include: a description of the participating units/degrees, an overview of the existing academic course of studies, the rationale and demand for the new double major, guidelines for academic eligibility and meeting the School of Graduate Studies regulations, and any other supporting materials to assist with a thorough review of the request. A letter of support from the chair or director of each participating unit stating faculty support must also accompany the proposal.

### **Dual Degree Programs**

Dual degree programs are those in which a student may enroll concurrently in two degree programs offered in two different academic units at two institutions, both at the master's level.

At least 18 credit hours must be unique to each program. Students in dual degree programs will have to comply with the requirements of both degree programs as stated in the dual degree agreement.

A student must apply to and be accepted by both programs before officially beginning the dual degree program. In a practical sense, this means that a student should either be accepted by both programs at the same time or be accepted to the second program by the end of the second semester in the first program. Dual degrees will not be awarded after the curricular requirements for both programs have already been met without initial application.

Dual degree proposals must be approved by the proposing departments and schools/colleges and their respective institutions. Dual degree programs are also subject to approval by SACS. In addition to the sharing of courses, proposal materials should include: a description of the participating units/degrees, an overview of the existing academic course of studies, the rationale and demand for the new dual degree, the structure and resource support for the new dual degree, guidelines for academic eligibility and

meeting the School of Graduate Studies regulations, and any other supporting materials to assist with a thorough review of the request. A letter of support from the chair or director of each participating unit stating faculty support must also accompany the proposal.

### **Joint Degree Programs**

Joint degree programs are those from which a single degree is awarded by two or more institutions participating in a joint degree program. A joint degree will carry the name of each participating institution on a student's diploma.

The development of a joint degree program must follow respective institutional processes for the approval of new degree programs at each participating institution before being submitted to the UNC Board of Governors for approval. Information regarding UNC System policies on joint degrees may be found at: <http://intranet.northcarolina.edu/docs/legal/policymanual/400.1.1.pdf>. Joint degree programs are also subject to approval by SACS.

### **Accelerated Bachelor's / Master's Program**

The Accelerated Bachelor's/Master's (ABM) degree program allows an undergraduate student at North Carolina A&T State University an opportunity to complete the requirements for both the bachelor's and master's degrees at an accelerated pace. A student accepted into the ABM program will be permitted, as an undergraduate student, to take up to 12 credit hours of graduate courses that may also be used to satisfy requirements for his/her undergraduate degree. This will allow a student to complete a master's degree in the same field within approximately 18 months of completing the bachelor's degree.

#### Establishing an ABM Program

Prior to admission of any student into the ABM degree program, the program must be developed by the department/program and school/college and approved by the Graduate Council, the dean of the school/college offering the undergraduate program, the dean of the Graduate College, the Faculty Senate, and the Provost. The program may also require approval by SACS.

The same department or program that awards the bachelor's degree must sponsor the master's degree (ABM). This does not preclude a master's degree in interdisciplinary graduate programs in which the sponsoring department participates, nor acceptance of the student in a closely related field, if the department granting the graduate degree recommends admission to the Graduate College.

#### Acceptance into the ABM Program

A student accepted into the ABM program has approval to pursue the ABM degree option. Acceptance is not a guarantee of admission into the Graduate College. Acceptance into the ABM program is contingent on meeting the following eligibility requirements:

- a. A student must have completed between 75 and 90 credit hours in his/her undergraduate program, including credit hours earned from advanced placement.
- b. A transfer student must have completed a minimum of two semesters (24 credit hours) as a full-time A&T student in addition to the 75 to 90 earned hours as stated above.
- c. A student must have a minimum cumulative Grade Point Average (GPA) of 3.25 on a 4 point scale.

#### Application to the ABM Program

A prospective student who meets the eligibility requirements for the ABM program must set up a meeting with his/her undergraduate advisor and the graduate program coordinator to develop a Plan of Study for her/his bachelor's and master's degree programs. Before acceptance into an ABM program can be finalized, a student must submit:

- a. The standard application for admission to the Graduate College;

- b. A Plan of Study for the graduate degree that also indicates the graduation date for the master's degree. The Plan of Study must indicate the following: (i) a maximum of 12 graduate credit hours that will also count towards the undergraduate degree, (ii) a maximum of six (6) additional graduate credit hours that may be taken as an undergraduate student that will not be counted towards the bachelor's degree, (iii) courses that will be taken after matriculating into the graduate program, and (iv) the graduation date for the master's degree that meets the time limit for the ABM program (i.e. obtaining a thesis or non-thesis master's degree in the same field within 18 months of completing the bachelor's degree).
- c. Any changes to the ABM Plan of Study must be submitted in writing and approved by the chairperson and graduate program coordinator and by the dean of the Graduate College.

#### Requirements for Participation and Graduation

A student must complete the bachelor's degree prior to being admitted to the master's program. A student in the ABM may not elect to by-pass the bachelor's degree.

#### Continuing Eligibility

It is the responsibility of the student to recognize his/her eligibility status. To maintain continuing eligibility, a student must complete the bachelor's degree requirements with a GPA of at least 3.25 on a 4.0 scale, follow the plan of study, and meet other departmental requirements to continue to be eligible to participate in the program. If a student becomes ineligible to participate in the ABM degree program, the graduate program coordinator must inform the student in writing of his/her ineligibility. A copy of the letter to the student must be sent to the Graduate College.

#### Withdrawal

A student may, at any time, withdraw from the ABM program by informing her/his undergraduate advisor and graduate program coordinator in writing. A copy of this request to withdraw must be sent to the Graduate College for approval.

A student who either withdraws or loses eligibility to continue in the program will not be able to use any graduate courses towards the bachelor's degree. However, a maximum of six credit hours of graduate courses may be used towards another master's degree with the approval of the graduate program coordinator, department chair, and the dean of the Graduate College.

#### **Master's Degree Enroute to Doctoral Degree**

Graduate programs have the option of making their master's degrees available to students pursuing doctoral degrees in the same field without applying for admission to the master's programs provided the student continues to make satisfactory progress towards the doctoral degree.

A student admitted to a doctoral program may be awarded a master's degree in the same field as the doctoral program provided that all of the following conditions are satisfied:

- The student does not already have a master's degree in the same field.
- A Plan of Study for the doctoral program is approved by the student's advisor, department chair, and the Graduate School.
- The student makes normal academic progress toward the fulfillment of the doctoral degree requirements, consistent with the doctoral Plan of Study.
- A Plan of Study for the master's degree is submitted in the semester when the student expects to pass the doctoral preliminary exam and is approved by the student's advisor, the department chair, and the Graduate School. Only courses that are creditable towards the doctoral degree may be included in the master's Plan of Study.

- The student’s advisor and department chair approves the awarding of the master’s degree and the student submits an application to receive the master’s degree.
- All Graduate School, academic School/College, and Department/Program requirements for the master's degree are satisfied.
- Unless previously approved by the Graduate School, the master’s degree will be awarded after admission to candidacy.
- The maximum time limit for completion of the doctoral degree remains unchanged.

International doctoral students who are admitted to a PhD program and receive approval from the Graduate School to earn a master's degree enroute to the PhD must fulfill all requirements for the PhD in order to receive the master’s degree. International students who decide to abandon the PhD program in favor of a master’s degree program with the intention of applying for practical training in the field of the master's curriculum must apply for and be admitted to the new curriculum at the master's level at least one semester in advance of the intended change. International students must document the level change in writing from the Graduate School with the appropriate forms in order to be eligible for practical training in that field. Students in F-1 status who transfer to a new curriculum at the master's level must have a new Form I-20 issued prior to the transfer and should also understand that the PhD I-20 will remain as an "incompleted" program in the Student and Exchange Visitor Information System (SEVIS). The international doctoral graduate student must communicate his/her intentions to the Graduate Coordinator as well as to the Office of International Affairs and receive approval at least one full semester in advance of the change. Failure to do so could result in a violation of non-immigrant status and subsequent ineligibility for any type of employment.

## **Graduate Student Appeals**

Students may appeal the following decisions made by the academic programs or by the Graduate College.

### **Grade appeals**

The Graduate Appeals Committee (GAC) of the Graduate Council considers grade appeals from graduate students that have not been resolved by the instructor and department chair and presented to the Dean of the Graduate College. There are two grounds for appealing a grade: (1) evidence of miscalculation, and (2) material deviation from information published in the course syllabus without adequate notice of the change.

Before filing an appeal, a graduate student is expected to attempt to resolve the grading issue with the course instructor and the department chairperson of the academic unit in which the grade was assigned. A graduate student who is unable to resolve issues with the course professor and department chairperson has thirty (30) calendar days from the date on which grades are due (as specified on the Registrar’s academic calendar) for the relevant semester or summer session, or thirty (30) calendar days after the adverse decision at the department level to file an appeal with the dean of the Graduate College. If this date falls on a weekend or a university holiday, then the deadline will be the next workday. Students are responsible for submitting a written appeal with the required documentation to the dean of the Graduate College so that they are postmarked or hand-delivered by the deadline date. If a request for appeal is not postmarked or hand delivered by this deadline, it will not be considered. The decisions of the Graduate Appeals Committee are final.

### **Appealing dismissal from program**

A written appeal must be submitted to the Graduate College within thirty (30) calendar days following the adverse recommendation or decision. The written appeal should include three important aspects: (i) the action(s) being challenged, (ii) the person(s) against whom the complaint is being made—the “respondent,” and (iii) the redress being sought. A decision shall be deemed final on the expiration of the

period for filing an appeal, or if an appeal is filed, upon issuance of a decision in such an appeal, whichever is later.

One representative of the Graduate College, together with one representative from Student Affairs, shall examine the appeal and jointly determine whether the cited actions were disciplinary or academic. If the challenged action is deemed to be disciplinary, the dean of the Graduate College shall refer the complaint to the appropriate university officers responsible for disciplinary matters within five (5) business days. If the challenged action is deemed to be an academic matter, the dean of the Graduate College shall forward the appeal to a review panel. The final decision will be resolved no later than the end of the following semester.

The academic review panel will consist of two faculty members and a graduate student. One faculty member, from a college other than the one in which the student's academic department resides, will be appointed by the dean of the Graduate College. The other faculty member, from the college in which the student's program resides, will be appointed by the dean of the academic college. However, this representative will not be from the student appellant's department. In the event that either of the two aforementioned deans is a respondent against whom one or more allegations are pending in the appeal, the Provost will appoint the faculty member(s) for the affected dean. The Graduate Student Council will appoint a graduate student for the review panel who is not a student in the appellant's college. The review panel will review all written records of the case. As appropriate, it may afford the student appellant an opportunity to appear in person before it, and consider any written materials the student may wish to bring to its attention. The review panel may also hear from the academic officer(s) whose action is being appealed and may confer with other involved parties. It shall evaluate any other information it deems important to its deliberations. The panel's report will be submitted to the dean of the Graduate College and the dean(s) of the appellant and the respondent(s). The dean of the Graduate College and the dean of the appellant's college shall jointly review the case, giving due consideration to the review panel's report and recommendation. The decision of the two deans will be final. In the event that one or both deans are respondents in the case, the Provost will appoint other dean(s) to officiate with respect to the appeal.

### **Termination of an assistantship**

Before filing an appeal, a graduate student is expected to attempt to resolve the termination issue with the hiring faculty member and/or department chairperson and dean of the academic unit in which the assistantship is assigned. A graduate student who is unable to resolve issues with the hiring faculty member and/or department chairperson has thirty (30) calendar days from the date of termination, or thirty (30) calendar days after the adverse decision at the department or college level to file an appeal with the dean of the Graduate College. Graduate students are responsible for submitting a written appeal with the required documentation to the dean of the Graduate College so that they are postmarked or hand-delivered by the deadline date. If a request for appeal is not postmarked or hand-delivered by this deadline, it will not be considered. The Graduate Student Appeals Committee of the Graduate Council considers appeals of termination of Graduate Assistantships. The decisions of the Graduate Student Appeals Committee are final and do not set precedent; each case is considered on its own facts and merits.

### **Graduate Appeals Committee**

The Graduate Appeals Committee will consist of two faculty members and a graduate student. One faculty member, from a college/school other than the one in which the student's academic department resides, will be appointed by the dean of the Graduate College. The other faculty member, from the college/school in which the student's program resides, will be appointed by the dean of the academic college/school. However, this representative will not be from the student appellant's department. In the event that either of the two aforementioned deans is a respondent against whom one or more allegations

are pending in the appeal, the Provost will appoint the faculty member(s) for the affected dean. The Graduate Student Council will appoint a graduate student who is not a student in the appellant's college/school.

The Graduate Appeals Committee will review all written records of the case. As appropriate, it may afford the student appellant an opportunity to appear in person before it, and consider any written materials the student may wish to bring to its attention. The committee may also hear from the academic officer(s) whose action is being appealed and may confer with other involved parties. It shall evaluate any other information it deems important to its deliberations. The committee's report will be submitted to the dean of the Graduate College and the dean(s) of the appellant and the respondent(s). The dean of the Graduate College and the dean of the appellant's college/school shall jointly review the case, giving due consideration to the Graduate Appeals Committee's report and recommendation. The decision of the two deans will be final and do not set precedent; each case is considered on its own facts and merits.

In the event that one or both deans are respondents in the case, the Provost will appoint other dean(s) to officiate with respect to the appeal.

### **Graduate Faculty**

Graduate faculty shall be selected based on their demonstrated ability to effectively teach graduate students, complete high quality creative work, conduct scholarly research, and direct the research of graduate students in accordance with the criteria set forth in the Faculty Credentialing Policy.

#### **Purpose:**

The Graduate Faculty of North Carolina A&T State University (N.C. A&T or University) exist as part of the total university faculty. The primary function of the Graduate Faculty shall be to provide educational and research experiences which support a high quality graduate education and advise on policies associated with graduate programs at the university.

#### **Obtaining Graduate Faculty Status:**

Each college/school will establish specific criteria, including the number of research publications or funded research grants within specified time frames, that delineate what constitutes an adequate record of sustained academic and scholarly activity for full or affiliate membership in the graduate faculty. On the basis of the approved criteria, the college/school will develop a process of systematic review and evaluation that will lead to becoming a member of the graduate faculty. The roster of members of the graduate faculty for graduate programs of each college shall be provided to the Dean of the Graduate College at the start of each academic year. Faculty may hold graduate faculty status in more than one college and department. For joint programs, faculty members from other institutions are granted graduate faculty status by reciprocity.

#### **Full Members:**

Tenured, tenure-track, and full-time non-tenure track faculty members with a terminal degree and full-time EHRA non-teaching employees with a terminal degree are eligible for full graduate faculty status. Full members of the graduate faculty will meet the criteria for graduate faculty membership established by the academic college/school faculty and will be granted full member status through a process determined by the academic college/school. In certain circumstances, full members of the graduate faculty from one college or department may serve as the chair in a different college or department. These members must be approved by the dean of the respective college/school and the Dean of the Graduate College.

Full members of the graduate faculty may teach graduate level courses in their areas of expertise, serve as graduate program coordinator, serve on thesis/dissertation committees, and chair master's thesis and doctoral dissertation committees. Full members are eligible for election to the Graduate Council, to serve as a Graduate Coordinator, to represent the Graduate College on thesis and dissertation defenses, and to vote on graduate program issues presented to the Graduate Faculty.

### **Affiliate Members**

Full-time or part-time non-tenure track faculty members, full-time or part time EHRA non-teaching employees, visiting, retired, clinical, extension, practicum, research, teaching, and contractual employees are eligible for affiliate membership status. In addition, affiliate graduate faculty will meet the criteria for obtaining graduate faculty status established by the academic college/school faculty and will become an affiliate member of the graduate faculty through a process determined by the academic college/school. Those external to the university may be granted graduate faculty membership by a majority vote of the graduate faculty in the department/program.

Affiliate members of the graduate faculty may teach graduate courses, serve as the third member on a thesis committee, fourth member on a dissertation committee, and may serve as the program coordinator with approval from the Dean of the Graduate College.

### **Review and Continuation of Graduate Faculty**

Each college/school will establish a process for continuation and removal of graduate faculty status. This process will be based on a variety of factors, including scholarly productivity, record of graduate teaching or mentorship, and other factors as defined by the college/school. The period of review will be defined by each college/school based on posted criteria, but must occur at least once every five years. The period of review may be scheduled to coincide with tenure and post tenure review. The dean of the college conducting the review will notify the faculty member of the result of the review.

A faculty member will automatically lose graduate faculty status at any time the faculty member deemed deficient under post-tenure review.

## **Graduate Program Coordinators**

### **Appointment Process**

Each department offering graduate study is required to appoint a [Director of Graduate Programs](#) (DGP) from among its Graduate Faculty. The Department Head, or Dean in the case of interdisciplinary programs, submits this designation in writing to the Dean of The Graduate College. The Director of Graduate Programs plays a critical role in overseeing graduate education at the department/program level in variety of arenas as outlined below.

### **Responsibilities**

#### Communication

- Handles all correspondence between the graduate program and The Graduate College;
- Transmits information from The Graduate College to students;
- Submits requests for scheduling preliminary and final oral examinations and graduation clearances;

- Communicates with the Office of International Services (OIS) and serves as a critical academic authority for matters that may affect students' visa status.

#### Oversight

- Conducts the daily administration of departmental graduate programs;
- Recommends admission or denial of graduate applicants;
- Approves students' Graduate Plans of Work after approval by the student's Graduate Committee; submits plans to the Graduate School.

#### Interaction with Students

- Plays a lead role in recruiting graduate students;
- Conducts orientation of new graduate students;
- Serves as the program's point of contact for concerns that students may have;
- Assigns graduate students to assistantships.

#### Advising

- Advises students requesting admission to the graduate program;
- Serves as temporary advisor to new graduate students, providing them information and advice including but not limited to course selection and scheduling, faculty interests, procedural matters, and University resources;
- Monitors graduate students' progress and graduation credits;
- Assists new students in selecting a major advisor;
- Advises students on various aspects of program progress and completion as needed.

#### Fellowship Support

- Assists the Graduate School in developing fellowship proposals, including recruitment of graduate faculty to draft proposals and participate in proposed fellowship project;
- Nominates eligible students for individual fellowships and transmits their applications to the Graduate School;
- Supports the Graduate School in managing fellowship awards to the program's graduate students.

#### Program Development and Evaluation

- Initiates program-related proposals to the Administrative Board of the Graduate School (Admin Board), either informally through contact with Graduate Deans or formally through written proposals to be considered at Admin Board meetings; seeks approval of College Graduate Studies Committee and College Associate Dean for Academic Affairs prior to submitting to Admin Board;
- Assists the Graduate School in conducting the annual and 8-year (or shorter as required by accrediting bodies) reviews of the graduate program, by initiating the self-study process upon notification by the Graduate School.

## **Class Attendance**

The University is committed to the principle that regular and punctual class attendance is essential to the students' optimum scholastic achievement. An absence, excused or unexcused, does not relieve the student of any course requirement. **Attendance is required and punctuality is expected!** A student is responsible for all the work, including tests and written work, of all class meetings.

## **Instructor's Responsibility**

1. Attendance requirements should be stated in the course syllabus and announced in class, particularly at the beginning of each term. If class attendance is to affect a student's course grade, then a statement to that effect must be a part of the course syllabus distributed to each student.
2. Instructors will keep attendance records in all classes. Each instructor has the right to prescribe procedures as to how and when attendance will be taken.

## **Student's Responsibility**

It is the responsibility of each student to learn and comply with the requirements set by the instructor for each class in which he or she is registered. The student should:

1. have knowledge of each instructor's attendance and monitoring practices for class absences during the term,
2. become familiar with all materials covered in each course during absences and makeup work of any work required by the instructor, and
3. Initiate the request to make-up work on the first day of class attendance after the absence.

## **Make-Up of Required Course Work**

The administration, faculty and staff recognize that there are circumstances and events which require students to miss classes and any required course work which may be performed or due on the day of the absence. Also, they recognize that required course work is needed to give each student an adequate performance evaluation. Therefore, whenever reasonable (and more specifically described below), students should be allowed to make up required work.

The following definitions will apply with respect to this policy:

- a. Required course work – All work which will be used in the determination of final grades, e.g. examinations, announced quizzes, required papers and essays, required assignments.
- b. Instructor – Person responsible for the course and providing instruction and evaluation.
- c. Permissible reasons for requesting make up of required work – Sickness; death of relatives (immediate family); participation in approved University related activities; acting in the capacity of a representative of the University (band, choir, sports related travel, etc.); and extraordinary circumstances (court appearance, family emergency, etc.). NOTE: Other reasons for requesting make up of required course work are not acceptable.
- d. Documentation – Verification of sickness requires a signed statement of a physician or a duly authorized staff member of the Sebastian Health Center. Verification of death requires a signed statement from the Minister or Funeral Director. Verification of participation in University related activities requires a signed statement from the appropriate University official. Verification of other reasonable circumstances; for example, court appearance, family emergency, etc. requires a signed statement from an appropriate official (e.g., Court Official, parent or guardian, etc.).

The policy regarding make-up of required course work is as follows:

1. A student may petition an instructor to make up required course work whenever the student has a permissible reason for requesting make up of required course work.
2. A student will be required to present documentation which certifies absence constituting permissible reason.
3. Whenever possible, a student should consult with the instructor prior to an absence which will involve the failure to do required course work. Arrangements for make-up should be discussed and agreed upon at this time.
4. A student must petition for make-up of required course work on the first day that he or she returns to class.
5. If permission is granted to make up required course work, the instructor and the student should agree on an acceptable date for completion of missed required course work.
6. Failure to comply with item 4 may result in the denial to make up required course work.

Instructors should schedule make up work at a time that is convenient to both the instructor and the student.

### **Student Religious Observance**

The General Assembly of North Carolina enacted G.S. 116-11(3a), a law mandating the establishment of excused absences for religious observance by students.

1. The University allows up to two (2) excused absences per academic term for religious observances required by the faith of a student.
2. Instructors have the authority to specify, by posting on their course syllabi, the requirements that students must follow in requesting an excused absence for religious observances. These requirements may include, but are not limited to, providing written notice to the instructor, the amount of lead time required prior to the religious observance, the nature of the religious observance and confirmation of the student's participation in writing by an official of the religious organization. All requests for absences for religious observances and the supporting documentation must be maintained by the student's academic college/school.
3. When appropriate notice is provided by a student, the student must be granted up to two (2) excused absences per academic term under this policy and must be allowed to satisfy missed assignments, tests/exams, or other course work disseminated during the period of absence, including requirements to complete anticipated tests/exams or assignments in advance of the originally scheduled date. Beyond the terms and limits of this policy, instructors maintain authority to establish and enforce the attendance policy in their respective courses. The requirement for students to make such requests for excused absences applies only to days when the University is holding class

### **Add and Drop Period**

**Adding Courses:** Courses may be added during the first five (5) class days of a fall or spring semester. Courses may be added during the first two (2) class days of a summer session.

**Dropping Courses:** Courses may be dropped during the first five (5) class days of a fall or spring semester. Courses may be dropped during the first two (2) class days of a summer session.

Official student enrollment is represented by the number of hours in which a student is enrolled at the end of the fifth (5) day of classes in a fall or spring semester and at the end of the second (2) day of classes in

a summer session. This date corresponds with the last day to drop courses and receive financial credit. Students wishing to drop all courses after this date must follow the University's withdrawal procedure.

All add/drop transactions must be completed by the official close of business on the last day to add/drop classes. If there are University-wide extenuating circumstances that prevent interaction with the web-based student information system, an extension of the add/drop deadline will be established

### **Withdrawal from an Individual Course**

A student may withdraw from any course or courses by submitting a Change of Schedule form to the Office of the Registrar on or before the last day to withdraw from an individual course, as published in the Academic Calendar.

Students who withdraw from a course or courses on or before the last day to withdraw from an individual course are assigned a grade of "W." Failure to attend class does not constitute a withdrawal from that course or courses. Students are limited to a maximum of one (1) withdrawal per course, up to a maximum of sixteen (16) credit hours over the student's academic career. Upon a second attempt in a single course, the student is not permitted to withdraw from the course and must receive a grade for the course.

A student who does not officially withdraw from a course or courses will be assigned final grade in each course in which he or she was enrolled during the semester in question. Withdrawing from a course or courses may affect a student's financial aid status, will count toward the tuition surcharge threshold, and may affect the student's progress toward degree completion.

Students considering withdrawing from a courses or courses should consult their faculty advisor or academic unit advisor and the Office of Student Financial Aid.

### **Withdrawal from the University**

Any student who is officially registered for classes and who wishes to withdraw from the University must complete the withdrawal process by the last day to withdraw from the university as published in the academic calendar.

Students who withdraw from the University prior to the published withdrawal deadline shall receive a "W" in all classes in which they were enrolled. Failure to attend classes does not constitute a withdrawal from the University. A student who does not officially withdraw from the University will be assigned the final grade earned in each course in which he or she was enrolled during the semester in question.

Withdrawal applications by students who have a pending judicial charge will not be processed by the Registrar. Pending judicial charges must be cleared before a student may officially withdraw from the University.

Withdrawal from the University may have significant academic and/or financial aid implications. Students are strongly encouraged to seek advisement by their academic advisor or academic unit and financial aid officer before completing the withdrawal process.

Students withdrawing from the university with extenuating circumstances may affect a student's financial aid status and may affect the student's progress toward degree completion; however, the course or courses will not count in the tuition surcharge calculations and in the number of maximum attempts. Extenuating circumstances include serious medical and psychological difficulties and may include military deployment, unanticipated life events, or administrative reasons.

### **Retroactive Withdrawal from the University**

A student who was unable to initiate the process for withdrawal from the University by the last day to withdraw as published in the academic calendar may request a retroactive withdrawal. Requests for a retroactive withdrawal shall be considered on a case-by-case basis, and shall be based on the following:

- serious illness or documented medical condition;
- death of an immediate family member;
- involuntary call to active military duty;
- documented change in conditions of employment;
- newly documented learning disability;
- other emergency circumstances, legal requirements, or extraordinary situations.

Written requests must be submitted prior to the end of the semester immediately following the semester for which the retroactive withdrawal is being requested. Before Sebastian Health Center or the Counseling Services approves a retroactive withdrawal, the health care provider shall consult (with the student's consent and without providing medical details) with the school/college dean in the student's field of study for the dean's input.

Except under extraordinary circumstances or to comply with legal requirements, for retroactive withdrawals subsequent to the effective date of this policy, students are limited to one (1) retroactive withdrawal during their academic career.

### **Cancellation of Course Registration**

Under specific circumstances a student's course registration will be cancelled. The following are situations in which a student's course registration will be cancelled:

1. When the University cancels a course due to low enrollment or the unavailability of a qualified instructor,
2. When a student notifies the University, in writing, prior to the first day of classes that he/she will not be attending,
3. When a student fails to finalize payment of tuition and fees, after official notification to the student,
4. When a student is placed on academic suspension or on academic dismissal,
5. When a student is found to be ineligible to remain in the course due to not meeting the course prerequisite(s) or any course requirement(s),
6. When a student is found to be in violation of the Student Code of Conduct, prior to the first day of classes, and the Office of the Vice Chancellor for Student Affairs requests that the registration be cancelled.

### **Student Immunization Requirement**

To protect the general health of the University community, the General Assembly of North Carolina enacted G.S. 130A-155.1, a law mandating that students submit proof of receiving required immunizations. Students who fail to submit proof of immunization, by the published deadline, will not be allowed to register for courses or they will have their course registration cancelled.

### **Payment of Tuition, Fees and other Dues**

Students are officially enrolled at North Carolina A & T State University when all tuition, housing, meals and other applicable charges and fees have been paid in full. Students are responsible for full payment of tuition, fees and all other debts to the University by the published due date for the term. Failure to pay tuition, fees and all other debts will result in cancellation of the student's schedule/courses.

Students who add courses during the drop/add period, that result in additional tuition charges, are required to pay all charges and fees by the published due date. If the student fails to pay the additional charges, registration for the additional course(s) will be cancelled. Students who drop courses during the drop/add period, that result in a reduction in the tuition amount previously paid, will receive a refund if the transaction is made prior to the last day to drop and receive financial credit. It is the responsibility of the student to periodically check their student account for additional charges. It is also the student's responsibility to immediately respond to all bills and email notification of balances due the university.

### **Privacy of Student Records**

The University ensures students access to their official academic records but prohibits the release of personally identifiable information, other than "directory information," from these records without their permission, except as specified by public law 93-380. "Directory information" includes: Student's name, address, E-mail address, telephone number, date and place of birth, school, major, dates of attendance, degree(s) received, honors received, institution(s) attended prior to admission to North Carolina Agricultural and Technical State University, past and present participation in officially recognized sports and activities, and physical factors. Public Law 93-380 further provides that any student may, upon written request, restrict the printing of such personal information relating to himself or herself as is usually included in campus directories. A student who desires to have "directory information" withheld must submit a written request to the Office of the Registrar prior to the end of the add/drop period for the semester in which he or she is enrolled.

### **Access to Student Records**

1. The policy for the administration of student academic records is in accordance with the Family Educational Rights and Privacy Act of 1974 as amended.
2. Students have the right to inspect and review any and all official records, files, and data directly related to them.
3. A student who believes that his or her record contains inaccurate or misleading information shall have an opportunity for a hearing to challenge the content of the record, to assure that the record is not inaccurate, misleading, or otherwise in violation of his or her privacy or rights, and to provide an opportunity for the correction or deletion of any such inaccurate, misleading, or otherwise inappropriate data contained therein or include the student's own statement of explanation.
4. The University will comply with requests for records within a reasonable period of time and not later than (30) days after the request is received.
5. The release of academic records requires the written permission of the student, except as provided by Public Law 93-380. Transcripts are not issued to a student who has not met his or her financial obligations to the University.

### **Change of Name and Address**

It is the obligation of every student to notify the Office of the Registrar of any change in name or address. Failure to do so can result in a delay in the handling of the student's records and in sending official University notifications to the student's home. To change a name a student must first have a legal court document.

### **Transcripts of Records**

Students needing an official transcript should submit a completed Transcript Request Form to the Office of the Registrar at least one week before the official transcript is needed. Transcript requests are not processed for any student or alumnus with an obligation to the University such as unpaid fees, overdue loans, library books, audiovisual equipment, or whose admission records are not complete. The completed

transcript request should contain the student's name (at the time they attended), student identification number, date of birth, the name and address of where the transcript is to be sent, and the student's signature. Unofficial transcripts may be obtained via Aggie Access On-Line ([https://ssbprod-ncat.uncecs.edu/pls/NCATPROD/twbkwbis.P\\_WWWLogin](https://ssbprod-ncat.uncecs.edu/pls/NCATPROD/twbkwbis.P_WWWLogin)). Official transcripts may be obtained via <https://www.ncat.edu/registrar/student-info/transcript-requests.php>.

### **Academic Dishonesty Policy**

North Carolina Agricultural and Technical State University is committed to a policy of academic honesty for all students. Examples of Academic Dishonesty include but are not limited to:

- Cheating or knowingly assisting another student in committing an act of academic dishonesty;
- Plagiarism (unauthorized use of another person's words or ideas as one's own) which includes but is not limited to submitting examinations, theses, reports, drawings, laboratory notes or other materials as one's own work when such work has been prepared by another person or copied from another person.
- Unauthorized possession of examinations or reserve library materials, destruction or hiding of source materials, library materials, or laboratory materials or experiments or any other similar action;
- Unauthorized changing of grades or marking on an examination or in an instructor's grade book, or such change of any grade record;
- Aiding or abetting in the infraction of any of the provisions anticipated under the general standards of student conduct; or
- Assisting another student in violating any of the above rules.

A student who has committed an act of academic dishonesty has failed to meet a basic requirement of satisfactory academic performance. Thus, academic dishonesty is not only a basis for disciplinary action but may also affect the evaluation of the student's level of performance. Any student who commits an act of academic dishonesty is subject to disciplinary action as defined below.

In instances where a student has clearly been identified as having committed an academic act of dishonesty, the instructor may take appropriate punitive action including a loss of credit for an assignment, an examination or project, or award a grade of "F" for the course subject to the review and endorsement of the chairperson and the dean. Repeated offenses can even lead to dismissal from the University.

### **Student Appeal**

A student who feels unfairly treated as a result of an academic dishonesty matter may appeal the action in writing to the University Judicial Tribunal. The written notice of appeal must be submitted within one week (seven calendar days) of the date of the incident. The student should refer to the section on Appellate Procedures in the Student Handbook.

### **Disruptive Behavior in the Classroom**

*(UNC-GA Policies for Students-Adopted by BOG October 26, 1970)*

The instructor may withdraw a student from a course for behavior he deems to be disruptive to the class. The grade assigned will be "W" if the behavior occurs before the deadline for dropping a course without academic penalty, and the instructor has the option of giving a "W" or a "F" if the behavior occurs after the deadline.

### **Binding Procedures for Instructors**

The instructor must provide an opportunity for the student to be heard. In providing this opportunity, the instructor must follow the procedure described below:

1. The student should be notified in writing at the next class attended that the instructor proposes to drop the student from the course for disruption of the class, and the instructor should provide the student with written instructions regarding the time and place for a meeting with the instructor. A copy of this written notification must be sent to the instructor's department head at the same time.
2. A time limit of five working days (M-F) from the time written notification is given for the student's opportunity to be heard by the instructor.
3. The date of notification establishes whether the withdrawn student will be given a "W" or "F." "W" is appropriate before the 8-week drop date and either "W" or "F" is appropriate after that date, at the instructor's discretion.
4. The instructor may suspend the student from class until the instructor takes final action to withdraw the student from class or to allow the student to continue in the class. The final decision to withdraw or continue the student is the instructor's.
5. Either party in the resolution of this dispute may invite one other person of the university community to be present as an observer.

### **Student's Right to Appeal**

If the student wishes to appeal the instructor's decision to withdraw the student from class, he/she should follow the academic appeal procedures.

### **Cell Phone Policy**

The use of cell phones inside the classroom during the classroom period is prohibited. Please be advised that placing or receiving calls as well as conversing on cell phones during the conduct of a class shall be considered as disruptive behavior for students and unprofessional behavior for faculty and staff.

## Graduate Degree Programs

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### COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

<https://www.ncat.edu/caes/index.php>

Mohamed Ahmedna, Dean and Research Director

Antoine J. Alston, Associate Dean for Academic Studies

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The College of Agriculture and Environmental Sciences (CAES) is organized in the land-grant university tradition where programs of resident instruction in the food, agricultural, family and environmental sciences, as well as closely related areas are offered. Agricultural Research and Cooperative Extension completes the land grant institution tripartite mission. Thus, the College is guided by the values that underlie the land-grant philosophy:

- Learning – creating a responsive learning environment and enhancing access to educational opportunities for all;
- Discovery – expanding knowledge through research;
- Engagement – putting that knowledge to work; and collaborating with diverse institutions, communities and people to improve their quality of life.

The hallmark of the College's work is the integration of these three values – learning, discovery and engagement – into programs that make a difference. Our teaching, research and Extension programs are part of a national system that maintains a statewide presence and links local, state, national and global issues.

The College is fundamentally interdisciplinary; we apply the biological, physical and social sciences to challenges in food, fiber, agricultural and environmental systems. Instructional programs provide a strong foundation in the natural sciences, social sciences and economics, which support curricula in agricultural, family and consumer sciences. These programs originate from a highly qualified faculty committed to academic excellence and the development of individuals to their personal and professional potential. Central to the College's goals is the cultivation of interdisciplinary problem-solving skills that serves as a foundation for continuing academic development, critical thinking and inquiry, life-long learning, assessment, and adaptation to change.

### DEGREE AND CERTIFICATE PROGRAMS OFFERED

#### Doctoral Degree

- Ph.D. Agricultural and Environmental Sciences \* with concentrations in:
  - Food Science, Human Nutrition & Health
  - Sustainable Agriculture and Environmental Sciences
  - Agribusiness and Applied Economics
  - Agricultural and Extension Education
  - Sustainable Animal Production and Health

#### Masters Degrees

- MS Agricultural Education\* with concentrations in:
  - Professional Licensure
  - Professional Service
- MS Agricultural and Environmental Systems with concentrations in:
  - Integrated Animal Health Systems
  - Agribusiness & Food Industry Management
  - Natural Resources and Environmental Systems

- MS Food and Nutritional Science

Post Baccalaureate Certificate Programs

- Family and Consumer Sciences\*
- International Agricultural Development and Engagement
- Advanced Waste Management
- Human Lactation
- Interdisciplinary Environmental Certificate Program (IECP)

\*Approved for distance education

## Agriculture and Environmental Sciences, PhD

Concentration: Food Science, Human Nutrition and Health

College of Agriculture & Environmental Sciences

**Graduate Coordinator:** Dr. Heather Colleran    **Email:** [hcolleran@ncat.edu](mailto:hcolleran@ncat.edu)    **Phone:** (336)285-3627

**Department Chair:** Dr. Valerie L. McMillan    **Email:** [vcmillan@ncat.edu](mailto:vcmillan@ncat.edu)    **Phone:** (336)334-7850

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The Ph.D. in Agriculture and Environmental Sciences-Food Science, Nutrition and Health concentration is designed to provide opportunities for advanced study and research that will enhance human health by developing a food supply that is sustainable, safe, nutritious, accessible and affordable. This Ph.D. degree in Food Science, Human Nutrition and Health will encompass basic and applied sciences and the interrelationships among food, nutrition and health. The program will prepare students for successful careers as teachers, researchers, entrepreneurs and leaders in academia and industry in both the public and private sectors. This is an innovative degree program that will prepare professionals to make a difference in the nexus of food and human health.

### Additional Admission Requirements

- At least one degree in a Food, Agricultural, or Environmental Science or closely related Agricultural Discipline.
- Master of Science degree from one of the aforementioned areas with a cumulative GPA of 3.3.
- A Graduate Record Exam (GRE) Aptitude Exam score
- A Personal Statement, current vita, and three professional letters of recommendation (at least one from a former faculty advisor)

### Program Outcomes

The program will prepare graduates to:

- Apply their critical thinking skills to solve complex issues impacting food and nutritional sciences.
- Demonstrate effective communication skills through project and dissertation work and conference presentations.
- Conduct research or undertake advanced projects in an area of food and nutritional sciences,
- Be active and effective leaders in their professional societies and will demonstrate and model disciplinary expertise.

### Degree Requirements

Total credit hours: 65 (post baccalaureate)

- Core courses (15 credits)
- Seminar (2 credits)
- Dissertation (12 credits)
- Supervised Teaching/Professional Development (3 credits)
- Pass qualifying exam, preliminary exam, and dissertation defense
- In consultation with advisor, take 18 credit hours within food science or human nutrition (**FCS 600 – 999**)
- In consultation with the advisor, take 15 credit hours of additional elective courses relevant to research area\*\*

**\*\*Students who did not take a statistics course within their Master's Degree program will take an introductory statistics class in lieu of one Elective Area course. \*\***

## Agriculture and Environmental Sciences, PhD

Concentration: Sustainable Agriculture and Environmental Sciences

College of Agriculture & Environmental Sciences

**Graduate Coordinator:** Dr. Guochen Yang      **Email:** yangg@ncat.edu

**Phone:** (336)285-4853

**Department Chair:** Dr. Gregory Goins

**Email:** [ggoins@ncat.edu](mailto:ggoins@ncat.edu)

**Phone:** (336)285-2191

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Sustainable agriculture is an integrated system of plant and animal production practices with a site-specific application that will, over the long term, satisfy human food and fiber needs, enhance environmental quality, make the most efficient use of natural resources, sustain the economic viability of farm operations, and enhance the quality of life for farmers and society as a whole. The goal of sustainable agriculture is to attain healthy environment, economic profitability, and social and economic equity, with minimal negative impact on the environment.

The PhD in Agriculture and Environmental Sciences concentration ‘Sustainable Agriculture and Environmental Sciences (SAES)’ is designed and delivered in a way that builds capabilities in core analytical, conceptual, communications and research skills, as well as provide the knowledge base required to develop careers in the broad area of sustainable agriculture and environmental sciences. The SAES concentration will produce scientists who will integrate knowledge in plant science, natural resources, soil science, microbiology, crop science, agronomy, Integrated Pest Management, biotechnology, economics, biological engineering, environmental science, etc., to teach, conduct research and practice agriculture that is environment friendly, while maintaining food security and profitability in the 21st century and beyond.

### Additional Admission Requirements

- At least one degree in a Food, Agricultural, Biological or Environmental Science or closely related discipline.
- Master of Science degree from one of the aforementioned areas with a cumulative GPA of 3.3.
- A Graduate Record Exam (GRE) Aptitude Exam score
- A Personal Statement, current vita, and three professional letters of recommendation (at least one from a former faculty advisor)

### Program Outcomes

The program will prepare graduates to:

- Apply their critical thinking skills to solve complex issues impacting sustainable agriculture and environmental sciences
- Demonstrate effective communication skills through project and dissertation work and conference presentations.
- Conduct research or undertake advanced projects in an area of sustainable agriculture and environmental sciences
- Be active and effective leaders in their professional societies and will demonstrate and model disciplinary expertise.

### Degree Requirements

Total credit hours: 65 (post baccalaureate)

- Core courses (15 credits)
- Seminar (2 credits)
- Dissertation (12 credits)
- Supervised Teaching/Professional Development (3 credits)
- Pass qualifying exam, preliminary exam, and dissertation defense
- In consultation with advisor, take 18 credit hours within natural resources and environmental design or other area subject to the recommendation of the student committee (**NARS 600** –

**999, HORT 600 – 999, ENVS 600 – 999, SLSC 600 – 999, and WMI 600 – 999)**

- In consultation with the advisor, take 15 credit hours of additional elective courses relevant to research area\*\*

**\*\*Students who did not take a statistics course within their Master's Degree program will take an introductory statistics class in lieu of one Elective Area course.\*\***

## Agriculture and Environmental Sciences, PhD

Concentration: Agribusiness and Applied Economics

College of Agriculture & Environmental Sciences

**Graduate Coordinator:** Dr. Godfrey Ejimakor

**Email:** [ejimakor@ncat.edu](mailto:ejimakor@ncat.edu) **Phone:** (336)285-4834

**Department Chair:** Dr. Kenrett Jefferson Moore

**Email:** [jykenret@ncat.edu](mailto:jykenret@ncat.edu) **Phone:** (336)285-4829

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The Agribusiness and Applied Economics concentration will combine training in agribusiness and/or applied economics. Training may include sustainable agricultural food systems, environmental economics, and international trade with emphasis on course work in economic theory, research methods, and quantitative techniques. Students are prepared for a variety of successful careers in agribusiness, agricultural and applied economics research within public and private institutions by fulfilling the requirements for expertise in quantitative methods and developing a rigorous background in economic theory and research.

### Additional Admission Requirements

- At least one degree in a Food, Agricultural, or Environmental Science or closely related discipline.
- Master of Science degree from one of the aforementioned areas with a cumulative GPA of 3.3.
- A Graduate Record Exam (GRE) Aptitude Exam score
- A Personal Statement, current vita, and three professional letters of recommendation (at least one from a former faculty advisor)

### Program Outcomes

The program will prepare graduates to:

- Apply their critical thinking skills to solve complex issues impacting agriculture
- Demonstrate effective communication skills through project and dissertation work and conference presentations.
- Conduct research or undertake advanced projects in an area of agribusiness and applied economics
- Be active and effective leaders in their professional societies and will demonstrate and model disciplinary expertise.

### Degree Requirements

Total credit hours: 65 (post baccalaureate)

- Core courses (15 credits)
- Seminar (2 credits)
- Dissertation (12 credits)
- Supervised Teaching/Professional Development (3 credits)
- Pass qualifying exam, preliminary exam, and dissertation defense
- In consultation with advisor, take 18 credit hours within agribusiness and applied economics (**ABM 600 – 999, AGECE 600 – 999**)
- In consultation with the advisor, take 15 credit hours of additional courses relevant to research area\*\*

**\*\*Students who did not take a statistics course within their Master's Degree program will take an introductory statistics class in lieu of one Elective Area course.\*\***

## Agriculture and Environmental Sciences, PhD

Concentration: Sustainable Animal Production and Health  
College of Agriculture & Environmental Sciences

**Graduate Coordinator:** Dr. Derrick Coble

**Email:**

**Phone:** (336)285-4776

**Department Chair:** Dr. Radiah Minor

**Email:** [reminor@ncat.edu](mailto:reminor@ncat.edu)

**Phone:** (336)285-4776

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The Sustainable Animal Production and Health focus area is designed to give doctoral candidates an in-depth look at the challenges facing the animal industry and equip them with the appropriate tools to answer and research questions related to the fields of sustainable animal production and animal health. This program offers guidance in conducting interdisciplinary research in genetics, nutrition, and physiology to name a few, with access to a diverse array of animal species. The goal of this program is to assist future professionals and scientists in developing their capabilities to assess and conduct valid scientific research and practices that will facilitate sustainable food production and promote preventative animal health through an in-depth understanding of agriculture and environmental systems and interdisciplinary approaches.

### Additional Admission Requirements

- At least one degree in a Food, Agricultural, or Environmental Science or closely related discipline.
- Master of Science degree from one of the aforementioned areas with a cumulative GPA of 3.3.
- A Graduate Record Exam (GRE) Aptitude Exam score
- A Personal Statement, current vita, and three professional letters of recommendation (at least one from a former faculty advisor)

### Program Outcomes:

The program will prepare graduates to:

- Apply their critical thinking skills to solve complex issues impacting agriculture
- Demonstrate effective communication skills through project and dissertation work and conference presentations.
- Conduct research or undertake advanced projects in an area of sustainable animal production and health.
- Be active and effective leaders in their professional societies and will demonstrate and model disciplinary expertise.

### Degree Requirements

Total credit hours: 65 (post baccalaureate)

- Core courses (15 credits)
- Seminar (2 credits)
- Dissertation (12 credits)
- Supervised Teaching/Professional Development (3 credits)
- Pass qualifying exam, preliminary exam, and dissertation defense
- In consultation with advisor, take 18 credit hours within sustainable animal production and health (**ANSC 600 – 999**)
- In consultation with the advisor, take 15 credit hours of additional courses relevant to research area\*\*

**\*\*Students who did not take a statistics course within their Master's Degree program will take an introductory statistics class in lieu of one Elective Area course.\*\***

## Agriculture and Environmental Sciences, PhD

Concentration: Agricultural and Extension Education

College of Agriculture & Environmental Sciences

**Graduate Coordinator:** Dr. Chastity Warren English **Email:** [ckwarren@ncat.edu](mailto:ckwarren@ncat.edu) **Phone:** (336)285-4819

**Department Chair:** Dr. Kenrett Jefferson Moore **Email:** [jykenret@ncat.edu](mailto:jykenret@ncat.edu) **Phone:** (336)285-4829

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The Agricultural and Extension Education concentration is designed for students wanting to learn more about leadership styles, development and educational methods for youth and adults used in agricultural and related fields. Advanced work may involve specialized training in career and technical education and extension education. Candidates will develop an individual plan of study that provides a comprehensive knowledge of the teaching and learning process with a robust theoretical foundation and practical research experience in agricultural education. Candidates are prepared for a position of leadership in a variety of educational settings, such as public and private schools, community colleges, universities, businesses, government, and industry.

### Additional Admission Requirements

- At least one degree in a Food, Agricultural, or Environmental Science or closely related Discipline.
- Master of Science degree from one of the aforementioned areas with a cumulative GPA of 3.3.
- A Graduate Record Exam (GRE) Aptitude Exam score
- A Personal Statement, current vita, and three professional letters of recommendation (at least one from a former faculty advisor)

### Program Outcomes:

The program will prepare graduates to:

- Apply their critical thinking skills to solve complex issues impacting agriculture and environmental sciences
- Demonstrate effective communication skills through project and dissertation work and conference presentations.
- Conduct research or undertake advanced projects in an area of sustainable agriculture and environmental sciences
- Be active and effective leaders in their professional societies and will demonstrate and model disciplinary expertise.

### Degree Requirements

Total credit hours: 65 (post baccalaureate)

- Core courses (15 credits)
- Seminar (2 credits)
- Dissertation (12 credits)
- Supervised Teaching/Professional Development (3 credits)
- Pass qualifying exam, preliminary exam, and dissertation defense
- In consultation with advisor, take 18 credit hours within agriculture and environmental sciences (AGED 600 – 999)
- In consultation with the advisor, take 15 credit hours of additional courses relevant to research area\*

**\*Students who did not take a statistics course within their master's degree program will take an introductory statistics class in lieu of one Elective Area course. \***

## Agricultural Education – Professional Licensure, MS

College of Agriculture & Environmental Science

**Graduate Coordinator:** Chastity Warren English **Email:** [ckwarren@ncat.edu](mailto:ckwarren@ncat.edu) **Phone:** (336) 285-4819

**Department Chair:** Kenrett Jefferson-Moore **Email:** [jykenret@ncat.edu](mailto:jykenret@ncat.edu) **Phone:** (336) 285-4829

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The Master of Science in Agricultural Education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber, and natural resources systems. Agricultural Education at North Carolina A&T is offered completely online and on campus. The Professional Licensure concentration prepares individuals to teach agriscience education in middle and high schools. Graduates of this track are eligible to apply for advanced (graduate level) licensure in North Carolina. This track offers graduates versatility in career options, because it also prepares them for the many other professions that rely on agricultural educators. The Agricultural Education program is accredited by the National Council for Accreditation of Teacher Education (NCATE) and the North Carolina Department of Public Instruction to offer advanced licensure training in Agricultural Education.

**Teacher Educator Licensure:** Completing this master’s degree and obtaining a teaching license are separate processes. Admission to this master’s program does not guarantee admission to the Educator Preparation Program. To be recommended for licensure, candidates must first be formally admitted to the Educator Preparation Program. Failure to complete the Educator Preparation Program admission requirements during the first semester of enrollment may result in the student’s inability to register for certain required courses. Applicants and current students should review licensure requirements at <https://www.ncat.edu/ced/departments/educator-preparation/index.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- Basic preparation in an agricultural related discipline or other closely related areas.
- The Professional Licensure track is designed for individuals who are currently teaching secondary agricultural education, holders of the “A” License for secondary agricultural education in the State of North Carolina, are provisionally licensed for agricultural education, or are seeking licensure through the graduate program.

### Program Outcomes:

Upon completion of the graduate program in Agricultural Education:

- Students will critically analyze issues impacting the food, agricultural, and environmental sciences.
- Students will demonstrate the ability to effectively communicate knowledge and issues impacting the food, agricultural, and environmental science disciplines.
- Students will develop and implement effective program planning and evaluation plans for their agricultural education programs to facilitate improvement of agricultural education programs.
- Demonstrate a deeper appreciation and knowledge of the agricultural education discipline.
- Students will be able to implement and use a variety of instructional methodologies and technologies.
- Students will be prepared to teach a diverse population about subject matter related to food, agricultural, and environmental sciences.

### Degree Requirements

Total credit hours: 30

- Recommended Core Courses (12 credit hours): AGED 703, 704, 710, 711 (based on student’s previous coursework)

### Thesis option

- Take AGED 752

- Select 9 credits from College of Agriculture or Educator Preparation with approval of advisor
- Thesis (AGER 797: 6 credits)
- Pass thesis defense

Project option

- Take AGED 752
- Select 12 credits from College of Agriculture or Educator Preparation with approval of advisor
- Project (AGED 796: 3 credits)

## Agricultural Education – Professional Service, MS

College of Agriculture & Environmental Science

**Graduate Coordinator:** Chastity Warren English **Email:** [ckwarren@ncat.edu](mailto:ckwarren@ncat.edu) **Phone:** (336)285-4819

**Department Chair:** Kenrett Jefferson-Moore **Email:** [jykenret@ncat.edu](mailto:jykenret@ncat.edu) **Phone:** (336)285-4829

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The Master of Science in Agricultural Education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber, and natural resources systems. Agricultural Education at North Carolina A&T is offered completely online and on campus. The Professional Service concentration prepares individuals for careers in agribusiness, government, or legal professions. Students on both study tracks are also prepared for doctoral degree programs and other professional schools. Graduates of the program find employment in secondary education, agribusiness industry, federal and state government, cooperative extension, higher education, rural and international development, and nonprofits. Some prominent employers include the United States Department of Agriculture, John Deere, Kraft, Cargill, and the North Carolina Public School System. Many graduates go on to pursue doctoral work at prestigious research universities such as Virginia Tech, University of Florida, Iowa State, Purdue, and Penn State.

### **Additional Admission Requirements**

- Basic preparation in an agricultural related discipline or other closely related areas.

### **Program Outcomes:**

Upon completion of the graduate program in Agricultural Education:

- Students will critically analyze issues impacting the food, agricultural, and environmental sciences.
- Students will demonstrate the ability to effectively communicate knowledge and issues impacting the food, agricultural, and environmental science disciplines.
- Students will develop and implement effective program planning and evaluation plans for their agricultural education programs to facilitate improvement of agricultural education programs.
- Demonstrate a deeper appreciation and knowledge of the agricultural education discipline.
- Students will be able to implement and use a variety of instructional methodologies and technologies.
- Students will be prepared to teach a diverse population about subject matter related to food, agricultural, and environmental sciences.

### **Degree Requirements**

Total credit hours: 30

- Recommended Core Courses (12 credit hours): AGED 703, 704, 710, 711 (based on student's previous coursework)

### Thesis option

- Take AGED 712
- Select 9 credits from College of Agriculture or Educator Preparation with approval of advisor
- Thesis (AGER 797: 6 credits)

- Pass thesis defense

Project option

- Take AGED 712
- Select 12 credits from College of Agriculture or Educator Preparation with approval of advisor
- Project (AGED 796: 3 credits)

## Agricultural and Environmental Systems - Integrated Animal Health Systems, MS

College of Agriculture & Environmental Science

**Graduate Coordinator:** Radiah Minor

**Email:** rcminor@ncat.edu

**Phone:** (336)285-4787

**Department Chair:**

**Email:**

**Phone:**

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The Master of Science in Agricultural and Environmental Systems - Integrated Animal Health Sciences is designed to provide a solid foundation of fundamental biological and biochemical principles within the areas of biotechnology, breeding and genetics, microbiology, nutrition, physiology and toxicology. Thesis research or a project is conducted in the laboratories of faculty research advisors in the areas of biotechnology, immunology, microbiology, nutrition and physiology in poultry and livestock production (swine, goat, sheep, dairy and beef cattle) for sustainable agricultural and environmental systems.

### **Additional Admission Requirements**

- Baccalaureate degree in animal science, agriculture or other related STEM area. Unconditional admission requires an undergraduate degree in animal sciences or a closely related discipline that includes work with lab or farm animals

### **Program Outcomes:**

- To develop abilities to assess and conduct valid scientific research and practices that will facilitate sustainable food production
- To develop understanding of agricultural and environmental systems and interdisciplinary approaches for improved animal health, management and well being

### **Degree Requirements**

- Core courses (9 credit hours): AGRI 604/ABM 705, AGRI 700, 780

#### Thesis option

- Select 15 credit hours from ANSC courses with approval of advisor
- Thesis (ANSC 797: 6 credits)
- Pass thesis defense

#### Project option

- Select 15 credit hours from ANSC courses with approval of advisor
- Select 3 credit hours from any discipline with approval of advisor
- Project (ANSC 796: 3 credits)

## Agricultural and Environmental Systems - Agribusiness & Food Industry Management, MS

College of Agriculture & Environmental Science

**Graduate Coordinator:** Godfrey Ejimakor      **Email:** ejimakor@ncat.edu      **Phone:** (336)285-4829

**Department Chair:** Kenrett Jefferson-Moore      **Email:** jykenret@ncat.edu      **Phone:** (336)285-4827

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The Master of Science in Agricultural and Environmental Systems - Agribusiness and Food Industry Management focuses on business applications that support the food and fiber industry. The overall mission of the program is to prepare students for successful post-baccalaureate work by developing and maintaining a program in partnership with industry that is the focal point of state agribusiness which includes the food, fiber and animal sub-sectors in North Carolina as well as the United States.

### **Program Outcomes:**

- The program will give students the skill set, including analytic and communication (both written and oral), to manage an agribusiness enterprise.
- The program will give the students the decision-making skills, including decision-making under risk and uncertainty.
- The program will give students the ability to understand applied economics, including transaction costs analysis and game theory.
- The program will give students the ability to understand the functions of management, including business strategy, marketing, finance, operations/logistics, and human resource management.
- The program will give students an appreciation for contemporary issues facing food and agribusiness managers.
- The program will enhance students' ability to be comfortable with networking (i.e. building social capital).

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credit hours): AGRI 604/ABM 705, AGRI 700, 780

#### Thesis option

- Select 15 credit hours from ABM courses with approval of advisor
- Thesis (ABM 797: 6 credits)
- Pass thesis defense

#### Project option

- Select 18 credit hours from ABM courses with approval of advisor
- Project (ABM 796: 3 credits)

## Agricultural and Environmental Systems - Natural Resources and Environmental Systems, MS

College of Agriculture & Environmental Science

**Graduate Coordinator:** Guochen Yang

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**Phone:** (336)285-4853

**Department Chair:** Gregory Goins

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**Phone:** (336)285- 2191

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The Master of Science in Agricultural and Environmental Systems – Natural Resources and Environmental Systems concentration provides a foundation in the fundamental biological and biochemical sciences related to natural and renewable resources, bioprocessing, food systems sustainability including the underlying principles of horticulture, agroecology, environmental remediation and protection, plant and soil health, mushroom science and biotechnology. Thesis or project research is a degree requirement in one of these knowledge areas under the direction of a graduate faculty member. Graduates are trained to be analytical in their thinking and applied in their performance with an understanding of transdisciplinary science.

### **Additional Admission Requirements**

- Sound academic preparation in basic sciences (e.g. Biology, Chemistry and Physics)
- Undergraduate Math (Algebra and Calculus)

### **Program Outcomes:**

- The production of advanced agricultural scholars that obtain professional and leadership roles with agricultural and environmental related entities
- Individuals that pursue doctoral studies and the valuable scholarly works produced by graduates of the program, through thesis and capstone project endeavors.

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credit hours): AGRI 604/ABM 705, AGRI 700, 780

#### Thesis option

- Select 15 credit hours from: NARS; AGRI; HORT; SLSC; ENVS with approval of advisor
- Thesis (NARS 797: 6 credits)
- Pass thesis defense

#### Project option

- Select 18 credit hours from: NARS; AGRI; HORT; SLSC; ENVS with approval of advisor
- Project (NARS 796: 3 credits)

## Food and Nutritional Sciences, MS

College of Agriculture and Environmental Science

**Graduate Coordinator:** Heather Colleran

**Email:** hcolleran@ncat.edu

**Phone:** (336)285-3644

**Department Chair:** Valerie L. Giddings

**Email:** vlgiddin@ncat.edu

**Phone:** (336)334-7850

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The Master of Science in Food and Nutritional Sciences is designed to develop the basic knowledge and skills necessary to undertake research in Food and Nutritional Sciences and other related areas. It also develops competencies to work as food and nutrition specialists in education, or with other community nutrition agencies and food industries. The program also develops theoretical and experimental competencies necessary to pursue additional graduate studies or obtain professional degrees.

### Additional Admission Requirements

1. Unconditional admission requires an earned baccalaureate degree in food and nutrition or related field from an accredited institution and a GPA of 2.80 or higher
2. Applicants without the following background courses or their equivalent will be required to take them as prerequisites:
  - FCS 157: Introduction to Human Nutrition
  - FCS 245: Introduction to Food Science
  - CHEM 251: Elementary Biochemistry and biochemistry Laboratory (CHEM 255)
3. Resume

### Program Outcomes:

1. Upon completion of their coursework, students will accurately communicate in writing their knowledge of advanced concepts and principles related to food and nutritional sciences.
2. Upon completion of their coursework, students will effectively express in an oral presentation their knowledge of food and nutritional sciences concepts, principles and trends.
3. Upon completion of core courses, students will read and analyze scholarly literature in food and nutritional sciences for accuracy of research techniques and contributions to the discipline.
4. Upon completion of the thesis option, students will develop research questions, hypotheses and research methodology to address a problem in the field of food and nutritional sciences.
5. Upon completion of the program, students will identify and apply appropriate theories to address food and nutrition related issues impacting society.

### Degree Requirements

Total credit hours: 30

- Take Core courses (16 credits): FCS 711, 730, 735, 789; CHEM 651; ABM 705
- (1 credit) FCS 789

#### Thesis option:

- Electives
  - Food Science Concentration: Select 6 credit hours from Food Science Electives
  - Nutritional Science Concentration: Select 6 credit hours from Nutritional Science Electives
- Thesis (FCS 797: 6 credits)
- FCS 799: Continuation of Thesis
- Pass thesis defense
- Pass comprehensive exam

#### Non-thesis Option:

- Electives
  - Food Science Concentration: Select 6 credit hours from Food Science Electives
  - Nutritional Science Concentration: Select 6 credit hours from Nutritional Science Electives
- Practicum (FCS 784: 3 credits)
- FCS or approved electives related to food and nutritional sciences or research (4 credits)
- Pass comprehensive exam

## Certificate - Family and Consumer Sciences, PB

College of Agriculture and Environmental Science

**Graduate Coordinator:** Valerie L. Giddings    **Email:** vlgiddin@ncat.edu    **Phone:** (336)334-7850

**Department Chair:** Valerie L. Giddings    **Email:** vlgiddin@ncat.edu    **Phone:** (336)334-7850

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The Certificate Program in Family and Consumer Sciences Education provides individuals with a strong foundation in teaching methods, classroom management, curriculum development, assessment, leadership, education technology, and content knowledge in family and consumer sciences. Graduates will accept positions as teachers at the middle and high school levels with content knowledge in family and consumer sciences. The certificate is especially designed for teachers in Jamaica who are committed to preparing students for family life, work life or for careers in family and consumer sciences.

### **Certificate Requirements**

Total credit hours: 18

- Take 18 credit hours: FCS 641, 681, 682, 683, 701, 702, 734

## Certificate – Human Lactation, PB

College of Agriculture and Environmental Science

**Graduate Coordinator:** Meeshay Williams Wheeler **Email:** [mwwheele@ncat.edu](mailto:mwwheele@ncat.edu) **Phone:**  
(336)334-7850

**Department Chair:** Valerie L. Giddings **Email:** [vgiddin@ncat.edu](mailto:vgiddin@ncat.edu) **Phone:**  
(336)334-7850

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Accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP), the Advanced Certificate Program in Human Lactation will prepare students for a professional healthcare career as an International Board Certified Lactation Consultant (IBCLC). As a result of the 95 didactic hours of coursework and 300 hours of clinical experience required by the International Board of Lactation Consultant Examiners (IBCLE), students who successfully pass the exam will qualify for positions domestically and internationally. The graduate certificate, designed to prepare IBCLCs, will focus on the health advantages of human milk, the physiology of breastfeeding, clinical practice and care management of breastfeeding, and how to provide culturally-competent care to families.

### Certificate Requirements

Total credit hours: 18

Courses: FCS 620, 621, 622, 623, 624, 625

## Certificate – International Agricultural Development and Engagement, PB

College of Agriculture and Environmental Science

**Graduate Coordinator:** Osei-Agyeman Yeboah **Email:** oyeboah@ncat.edu **Phone:** (336)285-4727

**Department Chair:** Kenrett Jefferson-Moore **Email:** jykenret@ncat.edu **Phone:** (336)285-4827

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The Advanced Certificate Program in International Agricultural Development & Engagement provides traditional and non-traditional students interested in international agricultural development with the requisite knowledge and skills that will enable them to secure employment and effectively work across cultural boundaries. As a result of the coursework, research, experiential learning opportunities (domestically and abroad), graduates of the program will qualify for positions as mid-level personnel at the USDA Foreign Agricultural Service's missions globally; trade coordinators for international corporations including Cargill, Archer Daniels' Midlands (ADM), Syngenta, Phillip Morris, and others. The graduate certificate will focus on international trade issues, policy analysis techniques; project management, monitoring, and evaluation; techniques for solving complex problems involving multiple stakeholders; and behavior and culture in work organizations.

### **Program Requirements**

Total credit hours: 12

- ABM 738, 638; AGED 712, 713

## Certificate – Advanced Waste Management, PB

College of Agriculture and Environmental Sciences

**Graduate Coordinator:** Godfrey A, Uzochukwu **Email:** [uzo@ncat.edu](mailto:uzo@ncat.edu)

**Phone:** (336)334-7030

**Department Chair:** Gregory Goins

**Email:** [ggoins@ncat.edu](mailto:ggoins@ncat.edu)

**Phone:** (336) 285-2191

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The advanced interdisciplinary waste management certificate program is open to all graduate students. It is designed to create a talented pool of advanced students who will become leaders in environmental and waste management fields.

### **Program Requirements**

Total credit hours: 12

- Capstone: Select 1 credit hour: WMI 747 (1 credit hour capstone)
- Select 5 credit hours from: WMI 617, 619, 629
- Select 6 credit hours from: Advanced environmental/waste management/related courses in major. Special topic/project courses in environmental/waste management in major are acceptable

## Certificate - Interdisciplinary Environmental Certificate Program (IECP), PB

College: Graduate College in Collaboration with the Interdisciplinary Waste Management Institute Under the Leadership of the College of Agriculture and Environmental Sciences, College of Engineering, College of Science & Technology, College of Health and Human Sciences and College of Arts, Humanities and Social Sciences

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**Interdisciplinary Graduate Certificates Offered:** Environmental Engineering, Environmental Sciences, Environmental Justice and Environmental Health and Safety  
**Director:** Godfrey A, Uzochukwu, PhD Email: [uzo@ncat.edu](mailto:uzo@ncat.edu) Phone: 336-285-4866

### Graduate Certificates

#### **Interdisciplinary Environmental Engineering Certificate (IEEC)**

**Coordinator:** Manoj, Jha, PhD Email: [mkjha@ncat.edu](mailto:mkjha@ncat.edu) Phone 336-285-3678

**Contacts:** Renzun Zhao, PhD Email: [rzhao@ncat.edu](mailto:rzhao@ncat.edu) Phone: 336-285-3684

Michael Atkinson, PhD Email: [mdatkinson@ncat.edu](mailto:mdatkinson@ncat.edu) Phone: 336-285-2202

Omar Basha, PhD Email: [ombasha@ncat.edu](mailto:ombasha@ncat.edu) Phone: 336 285 3669

**Admission Requirements:** Earned BS Degree and Application for Admission through Graduate College

Courses (15 Credit Hours)

MEEN 675, CIEN 700\*, WMI 617, CIEN 616, CIEN 785 and WMI 747\*

Interdisciplinary Environmental Sciences Certificate (IESC):

**Coordinator:** Godfrey A, Uzochukwu, PhD Email: [uzo@ncat.edu](mailto:uzo@ncat.edu) Phone: 336-285-4866

Admission Requirements: Earned BS Degree and Application for Admission Through Graduate College

Courses (15 Credit Hours)

ENVS 699, CIEN 616, NARS 785, WMI 747\*, WMI 617 and CIEN 700\*

#### **Interdisciplinary Environmental Justice Certificate (IEJC):**

**Coordinator:** Godfrey A, Uzochukwu, PhD Email: [uzo@ncat.edu](mailto:uzo@ncat.edu) Phone: 336-285-4866

Admission Requirements: Earned BA/BS Degree and Application for Admission Through Graduate College

**Courses (15 Credit Hours)**

WMI 617, WMI 619, NARS 785, EHS 704\*\*, ENVS 699 and WMI 747\*

#### **Interdisciplinary Environmental Health and Safety Certificate (IEHC)**

**Coordinator:** Alesia Ferguson, PhD Email: [acferguson@ncat.edu](mailto:acferguson@ncat.edu) Phone 336 285 3101

Admission Requirements: Earned BS Degree and Application for Admission Through Graduate College

**Courses (15 Credit Hours)**

EHS 708, EHS 711, WMI 617, EHS 600, WMI 747\* and EHS 704\*\*

**Required Core Courses:**

CIEN 700\*, WMI 747\* and EHS 704\*\*

**Optional/Substitute Courses**

MEEN 685, EHS 613 and ENVS 622

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### **Vision:**

To train students with in-depth knowledge to develop innovative and creative solutions to improve and sustain the environment.

## **Skills**

1. **Environmental Engineering**  
Students will learn the application and understanding of technical skills needed to solve infrastructure issues and knowledge of mathematical modeling for systems thinking.
2. **Environmental Sciences**  
Students will be exposed to applications and understanding of environmental regulations, risk assessment, environmental impacts, social and economic impact on humans and knowledge of pollutant measurements and interpretations.
3. **Environmental Justice**  
Knowledge of social justice dynamics and being aware of what the policies are (local, state, federal), public policy that impact environmental decision making, economic activity and environment, history of environmental justice and ethical considerations of environmental decision making.
4. **Environmental Health and Safety**  
Knowledge of health and safety challenges in the workplace, home and public spaces, chemical, physical, biological hazards and their controls, toxicological impacts of exposure to hazards and environmental regulations.

## **COURSE DESCRIPTIONS: College of Agriculture and Environmental Sciences**

### **Agribusiness, Applied Economics & Agriscience Education**

#### **ABM 632 - Interna Agribusiness Market**

Food and Agribusiness Policy Analysis is designed to provide an economic analytical framework useful for examining current issues involving agricultural policies, fiscal and monetary policies, international trade of agricultural commodities and products, and environmental and natural resources. Prerequisite: None. (F;S;SS)

#### **ABM 634 - Interna Agribusiness Market**

This course examines and analyzes the problems, issues, policies, regulations and procedures relevant to the global marketing of agricultural and related commodities by agribusiness firms. Emphasis is on combining firm-level agribusiness marketing concepts with international agribusiness marketing and export management practices, including the development of international agribusiness marketing plans and case studies from international agribusiness firms. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

#### **ABM 638 - Special Prob in Agribusiness**

This course is designed for students who desire to work out special problems in the field of agribusiness management; problem definition, formulation and investigation will be emphasized. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

#### **ABM 640 - Advanced Ag and Food In Manage**

This course emphasizes decision-making of agribusiness managers, agribusiness management consultants, and entrepreneurs of agriculturally related firms. Contemporary topics facing the agribusiness decision-maker such as how to establish an agriculturally based firm, marketing agribusiness firms through E-Commerce, examining food supply chains, establishing contractual agreements with other firms, and evaluating industrial organization within the agribusiness industry are presented. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

#### **ABM 641 – Special Prob in Agribus Manage**

This course relies heavily on the "Harvard Case Studies Approach" to make decisions and solve problems faced by agribusiness managers. Also students will be exposed to quantitative techniques for analyzing and solving problems confronting the firm. Emphasis is placed on applying theoretical concepts to the real world decision-making environment. Prerequisite: Consent of instructor. (F;S;SS)

#### **ABM 648 – Agribusiness Financial Manage**

This course covers financial management, long-term investment analysis, the performance of alternative investments, and the theory of efficient markets. Topics covered include comparative financial analysis, short-term budgeting, and capital budgeting. Prerequisite: None. (F;S;SS)

#### **ABM 675 – Advanced Comput Ap in Agribusi**

This course is designed to provide students with the tools to utilize computers for agribusiness decision-making. Emphasis will be placed on utilizing existing software packages for microcomputers and mainframe computers to make financial, economic and quantitative analyses of farm and agribusiness-related problems. Prerequisite: None. (F;S;SS)

**ABM 705 - Statistical Meth for Agri**

Advanced topics on analysis of variance, regression, correlation, multistage sampling and probability are covered in depth. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**ABM 708 - Econometrics in Agribusiness**

Use of econometrics to enhance agribusiness decision making is the focus. Concepts of simple and multiple regression and limited dependent variable models are presented. Econometric issues of functional form, relevant variables, predictive performance and model diagnostics will be examined. Numerous applications of techniques to agribusiness problems are used. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**ABM 710 - Advanced Microeconomics Theory**

This course applies basic economic tools and models to problems involving supply, demand, individual consumer and firm behavior, and market structure. Basic market structure models covered include competition, monopolistic competition oligopoly, and monopoly. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**ABM 720 - Advanced Macroeconomic Theory**

A continuation of aggregate economics, with emphasis upon measurement, growth, and fluctuation of national income is the focus of this course. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**ABM 734 – Agribus Market and Inter Trade**

This course is designed to apply basic economic theory to interpret the essential components of the domestic and international marketing process for agricultural products. The primary focus will be on the spatial, temporal and form dimensional of market price analysis with significant emphasis on regional interrelationship and specialization, current trade issues and the rationale for trade. Prerequisite: None. (F;S;SS)

**ABM 736 – Agri Finance and Market Manage**

This course emphasizes the analysis of financial institutions and financial markets and policy issues of financial intermediaries of entrepreneurs, managers, or consultants of agriculturally related firms. Emphasis is placed on the analysis and problem solving faced by the agribusiness decision-maker. Case studies, research articles, and simulation games are used. Prerequisite: None. (F;S;SS)

**ABM 756 – Agri Marketing and Price Anal**

The use of price information in the decision-making process is the essence of this course. The relation of supply and demand in determining agricultural prices and the relation of prices to grade, time, location, and stages of processing in the marketing system are considered. The course also includes advanced methods of price analysis, the concept of parity and the role of price support programs in agricultural decisions. Prerequisite: None. (F;S;SS)

**ABM 796 - Master's Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal, which outlines the nature of the project, must be submitted for approval. This course is only available to project option students. prerequisite: None. (F;S;SS)

3.000 Credit hours

**ABM 797 - Master's Thesis Research**

Master of Science thesis research under the supervision of the thesis committee chairperson, leading to the completion of the Master's thesis. This course is only available to thesis option students. Prerequisite: None. (F;S;SS)

1.000 to 6.000 Credit hours

**ABM 799 - Master's Thesis Continuation**

This course is for master's students who have completed all required credit hour requirements.

Prerequisites: Completion of all course work and thesis/project Credits. (F;S;SS)

1.000 Credit hours

**ABM 825 - Research Methods in Agribusi**

The philosophical basis for research methods used in agribusiness is discussed. Alternative research methods are compared with respect to their dependence on the concepts of economic theory, mathematics and statistics. Alternative approaches to planning research projects are evaluated. Prerequisite: None.

(F;S;SS)

3.000 Credit

**AGED 600 - Youth Organ & Prgm Mgmt**

Principles, theories, and practices involved in organizing, conducting, supervising and managing youth organizations and programs will be examined. Emphasis will be on the analysis of youth organization and programs in vocational and extension education.

3.000 Credit hours

**AGED 601 - Adult Ed Vocation & Exten Ed**

This course is a study of the principles and problems of organizing and conducting programs for adults. Emphasis is given to the principles of conducting organized instruction in agricultural education, extension and related industries. (F)

3.000 Credit hours

**AGED 607 - Environmental Education**

This course examines the principles and practices of understanding the environment and the interrelated complexities of the environment and materials that need to be developed for use by high school teachers of agriculture and other professional workers. (S)

3.000 Credit hours

**AGED 608 - Agri Exten Organ & Methods**

The principles, objectives, organization, program development and methods in cooperative extension will be examined.

3.000 Credit hours

**AGED 609 – Community Analysis Rural Life**

This course is the study of the educational processes, structure and function of rural society, and the role which diverse organizations, agencies, and institutions play in the education and adjustment of rural people to the demands of modern society. (SS) (DEMAND)

3.00 Credit hours

**AGED 610 – International Edu in Agriculture**

This course examines formal and informal agricultural education systems and related situations and processes which influence agricultural development in developing countries. Included are the nature and

scope of the world food situation, the rationale and extent of U.S. involvement in development efforts, and the agencies and organizations involved and procedures they use. Educational programs that will enable families to improve their quality of life will be emphasized. (DEMAND)  
3.00 Credit hours

**AGED 611 - Spec Prob Agricul Ed & Exten** Special work in problems dealing with Agricultural Education and Extension will be examined. Students should be at the graduate level or be working on their lateral or provisional license in agricultural education. (Enrollment by permission of department) )  
Note: May be repeated for credit.  
1.000 TO 6.000 Credit hours

**AGED 612 - Field Studies in AG ED**  
Field Studies involved in Agricultural and Extension Education. (Enrollment by permission of department.) ) Note: May be repeated for credit.  
1.000 TO 6.000 Credit hours

**AGED 620 - Rural Communities and Leader**  
This course will focus upon the importance of grassroots leadership development within the context of rural community settings. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**AGED 703 - Scientific Mthds Research I**  
Methods of procedures in investigation and experimentation in education, accompanied by critical examination of studies made in agricultural education and related fields. A research problem is developed under the supervision of the staff.  
3.000 Credit hours

**AGED 704 - Found & Phil of AG ED**  
This advanced course deals with the development, organization, and philosophical foundations of agricultural education from colonial times to the present. Emphasis is placed on the role of societal and scientific changes, the federal government, and philosophy and its role in life including the rise of education in America, legislation having an impact on agricultural education, education in agriculture, and current issues in agricultural education on the evolution of agricultural education. Students will be expected to develop and defend their philosophy of agricultural education based on the foundations and philosophy of Agricultural Education. In addition to the above, students will be expected to research educational topics, critique the current research and present a seminar on their research topic.  
3.000 Credit hours

**AGED 705 - Current Trends in Ag**  
This course is designed as a research and discussion-based course that will provide students with an opportunity to explore broad and ever-changing arrays of social concerns and issues. Students will have to consider a variety of opinions and perspectives on controversial and complex topics. Ultimately students will have to take and defend a position. This course requires extensive class participation and discussion. The primary objective of this course is to add relevance to past and current studies as well as to promote global awareness, create an educated well as to promote global awareness, create an educated.  
3.000 Credit hours

**AGED 709 – Study Ap Tech Ad Best Prac Ag**  
This course provides students with an opportunity to observe and study the application of technological advances and best practices in a variety of settings in agriculture. In addition, students will work to develop a repertoire of skills and techniques that will enable them to select and apply innovations to their

own educational settings, particularly the infusion of technology into the curriculum. The program will draw on the expertise of industry specialists and researchers, field trips and labs will provide hands-on experience. Prerequisites: None. (SS)  
3.000 Credit hours

**AGED 710 - Prog Dsgn, Mgmt & Eval**

The planning, management and development of agricultural educational programs including needs assessment, objectives, development and content and materials selection. Evaluation of instructional programs; formative for program improvement and summative for outcome accountability. Prerequisite: None. (F;S)  
3.000 Credit hours

**AGED 711 - Clinical Mtds Tch Ag Assesment**

This course focuses on advanced concepts and methods relevant for both formal and informal agricultural education presentations, effects that methods may have on individuals involved in the learning experience and demonstrations of proficiency in use of various advanced methodologies, technologies and concepts. Students will focus on human learning development, diversity issues, motivational strategies to plan, use and evaluate student learning. Students will research and present projects based on the course of study. Students will keep a reflective journal based on the infusion of learning methods used in their educational occupations. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**AGED 712 - Agricultural Policy**

Students will become conversant with basic principles, procedures, and phases of public policy formulation, analysis and decision making. Students will use agricultural issues/problem and policy as case studies to trace the evolution of an issue/problem/felt need into legislation or policy. Students will also learn basic techniques for analyzing policy impacts. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**AGED 713 - Program Project Management**

Students will receive training in the processes of initiation, planning, executing, monitoring and closing, and associated methodologies in domestic and international contexts employing the template of project management body of knowledge (PMOBK). Review of the project impact on populations, the impact of affluence, technology and stewardship on natural resource use, and on achieving sustainable development in a global context.  
3.000 Credit hours

**AGED 715 – Employability Skills in Ag**

This course is designed for agricultural students who seek to enhance and reflect upon their employability skills. Students will review literature on the latest trends regarding employability skills required of workplace success. The course will focus on the following core skills: Communication, Self-Regulated Learning, Critical Thinking, and Team Work.  
3.000 Credit hours

**AGED 750 - Community Problems**

A study of the common problems of the community that relate to agriculture and related areas and of solutions for these problems.  
3.000 Credit hours

**AGED 751 - Curriculum Integration in AG** This advance course will center on the application of curriculum development models, theories and processes in agricultural education. A large portion of the

class will be devoted to the integration of agricultural curriculum into other subject areas such as Math, Science, English and History and the integration of other subject matter areas into agricultural education. Student will evaluate curriculum products and learn to all students as well as reinforce other curricular areas. modify curriculum to meet the needs of all students as well as reinforce other curricular areas. Students will see how content matter can be reinforced as it is taught across all curricular areas. Students will be expected to present a project based on developing curricular plans and materials that address curriculum integration as related to agricultural education. Prerequisite: None. (F,S)  
3.000 Credit hours

**AGED 752 - Inclus, Diversity, Eqty in Ag** This advance course will focus on the diverse needs of students for learning to take place. Special emphasis will be placed on the instruction of agricultural education to populations of students within economic, gender, ethnic, cultural, political, physical differences. Students will discover and use educational theory to examine strategies and plans to overcome problems in their educational occupations. Students will research both legal requirements and expectations that effect what can be done with increase student learning. Students will be required to develop and present a diversity management plan for their program. Prerequisite(s): None. (F;S)  
3.000 Credit hours

**AGED 753 – Tchng & Assessment Agri Prof**

This course focuses on concepts and methods relevant for both formal and informal education presentations, effects that methods may have on individuals involved in the learning experience and demonstrations of proficiency in use of various educational methodologies, technologies and concepts. Students will focus on human learning development, diversity issues, motivational strategies to plan, use and evaluate student learning. Students will research and present projects based on the course of study. Students will keep a reflective journal based on the infusion of learning methods used in their educational occupations. Prerequisite: None. (F;S)  
3.000 Credit hours

**AGED 754 – History of AG ED and Extension**

Historical development, social and philosophical foundations, and current status in relation to the total vocational education program. Special attention is given to agricultural education and extension as it developed in the United States.  
3.000 Credit hours

**AGED 785 – Agricult Industry Internship**

Students will spend five weeks (minimum of 200 hours) working for an agricultural company or organization. During this experience, students will be expected to work in different areas of the company or organization. A formal journal will be required to show evidence of learning objectives, experiences and reflections of how information and skills learned can be adapted to the student's educational occupation. The student, teacher educator and company/organization representative will establish activities to be accomplished for the five-week experience. The experience will be aligned with the subject matter in which the student is involved with in his/her educational occupation. Prerequisites: None. (F;S;SS)  
0 to 13 Credit Hours

**AGED 799 - MS Thesis Research**

Master of Science thesis research under the supervision of the completion of the Master's thesis. This course is only available to thesis option students. Prerequisite: Permission of advisor.  
6.000 Credit hours

**AGER 796 - Master's Project**

Students in the Non-thesis option will be required to complete an applied research project. Prerequisites: Advisor Consent. (F;S;SS) ) Note: May be repeated for credit.

3.000 Credit hours

#### **AGER 797 - Master's Thesis**

Master of Science thesis research under the supervision of the completion of the Master's thesis. This course is only available to thesis option students. Prerequisite: Permission of advisor. Prerequisites: Advisor Consent. (F;S;SS) ) Note: May be repeated for credit.

1.000 TO 6.000 Credit hours

#### **AGER 799 - Continuation Residency**

Meets requirement for continuous enrollment during final term prior to graduation when all course credit requirements (including thesis or dissertation) have been completed. This course is non-graded, may receive a grade of S/U, and credit for this course does not count toward the degree. May be repeated twice. Prerequisites: Graduate Standing. (F;S;SS) ) Note: May be repeated for credit.

1.000 TO 3.000 Credit hours

### **Agricultural Doctoral Program Core Courses**

#### **AGRI 880 - Agricultural Research Rotation**

This course provides students with an applied exposure to the various interdisciplinary concentrations within the Agricultural and Environmental Sciences doctoral program. Prerequisite: None. (F;S;SS)

3.000 Credit hours

#### **AGRI 885 - Special Topics in AGRI SCI**

This course introduces agricultural sciences special topics of current interest. Prerequisites: Graduate standing and Consent of Instructor. (F;S;SS)

3.000 Credit hours

#### **AGRI 892 - Research Tec and Proc in Ag Sc**

This course is designed to help graduate students develop the proficient bench top and hands-on research skills required to undertake and complete doctoral level research projects. This course will provide students with the training required to develop the skills to review and critically analyze research topics related to their research projects, justify the rationale for research, develop effective research experimental designs for their projects, and learn to write research proposals. Students will acquire skills in both qualitative and quantitative research techniques and learn to report research findings with implications and draw conclusions. Prerequisite: None. (F;S;SS)

3.000 Credit hours

#### **AGRI 992 - Graduate Seminar**

Graduate Seminar This course includes presentations delivered by the doctoral students, faculty, and invited speakers on topics related to agricultural and environmental sciences issues and research.

Prerequisite: None. (F;S;SS) 2.000 Credit hours 23.000 Lecture hours

2.000 Credit hours

#### **AGRI 997 - Doctoral Dissertation**

This course represents the supervised research leading to the dissertation for the doctoral student. Doctoral dissertation research will be conducted under the supervision of the dissertation committee chairperson and include regular meetings with the dissertation committee to evaluate progress on the

dissertation. Prerequisite: Doctoral standing. (F;S;SS)  
1.000 TO 12.000 Credit hours

**AGRI 999 - Contin of Thesis in Ag Educ**

This course meets the Graduate College requirement for continuous enrollment during the final term prior to graduation when all degree requirements (including dissertation hours) have been completed. The course is satisfactory/unsatisfactory. Credit for this course does not count toward the degree. May be repeated twice. Prerequisite: AGRI 997.  
1.000 Credit hours

**Natural Resource & Environmental Design**

**AGRI 604 - Experimental Mthds in Rsrch**

Experimental design, methods and techniques of experimentation, application of experimental design to plant, Animal and food research; and interpretation of experimental data will be included in the course. Prerequisite: MATH 224.(F)  
3.000 Credit hours

**AGRI 700 - Sustain Ag Local Food Sys Anal**

Sustainable Agriculture and local Food Systems Analysis: This course will focus upon issues impacting 21st Century Sustainable Agriculture and Local Food Systems, and offer interdisciplinary methods for approaching them. Prerequisite: None. (F)  
3.000 Credit hours

**AGRI 780 - Inte Prob Anal Agri Enviro Sys**

Students will be required to identify and analyze integrated case studies concerning issues and problems within Agricultural and Environmental Systems, for which they will research, design, and propose solutions. Additionally students will complete an integrated systems inquiry assessment within their respective concentrations. Prerequisites: Graduate Standing. (F;S;SS)  
3.000 Credit hours

**AGRI 799 - Thesis in Food & Nutri Sci**

Master of Science thesis research under the supervision of the thesis committee chairperson, leading to the completion of the Master's thesis. This course is only available to thesis option students.  
1.000 TO 6.000 Credit hours

**ENVS 622 - Sanitation and Waste Manage**

This course is the study of traditional and innovative methods of managing and handling liquid, solid and other forms of waste products in urban and rural environments. Prerequisites: Senior standing and consent of instructor. (F)  
0.000 OR 3.000 Credit hours

**ENVS 699 - Environmental Problems**

This course covers multidisciplinary examinations of environmental problems and application of innovative techniques of analysis to environmental problems. Team taught by environmental faculty. Prerequisites: Senior standing and consent of the instructor. (F)  
3.000 Credit hours

**HORT 600 - Advanced Tech for Hor Crop Im**

This course studies principles and techniques of plant cell, tissue and organ culture, embryogenesis and organogenesis breeding and genetic transformation, and their applications in horticultural crop improvement. Prerequisites: NARS 110, HORT 334. (F)  
0.000 OR 3.000 Credit hours

### **HORT 602 - Grapes and Small Fruits**

This course covers principles and production practices of the various varieties of grapes and small fruits produced in North Carolina. Prerequisite: NARS 110. (F;S)  
3.000 Credit hours

### **HORT 603 - Specialty Crops**

This course will cover production aspects of some specialized crops, like Mushrooms, Herbs and Medicinal plants. Prerequisites: NARS 110. (F;S)  
3.000 Credit hours

### **HORT 608 - Special Probs in Horticulture**

This course involves work along special lines given largely by the project method for advanced undergraduate and graduate students who have the necessary preparation. Special arrangement with instructor required. (F;S;SS)  
3.000 Credit hours

### **HORT 610 - Season Exten Sustainable Pro**

This course covers different options for producing vegetables, small fruits or other edible plant requiring limited space in an urban environment. From the production under protected conditions to season extension, what are the different possibilities offered to growers. Prerequisite: NARS 110. (F;S)  
2.000 Credit hours

### **HORT 611 - Prac in Sea Exten in Sus Prac**

This course offers practical experience on season extension and production of vegetables, small fruits or other edible plants requiring limited space in greenhouse, high tunnel and other techniques. Prerequisites: NARS 110, HORT 610 (or concurrent registration) (F;S)

### **NARS 601 - Plant Pathol Plant Disease Con**

Fundamental principles of plant pathology, including disease etiology, symptomatology, epidemiology of representative of different crop and tree diseases will be covered. Modern and biotechnology approaches to disease identification and control will be covered. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

### **NARS 603 – Principles of Entomol and Pest Management**

The course provides an understanding of arthropod biology and ecology, diversity and the approaches used in the sustainable management of insects and other arthropods of agricultural, urban, medical and veterinary importance. Prerequisites: BIOL 240, CHEM 106. (F;S;SS)  
0.000 OR 3.000 Credit hours  
3.000 Lecture hours  
0.000 Lab hours, [Combined Lecture and Lab](#)  
Levels: Graduate, Undergraduate

### **NARS 604 - Crop Ecology**

This course is the study of the physical environment and its influence on crops; geographical distribution of crops.  
3.000 Credit hours

**NARS 605 – Breeding of Crop Plants**

This course examines the following: the significance of crop improvements in the maintenance of crop as well as the yields; application of genetic principles and techniques used in the improvement of crops; and the place of seed certification in the maintenance of varietal purity. (DEMAND)

3.000 Credit hours

3.000 Lecture hours

**NARS 610 – Applied Spatial Statist and GIS**

This course introduces spatial statistical analysis techniques, which provide the students with the opportunity to conduct exploratory spatial data analysis with ArcView GIS, S- PLUS/ SpatialStats and the SAS/GIS Software. The focus of this course is on effective application of spatial data analysis in GIS environment; MATH 224 and GIS software or consent of instructor. (DEMAND)

0.000 OR 3.000 Credit hours

3.000 Lecture hours

0.000 Lab hours

**NARS 618 – Principles of Agroforestry**

This course discusses the principles and practices related to the emerging field of agroforestry. This course will enable students to understand the design, planning and implementation of agroforestry principles and practices. Course content focuses mainly on temperate agroforestry but will address tropical agroforestry.

Prerequisite: BIOL 140. (F;S;SS)

3.000 Credit hours

3.000 Lecture hours

**NARS 605 – Breeding of Crop Plants**

This course examines the following: the significance of crop improvements in the maintenance of crop as well as the yields; application of genetic principles and techniques used in the improvement of crops; and the place of seed certification in the maintenance of varietal purity. (DEMAND)

3.000 Credit hours

3.000 Lecture hours

**NARS 610 – Applied Spatial Statist and GIS**

This course introduces spatial statistical analysis techniques, which provide the students with the opportunity to conduct exploratory spatial data analysis with ArcView GIS, S- PLUS/ SpatialStats and the SAS/GIS Software. The focus of this course is on effective application of spatial data analysis in GIS environment; MATH 224 and GIS software or consent of instructor. (DEMAND)

0.000 OR 3.000 Credit hours

3.000 Lecture hours

0.000 Lab hours

**NARS 618 – Principles of Agroforestry**

This course discusses the principles and practices related to the emerging field of agroforestry. This course will enable students to understand the design, planning and implementation of agroforestry principles and practices. Course content focuses mainly on temperate agroforestry but will address tropical agroforestry.

Prerequisite: BIOL 140. (F;S;SS)

3.000 Credit hours

3.000 Lecture hours

**NARS 685 - Special Topics**

In this course, specific need areas will be taught as case scenarios involving literature searches, hands-on activities and lectures, as needed. Students will acquire specialized knowledge and learn new skills and terminology used in the specific case scenarios and conduct critical evaluations leading to reports and/or juried presentations. Prerequisites: Graduate of Senior Standing. (F;S;SS)

3.000 Credit hours

#### **NARS 700 – Intro to Grad Stud in Natu Res**

This course will prepare students for the entire Master's Program. Students will establish goals and objectives for their Master's Program. Faculty will present lectures on their research areas to acquaint students with research opportunities in the department. Prerequisites: None. (F;S)

3.000 Credit hours

3.000 Lecture hours

#### **NARS 708 – Soil Management and Conservation**

In this course, case scenarios will be discussed where appropriate soil and conservation techniques have improved soil productivity and resulted in sustainable food production system. Students will learn terminology used in soil conservation and management, read and critically evaluate reports/articles related to soil and water conservation and quality issues, understand the processes of soil degradation, and design land management plans that improve soil quality. Prerequisites: None. (F;S;SS)

3.000 Credit hours

3.000 Lecture hours

#### **NARS 789 - Grad Semi in Natural Resources**

This course teaches the fundamentals of proposal writing, thesis preparation; it prepares students to make scientific presentations and publish their research findings in scientific journals. Prerequisites: Graduate Standing. (F;S)

1.000 Credit hours

#### **NARS 796 - Master's Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal, which outlines the nature of the project, must be submitted for approval. This course is only available to project option students. Prerequisite: Consent of advisor. (F;S;SS)

3.000 Credit hours

#### **NARS 797 - Master's Thesis Research**

Master of Science thesis research under the supervision of the thesis committee chairperson, leading to the completion of the Master's thesis. This course is only available to thesis option students. Prerequisite: None. (F;S;SS) Note: May be repeated for credit.

1.000 TO 6.000 Credit hours

#### **NARS 799 - Thesis Rsrch Agric Env Sci**

Note: May be repeated for credit.

#### **SLSC 621 – Soil Microbiology**

A study of soil micro and macro organisms and their role in elemental cycles, environmental pollution remediation and crop yields. Also, deals with the rhizosphere ecology and processes. Organic matter accumulation and carbon sequestration in soils.

#### **SLSC 632 – Soil Physics**

This course is a study of fundamental physical principles and laws that govern the behavior of soils. Physical constitution of soil water, soil air and the relationship of soil physical conditions to physical conditions to plant growth and engineering usage will also be studied.  
3.000 Credit hours

**SLSC 633 - Soil Genesis Classif Land Use**

Factors and processes of soil formation, grouping of soils based on their properties, soil mapping, soil interpretations for various uses and discussion of new concepts in soil taxonomy will be studied.  
Prerequisite: SLSC 338 or consent of instructor. (F)  
0.000 OR 4.000 Credit hours

**SLSC – Soil Environmental Chemistry**

This course is a study of the chemical properties of soil environment including interactions of solid, liquid and gaseous phases. Discussion will also include ion and pollutant interactions with soil, their retention, potential movement and the environmental impact. Additional discussion will include oxidation and reduction, soil acidity and alkalinity and their impact on waste management, resource utilization and the environment. (F)  
4.000 Credit hours

**SLSC 640 - Wetland Management**

Designed to provide a basic understanding of the benefits that wetlands in their natural conditions offer mankind, Fish and wildlife habitat, water quality improvement, flood protection, filter traps for pollutants, erosion control, natural products, recreation, and aesthetics. Primary instructional areas will include ecology, wetland systems of the southeast region, wetland law and regulations, soil conditions of wetlands, hydrology of wetlands, methodology of delineating wetlands, wetland irrigation, plant and vegetation identification, and writing environmental reports. 3.000 Credit hours

**SLSC 710 – Soils of North Carolina**

A study of the factors basic to the understanding of the soils on North Carolina, their classification, and properties as related to sound land use and management.  
3.000 Credit hours

**SLSC 715 – Soil Mineralogy**

A study of soil minerals with regard to their composition, structure, classification, identification, origin, and significance. Special emphasis on primary weatherable silicate, layers silicates, and oxide minerals.  
3.000 Lecture hours

**SLSC 717 – Methodology Soil and Plant**

A study of principles involved in the analysis of soils, plants and water. Emphasis on basic instrumental and chemical methods for interpretation of soil fertility and environment. Instruction in the use of special instruments.  
3.000 Credit hours

**SLSC 718- Environment Soil Microbiology**

Discussion of interaction between micro-organisms and their physical environment, and significance of micro-organisms in eutrophication, mining spoils, and waste treatment. Prerequisites: General Microbiology 221 and consent of instructor.  
3.000 Credit hours

**SLSC 727 – Soil Fertil Plant Nutri Manage**

Soil fertility fundamentals, Chemical behavior of soil nutrients; Nutrient availability for plants, and environmental impacts of nutrient management.

3.000 Credit hours

**SLSC 734 – Environmental Soil Chemistry**

Soil properties and chemical reactions responsible for the reactivity of soils. Fundamental chemical processes that occur in soils. Interactions between soil and contaminants, modes of contaminant transport and techniques to remediate contaminated soils and water. Prerequisites: SLMG 300, SLMG 400. (F;S)

3.000 Credit hours

**SLSC 777 – Special Problems Plant Science**

3.000 Credit hours

**WMI 617 - Environ Ethics & Philosophy**

2.000 Credit hours

**WMI 619 - Environmental Justice**

This lecture class will cover case studies on landfills, air pollution issues, water pollution issues, solid waste disposal, hazardous waste disposal, nuclear waste issues, biological waste issues, ocean dumping, global oil spill and coastal impacts, incineration and climate issues.

Prerequisites: Senior Standing and Consent of instructor. (S)

3.000 Credit hours

**WMI 629 - Hazmat Training**

Students are introduced to regulations, toxicology, monitoring, chemistry, site characterization, safety plan, sampling, spill, control and emergency response. Emphasis is placed on 29 CFR 1910.120 OSHA regulations and other applicable standards. Students will receive a 40-hour Hazmat Training Certificate upon completion of this course in addition to a course grade.

Prerequisites: Consent of Instructor. (F;S)

3.000 Credit hours

**WMI 747 - Adv Waste Mgmt Capst Seminar I**

1.000 Credit hours

**Environmental Studies**

**ENVS 622 - Sanitation and Waste Manage**

This course is the study of traditional and innovative methods of managing and handling liquid, solid and other forms of waste products in urban and rural environments. Prerequisites: Senior standing and consent of instructor. (F)

0.000 OR 3.000 Credit hours

**ENVS 699 - Environmental Problems**

This course covers multidisciplinary examinations of environmental problems and application of innovative techniques of analysis to environmental problems. Team taught by environmental faculty.

Prerequisites: Senior standing and consent of the instructor. (F)

**Animal science**

**ANSC 611 – Nutrition**

Fundamental of modern animal nutrition; classification of nutrients, nutrient metabolism; nutrient partitioning in production. (S)

3.000 Credit hours

**ANSC 624 – Phys Reprod Verteb Species**

Mechanisms of reproductive processes with special emphasis on their interaction with the disciplines of nutrition, immunology and biochemistry. Prerequisite: ANSC 461, 623, or permission of instructor. (F)

3.000 Credit hours

**ANSC 637 - Environmental Toxicology**

Basic principles of environmental toxicology; regulatory perspectives; spills, anthropogenic pollution problems; ecological and human risk assessments; overview of classes of toxic agents, routes of exposure, target animals (aquatic, terrestrial, and mammalian species), and toxicological testing. Prerequisites: BIOL 101, CHEM 106 or 107, and CHEM 251. (S)

0.000 OR 3.000 Credit hours

**ANSC 641 - Disease Mgmt Livestock Poultry**

Prevention and control of diseases in livestock species and Poultry; Micro and macroenvironments that result in disease. Prerequisite: ANSC 451. (S)

0.000 OR 3.000 Credit hours

**ANSC 665 - Techniques in Biotechnology**

Basic principles and laboratory experiences in biotechnology Concepts of DNA structure, function, related applications in biotechnology. Methods: isolating DNA and RNA; genomic DNA and plasmid DNA analysis, gel electrophoresis, Southern hybridization, gene probes, and more. Prerequisite: CHEM 251, ANSC 214, BIOL 466, or permission of instructor. (F;S)

0.000 OR 3.000 Credit hours

**ANSC 701 - Topics in Animal Health**

Influence of the environment upon the health status of animals within the disciplines of epidemiology, toxicology, pathobiology, reproductive physiology, nutrition, and microbiology.

3.000 Credit hours

**ANSC 702 - Seminar in Animal Health**

Seminar includes faculty, graduate students, and guest lectures on research, scientific methods, the publication process and related topics in the field of animal health sciences.

1.000 Credit hours

**ANSC 708 - Sp Problems in Animal Health**

Independent investigations to strengthen the student's knowledge of the scientific methods. Investigations are conducted within a variety of research areas congruent with the environmental focus of the Animal Health Science program.

2.000 Credit hours

**ANSC 712 – Nutrition and Disease**

The effect of altering the levels and ratios of nutrients upon the health of an animal and resultant biochemical or biological processes. The effects of disease upon altered nutrient supply. Prerequisite: ANSC 611 or Permission of instructor.

3.000 Credit hours

**ANSC 713 - Global Livestock Systems**

Research relating to various phases of livestock production; the livestock enterprise on the whole farm system. Overall economic performance. (F)

3.000 Credit hours

**ANSC 723 – Animal Physiology**

An in-depth study of function and interrelationships among nervous, muscular, circulatory, respiratory, digestive, urinary and reproductive systems of laboratory and farm animals. Prerequisite: Permission of instructor.

3.000 Credit hours

**ANSC 771 - Bioinformatics Genome Analysis**

The course will be on bioinformatics and its application to genome analysis, computational tools and methods for organizing data, as well as large scale DNA sequencing, gene expression analysis methods and algorithms for basic and advanced search techniques.

3.000 Credit hours

**ANSC 782 - Cellular Pathobiology**

Current concepts of the structure, function and pathobiology of the cell. Methodologies used to study the cell and its processes. Prerequisite: Chem 651 or permission of instructor.

3.000 Credit hours

**ANSC 796 - Master's Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal, which outlines the nature of the project, must be submitted for approval. This course is only available to project option students. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**ANSC 797 – Master's Thesis Research**

Master of Science thesis research under the supervision of the thesis committee chairperson, leading to the completion of the Master's thesis. This course is only available to thesis option students. Prerequisite: None. F;S;SS)

1.000 TO 6.000 Credit hours

**ANSC 799 - Thesis Animal Health Science**

Note: May be repeated for credit.

1.000 TO 6.000 Credit hours

**ANSC 999 - Con't Thesis Anim Hlth Science**

Note: May be repeated for credit.

1.000 Credit hours

**LASC 660 - Tech Prep/Immu/Micro/Rad**

Special expertise in either the preparation of animal models for classroom, museum, and special display, the theoretical and practical aspects of immunological techniques, electron and light microscopy, radiology, tissue culture or histochemistry. Prerequisite: Senior standing or special departmental permission. (F;S;SS)

0.000 OR 3.000 Credit hours

## Family and Consumer Sciences

### **FCS 603 - Sp Prob In Fam And Cons Sci**

Problems in the various areas of Family & Consumer Sciences may be chosen for individual study.  
3.000 Credit hours

### **FCS 604 – Seminar In Fam and Cons Sci Ed**

Consideration of problems resulting from the impact of social change in the various fields of Human Environment and Family Sciences, and the review of research and professional development will be included in this course.

3.000 Credit hours

### **FCS 629 - Appl Princ Infant & Toddler Cur**

This course is designed to link child development theories, assessment, and classroom practices for infant, toddlers, and young children, birth to age three, and their families. A major emphasis of this course is to prepare students to plan, implement, and evaluate developmentally, individually, and culturally appropriate child care practices, teaching strategies and learning environments for infants, toddlers, and young children with and without disabilities. Students will apply content knowledge, skills, and dispositions in the field-based experience. Prerequisites: FCS 600. (F:S)

3.000 Credit hours

### **FCS 631 – Food Chemistry**

This course is the study of food components, their interactions and reactions with emphasis on biochemical changes in fruits and vegetables on post harvest storage, postmortem biochemical changes in meat and fish, browning reactions, lipid oxidation and other chemical alternations in food. Prerequisite: FCS 236. (F)

3.000 Credit hours

### **FCS 633 - Food Analysis**

This course is the study of fundamental chemicals, physical and sensory aspects of food composition as they relate to physical properties, acceptability and nutritional values of foods. Prerequisites: CHEM 102, 112, and FCS 236.

3.000 Credit hours

### **FCS 637 - Spe Prob Food Nutrit-Food Sci**

This course provides independent study/research in the areas of Food and Nutrition or Food Science. Prerequisites: Junior, senior, graduate standing, and consent of instructor.

3.000 Credit hours

### **FCS 639 - Appl Prin Preschl Kinderg Curr**

This course involves the study of basic principles, materials, and evaluation measures underlying acting leading experiences in improving children's intellectual styles and social relations. Special attention is given to goals and objectives, daily routine, teacher-made materials, questioning techniques and ideas for small and large group activities. Simulated teaching experiences are required. Prerequisites: FCS 310, 311, 414, and 600.

3.000 Credit hours

### **FCS 640 - Geriatric Nutrition**

Multi-disciplinary approaches to geriatric foods, nutrition and health problems. Evaluation of nutritional status and nutrition care of the elderly is emphasized. Field experiences: nursing home and other

community agencies. Prerequisites: FCS 337.  
3.000 Credit hours

### **FCS 641 - Food Protection and Defense**

This course covers foundational and advanced concepts and policies related to protecting the food supply from intentional contamination. Prerequisite: Permission of Instructor. (F;S;SS)  
4.000 Credit hours

### **FCS 643 - Food Preservation**

This course is a study of current methods of preserving foods - canning, freezing, dehydration, radiation and fermentation. Prerequisite: FCS 236 or equivalent.  
3.000 Credit hours

### **FCS 679 - Nutrition Education**

This course covers the philosophy, principles, methods and materials involved in nutrition education. The application of nutrition knowledge and skills in the development of the nutrition education curriculum and programs in schools and communities are implemented. Prerequisites. (FCS) 332 and 337. Students must be advanced undergraduate or graduate level.  
3.000 Credit hours

### **FCS 681 - Curr Instruct Plan Assessment**

This course addresses the need for planning programs in education. The course covers teaching objectives, curriculum models, evaluation of family and consumer sciences programs, use of advisory groups, organizations, and use of resources and facilities. Prerequisites: Consent of Instructor. (F;S)  
3.000 Credit hours

### **FCS 682 - Advanced Interior Design**

This course will address the current aspects of interior design. Topics to be covered include certification laws, fire-safety and abrasions resistance requirements for furniture and fabrics, accommodations for universal access, and issues of environmentalism. Stylistically, the course will address neoornamentalism, post modernism, and deconstructionism. Additionally, students will be made aware of new composite materials, acoustic controls, and lighting types. Prerequisites: Consent of Instructor, (F;S)  
3.000 Credit hours

### **FCS 683 - Consumer Behavior in Fashion**

This course is the study of how the consumer's world is influenced by the actions of fashion marketers and how fashion marketers are influenced by consumers. Marketing and consumer behavior theories and concepts as they apply to fashion will be discussed. Results of research studies will be used to illustrate marketing and consumer behavior theories and concepts. Students will gain an understanding of how fashion shapes the everyday world of consumers. Prerequisites: Permission of Instructor. (F;S)  
3.000 Credit hours

### **FCS 692 – Advanced Nutrition Assessment**

This course is designed to provide the student with advanced knowledge and skills for the assessment of the nutritional status of individuals. Students will develop nutrient-based care plans for persons with various disease conditions.  
3.000 Credit hours

### **FCS 693 - Advanced Sensory Evaluation**

The course describes basic concepts related to sensory evaluation techniques. Students will learn how to use discrimination/difference, acceptance and descriptive tests, their applications, strengths and

weaknesses. Correct interpretation of the data and factors that influence sensory perception will be discussed. Prerequisite: None. (F;S;SS)  
3.000 Credit hours (2-2)

### **FCS 695 - Advanced Food Analysis**

This course is the study of fundamental chemicals, physical and sensory aspects of food composition as they relate to physical properties, acceptability and nutritional values of foods. Students will explore advanced analytical tools as they relate to food analysis issues and research. Prerequisite: None. (F;S;SS)  
3.000 Credit hours (2-2)

### **FCS 696 - Advanced Food Preservation**

This course is a study of advanced aspects of modern methods of preserving foods-canning, freezing, dehydration, radiation, and fermentation. Prerequisite: None. (F;S;SS)  
3.000 Credit hours (2-2)

### **FCS 697 - Adv Food Microbio Biotech**

This course is designed to teach students about basic and advanced knowledge in fermentation, food borne illnesses, food spoilage, as well as the differences and similarities between each. Student will learn about the microorganisms involved in each of these processes as well as the health promoting microorganisms known as probiotics. Importantly, students will learn about methods for their food microorganism control.  
3.000 Credit hours

### **FCS 698 - Advanced Nutrition Education**

This course covers the philosophy, principles, methods and materials involved in nutrition education. The application of nutrition knowledge and skills in the development of the nutrition education curriculum and programs in schools and communities are implemented. Students will examine research related to the impact of nutrition on health and wellness.  
3.000 Credit hours

### **FCS 699 - Advanced Community Nutrition**

This course covers advanced application of the principles of nutrition to various community nutrition problems of specific groups ((geriatrics, preschoolers, adolescents and expectant mothers). Students will evaluate nutrition programs of public health and social welfare agencies at local, state, federal and international levels and examine research related to community nutrition. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

### **FCS 692 – Advanced Nutrition Assessment**

This course is designed to provide the student with advanced knowledge and skills for the assessment of the nutritional status of individuals. Students will develop nutrient-based care plans for persons with various disease conditions.  
3.000 Credit hours

### **FCS 693 - Advanced Sensory Evaluation**

The course describes basic concepts related to sensory evaluation techniques. Students will learn how to use discrimination/difference, acceptance and descriptive tests, their applications, strengths and weaknesses. Correct interpretation of the data and factors that influence sensory perception will be discussed. Prerequisite: None. (F;S;SS)  
3.000 Credit hours (2-2)

### **FCS 695 - Advanced Food Analysis**

This course is the study of fundamental chemicals, physical and sensory aspects of food composition as they relate to physical properties, acceptability and nutritional values of foods. Students will explore advanced analytical tools as they relate to food analysis issues and research. Prerequisite: None. (F;S;SS)  
3.000 Credit hours (2-2)

**FCS 696 - Advanced Food Preservation**

This course is a study of advanced aspects of modern methods of preserving foods-canning, freezing, dehydration, radiation, and fermentation. Prerequisite: None. (F;S;SS)  
3.000 Credit hours (2-2)

**FCS 697 - Adv Food Microbio Biotech**

This course is designed to teach students about basic and advanced knowledge in fermentation, food borne illnesses, food spoilage, as well as the differences and similarities between each. Student will learn about the microorganisms involved in each of these processes as well as the health promoting microorganisms known as probiotics. Importantly, students will learn about methods for their food microorganism control.  
3.000 Credit hours

**FCS 698 - Advanced Nutrition Education**

This course covers the philosophy, principles, methods and materials involved in nutrition education. The application of nutrition knowledge and skills in the development of the nutrition education curriculum and programs in schools and communities are implemented. Students will examine research related to the impact of nutrition on health and wellness.  
3.000 Credit hours

**FCS 699 - Advanced Community Nutrition**

This course covers advanced application of the principles of nutrition to various community nutrition problems of specific groups ((geriatrics, preschoolers, adolescents and expectant mothers). Students will evaluate nutrition programs of public health and social welfare agencies at local, state, federal and international levels and examine research related to community nutrition. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**FCS 700 - Adv Multicul Aprprch Chld Dev**

This course analyzes how national and international cultural experiences impact the purposes and practices of educational programs and policies. The research base for teaching and learning methods that are responsive to diverse learners will be examined. Students will develop systemic educational models that address child and family diversity. Prerequisites: Completion of Phase I or Permission of Instructor. (F;S)  
3.000 Credit hours

**FCS 701 - Family in Contemporary Society**

This course will focus on the advanced theoretical approaches to understanding the roles and responsibilities of family functioning, priorities and concerns within the context of a diverse society. This course will also address the professional's role in promoting optimal family functioning. Prerequisites: FCS 611, SPED 600 or Permission of Instructor. (F;S)  
3.000 Credit hours

**FCS 702 - Ad In Meth in Fam and Con Sci**

This course provides differentiating instructional strategies and techniques that respond to the diverse learning styles and needs of learners. The theoretical foundation and practical application of one or more teaching strategies will be explored and critically assessed within the context of sound curriculum design,

principles and processes at the preschool and secondary levels. Prerequisite: Permission of instructor. (F;S;SS)  
3.000 Credit hours

**FCS 703 - Fam Consum Sci Edu Prin Design**

This course will focus on the historical and legislative viewpoints, as well as program design, national standards, and discipline-specific body of knowledge of family and consumer sciences. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**FCS 704 - Cur Issues in Fam and Con Sci**

This course will examine current and relevant issues, trends and initiatives at the local, state, national, and international levels as they relate to family and consumer sciences. Prerequisites: Completion of Phase 1 or Consent of Instructor. (F;S;SS)  
2.000 Credit hours

**FCS 710 - Assess & Eval in Div Inst Set**

This course will focus on the collection and use of multiple assessment methods and approaches from multiple sources of information across diverse learning settings to support all children's individual and unique learning strengths and needs, as well as inform curriculum and environmental decisions. Applied activities in classroom settings will be included. Prerequisites: FCS 611, SPED 661 or consent of instructor. (F;S;SS)  
3.000 Credit hours

**FCS 711 - Re Design Meth in Fam Con Sci**

This is an introductory course in research methodology to include formulation of a research problem, design, sampling, data collection, measurement, data analysis, interpretation, and writing the research report. Students will examine current research in Child, Family, Food & Nutrition and Consumer Sciences. Prerequisites: Graduate Standing. (F;S;SS)  
3.000 Credit hours

**FCS 713 - Early Chld Leader and Prof Dev**

This course examines a variety of leadership models, roles, and personal styles. Topics will include problem analyses, collaboration, conflict resolution, group facilitation, effective communication, and reflective practice. Strategies for valuing, supporting and sustaining life-long learning through personal and professional growth will be explored. Prerequisites: Completion of Phase 1. (F;S)  
3.000 Credit hours

**FCS 714 - Family Financial Management**

This advanced course focuses on the integration of family financial management behavior and decision making over the life cycle. Effects of public policy on household financial decisions and interrelationships between management behavior and the labor market will be examined. Prerequisite: Graduate Standing. (F;S;SS)  
3.000 Credit hours

**FCS 715 - Trace Elements and Nutrition**

Physiological functions and requirements of trace minerals as well as the roles of trace minerals in health and disease will be discussed. Prerequisites: FCS 357, CHEM 651. (F;S;SS)  
3.000 Credit hours

**FCS 716 - Social Entrepreneurship in FCS**

This course provides an overview of social entrepreneurship within the family and consumer sciences field. Students will analyze historic and current factors contributing to the diversity in individuals, families, and communities and the challenges they face. Students will identify social concerns and integratively apply family and consumer sciences disciplinary knowledge, critical thinking and entrepreneurial skills to develop innovative and timely solutions. Prerequisite: Graduate Standing  
3.000 Credit hours

#### **FCS 717 - Practicum in Fam and Cons Sci**

This is an experiential course in which students will apply knowledge and skills in their study of family and consumer sciences. Field experiences with private or public agencies will be required. Students will work under the supervision of an on-site practicum supervisor and a family and consumer sciences faculty member. Prerequisites: Permission of instructor and completion of 12 credit hours of graduate level coursework  
3.000 Credit hours

#### **FCS 730 - Nutrition and Disease**

Significance of nutrition in health and disease. Consideration of: (1) the methods of appraisal of human nutritional status to include clinical, dietary, biochemical, and anthropometric techniques; (2) various biochemical parameters used to diagnose and treat disorders; and (3) the role of diet as a therapeutic tool. Prerequisite: FCS 630 or equivalent.  
3.000 Credit hours

#### **FCS 733 – Nutrition During Growth and Dev**

Nutritional, genetical and environmental influences on human growth and development. Prerequisites: FCS 554 or equivalent. (F;S;SS)  
3.000 Credit hours

#### **FCS 734 – Nutrition Education**

Interpretation of the results of nutrition research for use with community groups. Preparation of teaching materials based on research for use in nutrition education programs. Prerequisite: FCS 357. (F;S;SS)  
3.000 Credit hours

#### **FCS 735 - Experimental Foods**

Objective and subjective evaluation of food, development and testing of recipes, and experimentation with food. Prerequisite: HEFS-236 or equivalent.  
4.000 Credit hours

#### **FCS 736 – Res Meth in Food and Nutrition**

Experimental procedures in food and nutrition research care of experimental animals, analysis of food, body fluids, and animal tissues. Prerequisite: Math 224 or equivalent.  
4.000 Credit hours

#### **FCS 738 – Advanced Food Product Development**

This course provides experience for those interested in Food Science and requires the application of food chemistry, food processing/engineering, microbiology, regulatory, and other course concepts in formulating a new food product. The course will require the integration of scientific principles and the use of problem solving skills to address a specific project development objective from concept to finished product.  
3.000 Credit hours

#### **FCS 739 - Thesis Research**

Research problems in food or nutrition.  
3.000 Credit hours

**FCS 740 - Community Nutrition**

Application of the principles of nutrition to various community nutrition problems of specific groups (geriatrics, preschoolers, adolescents and expectant mothers). Evaluation of nutrition programs of public health and social welfare agencies at local, state, federal and international levels. Prerequisites: FCS 357. (F;S;SS)  
3.000 Credit hours

**FCS 760 - Gradu Semi in Fam and Con Sci**

This course provides opportunities for the presentation and discussion of selected topics of interest such as faculty and student research interests, communication, problem solving, professional development, and current issues and trends. Prerequisite: Graduate Standing. (F;S;SS)  
1.000 Credit hours

**FCS 769 - Special Topics**

The course is designed to allow the introduction of potential new courses on a trial basis or the offering of special course topics on a once-only basis. The course may be offered to individuals or groups of students. A definite topic must be agreed upon by the faculty before the student registers for the course. Prerequisite: Graduate Standing. (F;S;SS)  
3.000 Credit hours

**FCS 784 - Practicum in Food and Nutri**

Field experiences with private or public agencies. Prerequisite: Students must have completed at least 12 credit. (F;S;SS)  
3.000 TO 10.000 Credit hours

**FCS 789 - Graduate Seminar**

This course provides opportunities for the presentation and discussion of selected topics of interest such as faculty and student research interests, communication, problem solving, professional development, and current issues and trends. Prerequisite: Graduate Standing. (F;S;SS)  
1.000 Credit hours

**FCS 797 - Thesis Research**

Research problems in food or nutrition. Prerequisites: Advisor Approval. (F;S;SS) Note: May be repeated for credit.  
1.000 TO 6.000 Credit hours

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## COLLEGE OF ARTS, HUMANITIES AND SOCIAL SCIENCES

<http://www.ncat.edu/cahss/index.html>

Frances Ward-Johnson, Dean

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### OBJECTIVES

The College of Arts, Humanities and Social Sciences at North Carolina Agricultural and Technical State University introduces the student to the world of higher education and its many fields of human interests. The College provides opportunities for the acquisition of knowledge, skills, attitudes and behavioral patterns that promote excellence and competence. Our primary aim is to provide students with a global educational experience which prepares them to perform in a variety of dynamic leadership and employment situations. Through its formal curriculum and program of study in the arts and humanities, and the social sciences, the College intends to achieve the following objectives:

1. Provide courses of instruction and service-learning experiences that prepare students for professional or self-employment.
2. Provide opportunities and experiences for the student to acquire analytical and critical thinking skills.
3. Provide training in effective communication.
4. Stimulate and encourage individual creativity and personal development through research and related activities.
5. Foster and inspire creativity, self-discipline, and objective thinking among our students.
6. Provide the undergraduate academic foundation for successful graduate and professional education.

### DEGREE PROGRAMS OFFERED

#### Doctoral Degrees

- Ph.D. Social Work (Joint with UNCG)

#### Masters Degrees

- MSW Social Work (Joint with UNCG)
- MA English and African American Literature

#### Graduate Certificates

- Technical and Professional Communication

## English and African American Literature, MA

College of Arts Humanities and Social Sciences

**Graduate Coordinator:** Hope Jackson

**Email:** jacksonw@ncat.edu

**Phone:** (336)285-3513

**Department Chair:** Jason DePolo

**Email:** jdepolo@ncat.edu

**Phone:** (336)285-3506

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The objective of the M.A. program in English and African American literature is to provide in-depth training in English Education; English, American and African American literature; folklore and language. The department introduces students to a diverse range of graduate-level work, including critical theory, graduate literary studies, and contemporary practices in grammar and rhetoric. Students' exposure to various genres and works of African American, American and English literatures will provide a substantial foundation for continued study at the doctoral level as well as preparation for various professional and teaching contexts. The program provides students the opportunity to explore critical theories and hone their critical reading, thinking and writing skills. It also offers a solid foundation for those who may choose to seek a Ph.D. in such disciplines as African American, Comparative, and English Literatures as well as African American, Africana, Cultural, Ethnic, Gender, Subaltern and Women's Studies.

### **Additional Admission Requirements**

1. At least 24 undergraduate credit hours in English
2. Writing Sample (undergraduate research paper, literary analysis, etc.)
- 3.

### **Degree Requirements**

Total credit hours: 30

- Core Courses (9 credit hours): ENGL 700, 753, 755

#### Thesis Option

- Select 9 (or 6) credit hours in African American Literature from: ENGL 631, 650, 652, 656, 658, 660, 744, 760, 762, 764, 790
- Select 6 (or 9) credit hours in English and American Literature from: ENGL 603, 628, 631, 653, 672, 701, 703, 705, 706, 707, 709, 712, 721, 722, 723, 724, 731, 744, 790
- Thesis: ENGL 797 (6)

#### Non-Thesis Option

- Select 12 credit hours in African American Literature from: ENGL 631, 650, 652, 656, 658, 660, 744, 760, 762, 764, 790
- Select 9 credit hours in English and American Literature from: ENGL 603, 628, 631, 653, 672, 701, 703, 705, 706, 707, 709, 712, 721, 722, 723, 724, 731, 744, 790

## Certificate - Technical and Professional Communication (TPC)

College of Arts Humanities and Social Sciences

**Graduate Coordinator:** Hope Jackson      **Email:** jacksonw@ncat.edu      **Phone:**(336)285-3513

**Certificate Coordinator:** Kimberly Harper      **Email:** kharper@ncat.edu      **Phone:**(336)334-7764

**Department Chair:** Jason DePolo      **Email:** jdepolo@ncat.edu      **Phone:**(336)285-3506

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The objective of the Graduate Certificate in Technical and Professional Communication is to provide post-graduate training in technical and professional communication, digital rhetoric, medical rhetoric, discourse analysis, and editing. The department introduces students to a diverse range of graduate-level work, including critical theory, graduate literary studies, and contemporary practices in grammar and rhetoric. The program provides students the opportunity to explore critical theories and hone their critical reading, thinking, writing, and editing skills. It also offers a solid foundation for those who may choose to seek a Ph.D. in such disciplines as Technical and Professional Communication or English Studies, Technical and Professional Discourse or who wish to work as technical communicators in professional industry.

### Admissions Requirements

1. B.A. or B.S degree from a regionally accredited college or university
2. Cumulative GPA of 2.80 or higher from the undergraduate degree-granting institution
3. Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Additional Admission Requirements

- Writing Sample (undergraduate research paper, workplace writing sample)
- Letter of Reference
- Curriculum Vita and/or Resume

### Certificate Requirements

Total credit hours: 15

- Required Courses (6 credit hours): ENGL 713, 716
- Select (9 credit hours) of electives from: English 707, English 714, English 715, English 717, English 718, English 719

## **COURSE DESCRIPTIONS: College of Arts, Humanities, and Social Sciences**

### **English**

#### **ENGL 600 - Language Variations in American English**

This course is a survey of regional and social dialects in the United States and a study of their interrelationship; examples of some of the motivations for dialectical divergences, especially in the instance of non-standard dialects; and a consideration of functional varieties and social dialect shifting. Prerequisite: ENGL 310 or graduate standing.

3.000 Credit hours

#### **ENGL 602 - Advanced Methods for Teaching English in Secondary School**

This course prepares students to become effective teachers of secondary English/Language Arts. Students will explore the materials and methods of teaching English, especially as related to the successful implementation of instruction based on the Common Core State Standards for English/Language Arts.

Prerequisite: EDPR 520. (F;S)

3.000 Credit hours

#### **ENGL 603 - Introduction to Folklore**

This course is a basic introduction to the study and appreciation of folklore. (Cross-listed as Anthropology 603 (summer/alternate years))

3.000 Credit hours

#### **ENGL 627 - High School Literature**

This course acquaints prospective and in-service teachers with a wide variety of literature taught in the high schools of North Carolina. Students will survey texts in a variety of genres, select texts appropriate for high school programs, examine themes found in the literature, and investigate strategies for encouraging student reading. Prerequisite: None. (F;S;SS)

3.000 Credit hours

#### **ENGL 628 – The American Novel**

This course is a history of the American novel from Cooper to Faulkner; Melville, Twain, Howells, James, Dreiser, Lewis, Hawthorne, Faulkner and Hemingway will be included. Prerequisite: English 210. (Demand) 3.000 Credit hours

#### **ENGL 629 – Dimensions of Literacy**

This course introduces students to the various dimensions of literacy. Literacy will be studied from linguistic, cognitive, sociocultural, developmental, and educational perspective, linking theory and research to practice. The topical foci include the nature of language, oral-written language relations, reading comprehension, writing processes, literacy as social practices, and the teaching of literacy skills.

Prerequisites: Senior Standing or above or by Permission of Instructor. (F;S;SS) 3.000 Credit hours

#### **ENGL 630 – Sociolinguistics**

This course introduces students to the study of language in social contexts. Students will explore the relationship between language and society by examining language variations among different cultures, genders, and societal positions. The course focuses on how language both constructs and is constructed by identity in reference to language and power, vernacular dialects, pidgins and creoles, language and gender differences, and technologies' impact on language use and reception. Prerequisites: Senior Standing or above or by Permission of Instructor. (F;S;SS) 3.000 Credit hours

**ENGL 631 – Black Women Writers of the African Diaspora**

This course is a global coverage of Black women writers of African descent. (F;S;SS) 3.0 Credit hours

**ENGL 650 – African American Folklore**

This course studies folk tales, ballads, riddles, proverbs, superstitions, and folk songs of African Americans. Parallels will be drawn between folklore peculiar to African-Americans and that of Africa, the Caribbean, and other nationalities. (Spring) 3.000 Credit hours

**ENGL 652 – African American Drama**

This course is a detailed study of the dramatic theory and practice of African American writers against the backdrop of Continental and American trends. Special attention will be given to the works of major figures from the Harlem Renaissance to the present. Works by Bontemps, Cullen, Hughes, Hansberry, Ward, Davis, Baldwin, Baraka (Jones), Gordone, and Bullins will be included. (Demand) 3.000 Credit hours

**ENGL 653 - Teaching English as a Second Language**

This course introduces prospective secondary and college teachers of students learning English as a second and/or a foreign language to various pedagogical approaches. The course will explore theories and practices aimed at second language acquisition involving reading and writing. (F;S;SS) 3.000 Credit hours

**ENGL 654 - African American Novel I**

This course is an intensive bibliographical, critical, and interpretative study of novels by major African American writers through 1040. Novelists emphasized include Dunbar, Chestnutt, Toomer, McKay, Larsen, Hurston, Griggs, Fauset, and Wright. 3.000 Credit hours

**ENGL 656 - African American Novel II**

This course is an intensive bibliographical, critical, and interpretative study of novels by major African American writers after 1040. Novelists emphasized include Wright, Ellison, Baldwin, Himes, Demby, Williams, Walker, Brooks, Petry, Gaines, and Mayfield. 3.000 Credit hours

**ENGL 658 - African American Poetry I**

This course is an intensive study of African American poetry from its beginning to 1940, with special attention given to poets of the Harlem Renaissance. Poets to be studied include Terry-Hammon, Wheatley, A. A. Whitman, Horton, Braithwaite, J.W. Johnson, Horne, Fenton Johnson, George Douglas Johnson, McKay, Cullen, Cuney, and Hughes. 3.000 Credit hours

**ENGL 660 - African American Poetry II**

This course is an intensive study of African American poetry from 1940 to the present with considerable attention given to the revolutionary poets of the sixties and seventies. Poets to be studied include Hughes, Walker, F.M. Davis, Brooks, Brown, Hayden, Tolson, Lee, Reed, Giovanni, Angelou, Jeffers, Sanchez, Redman, Fabio, Fields, and Baraka. 3.000 Credit hours

**ENGL 672 - Directed Study in English**

3.000 Credit hours

**ENGL 700 - Introduction to Critical Theory**

This course outlines and critiques major movements in contemporary literary theory, including, for example, Marxism, feminism, and various poststructuralisms. Prerequisites: Graduate. (S)  
3.000 Credit hours

**ENGL 708 Issues in Digital Composition: Race, Rhetoric, and Technology**

Race is a multi-faceted concept and reality that can function as a representation or a mediating cultural and political technology. Indeed, Chun and many critical race scholars argue that race is a significant organizing force in our everyday lives. In effect, race is similar affect the way we mediate our beliefs and actions in the world. Conversely, both rhetoric and digital technologies have central roles in developing race and racism in the 21st century. This seminar will explore how race, rhetoric, and technology are interconnected in fundamental ways of writing. This course will draw on work from a variety of fields such as Communications, Media Studies, Cultural Studies, and artistic/critical productions from popular culture. Students will be encouraged to create intersections between readings and their own scholarly interests.  
3.000 Credit hours

**ENGL 712 - Teaching of Freshman Writing**

This course is required of all English graduate teaching assistants (GTAs), and is designed solely to provide an academic setting for the theoretical and practical components of teaching English 100. GTAs will discuss and implement writing assignments, exercises in literature and grammar, and the methods of leading class discussion.  
3.000 Credit hours

**ENGL 713 - Introduction to Technical and Professional Communication Theory**

This required course introduces students to the history and theory of technical and professional communication as well as a variety of problem-solving strategies for technical scientific communication. The course also introduces students to principles of effective writing and includes practice in writing short reports, proposals, and other documents in technical and scientific fields. This course is designed to introduce students of technical and professional communication to some central works in the field, familiarize them with some of the prominent theorists, and present some of the notable theoretical approaches. Our inquiries will be grounded in application, with frequent references to the practice of technical and professional communication, and to the artifacts (manuals, online help, Web pages, Social medial, and so forth) that technical and professional communicators produce on the job.  
3.000 Credit hours

**ENGL 714 – English Advanced Discourse Analysis**

The terms discourse and discourse analysis carry a range of meanings, often depending on the disciplinary and/or theoretical perspective of the individual using them. There is a cluster of meanings for these terms as they are used within cultural studies and a different (though sometimes overlapping) set of meanings as they are used with linguistics. This course is taught from a social linguistic perspective, so a linguistic approach will predominate, but students will also survey variety of theoretical and methodical approaches to discourse analysis. It is assumed that students will have some familiarity with the structure of English grammar, but it is not expected for students to have previous studies in linguistics or in discourse analysis.  
3.000 Credit hours

**ENGL 715 - Technical and Scientific Editing**

This course addresses the roles, responsibilities, and practices of an editor. Students learn how to establish effective relationships with authors, edit manuscripts to make them clear to readers or consistent with the policies of an organization, mark copy for typesetters, edit online, and create and use style guides. In

addition to editing the printed document, students will also learn to edit online documents and design evaluation strategies.

3.000 Credit hours

### **ENGL 716 - Managing Technical & Scientific Communication Departments (required)**

This course addresses the responsibilities of people who manage technical and scientific communication systems, including in-house communication departments, independent companies, organization-wide information policies, professional journals, and other publications. By reading, speaking with practicing managers, and analyzing case studies, students will learn about the strategies used by managers of such systems.

3.000 Credit hours

### **ENGL 717 – Technical Communication, Rhetoric, & Social Justice**

This course examines the discursive practices of activism and focuses on the rhetorical practices through which people organize. It also looks at the role technical communication plays in the world of advocacy for underrepresented groups. Students will identify and study the rhetorical practices of social movement groups that work on behalf of underrepresented groups in society.

3.000 Credit hours

### **ENGL 718 Writing/Researching & Writing Public Policy**

This course introduces the principles of rhetoric/s of public writing and public policy. Drawing from interdisciplinary scholarship, we will query notion(s) of public(s), the relationship of private and public spheres, and how counter publics emerge in response to dominant publics and cultural hegemony. We will examine the intersection of democracy, agency, and public rhetoric as well as consider various methodologies for analyzing and critiquing the circulating and networked discourses of the public sphere. Students will gain a broader understanding of how discursive controversies arise when communal ideals and policies are challenged in response to emerging rhetorical situations as well as how citizens in local communities become active participants in the formulation of policies that affect their lives. This course introduces theories and strategies of civic engagement, how texts engage and encourage participation in communities, and how texts circulate to shape and influence publics. Ultimately, we consider how to engage publics to actively participate in deliberations and the power relations, ethics, politics, economics, and history that influence these deliberations.

3.000 Credit hours

### **ENGL 719 Rhetorics of Health & Medicine**

This class will focus on formulating arguments, presenting data and conveying medical information and is designed to help clinicians, clinical investigators, researchers and allied health professionals achieve their personal writing and career objectives. We will study the intersectionality of race, class, and gender and explore how it affects the rhetoric of health and medicine. This class also investigates persuasion in contemporary medicine/health care from clinical settings through mass media. Case studies explore contagion, health policy, the body, death, and biopower. The course requires extensive discussion of readings and an original research project.

3.000 Credit hours

### **ENGL 721 - Major American Writers I**

This course is an intensive bibliographical, critical, and interpretive study of works by major American writers through 1900. Writers to be discussed will vary, and will include Emerson, Fuller, Thoreau, Melville, Dickinson, and James, among several others.

3.000 Credit hours

**ENGL 722 - Major American Writers II**

This course is an intensive bibliographical, critical, and interpretive study of works by major American writers from 1900 to the present. Writers to be discussed will vary, and will include Stein, Eliot, Hemingway, Faulkner, Toomer, Hurston, Frost, Oates, and Morrison, among several others.

3.000 Credit hours

**ENGL 724 - American Multi-Cultural Literature**

This course will examine the critical and historical perspectives of selected works by Native American, Asian American, and Hispanic (including American Chicano, Latino, and Puerto Rican) authors. Writers to be studied include Black Elk, Paula Gunn Allen, Joy Harjo, Louise Erdrich, N. Scott Momaday, Simon Ortiz, Leslie Marmon Silko, James Welch, Maxine Hong Kingston, Frank Chin, Amy Tan, Jose Garcia Villa, Rudolfo Anaya, Pat Victor Cruz Hernandez, and Sandra Cisneros.

3.000 Credit hours

**ENGL 731 – Technology in Teaching/Researching in the Humanities**

This course offers students the opportunity to develop and apply advanced technology in the areas of teaching and/or research in the humanities. Applications include the following: virtual reality, hypertext, hypermedia, distance learning, web-enhanced teaching, advanced research techniques, and hypertext bibliographies. Prerequisite: approval of instructor. (Spring) 3.000 Credit hours

**ENGL 744 - Postcolonial Novel and Theory**

This course examines postcolonial theory and its application to both postcolonial (including the Caribbean, Latin America, Africa, the Middle East, and the Balkans, the former republics of the Soviet Union, India, Asia, and Oceania) novels and contemporary society, whether local, national, or global.

Prerequisites NONE. (F;S;SS)

3.000 Credit hours

**ENGL 753 - Bibliography & Research**

This course is an introduction to tools and techniques used in investigation of literary subjects and helps students to design individual research projects. Prerequisites: Graduate. (F)

3.000 Credit hours

**ENGL 755 - Contemporary Practices in Grammar & Rhetoric**

This course is designed to provide secondary teachers of English with experience in linguistics applied to modern grammar and composition.

3.000 Credit hours

**ENGL 760 – Non-Fiction of African-American Writers**

This course studies non-fiction by African American writers, including slave narratives, autobiographies, biographies, essays, letters, and orations 3.000 Credit hours

**ENGL 762 - Short Fiction African-American Writers**

This course is an intensive examination of short fiction by African American writers. Among those included are Chesnutt, Dunbar, Toomer, Hurston, McKay, Hughes, Bontemps, Wright, Clarke, Ellison, Fair, Alice Walker, Ron Milner, Julia Fields, Jean W. Smith, Petry, Baldwin, Kelley, and Baraka.

3.000 Credit hours

**ENGL 764 - African-American Aesthetics**

This course defines those qualities of African American literature that distinguish it from traditional American literature through an analysis of theme, form and technique as they appear in a representative sample of works by African-American writers.

3.000 Credit hours

**ENGL 789 - Seminar in African-American Literature Language**

This is a topics course that will vary; focus will be on prominent themes and/or subjects treated by African American writers from the beginning to the present. An attempt will be made to characterize systematically the idiom (modes of expression, style) of African American writers. Prerequisites: Graduate. Demand.

3.000 Credit hours

**ENGL 790 - Independent Study**

This course provides an opportunity for students to pursue in-depth study in literary criticism, literature, linguistics, or writing. Also, work done in this course may serve as groundwork for students pursuing the thesis option, developing a portfolio, or acquiring practicum experience. Repeatable once upon approval of departmental chair and/or coordinator of graduate studies in English. Prerequisite: approval of and prior consultation with instructor. (F;S;SS)

3.000 Credit hours

**ENGL 797 - Thesis Research**

Note: May be repeated for credit.

6.000 Credit hours

**ENGL 799 - Continuation of Thesis**

Note: May be repeated for credit.

1.000 Credit hours

## **History and Political Science**

**HIST 633 - Independent Study in History**

By arrangement with instructor. (F;S;SS) Note: May be repeated for credit.

1.000 TO 3.000 Credit hours

**HIST 714 - Colloquium in World History**

This course requires students to engage in intensive reading, discussion, and written analysis of selected topics in world history. It is designed to enable prospective teachers to strengthen their delivery of world history surveys and electives at the level of secondary education. Prerequisite: Graduate Standing.

(F;S;SS)

3.000 Credit hours

**HIST 715 - Colloquium in U.S. History**

This course provides a broad sweep of core literature of United States history from European contact to the present. Students will engage in intensive reading, discussion, and written analysis of selected topics in United States History. This course is designed to enable prospective teachers to strengthen their delivery of U.S. history surveys and electives at the secondary education level. It is required of all MAT History Education students, but is open to other interested graduate students. Prerequisites: None. (F;S)

3.000 Credit hours

**HIST 735 - Historical Thinking**

This course introduces students to the intellectual currents and schools of thought that have characterized the study of history over time. Through the use of methodological and conceptual frameworks, students

will engage with historical debates. They will also develop and write a major research paper.

Prerequisites: None. (F;S)

3.000 Credit hours

**HIST 740 - Hist Soc Sci Contemp Wrld Prob**

Readings, discussions, and reports on the relationships between history and the social sciences as a whole, as well as their combined roles in dealing with contemporary world problems.

3.000 Credit hours

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## **WILLIE A. DEESE COLLEGE OF BUSINESS AND ECONOMICS**

<http://www.ncat.edu/cobe/index.html>

Lisa Owens-Jackson, Dean  
Danielle Winchester, Associate Dean

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### **VISION**

Our vision is to be a national leader in global business education that transforms students' lives.

### **MISSION**

Our mission is to develop agile, culturally competent and diverse leaders who use analytical skills to meet the challenges of the future.

We accomplish our mission through evidence-based instruction, professional and community engagement, and high-quality impactful research.

### **DEGREE AND CERTIFICATE PROGRAMS OFFERED**

#### Masters Degrees

- MACC Accountancy
- MBA Business Administration with concentrations in:
  - Accounting
  - Human Resource Management\*
  - Supply Chain Management\*
  - General Management\*

#### Post Baccalaureate Certificate Programs

- Supply Chain Management\*
- General Management\*

\*Approved for distance education

## Accountancy, MACC

College of Business and Economics

**Graduate Coordinator:** Kecia Williams Smith **Email:** [kwsmith3@ncat.edu](mailto:kwsmith3@ncat.edu) **Phone:** (336) 285-3389

**Department Chair:** Lisa Owens-Jackson **Email:** [laowensj@ncat.edu](mailto:laowensj@ncat.edu) **Phone:** (336) 285-3370

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The Master of Accountancy (MACC) program consists of 30 credit hours and serves the primary purpose of preparing students for careers as professionally certified accountants. The primary target for the MACC will be students who have completed an undergraduate degree in accounting from an accredited business school. Students who have completed an undergraduate degree program in another discipline will require prerequisite courses as needed to ensure foundational knowledge in accounting and business. The Department of Accounting and Finance has achieved the separate Accounting accreditation by AACSB International.

### **Additional Admission Requirements:**

- GMAT or GRE exam score if undergraduate GPA is less than 3.30 and accounting GPA is less than 3.00.
- Resume
- Official college transcripts from all higher education institutions.
- Letters of recommendation.
- Letter of intent or statement of purpose
- Students without undergraduate accounting degree will be required to take ACCT 331, 332, 344, 443, 461; and FIN 343

### **Program Outcomes:**

- Students completing the program will meet all educational requirements for licensing as a Certified Public Accountant as well as other major certifications, including the Certified Management Accountant and the Certified Fraud Examiner certifications.

### **Degree Requirements**

Total credit hours: 30

- Core courses (24 credits): ACCT 689, 743, 744, 761, 763, 774, 781, 792, 795 and FIN 750
- Electives: BUAN 725 or MGMT 727 and 3 credits from any one of ECON, MGMT, or MKTG

## Business Administration - Accounting, MBA

Willie A. Deese College of Business and Economics

**Graduate Coordinator:** Eric Gladney      **Email:** emgladne@ncat.edu      **Phone:** (336)285-3774  
**Department Chair:** Lisa Owens-Jackson      **Email:** laowensj@ncat.edu      **Phone:** (336) 285-3370

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The Accounting concentration is intended for students interested in better understanding how to integrate financial and managerial accounting principles to result in more effective managerial decisions. The Accounting concentration within the MBA program is designed to supplement a corporate manager's existing operational experience with advanced financial and managerial accounting concepts to assist in managerial decision-making. The program combines strong development in broad business disciplines with advanced accounting knowledge. Our accounting professors bring professional experience to the classroom and emphasize the applicability of advanced accounting concepts to professional practice. The curriculum builds professional skills necessary for success including critical thinking, data analysis and communication skills. Case studies also provide development of professional research skills to solve accounting problems. The A&T MBA is among the state's most affordable and holds the gold standard in business education accreditation from AACSB International. Our business program has been accredited since 1979 and the accounting program since 1986.

### Additional Admission Requirements

- GMAT or GRE exam score if undergraduate GPA is less than 3.30
- A current resume
- Students without undergraduate business related degrees will be required to take up to 6 additional accounting credits: Income Tax Accounting and Auditing Principles and up to 12 additional credits of foundation courses in accounting and finance (ACCT 608), economics, (ECON 606), business analysis (BUAN 605), and enterprise management (MGMT 612)

### Learning Objectives:

- Students will gain enhanced knowledge of financial accounting processes needed for professional practice and successful completion of professional certification exams.
- Students will understand the application of accounting principles and practices in a global environment.

### Degree Requirements

Total credit hours: 36

- Core courses (24 credits): ACCT 710; ECON 708; FIN 750; MGMT 720, BUAN 725, MGMT 727, MGMT 750; MKTG 716
- Concentration Courses (12 credits): ACCT 763, ACCT 727, ACCT 725, ACCT 721, ACCT 691

## Business Administration - Human Resources Management, MBA

Willie A. Deese College of Business and Economics

**Graduate Coordinator:** Eric Gladney

**Email:** emgladne@ncat.edu

**Phone:** (336)285-3774

**Department Chair :** Lisa Snyder

**Email:** lguelden@ncat.edu

**Phone:** (336) 285-3372

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The Human Resource Management (HRM) concentration is intended for students interested in pursuing a career in human resource management or better understanding how to effectively develop and manage human resources. The program is recognized by the Society for Human Resource Management (SHRM) and prepares students for the SHRM assessment and certification exam. The HRM concentration prepares students for the human resource management profession and related practices. Learning expectations include understanding the concepts, applications and strategic importance of human resource management and its contributions to performance. Students will be able to plan, manage and revise the HRM function in a professional domestic or global setting while demonstrating the appropriate responses to ethical, social and multicultural issues. Program delivery is competency-based and student-focused. Depending upon qualification, students are prepared for either discipline professional certification or the national student exit exam. The curriculum is aligned with the SHRM Human Resources Curriculum Guidelines. SHRM is the world's largest association devoted to HRM. The A&T MBA is among the state's most affordable and holds the gold standard in business education accreditation from AACSB International. Our business program has been accredited since 1979.

### Additional Admission Requirements

- GMAT or GRE exam score if undergraduate GPA is less than 3.30
- A current resume
- Students without undergraduate business related degrees will be required to take up to 12 additional credits of foundation courses in accounting and finance (ACCT 608), economics, (ECON 606), business analysis (BUAN 605), and enterprise management (MGMT 612)

### Learning Objectives:

- Students will understand the concepts and applications of the HRM function, and its contribution to firm performance.
- Students will comprehend the strategic importance of the HRM function as a competitive advantage.
- Students will be able to plan, manage, and revise a HRM function in a professional domestic or global setting, while demonstrating the appropriate responses to ethical, social, and multicultural issues.

### Degree Requirements

Total credit hours: 36

- Core courses (24 credits): ACCT 710; ECON 708; FIN 750; MGMT 720, BUAN 725, MGMT 727, MGMT 750; MKTG 716
- Concentration courses (12 credits): MGMT 731, MGMT 733, MGMT 735, MGMT 736

## Business Administration - General Management

Willie A. Deese College of Business and Economics

**Graduate Coordinator:** Eric Gladney

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The General Management concentration provides a broad skillset that prepares business professionals for success in any industry or job function at any time in their career. The combination of our core curriculum which focuses on the basic business essentials (economics, accounting, finance, management, and marketing) followed by a broad set of electives, lays the groundwork for someone looking to assume more responsibility with their current employer or to seek a new position with a different company or industry. In their final semester, small groups of students spend the entire semester in a practicum course, working as consultants for one of our world-class corporate partners. For those with a non-business undergraduate degree, the General Management MBA is an ideal way to advance your business knowledge. The A&T MBA is among the state's most affordable and holds the gold standard in business education accreditation from AACSB International. Our business program has been accredited since 1979.

### Additional Admission Requirements

- GMAT or GRE exam score if undergraduate GPA is less than 3.30
- A current resume
- Students without undergraduate business related degrees will be required to take up to 12 additional credits of foundation courses in accounting and finance (ACCT 608), economics, (ECON 606), business analysis (BUAN 605), and enterprise management (MGMT 612)

### Learning Objectives:

- Students will understand the concepts and applications of the management function, and gain the professional skills necessary to effectively lead and work within teams.
- Students will master the skills to effectively operate in the global economic and business environment and develop long term strategies to positively impact business environments and organizations.
- Students will be able to analyze and synthesize information across disciplines/functions in order to evaluate business opportunities and make sound business decisions while demonstrating the appropriate responses to ethical, social, and multicultural issues.

### Degree Requirements

Total credit hours: 36

- Core courses (24 credits): ACCT 710; ECON 708; FIN 750; MGMT 720, BUAN 725, MGMT 727, MGMT 750; MKTG 716
- Concentration courses (12 credits): SCMG 701, BUED 740, MGMT 785, BUED 760.

## Business Administration - Supply Chain Management, MBA

Willie A. Deese College of Business and Economics

**Graduate Coordinator:** Eric Gladney

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**Phone:** (336)285-3774

**Department Chair:** Joseph Huscroft

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**Phone:** (336)334-7632

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The Supply Chain Management concentration addresses the need for professional knowledge and skills relating to supply chain management, strategic logistics, procurement logistics and global supply chain design management. As global operations continue to become more complex, corporations and the consulting firms that serve them are moving quickly to hire people with supply chain management expertise. But these experts are in short supply. The Deese College's MBA concentration in supply chain management prepares students to fill the market demands caused by the expanding business landscape and the growing demand for these professionals. Our graduates may work in sectors such as food production, technology, consumer products, retailing and health care.

Our Supply Chain Management MBA concentration will teach you how to use analytics to improve operational effectiveness and make the supply chain a source of competitive advantage; analyze relationships and interactions with supply chain partners through ethical and legal lenses; assess supply chains for efficiency and effectiveness; evaluate the effect of individual processes on the supply chain as a whole; and use a systems approach to interpret the interrelationships and competitive advantage of an efficient and effective supply chain. The A&T MBA is among the state's most affordable and holds the gold standard in business education accreditation from AACSB International. Our business program has been accredited since 1979.

### Additional Admission Requirements

- GMAT or GRE exam score if undergraduate GPA is less than 3.30
- A current resume
- Students without undergraduate business related degrees will be required to take up to 12 additional credits of foundation courses in accounting and finance (ACCT 608), economics, (ECON 606), business analysis (BUAN 605), and enterprise management (MGMT 612)

### Learning Objectives:

- Students will be able to evaluate the strategic importance of an acquisition process that aligns the supplier network with organizational goals and strategies.
- Students will be able to apply the principles of cost, demand, and supply chain design to effectively manage the information, product, and financial flows through the supply chain to develop value-creating networks
- Students will be able to apply enterprise resource planning to the function of supply chain management

### Degree Requirements

Total credit hours: 36

- Core courses (24 credits): ACCT 710; ECON 708; FIN 750; MGMT 720, BUAN 725, MGMT 727, MGMT 750; MKTG 716
- Concentration courses (12 credits): SCMG 701, SCMG 720, SCMG 725, SCMG 727

## Certificate - Supply Chain Management, PB

Willie A. Deese College of Business and Economics

**Graduate Coordinator:** Eric Gladney

**Email:** emgladne@ncat.edu

**Phone:** (336)285-3774

**Department Chair:** Joseph Huscroft

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The Graduate Certificate in Supply Chain Management provides professionals with the state-of-the-art knowledge necessary to design, manage, analyze, and update entire supply chain systems or various components within them. Graduates will be prepared to accept responsibility in supply chain management, purchasing, warehousing, inventory management, and global supply chain management. The certificate is designed for professionals in, logistics, manufacturing, insurance, food processing, hospitality and retailing.. Students will learn advanced supply chain management applications from the experts in the field. Our 100% in class and online Graduate Certificate in Supply Chain Management provides students with flexibility and choice. The Supply Chain Management courses taken as a part of the Graduate Certificate in Supply Chain Management will transfer (with grade of B or better) into the MBA program.

### **Certificate Requirements**

Total credit hours: 12

- SCMG 701, SCMG 720, SCMG 725, SCMG 727

## Certificate - General Management, PB

Willie A. Deese College of Business and Economics

**Graduate Coordinator:** Eric Gladney

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**Phone:** (336)285-3774

**Department Chair:** Eric Gladney

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The Graduate Certificate in General Management provides a broad skillset that prepares business professionals for success in any industry or job function at any time in their careers. Recipients of our post baccalaureate curriculum build a foundation of knowledge by completing a set of core courses in data analytics, accounting, organizational behavior and economics. This broad knowledge lays the groundwork for someone focused on looking to assume more responsibility with their current employer or seek a new position with a different company or industry. A focus is placed on developing and understanding leadership principles, along with honing analytical and management skills. . Our 100% in class and online Graduate Certificate in General Management provides students with flexibility and choice. The courses taken as a part of the Graduate Certificate in General Management will transfer (with grade of B or better) into the MBA program.

### Certificate Requirements

Total credit hours: 12

- BUAN 725, ACCT 710, MGMT 720, ECON 708

## **Accounting and Finance**

### **ACCT 608 - Seminar in Financial Concepts**

The course will examine basic concepts and tools to provide integrative coverage of accounting and finance. Accounting topics include the interpretation, analysis and use of accounting information, including basic accounting procedures, budgeting, cost tracking and cost/profit analysis. Finance topics include concepts and techniques for planning and managing the acquisition and allocation of financial resources, including cost of capital, capital structure and capital budgeting. coverage of these areas will be integrated by examining the basic contributions of each are to the decision processes for raising and allocating funds and the purposes they serve in assisting lenders and investors in assessing financial capacity and performance. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **ACCT 643 - Advanced Income Tax Accounting**

This course is a study of federal income tax laws related to partnerships, corporations, and fiduciaries. A study of property transactions is continued. Students are introduced to tax case research and the tax software for businesses. It is recommended that this course be taken for credit only and not for audit purposes. Prerequisite: C or above in ACCT 443, Accounting majors only, senior standing, or permission of instructor. (F;S;SS)

3.000 Credit hours

### **ACCT 689 - Advanced Applications in Financial Accounting**

This course covers selected and current accounting problems/issues relating to government/not-for-profit entities, multinational corporation, etc. Prerequisites: C or above in ACCT 332 or permission of instructor, co-requisite ACCT 792 and ACCT 795 or permission of instructor. (F;S;SS)

3.000 Credit hours

### **ACCT 690 - Advanced Accounting Theory**

This course focuses on the fundamental accounting concepts, principles, and procedures that make up the theoretical underpinning of financial accounting. In addition, emphasis is placed on knowledge needed for the CPA exam. Topics reviewed will include structure of financial statements, depreciation methods, inventory valuation, revenue recognition, fair value accounting, liabilities, pensions, leases, and taxes. This course is NOT recommended for audit. Prerequisites: C or above in ACCT 442, senior standing, Accounting major only, or permission of instructor. (F;S;SS)

3.000 Credit hours

### **ACCT 691 - Governmental and Not-for-Profit Accounting**

This course is an introduction to accounting and reporting standards for governmental units and not for-profit entities. Entities to be covered include municipal, state, and federal governments and various not-for-profit organizations. Prerequisite: ACCT. 710 or approval of chair. (F;S;SS)

3.000 Credit hours

### **ACCT 710 – Managerial Accounting Decision Making Concepts**

This course focuses on the role of management accounting in planning, controlling, evaluating performance and decision-making. The course covers traditional and contemporary concepts and techniques of product and service costing, budgeting, and interpretation of internal reported information. Emphasis is also given to the application of concepts and decision tools for managerial decision-making.

The course will use case studies and spreadsheet analysis for an integrative application of managerial accounting concepts. Prerequisites: Minimum C grade in ACCT 222 or ACCT 608 or permission of instructor. (F;S)  
3.000 Credit hours

#### **ACCT 721. Auditing for Managers**

This course is a study of financial statement audits and other assurance services. An evaluation of risk assessment, internal controls, and substantive testing is covered. Other topics include governmental, internal, and operational audits as well as emerging audit issues. Prerequisite: ACCT 710 or approval of chair. (F;S;SS)  
3.000 Credit hours

#### **ACCT 725. Federal Taxes for Managers—Overview**

This course introduces federal, state, and employment taxes and regulations related to business. Regulatory framework and design, tax policy, tax administration, and tax planning strategies are emphasized. Prerequisite: ACCT 710 or approval of chair. (F;S;SS)  
3.000 Credit hours

#### **ACCT 727. Financial Accounting Theory**

This case-based course examines the conceptual basis of domestic and international accounting frameworks and financial reporting regulation. In addition, the course will discuss the measurement and reporting of financial statement elements and the implications for managerial decision-making. Prerequisite: ACCT 710 or approval of chair. (F;S;SS)  
3.000 Credit hours

#### **ACCT 743. Regulations I.**

This course reinforces knowledge of individual income tax and property transactions; focuses on flow-through entities, emphasizing formation, operation, distribution, and liquidation rules. Students are also introduced to family tax issues and tax research. Prerequisite: C or better in ACCT 443 or permission of instructor. (F;S;SS)  
3.000 Credit hours

#### **ACCT 744. Regulations II.**

This course focuses on corporation formation, operation, distribution, and liquidation rules. Exempt organizations, multijurisdictional taxes, professional responsibility, and selected business law topics are also covered. Prerequisite: ACCT 743 or permission of instructor; co-requisite ACCT 774. (F;S;SS)  
3.000 Credit hours

#### **ACCT 761 - Advanced Auditing**

This course will build on knowledge and skills learned in a typical introductory auditing principles course. Topics will include the application of auditing concepts and techniques to various transaction cycles including the sales and collection cycle, the acquisition and payment cycle, the payroll and personnel cycle, the inventory and warehousing cycle and the capital acquisition and repayment cycle. Procedures to audit cash balances will also be covered. This course may also include an overview of the application of audit techniques to internal auditing, operational auditing and the audit of governmental entities. Case studies will be used. Prerequisites: C or above in ACCT 461 or equivalent. (F;S;SS)  
3.000 Credit hours

#### **ACCT 763 - Advanced Cost Accounting and Systems**

This course will cover contemporary issues/problems in cost and managerial accounting in the context of the modern business environment. Emphasis will be given to cost information systems and other

specialized cost topics such as analytical models, global aspects in management accounting, decision models, and nontraditional accounting systems. Case methodology and computer analysis will be utilized. Prerequisites: C or above in ACCT 344 or equivalent. (F;S;SS)  
3.000 Credit hours

**ACCT 774. Regulations Capstone.** This CPA review course will review and synthesize tax and commercial law content with a focus on understanding and applying regulatory knowledge to business transactions and ethical practices. Co-requisite: ACCT 744 or permission of instructor.  
1.000 Credit hour

**ACCT 781. Auditing Capstone.** This CPA review course will review and synthesize auditing and attestation content with a focus on integrating and applying knowledge to solve auditing problems. Co-requisite: ACCT 761 or permission of instructor.  
1.000 Credit hour

**ACCT 792. Seminar in Financial Accounting and Reporting.** This course covers complex financial accounting and reporting topics and long-standing issues such as financial statements and disclosures, depreciation methods, pensions, leases, accounting for income taxes, business combinations and consolidated financial statements, revenue recognition, fair value accounting, foreign currency transactions and translations, and IFRS vs. US GAAP, etc. The course will also address current topics and emerging issues in financial reporting. Prerequisite: C or better in ACCT 332 or permission of instructor; co-requisite ACCT 689 and ACCT 795.  
3.000 Credit hours

**ACCT 795. Financial Accounting Capstone.** This CPA review course will review and synthesize financial accounting content with a focus on integrating and applying knowledge to solve accounting-based problems. Co-requisite: ACCT 792 or permission of instructor.  
1.000 Credit hour

### **FIN 750 - Financial Management**

This course provides an overview of three major areas of corporate finance: Investment (Capital Budgeting), Financing, and Pay-out Policies. Students will gain insight on utilizing relevant information (financial and non-financial) to make informed decisions that are vital to modern firms. Emphasis is geared toward gaining an in-depth understanding of the financial implications of managerial operational decisions. Prerequisites: Minimum grade of C in FIN 253 or ACCT 608 or permission of instructor. (F;S)  
3.000 Credit hours

## **Business Education**

### **BUED 682 - Business Ed Planning and Lead**

This course focuses on the principles of effective planning, leadership and supervision of public school business education programs. It includes the foundations of career and technical education from the federal and state perspectives, as well as major issues, and trends in business education. Prerequisites: Senior or Graduate standing or consultation with chairperson. (F)  
3.000 Credit hours

### **BUED 760 - Organizational Communication**

This course expands on the application of organizational communication theory, technologies, and philosophies to develop business communication expertise. Emphasis will be placed on critical thinking,

interpersonal, and group communication skills in the global business context. Prerequisites: None. (S)  
3.000 Credit hours

### **BUED 790 - MAT Independent Study**

Intensive study, investigation, or research in a selected area of business education. Prerequisite: None. On Demand

1.000 TO 3.000 Credit hours

## **Management**

### **BUAN 605 - Methods in Business Analysis**

This course focuses on building an understanding of mathematical analysis techniques necessary to solve complex business problems from a wide range of business areas, including inventory, customer service, sales and quality management. Basic statistical concepts and statistical process improvement are covered. Students will use a variety of computer software packagings including Microsoft Excel and SPSS.

Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **MGMT 612 - Foundation of Enterprise Management**

This course provides an understanding of key themes related to successful enterprise management and discussions of the interpersonal and intellectual skills necessary to contribute to a highly competitive and globalized business environment. Topics include the globalization of commerce, marketing and market systems, competitive strategy, perspectives on legal and ethical business conduct, information technology and the elements of quality. Individual and team competencies are developed using materials that involve interpersonal skills, problem-solving and case analysis. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **MGMT 699 - Spe Topics in Human Resources**

This course will address selected topics in Human Resources Management (HRM) Examples include onsite assessment of HRM issues, strategies and policies; current trends in funding employee medical and retirement benefits; collective bargaining strategies for global enterprises; industry comparisons of critical success factors for HRM; and advance technologies for employee training and development. This course may also include an international experience (study abroad) when offered in the summer. Prerequisites: MGMT 730, MGMT 522 or permission of the instructor. (F;S)

3.000 Credit hours

### **MGMT 718 - Management and Organi Analysis**

This course is a study of formal organizations as rational, organic, open systems and their behavior in response to an ever-changing , global and domestic environment. It covers macro and micro theories of management and organizations and their application to organizational design and processes.

Organizational effectiveness, strategic planning and control structural designs, leadership, motivation, globalization, and corporate politics and culture and studied through extensive reading, case studies, exploratory research and seminar discussions. Prerequisites: ACCT 708, BUAD 705, BUAD 712 and ECON 706. (F;S)

3.000 Credit hours

### **MGMT 720 - Management and Organizational Behavior**

This course covers both macro and micro theories of management and organizations. This will include the study of formal organizations as rational, organic, open systems; their behavior in response to an ever-

changing, global and domestic environment; and the behavior of the employees employed by them. Organizational effectiveness, structural designs, leadership, motivation, globalization, and corporate politics and culture are studied through extensive reading, case studies, exploratory research, and seminar discussions. Prerequisites: MGMT 612 or Permission of Instructor. (F;S;SS)

3.000 Credit hours

### **BUAN 725 - Business Analytics**

This course will cover the basic descriptive, predictive, and prescriptive analytical techniques for decision making in all business functions. Topics covered will include constructing and analyzing data distributions, decision theory and analysis, statistical sampling and confidence estimation, business forecasting, linear and multiple regression models, linear and integer mathematical programming, and computer simulation. Students will utilize statistical and mathematical programming software throughout the course to solve complex managerial problems and interpret results. Prerequisites: BUAN 605 or Permission of Instructor. (F;S;SS)

3.000 Credit hours

### **MGMT 727 - Operations Management**

This course is designed to provide a solid foundation and deeper understanding of how the operations function contributes to ensuring effective and efficient flow of materials and information within and outside the organization. We will take a broad managerial perspective emphasizing the strategic impact of the operational decisions and the interfaces between operations and the other functional areas of the organization. We will look at the operations function in both service and manufacturing contexts and investigate how it provides sustainable competitive advantage along the dimensions of cost, quality, delivery, flexibility and innovation. Prerequisites: BUAN 605 or Permission of Instructor. (F;S;SS)

3.000 Credit hours

### **MGMT 731 - Staffing Workforce Planning and Development**

This course looks at theory and application methods used in the recruitment and selection of employees. Course topics include job analysis, interviewing and testing methods, selection techniques, legal issues in recruitment and selection, internal and external selection processes including performance appraisal and management, staffing philosophies for international operations and expatriate repatriation. Prerequisite: BUAN 605, MGMT 612 or Permission of Instructor. (F;S;SS)

3.000 Credit hours

### **MGMT 733 - Compensation and Benefits**

This course examines theory and practice in designing and managing compensation and benefits systems in organizations. Issues considered include compensation and benefit systems as vehicles for attracting, motivating and retaining employees; designing individual and group incentive plans; structuring pension plans; determining wage levels and structures; legal issues and considerations in compensation and benefit administration; and expatriate compensation. Prerequisite: BUAN 605, MGMT 612 or Permission of Instructor. (F;S;SS)

3.000 Credit hours

### **MGMT 735 - Employee Relations and Development**

This course examines the policies and practices used (A) to promote equitable treatment of employees and (B) for training and development human resources in organizations. Topics include employee health and safety equal opportunity and affirmative action, workforce diversity, conflict resolution, industrial relations, leadership and career development, change theory, and best practices for international operations are also discussed. Prerequisites: BUAN 605, MGMT 612 or Permission of Instructor. (F;S;SS)

3.000 Credit hours

### **MGMT 736 - Human Resource Management Strategy**

This course focuses on the formulation and implementation of human resources management strategies. Emphasis is placed on the strategic dimensions of recruitment, selection, development and retention of a workforce needed to accomplish organizational strategic objectives. Prerequisites:, MGMT 612, BUAN 605 or Permission of Instructor. (F;S;SS)

3.000 Credit hours

### **MGMT 750 - Corporate Strategy and Policy**

This is an integrative (CAPSTONE) course designed to develop students' ability to think strategically about issues central to creating and sustaining a firm's competitive position. Because of the ever-changing and increasingly complex business environment, it emphasizes both the dynamics and global aspects of strategic management. Topics include the strategic role of the general manager, crafting corporate and business-level strategy, managing strategic change, strategy implementation, and control. Others are building a firm's capability to sustain competitive advantage, analyzing industry evolution, global rivalry and ethical reasoning that underlie strategic competitive decisions. Course objectives are accomplished through extensive case analysis from a variety of industries and managerial settings to give students opportunity to apply strategic management skills and tools. Prerequisites: ACCT 710, FIN 750, MGMT 727, ECON 708, BUAN 725, MKTG 716. (F;S;SS)

3.000 Credit hours

### **MGMT 785 - Practicum or Internship**

The MGMT 785 course will provide students with an opportunity for experiential learning as students work in teams (functioning like consultants) in an approved position that allows them to leverage the theoretical aspects of their MBA (e.g. Big Data / Data Analytics, HRM, Global Supply Chain, etc) with real business deliverables within a company. Our in class and online MBA students will function in person and virtually to accomplish the objectives that are outlined for the company that we will support. Typically, there are several team-based deliverables leading up to a final presentation delivered to the Senior / Corporate management team where the students present their analysis and make recommendations based on that analysis. Prerequisites: MGMT 720, ACCT 710, FIN 750, MGMT 727, ECON 708, BUAN 725, MKTG 716. (F;S;)

3.000 Credit hours

### **MIS 713 - Manage Imple Enter Infor Sys**

This is an applied course in information systems concepts and techniques used in today's competitive environment. Topics will include the concepts of enterprise information systems, use of information systems to achieve strategic goals and to gain competitive advantages, the impacts of information systems on business process reengineering and management, managerial issues in developing information systems. IS project management, and other contemporary IS technologies. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **MIS 719 - Enterprise Sys Anal and Design**

This course takes a systematic approach to discuss the design of an enterprise information system for a business firm or inter-organizational supply chain. Enterprise analysis and design methodology is used to demonstrate the principles, models, and tools needed to design enterprise systems. Students will apply the enterprise system design methodology to perform business process analysis, design of information and functional requirements, and implementation of an actual enterprise resource planning project.

Prerequisite: MIS 713. (F;S;SS)

3.000 Credit hours

## **Marketing and Supply Chain Management**

### **MKTG 716 - Strategic Marketing**

This course provides a comprehensive view of strategic marketing decision-making. Students gain a deeper understanding of a customer orientation, competitor analysis, environmental scanning, and the role of marketing in an organization. Students are exposed to the marketing tools and processes used by managers including marketing research, data analytics, customer service and value analysis, brand equity and product management, integrated marketing communications, pricing strategies, salesforce effectiveness, and distribution strategies. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

### **SCMG 701 - Strategic Logistics Management**

This course covers the management of all supply chain activities while addressing real-world concerns related to domestic and global demand driven supply chains. This comprehensive approach encompasses the processes associated with the production of goods and services and the movement of raw materials, inventory, and finished goods from the point of origin to the point of consumption. The course addresses supplier management, global operations and decision making, demand and inventory management, distribution and logistics, customer relationship management, and performance measurement and analysis. The course also covers recent development in supply chain improvement methodologies as well as brings together Lean tools and techniques required to eliminate supply chain logistics issues. At the conclusion of the course, a student will have the necessary tools and metrics required to evaluate a current supply chain and recommend improvements to enhance efficiency and effectiveness. Prerequisites: None. (F;S)  
3.000 Credit hours

### **SCMG 720 - Global Sup Chain Design Manage**

This course is a comprehensive study of the concepts, processes, and models used in the design, development, analysis, and management of global supply chains. Specific topics include global procurement and sourcing, demand forecasting, facilities location, sales and operations planning, transportation decisions, distribution planning, inventory management, and logistics systems design. This course teaches students to identify, analyze, and solve problems in global supply chain management. Software will be used extensively to model logistics and supply chain applications. Prerequisites: SCMG 701. (F;S)  
3.000 Credit hours

### **SCMG 727 - Supply Chain Sys Integration**

This course provides a comprehensive application of Enterprise Resource Planning (ERP) to the functions of Supply Chain Management. An ERP application software will be used for students to evaluate the benefits of ERP implementation and application to supply chain operational efficiency. A strategic alignment of Sales and Distribution (SD), Materials Management (MM), Production Planning (PP), Financial Accounting (FI) and Controlling (CO) is essential to supply chain operations. Students will study the major types of supply chain strategies and how to design and manage the most effective supply configurations and interrelationships to develop and maintain competitive advantage. Prerequisites: SCMG 701. (F;S)  
3.000 Credit hours

### **SCMG 725 - Procurement Logistics and Supply Management**

This course is the student of the cross-functional management framework that integrates all activities related to the acquisition and management of tangible and intangible resources for the organization. This includes strategic sourcing, customer-supplier relationship management, demand management and day-to-day purchasing. This course will include a practicum experiential learning component with the local

chapter of the Institute for Supply Management (ISM) designed to increase the understanding of the impact of strategic sourcing and supply management on the competitive success and profitability of the firm. Every student will be required to join the ISM Professional organization (no cost for student membership) and attend one meeting per month where they will engage with corporate executives on various purchasing and procurement topics. . Prerequisites: SCMG 701. (F;S)  
3.000 Credit hours

## **Economics**

### **ECON 601 - Economic Understanding**

An introduction to the principles of economics utilizing the macro approach. No credit towards a degree in economics.

3.000 Credit hours

### **ECON 606 - Foundns Econ Grad Students**

This course introduces basic economic principles and their applications in business. Basic economic concepts, including marginal analysis of consumer and firm decisions, are covered, along with macroeconomic theories that support managers' understanding of the global economic environment and the economic policies affecting that environment. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **ECON 708 - Managerial Economics**

This course will apply the tools and methods of microeconomics theory to specific management decision making in the private sector. Particular emphasis will be placed on pricing profit, maximization, capital budgeting and financial decisions in the long-run. Prerequisites: ACCT 708, MGMT 705, MGMT 712, ECON 706 and MGMT 715 (S)

3.000 Credit hours

## **Finance**

### **FIN 750 - Financial Management**

This course provides an overview of three major areas of corporate finance: Investment (Capital Budgeting), Financing, and Pay-out Policies. Students will gain insight on utilizing relevant information (financial and non-financial) to make informed decisions that are vital to modern firms. Emphasis is geared toward gaining an in-depth understanding of the financial implications of managerial operational decisions. Prerequisites: Minimum grade of C in FIN 253 or ACCT 608 or permission of instructor. (F;S)

3.000 Credit hours

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## COLLEGE OF EDUCATION

<http://www.ncat.edu/CEd/index.html>

Paula Groves Price, Dean

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Through its three departments, the College of Education prepares students for careers in PK-12 schools, industry, government and other agencies. The Department of Educator Preparation, the Department of Counseling, and the Department of Leadership Studies and Adult Education have programs leading to degrees at the undergraduate and graduate levels. All our Educator Preparation programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. In addition, our counseling programs are accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP). We were the first HBCU to receive CACREP accreditation.

The Dean of the College of Education is the designated authority (by NC Department of Public Instruction and UNC General Administration) for university-wide licensure programs for teachers, school administrators, school counselors, and other school personnel. As such, although the secondary licensure programs are housed in other academic units, the College of Education is responsible for providing the core educational curriculum, coordinating and monitoring admission, placements, and assessment for all professional education students at the university. North Carolina A&T offers various North Carolina Approved licensure areas (<https://www.ncat.edu/tgc/graduate-catalog/grad-catalog-2020-21.pdf>) at the undergraduate (initial licensure) and graduate levels. The Dean chairs the Council of Educator Preparation (CEPP), which is the governance structure for all professional education (licensure) programs at the university. The CEPP approves and monitors implementation of curriculum development as well as admission, placement, and assessment policies and procedures for licensure programs. Consequently, the College of Education through the CEPP is responsible for overseeing (a) state mandated re-visioning of professional licensure programs and (b) attainment of state teacher productivity mandates.

The Department of Educator Preparation provides the professional studies component for the preparation of effective teachers and school personnel at the bachelor's and master's degree levels; the department cooperates with various departments within the university that offer Educator Preparation programs. The Department of Educator Preparation offers a bachelor's degree in elementary education with dual licensure in special education. Master's degrees include the Master of Arts in Teaching (MAT) in each of the following discipline areas: Special Education, Elementary Education, Biology Education, Business Education, Chemistry Education, Child Development (Birth to Kindergarten), English Education, Family and Consumer Sciences, Health and Physical Education, History Education, Math Education, and Technology Education. Other master's degrees include the MAED in Elementary Education and Reading. The Department of Counseling offers master's level programs in School Counseling, Community/Agency Counseling, and Rehabilitation Counseling as well as the doctoral degree in Rehabilitation Counseling and Counseling Education. The Department of Leadership Studies and Adult Education is an interdisciplinary academic unit that offers master's degree in Adult Education and the Master of School Administration and the doctoral degree in Leadership Studies.

### DEGREE AND CERTIFICATE PROGRAMS OFFERED

#### Doctoral Degrees

- Ph.D. Leadership Studies
- Ph.D. Leadership Studies Online Program
- Ph.D. Rehabilitation Counseling and Rehabilitation Counselor Education

#### Masters Degrees

- MAEd Elementary Education

- MAEd Reading Education
- MAT Master of Arts in Teaching\* with concentrations in:
  - Biology Education
  - Business Education
  - Chemistry Education
  - Child Development: Early Education & Family Studies Birth-K
  - Elementary Education
  - English Education
  - Family and Consumer Sciences Education
  - History Education
  - Math Education
  - Physical Education
  - Special Education
  - Technology Education
- MS Adult Education
- MS Mental Health Counseling with concentrations in:
  - Mental Health Counseling – Clinical
  - Mental Health Counseling – Rehabilitation
- MS School Counseling
- MSA School Administration

#### Post Baccalaureate Certificate Programs

- Community College Teaching
- Marriage and Family Counseling
- Rehabilitation Counseling and Behavioral Addiction
- Rehabilitation Psychology and Behavioral Medicine
- Vocational Evaluation and Work Adjustment

#### Post Masters Certificate Programs

- School Administration

\*Approved for distance education

## Leadership Studies, PhD

College of Education

**Graduate Coordinator:** Sydney Richardson    **Email:** sdrichardson1@ncat.edu    **Phone:** (336) 285-2342

**Department Chair:** Sydney Richardson    **Email:** sdrichardson1@ncat.edu    **Phone:** (336)285-2342

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The doctoral program in leadership studies prepares tomorrow's leaders to solve societal challenges through the study of theoretical and practical knowledge in leadership studies. Through its commitment to civic engagement, transformative research and creative scholarship the program produces critically minded scholars who are social justice advocates capable of transforming organizations to maximize human potential.

### Additional Admission Requirements

- Graduate Record Examinations (GRE), Graduate Management Admission Test (GMAT), or Miller Analogies Test (MAT)
- Three additional professional letters of recommendation from professors or employers. The recommendation letters should be submitted by the same individuals who complete the recommendation form included in the standard Graduate College application.
- A current resume or curriculum vita
- Statement of Purpose: In two double-spaced pages explain how earning a Ph.D. in Leadership Studies fits in with your academic/professional and personal goals; describe one or two of the key research topics that you may want to investigate as part of your research agenda; and discuss a key leadership lesson you have learned from your leadership experiences within or outside your profession.
- Master's or J.D. from a college or university recognized by a regional or general accrediting agency.
- Minimum cumulative Grade Point Average of 3.50 (on a 4.00 scale) in all graduate coursework.
- At least five years of professional work experience at the executive or managerial level
- Interview: After initial review of all applications, the most qualified candidates will be invited for an interview with the Leadership Studies faculty.

### Program Outcomes

- Demonstrate understanding of major leadership theories in Leadership Studies, and the ability to analyze and critique these theories, and apply these theories in diverse settings.
- Effectively demonstrate decision-making skills and a repertoire of knowledge needed to lead, organize, and engage diverse local, national, and global communities.
- Demonstrate the ability to use a range of perspectives from interdisciplinary fields of study, particularly to provide leadership that addresses societal challenges.
- Articulate an understanding of the role of ethics in leadership and develop ethical reasoning, as well as reflection skills that promote social justice.
- Demonstrate the ability to design, analyze, critique, and conduct research using qualitative, quantitative, and mixed methods research techniques.

### Degree Requirements

Total credit hours: 60 (post master's)

- Take ore courses (15 credit hours): LEST 800, 802, 811, 819, and choose one course between 835 or 850.
- Take research core courses (15 credit hours): LEST 803, 815, 860, 862, and choose one of the following courses: 863, 865, or 866.
- Select electives from LEST (15 credit hours), satisfying one of the following concentrations: Educational Leadership (Higher Education focus); Health Services Leadership; or Organizational Leadership.

- Complete LEST 995 (3 credit hours).
- Dissertation (12 credits): LEST 997.
- Pass qualifying exam, preliminary exam, and dissertation defense.

**Dissertation Research:**

A student may not register for dissertation credits before passing Qualifying Examination. No more than 12 dissertation credits are counted toward the total credit hours requirement for the degree.

**Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

**Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Admission to Candidacy**

Students will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary Oral Exam.

**Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar and must conform to the Graduate College's guidelines for theses and dissertations.

## Rehabilitation Counseling and Rehabilitation Counselor Education, PhD

College of Education

**Graduate Coordinator:** Michael Brooks

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**Department Chair:** Shirlene Coopwood

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The Doctoral Program in Rehabilitation Counseling and Rehabilitation Counselor Education is designed to prepare culturally competent students to work as counselor educators, researchers, clinicians, and supervisors in academic and non-academic settings. In addition to establishing a core foundation in rehabilitation counseling and research, major emphasis is provided in the area of Trauma and Trauma Informed Care. The primary educational objectives of the program are: a) to increase students' knowledge of the role and functions of rehabilitation counselor educators, researchers, and counselors, b) to equip students with unique counseling and research skills to provide effective rehabilitation counseling, education, and research within a cultural context, c) to prepare students to obtain content knowledge in cultural diversity, trauma informed care, and additional expertise in specific areas in rehabilitation education, d) to equip students with knowledge, skills, and experiences to increase the body of research addressing diversity, social justice, and disability issues, and e) to prepare students to address professional issues and become leaders and researchers in rehabilitation counselor education and disability research through professional associations, publications, and professional development.

### Additional Admission Requirements

- Master's in Rehabilitation Counseling (CORE), or Counseling (CACREP), or a related profession with overall GPA of 3.5 or higher
- GRE Score
- Two years of work experience preferred
- Statement of purpose: Describe career goals, research interests and a list of publications, professional and volunteer experience relevant to intended program of study, academic honors and organizations.
- Three professional letters of recommendation must include letters from professor(s) from Master's program and from supervisor(s) from professional settings
- A current resume or curriculum vitae
- Licensure and/or certification documentation
- Interview: After initial review of all applications, the applicants with greatest potential are also expected to participate in a pre-admission interview with the Counseling faculty. Pre-admission interviews can include: (a) individual interviews, (b) group interaction with observation, and (c) on-site writing sample.

### Program Outcomes

- **Critical Thinking:** Students will develop skills and attitudes of effective thinking that employ the use of thoughtful reflection and logical inquiry to draw evidence-based conclusions as they relate to community counseling.
- **Oral Communication Skills:** Students will demonstrate proficiency in communicating in individual dyads and small and large group settings and in appropriate use of grammar to communicate counseling findings, while avoiding sexist language, doublespeak, and clichés. Evaluation occurs during the benchmarking process. Students must receive a satisfactory rating from the majority of faculty to earn a satisfactory rating. Faculty will evaluate 100% of the student population.
- **Written Communication:** Students will demonstrate proficiency in academic and scientific writing, which includes avoiding digressions, consistent tenses, using the active voice and citing sources as well as findings, professional documentation, and report writing with emphasis on APA publishing guidelines.

- Cultural Self-Awareness and Sensitivity: Students will demonstrate awareness of self, including knowledge of macro, micro, and meso ecological systems.
- Cultural Competence: Students will demonstrate an understanding of the cultural context of relationships, issues, and trends in a multicultural society.
- Ethical Practice: Students will demonstrate understanding and application of relevant professional ethical standards.
- Professionalism: Students will demonstrate professional maturity, integrity, and discipline consistent with professional standards of practice.
- Research and Design: Graduate community counseling students will demonstrate proficiency in designing quantitative, qualitative, single case designs, action, and outcome-based research, as well as co-occurring and support software packages (e.g., SPSS). Students will understand ethics surrounding Human Subjects Social and Behavioral Science research procedures and Responsible Conduct in Research.
- Research Evaluation: Students will demonstrate proficiency in evaluating empirical and non-empirical research. Students will be able to review professional literature and glean from the review relevant information for both research and practice. Students will be able evaluate research and its application to field experiences. Students will develop a research paper that reflects their knowledge of this content. The specifics of the research paper along with the grading rubric are presented in the achievement summary.
- Statistics: Students will demonstrate proficiency in basic statistical methods including scales of measurement, measures of central tendency, indices of variability, shapes and type of distributions, correlations, reliability and validity. Students will apply supportive software packages (e.g., MS Excel, SPSS).
- Technological Competence: Students will demonstrate proficiency in implementing best technology practices.

### **Degree Requirements**

Total credit hours: 63 (post-master's)

- Take Core courses (27 credits): COUN 800, 802, 812, 818, 825, 850, 860, 880, 989
- Statistics Core courses (15 credit hours): COUN 810, 815, 830, 865, 870
- Field experience (9 credit hours): COUN 984, 985, 986
- Dissertation (12 credits): COUN 997
- Pass qualifying exam, preliminary exam, dissertation defense

### **Dissertation Research:**

A student may not register for dissertation credits before passing the Qualifying Examination. No more than 12 dissertation credits are counted toward the total credit hours requirement for the degree.

### **Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

### **Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory

Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Admission to Candidacy**

Students will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary oral Exam.

### **Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar and must conform to the Graduate College's guidelines for theses and dissertations.

### **Program Specific Academic Policies**

#### Endorsement

The Department stipulates endorsement for employment or credentialing only in the program area in which a student received training.

#### Program Academic Eligibility

A student will be required to maintain semester GPA of at least 3.0 at the end of every semester irrespective of total attempted hours otherwise the student will be placed on probation for one semester. If the semester GPA and/or the cumulative GPA at the end of the probationary semester remains less than 3.0, the student will be dismissed.

#### Program Code of Conduct and Ethical Standards of Practice

As pre-professional counselors, graduate students abide by the code of ethics and standards of practice as described in the *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on Rehabilitation Counselor Certification (CRCC)*, *The American Psychological Association*, the *Student Handbook*, the *Graduate Catalog*, and *Department of Human Development and Services Ethical Conduct Policy*.

Consequences of violation of the codes of conduct or ethical standards of practice include but are not limited to one or more of the following:

- Dismissal from the program
- Removal from the course or the field placement and a grade of "F" or "U"
- Referral to authorized campus authorities for further discipline.

#### Program Academic Progression and Retention Standards

The academic progression and retention standards for counselor education programs are in keeping with Council for the Accreditation of Counseling and Related Educational Programs (CACREP) standards, along with the standards set forth by the Council on Rehabilitation Education (CORE), the American Rehabilitation Counseling Association (ARCA), *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on Rehabilitation Counselor Certification (CRCC)*, *The American*

*Psychological Association, the Student Handbook, the Graduate Catalog, and Department of Human Development and Services Ethical Conduct Policy.*

#### The Benchmarking Review Process

Once each academic semester a benchmarking review of all enrolled students is conducted. The benchmarking committee is comprised of all full-time tenured and tenure-track counseling faculty and is chaired by a faculty member. Adjunct faculty members are also invited to attend the benchmarking review.

Reviews are conducted using the Benchmarking Assessment Rubric which focuses on academic performance, ethical behavior, and professional disposition. Each student will be notified in writing by the Department Chairperson regarding the outcome of the benchmarking review and a copy will be placed in the student's file. Students who receive an unsatisfactory evaluation will be placed on probation, provided with a remediation plan and given one semester to implement the remediation plan in order to improve their performance to a satisfactory level. A subsequent unsatisfactory evaluation after the probationary period will result in dismissal from the program.

## Elementary Education K-6, MAEd

College of Education

**Graduate Coordinator:** Gerrelyn C. Patterson **Email:** [gcpatterson@ncat.edu](mailto:gcpatterson@ncat.edu) **Phone:** (336) 285-4411

**Department Chair:** Gerrelyn C. Patterson **Email:** [gcpatterson@ncat.edu](mailto:gcpatterson@ncat.edu) **Phone:** (336) 285-4411

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The Master of Arts in Education (MAEd) Elementary Education program prepares highly qualified K-6 classroom teachers who utilize research-verified pedagogical approaches to engage students from diverse populations in developmentally appropriate, rigorous, and relevant instruction. Through courses in research and inquiry, current research in the elementary classroom, standards and accountability, and issues and trends in urban education, candidates in the Master of Arts in Education, Elementary Education program develop knowledge, skills, dispositions, and professional attitudes that empower them to become lifelong learners, skilled researchers, and exemplary educational leaders inside and outside K-6 learning contexts while concurrently developing the skills necessary to attain certification from the National Board Professional Teaching Standards. The MAEd program in Elementary Education is aligned with professional standards commensurate with the Interstate Teacher Assessment and Support Consortium (InTASC), the Council for the Accreditation of Educator Preparation (CAEP), the North Carolina Department of Public Instruction (NCDPI), and National Board Professional Teaching Standards (NBPTS). The Master of Arts in Education (MAEd) program in Elementary Education is an accredited program by the [Council for the Accreditation of Educator Preparation \(CAEP\)](#) and by the North Carolina Department of Public Instruction (NCDPI).

### Additional Admission Requirements

- Standard Professional 1 or 2 NC Teaching License in the area of study
- Statement of Purpose
- Official College Transcripts
- Letters of Recommendation

### Program Outcomes:

Candidates in the MAED Elementary Education program will: (1) demonstrate effective communication skills (written, oral, and interpersonal) (2) effectively use quantitative and qualitative analytical problem-solving skills, (3) demonstrate discipline-specific expertise (knowledge, skills, and professionalism, and (4) demonstrate ability to engage productively in the review and conduct of disciplinary research.

### Degree Requirements

Total credit hours: 30

- Core courses (9 credit hours): CUIN 711, 729, 783
- Phase I: Select 9 credits from: ELED 751, 752, 753, 754
- Phase II: Take 12 credits: ELED 719, 740, 755, 757

Prior to beginning Phase II, candidates must have: (1) a Planning Contract on file with the program coordinator, and (2) a minimum 3.00 Grade Point Average.

## Reading Education K-12, MAEd

College of Education

**Graduate Coordinator:** Nichole Smith

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**Department Chair:** Gerrelyn C. Patterson

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The Master of Arts in Education, Reading Education degree program prepares highly qualified reading specialists for K-12 students. Through courses in literacy and language development, diagnostic and prescriptive reading, and assessment and literacy instruction, candidates in the Master of Arts in Education, Reading Education program develop knowledge, skills, dispositions, and professional attitudes that empower them to become lifelong learners and exemplary educational leaders inside and outside K-12 learning contexts. The MAEd program in Reading Education is aligned with professional standards commensurate with the Interstate Teacher Assessment and Support Consortium (InTASC), the Council for the Accreditation of Educator Preparation (CAEP), the North Carolina Department of Public Instruction (NCDPI), and National Board Professional Teaching Standards (NBPTS). The Master of Arts in Education (MAEd) program in Reading Education is an accredited program by the Council for the Accreditation of Educator Preparation (CAEP) and by the North Carolina Department of Public Instruction (NCDPI).

### **Additional Admission Requirements**

- Standard Professional 1 or 2 NC Teaching License
- Statement of Purpose
- Official College Transcripts
- Letters of Recommendation

### **Program Outcomes:**

Candidates in the MAED Reading Education program will: (1) demonstrate effective communication skills (written, oral, and interpersonal) (2) effectively use quantitative and qualitative analytical problem-solving skills, (3) demonstrate discipline-specific expertise (knowledge, skills, and professionalism, and t (4) demonstrate ability to engage productively in the review and conduct of disciplinary research.

### **Degree Requirements:**

Total credit hours: 30

- Phase I Courses (9 credit hours): CUIV 711 and 729, READ 755
- Phase II Courses (21 credit hours): READ 735, 736, 738, 756, 757, 774; ELED 751

Prior to beginning Phase II, candidates must have: (1) a Planning Contract on file with the program coordinator, and (2) a minimum 3.00 Grade Point Average.

## Master of Arts in Teaching - Biology Education, MAT

College of Education

**Graduate Coordinator:** Cailisha L. Petty

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**Department Chair:** Gerrelyn C. Patterson

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in Biology Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Biology or related courses in grades 9 through 12. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Master of Art in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Admission Requirements

- Bachelor of Science (BS) or Bachelor of Arts (BA) degree from a regionally accredited college or university
- 24 hours of content-related coursework at grades of C or higher
- Cumulative grade point average of 2.80 or higher from the undergraduate degree-granting institution
- Criminal background check from county of residence
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.

- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

**Degree Requirements**

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; EDPR 611; EDPR 612; EDPR 620; EDPR 784; EDPR 785

## Master of Arts in Teaching - Business Education, MAT

College of Education

**Graduate Coordinator:** Cailisha L. Petty

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in Business Education is designed for college graduates who have earned a bachelor's degree in a business discipline. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Business education courses in grades 6 through 12. In addition to pursuing careers in public education, graduates of the MAT in Business Education also can seek positions in the workplace as business trainers. The degree enables candidates to develop the knowledge, skills, and dispositions needed to become excellent teachers. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. **Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability to register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of business or content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4- Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

### Degree Requirements

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; EDPR 611; EDPR 612; EDPR 620; EDPR 784; EDPR 785

## Master of Arts in Teaching - Chemistry Education, MAT

College of Education

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in Chemistry Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Chemistry or related courses in grades 9 through 12. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Master of Arts in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of chemistry or content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

### Degree Requirements

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; EDPR 611; EDPR 612; EDPR 620; EDPR 784; EDPR 785

## Master of Arts in Teaching - Child Dev, Early Edu and Family Studies B-K, MAT

College of Education

**Graduate Coordinator:** Cailisha L. Petty

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**Department Chair:** Gerrelyn C. Patterson

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in Child Development, Early Education and Family Studies Birth–Kindergarten prepares students to 1) master the knowledge, skills and dispositions required for the Birth–Kindergarten license; 2) analyze theoretical perspectives and current research, to conduct research and to apply this knowledge toward reflective, evidence-based practice in teaching and working with families; and 3) assume diverse professional and leadership roles in a wide variety of educational and community settings. All Teacher Education programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee
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### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

**Degree Requirements**

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

FCS 629; FCS 639; FCS 659; FCS 701; EDPR 784; EDPR 785

## Master of Arts in Teaching - Elementary Education K-6, MAT

College of Education

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the mission of the Master of Arts in Teaching (MAT) in Elementary Education (K-6) degree program is to prepare highly qualified classroom teachers for the K-6 classroom. Through courses in elementary-grades mathematics, social studies, language development, diagnostic and prescriptive reading, and assessment and evaluation, candidates in the Master of Arts in Teaching, Elementary Education program develop knowledge, skills, dispositions, and professional attitudes that empower them to become lifelong learners and exemplary educational leaders inside and outside K-6 learning contexts. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Elementary Education or related courses in grades K through 6. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Master of Art in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee
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### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.

- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

**Degree Requirements**

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

ELED 612; CUIN 612; CUIN 613; CUIN 620; EDPR 784; EDPR 785

## Master of Arts in Teaching - English Education, MAT

College of Education

**Graduate Coordinator:** Cailisha L. Petty

**Email:** [mrspetty@ncat.edu](mailto:mrspetty@ncat.edu)

**Phone:** (336) 285-4417

**Department Chair:** Gerrelyn C. Patterson

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**Phone:** (336) 285-4411

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in English Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach English or related courses in grades 9 through 12. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Master of Art in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of English or content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

### Degree Requirements

Total Credit Hours: 30

Core Course (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; EDPR 611; EDPR 612; EDPR 620; EDPR 784; EDPR 785

## Master of Arts in Teaching - Family and Consumer Sciences Education, MAT

College of Education

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**Department Chair:** Gerrelyn C. Patterson

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching in Family and Consumer Sciences prepares students to 1) master the knowledge, skills and dispositions required for the Family and Consumer Sciences license; 2) analyze theoretical perspectives and current research, to conduct research and to apply this knowledge toward reflective, evidence-based practice in teaching and working with families; and 3) assume diverse professional and leadership roles in a wide variety of educational and community settings. The Master of Arts in Teaching (MAT) in Family and Consumer Sciences Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Family and Consumer Science or related courses in grades 6 through 12. The program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

**Degree Requirements**

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

FCS 702; FCS 703; FCS 681; FCS graduate level course; EDPR 784; EDPR 785

## Master of Arts in Teaching - Health and Physical Education, MAT

College of Education

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Situated within the College of Education's conceptual framework of framework "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in Health and Physical Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Health and Physical Education or related courses in grades K through 12. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Masters of Art in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of health/physical education or content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

**Degree Requirements**

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; HPED 613; HPED 612; HPED 610; EDPR 784; EDPR 785

## Master of Arts in Teaching - History Education, MAT

College of Education

**Graduate Coordinator:** Cailisha L. Petty

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning, the Master of Arts in Teaching (MAT) in History Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach History or related courses in grades 9 through 12. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Masters of Art in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability to register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of history or content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4- Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

### Degree Requirements

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; EDPR 611; EDPR 612; EDPR 620; EDPR 784; EDPR 785

## Master of Arts in Teaching - Mathematics Education, MAT

College of Education

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in Mathematics Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Mathematics or related courses in grades 9 through 12. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Master of Art in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of mathematics or content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

### Degree Requirements

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; EDPR 611; EDPR 612; EDPR 620; EDPR 784; EDPR 785

## Master of Arts in Teaching - Special Education General Curriculum K-12, MAT

College of Education

**Graduate Coordinator:** Cailisha L. Petty

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**Phone:** (336) 285-4411

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the mission of the Master of Arts in Teaching (MAT) in Special Education: General Curriculum (K-12) degree program is to prepare highly qualified classroom teacher leaders who serve students with mild/moderate disabilities in diverse settings. Through courses which focus on characteristics of learners with special needs, evidence-based special education methods used in inclusive and other settings, diagnostic and prescriptive reading and math, assessment and IEP development, classroom and behavior management, educational and assistive technology and other content, candidates in the Master of Arts in Teaching: Special Education program develop knowledge, skills, dispositions, and professional attitudes that empower them to become lifelong learners and exemplary educational leaders inside and outside K-12 learning contexts. The MAT program in Special Education is aligned with professional standards commensurate with the North Carolina Department of Public Instruction (NCDPI), The Council for Exceptional Children, and the Council for the Accreditation of Educator Preparation (CAEP).. Graduates of the program are licensed by the North Carolina Department of Public Instruction.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.

- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

**Degree Requirements**

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

ELED 612; SPED 639; SPED 763; SPED 764; EDPR 784; EDPR 785

## Master of Arts in Teaching - Technology Education, MAT

College of Education

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**Department Chair:** Gerrelyn C. Patterson

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Situated within the College of Education's conceptual framework of "21<sup>st</sup> Century Professional Educators: Catalysts for Learning," the Master of Arts in Teaching (MAT) in Technology Education program is designed for college graduates who have decided to enter the teaching profession, many of whom will already be residency license teachers. Graduates of the program are licensed by the North Carolina Department of Public Instruction to teach Technology or related courses in grades 9 through 12. All Educator Preparation Programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Carolina Department of Public Instruction. The Master of Art in Teaching will enable prospective teachers, who bring content knowledge to the graduate degree, the opportunity to develop the knowledge, skills, and dispositions to become excellent teachers.

**Teacher Licensure:** Completing the master's degree and obtaining a teaching license are separate processes. Admission to the master's program does not guarantee admission to the Educator Preparation Program (EPP). To be recommended for licensure, candidates must first be formally admitted to the EPP. Failure to complete EPP admission requirements during the first semester of enrollment may result in the student's inability register for required courses. Applicants and current students should review licensure requirements and other EPP requirements at <https://www.ncat.edu/ced/departments/educator-preparation/prospective-graduate.php> or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- 24 credit hours of technology or content-related course work with a grade of C or better
- Criminal background check from county of residence
- Undergraduate GPA of 2.8 or higher
- Completed Graduate College application, including official transcripts from all colleges and/or universities attended, letters of reference submitted online, and application fee

### Program Outcomes

- Student Learning Outcome 1- Communication: Teacher candidates in the MAT program will demonstrate effective communication skills to demonstrate rapport with and respect for students and create a positive and challenging learning environment that promotes mutual respect among students.
- Student Learning Outcome 2- Critical Thinking: Teacher candidates in the MAT program will demonstrate the ability to use critical thinking to propose general supports that improves student learning related to assessed learning objectives.
- Student Learning Outcome 3- Disciplinary Expertise: Teacher candidates in the MAT program will demonstrate disciplinary-specific expertise by using content pedagogical knowledge and knowledge of students to inform instructional plans. MAT candidates will also select or design formative and summative assessments that monitor student progress.
- Student Learning Outcome 4-Research/Creative Engagement: Teacher candidates in the MAT program will demonstrate the ability to analyze qualitative and quantitative patterns of learning and use evidence to evaluate and change teaching practice using current research and theories.

### Degree Requirements

Total Credit Hours: 30

Core Courses (9 credit hours)

EDPR 600; EDPR 615; SPED 661

Additional Courses (21 credit hours)

EDPR 601; EDPR 611; TECH 708; EDPR 620; EDPR 784; EDPR 785

## Adult Education, MS

College of Education

**Graduate Coordinator:** Geleana Alston **Email:** [gdalston@ncat.edu](mailto:gadalston@ncat.edu)

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**Department Chair:** Sydney Richardson **Email:** [sdrichardson1@ncat.edu](mailto:sdrichardson1@ncat.edu)

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The Adult Education program is designed to prepare effective adult educators who will become change agents within local and international communities. Curricular experiences emphasize the historical, philosophical, and socio-cultural foundations of adult education with a special focus on the Black Diaspora. Graduates are prepared to work as community activists, agency supervisors/directors, program planners, program facilitators/planners, community leaders/organizers, directors of professional organizations, media organizers, and many other community roles. The Adult Education program follows the professional standards devised by the Commission of Professors of Adult Education.

### Program Outcomes:

- **Communication:** Students completing the master's degree in adult education will exhibit effective communication skills (written, oral, and interpersonal) appropriate for professionals in the field of adult education.
- **Critical Thinking:** Students completing the master's degree in adult education will effectively use quantitative and qualitative analytical problem solving skills appropriate for professionals in the field of adult education.
- **Disciplinary Expertise:** Students completing the master's degree in adult education will demonstrate depth and breadth of adult learning theories (knowledge, skills, and professionalism) appropriate for professionals in the field of adult education.
- **Research/Creative Engagement:** Students completing the master's degree in adult education will demonstrate ability to engage productively in the review and conduct of research that is appropriate for professionals in the field of adult education.

### Degree Requirements

Total credit hours: 30

- Core courses (12 credits): ADED 707, 708, 709, 716

#### Thesis option:

- Take 3 credits: ADED 794
- Take 9 credits from: ADED 600-799 with approval of advisor
- Thesis (ADED 797: 6 credits)
- Pass thesis defense

#### Non-Thesis Option:

- Take 15 credits from: ADED 600-799 with approval of advisor
- Practicum (ADED 784: 3 credits)
- Pass comprehensive exam

## Mental Health Counseling – Clinical, MS

College of Education

**Graduate Coordinator:** Shirlene Coopwood **Email:** sdsmith@ncat.edu

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**Department Chair:** Shirlene Coopwood **Email:** sdsmith@ncat.edu

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The Mental Health Counseling - Clinical program is a generalist program that is nationally accredited by the Council on the Accreditation of Counseling and Related Educational Programs (CACREP). This designation indicates curricular experiences encompassing each of the eight core areas of professional counseling including Professional Identity, Social and Cultural Diversity, Human Growth and Development, Career Development, Helping Relationships, Group Work, Assessment, and Research and Program Evaluation. Other required coursework includes clinical assessment and substance abuse. This degree prepares graduates to work in a variety of capacities such as marriage and family counseling, substance abuse counseling, clinical mental health counseling, college counseling, non-profit work, business settings, and many other areas. The U.S. Department of Labor projects that counseling is growing faster than average with some areas of clinical mental health counseling seeing growth rates up to 34% by 2016.

### **Additional Admission Requirements**

- Statement of purpose: Describe career goals, research interests and a list of publications, professional and volunteer experience relevant to intended program of study, academic honors and organizations.
- Three professional letters of recommendation from persons who know the applicant in either an academic or supervisory capacity. Letters from family members, acquaintances, and friends are not acceptable
- A current resume or curriculum vita
- Interview: After initial review of all applications, the applicants with greatest potential are also expected to participate in a pre-admission interview with the Counseling faculty.

### **Program Outcomes:**

- Critical Thinking: Students will develop skills and attitudes of effective thinking that employ the use of thoughtful reflection and logical inquiry to draw evidence-based conclusions as they relate to community counseling.
- Oral Communication Skills: Students will demonstrate proficiency in communicating in individual dyads and small and large group settings and in appropriate use of grammar to communicate counseling findings, while avoiding sexist language, doublespeak and clichés. Evaluation occurs during the benchmarking process. Students must receive a satisfactory rating from the majority of faculty to earn a satisfactory rating. Faculty will evaluate 100% of the student population.
- Written Communication: Students will demonstrate proficiency in academic and scientific writing, which includes avoiding digressions, consistent tenses, using the active voice and citing sources as well as findings, professional documentation, and report writing: with emphasis on APA publishing guidelines.
- Cultural Self-Awareness and Sensitivity: Students will demonstrate awareness of self, including knowledge of macro, micro, and meso ecological systems.
- Cultural Competence: Students will demonstrate an understanding of the cultural context of relationships, issues, and trends in a multicultural society.
- Ethical Practice: Students will demonstrate understanding and application of relevant professional ethical standards.
- Professionalism: Students will demonstrate professional maturity, integrity, and discipline consistent with professional standards of practice.

- **Research and Design:** Graduate community counseling students will demonstrate proficiency in designing quantitative, qualitative, single case designs, action, and outcome-based research, as well as co-occurring and support software packages (e.g., SPSS). Students will understand ethics surrounding Human Subjects Social and Behavioral Science research procedures and Responsible Conduct in Research.
- **Research Evaluation:** Students will demonstrate proficiency in evaluating empirical and non-empirical research. Students will be able to review the professional literature and glean from the review relevant information for both research and practice. Students will be able evaluate research and its application to field experiences. Students will develop a research paper that reflects their knowledge of this content. The specifics of the research paper along with the grading rubric are presented in the achievement summary.
- **Statistics:** Students will demonstrate proficiency in basic statistics methods including scales of measurement, measures of central tendency, indices of variability, shapes and type of distributions, correlations, reliability and validity. Students will apply supportive software packages (e.g., MS Excel, SPSS).
- **Technological Competence:** Students will demonstrate proficiency in implementing best technology practices.

### **Degree Requirements:**

Total credit hours: 60

- Core courses (18 credits): COUN 702, 713, 736, 740, 750, 770
- Practicum (COUN 784: 3 credits)
- Internship I (COUN 785: 3 credits)
- Internship II (COUN 786: 3 credits)
- Pass comprehensive exam
- Take 18 credits: COUN 707, 758, 759, 760, 763, 766
- Electives: Select 15 credit hours with approval of advisor

### **Comprehensive Exam**

The CPCE examination is a standardized test developed by the Center for Credentialing in Education (CCE) of the National Board for Certified Counselors (NBCC) and is the required test for all counseling master's students. Upon completion of all required curriculum courses (not including electives), students will apply to take the Comprehensive Examination. Students must complete and submit the Application for Comprehensive Exam form and be cleared by their advisor by the end of the third week of classes in the semester in which they intend to take the exam.

- *Students may take the Comprehensive Examination (CPCE) **no more than twice** and must pass the Comprehensive Examination in order to graduate. Should a student not receive a passing score on the first attempt, the student must take the examination in a subsequent semester.*
- *A recommendation for **academic dismissal** will be sent to the Graduate College for any student who fails the CPCE twice.*

### Practicum and Internships

Internships COUN 785 and 786 involve supervised professional experiences in settings appropriate to the student's vocational objectives. The internships will provide practical work in the student's area of specialization. Internships include 600 hours of field experience. Students must complete a minimum of 240 hours of direct services with clients. Each week, students receive one hour of individual supervision from their site supervisors and one and one-half hours group supervision from their university supervisors

during seminar. Students in all field experience placements are required to create program-appropriate audio recordings and/or participate in live supervision of their interactions with clients for review by their University Supervisor

Double major (Mental Health Counseling – Clinical and Mental Health Counseling – Rehabilitation)

Regulations on pursuing double majors are presented elsewhere in the catalog and must be followed. The student will be required to complete requirements of both programs. The programs require the following unique (minimum 18 credit hour requirements):

Mental Health Counseling – Clinical:

COUN 707, 758, 759, 760, 763, 766, 784, 785, 786

Mental Health Counseling – Rehabilitation:

COUN 708, 709, 731, 738, 743, 764, 775, 784, 785, 786

Double major (Mental Health Counseling – Clinical and School Counseling)

Regulations on pursuing double majors are presented elsewhere in the catalog and must be followed. The student will be required to complete requirements of both programs. The programs require the following unique (minimum 18 credit hour requirements):

Mental Health Counseling – Clinical:

COUN 707, 758, 759, 784, 785, 786

School Counseling:

COUN 704, 710, 712, 714, 717, 784, 785, 786

**Program Specific Academic Policies**

Endorsement

The Department stipulates endorsement for employment or credentialing only in the program area in which a student received training.

Program Academic Eligibility

A student will be required to maintain semester GPA of at least 3.0 at the end of every semester irrespective of total attempted hours otherwise the student will be placed on probation for one semester. If the semester GPA and/or the cumulative GPA at the end of the probationary semester remains less than 3.0, the student will be dismissed.

A grade of “B” or higher is required in the following courses:

COUN 702, 707, 708, 710, 712, 713, 736, 740, 750, 760, 770

Program Code of Conduct and Ethical Standards of Practice

As pre-professional counselors, graduate students abide by the code of ethics and standards of practice as described in the *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on Rehabilitation Counselor Certification (CRCC)*, *The American Psychological Association*, the *Student Handbook*, the *Graduate Catalog*, and *Department of Human Development and Services Ethical Conduct Policy*.

Consequences of violation of the codes of conduct or ethical standards of practice include but are not limited to one or more of the following:

- Dismissal from the program
- Removal from the course or the field placement and a grade of “F” or “U”

- Referral to authorized campus authorities for further discipline.

#### Program Academic Progression and Retention Standards

The academic progression and retention standards for counselor education programs are in keeping with Council for the Accreditation of Counseling and Related Educational Programs (CACREP) standards, along with the standards set forth by the Council on Rehabilitation Education (CORE), the American Rehabilitation Counseling Association (ARCA), *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on Rehabilitation Counselor Certification (CRCC)*, *The American Psychological Association*, the *Student Handbook*, the *Graduate Catalog*, and *Department of Human Development and Services Ethical Conduct Policy*.

#### The Benchmarking Review Process

Once each academic semester a benchmarking review of all enrolled students is conducted. The benchmarking committee is comprised of all full-time tenured and tenure-track counseling faculty and is chaired by a faculty member. Adjunct faculty members are also invited to attend the benchmarking review.

Reviews are conducted using the Benchmarking Assessment Rubric which focuses on academic performance, ethical behavior, and professional disposition. Each student will be notified in writing by the Department Chairperson regarding the outcome of the benchmarking review and a copy will be placed in the student's file. Students who receive an unsatisfactory evaluation will be placed on probation, provided with a remediation plan and given one semester to implement the remediation plan in order to improve their performance to a satisfactory level. A subsequent unsatisfactory evaluation after the probationary period will result in dismissal from the program.

## Mental Health Counseling – Rehabilitation, MS

College of Education

**Graduate Coordinator:** Glacia Ethridge

**Email:** [gethridg@ncat.edu](mailto:gethridg@ncat.edu)

**Phone:** (336)285-4391

**Department Chair:** Shirlene Coopwood

**Email:** [sdsmith@ncat.edu](mailto:sdsmith@ncat.edu)

**Phone:** (336) 334-7916

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The Mental Health Counseling - Rehabilitation program is accredited by the Council on Accreditation of Counseling and Related Educational Programs Education (CACREP) and is designed to prepare culturally competent counselors who specialize in working with persons with physical, developmental, cognitive, psychological, and neurological disabilities and/or illnesses. Rehabilitation Counseling students are equipped with knowledge, skills, and experience to empower persons with disabilities through the counseling process. Students are further equipped with unique competencies to provide effective rehabilitation counseling services within a cultural context.

### **Additional Admission Requirements**

- Statement of purpose: Describe career goals, research interests and a list of publications, professional and volunteer experience relevant to intended program of study, academic honors and organizations.
- Three professional letters of recommendation from persons who know the applicant in either an academic or supervisory capacity. Letters from family members, acquaintances, and friends are not acceptable
- A current resume or curriculum vita
- Interview: After initial review of all applications, the applicants with greatest potential are also expected to participate in a pre-admission interview with the Counseling faculty.

### **Program Outcomes:**

- **Critical Thinking:** Students will develop skills and attitudes of effective thinking that employ the use of thoughtful reflection and logical inquiry to draw evidence-based conclusions as they relate to community counseling.
- **Oral Communication Skills:** Students will demonstrate proficiency in communicating in individual dyads and small and large group settings and in appropriate use of grammar to communicate counseling findings, while avoiding sexist language, doublespeak and clichés. Evaluation occurs during the benchmarking process. Students must receive a satisfactory rating from the majority of faculty to earn a satisfactory rating. Faculty will evaluate 100% of the student population.
- **Written Communication:** Students will demonstrate proficiency in academic and scientific writing, which includes avoiding digressions, consistent tenses, using the active voice and citing sources as well as findings, professional documentation, and report writing with emphasis on APA publishing guidelines.
- **Cultural Self-Awareness and Sensitivity:** Students will demonstrate awareness of self-including knowledge of macro, micro, and meso ecological systems.
- **Cultural Competence:** Students will demonstrate an understanding of the cultural context of relationships, issues, and trends in a multicultural society.
- **Ethical Practice:** Students will demonstrate understanding and application of relevant professional ethical standards.
- **Professionalism:** Students will demonstrate professional maturity, integrity, and discipline consistent with professional standards of practice.
- **Research and Design:** Graduate community counseling students will demonstrate proficiency in designing quantitative, qualitative, single case designs, action, and outcome-based research, as well as co-occurring and support software packages (e.g., SPSS). Students will understand ethics surrounding Human Subjects Social and Behavioral Science research procedures and Responsible Conduct in Research.

- **Research Evaluation:** Students will demonstrate proficiency in evaluating empirical and non-empirical research. Students will be able to review the professional literature and glean from the review relevant information for both research and practice. Students will be able evaluate research and its application to field experiences. Students will develop a research paper that reflects their knowledge of this content. The specifics of the research paper along with the grading rubric are presented in the achievement summary.
- **Statistics:** Students will demonstrate proficiency in basic statistics methods including scales of measurement, measures of central tendency, indices of variability, shapes and type of distributions, correlations, reliability and validity. Students will apply supportive software packages (e.g., MS Excel, SPSS).
- **Technological Competence:** Students will demonstrate proficiency in implementing best technology practices.

### **Degree Requirements:**

- Core courses (18 credits): COUN 702, 713, 736, 740, 750, 770
- Practicum (COUN 784: 3 credits)
- Internship I (COUN 785: 3 credits)
- Internship II (COUN 786: 3 credits)
- Pass comprehensive exam
- Take 24 credits: COUN 707, 708, 709, 738 , 731, 743, 764, 775
- Electives: Select 9 credit hours with approval of advisor

### **Comprehensive Exam**

The CPCE examination is a standardized test developed by the Center for Credentialing in Education (CCE) of the National Board for Certified Counselors (NBCC) and is the required test for all counseling master's students. Upon completion of all required curriculum courses (not including electives), students will apply to take the Comprehensive Examination. Students must complete and submit the Application for Comprehensive Exam form and be cleared by their advisor by the end of the third week of classes in the semester in which they intend to take the exam.

- *Students may take the Comprehensive Examination (CPCE) **no more than twice** and must pass the Comprehensive Examination in order to graduate. Should a student not receive a passing score on the first attempt, the student must take the examination in a subsequent semester.*
- *A recommendation for **academic dismissal** will be sent to the Graduate College for any student who fails the CPCE twice.*

### Practicum and Internships

Internships COUN 785 and 786 involve supervised professional experiences in settings appropriate to the student's vocational objectives. The internships will provide practical work in the student's area of specialization. Internships include 600 hours of field experience. Students must complete a minimum of 240 hours of direct services with clients. Each week, students receive one hour of individual supervision from their site supervisors and one and one-half hours group supervision from their university supervisors during seminar. Students in all field experience placements are required to create program-appropriate audio recordings and/or participate in live supervision of their interactions with clients for review by their University Supervisor

### Double major (Mental Health Counseling – Rehabilitation and Mental Health Counseling – Clinical)

Regulations on pursuing double majors are presented elsewhere in the catalog and must be followed. The student will be required to complete requirements of both programs. The programs require the following unique (minimum 18 credit hour requirements):

Mental Health Counseling – Rehabilitation:  
COUN 708, 709, 731, 738, 743, 764, 775, 784, 785, 786

Mental Health Counseling – Clinical:  
COUN 707, 758, 759, 760, 763, 766, 784, 785, 786

#### Double major (Mental Health – Rehabilitation and School Counseling)

Regulations on pursuing double majors are presented elsewhere in the catalog and must be followed. The student will be required to complete requirements of both programs. The programs require the following unique (minimum 18 credit hour requirements):

Mental Health Counseling – Rehabilitation:  
COUN 708, 709, 738, 731, 743, 764, 775, 784, 785, 786

School Counseling:  
COUN 704, 712, 714, 717, 760, 763, 784, 785, 786

### **Program Specific Academic Policies**

#### Endorsement

The Department stipulates endorsement for employment or credentialing only in the program area in which a student received training.

#### Program Academic Eligibility

A student will be required to maintain semester GPA of at least 3.0 at the end of every semester irrespective of total attempted hours otherwise the student will be placed on probation for one semester. If the semester GPA and/or the cumulative GPA at the end of the probationary semester remains less than 3.0, the student will be dismissed.

A grade of “B” or higher is required in the following courses:  
COUN 702, 712, 713, 736, 740, 750, 760, 770

#### Program Code of Conduct and Ethical Standards of Practice

As pre-professional counselors, graduate students abide by the code of ethics and standards of practice as described in the *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on Rehabilitation Counselor Certification (CRCC)*, the *American Psychological Association*, the *Student Handbook*, the *Graduate Catalog*, and *Department of Human Development and Services Ethical Conduct Policy*.

Consequences of violation of the codes of conduct or ethical standards of practice include but are not limited to one or more of the following:

- Dismissal from the program
- Removal from the course or the field placement and a grade of “F” or “U”
- Referral to authorized campus authorities for further discipline.

#### Program Academic Progression and Retention Standards

The academic progression and retention standards for counselor education programs are in keeping with Council for the Accreditation of Counseling and Related Educational Programs (CACREP) standards, the American Rehabilitation Counseling Association (ARCA), *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on Rehabilitation Counselor Certification (CRCC)*, *The American Psychological Association*, the *Student Handbook*, the *Graduate Catalog*, and *Department of Human Development and Services Ethical Conduct Policy*.

#### The Benchmarking Review Process

Once each academic semester a benchmarking review of all enrolled students is conducted. The benchmarking committee is comprised of all full-time tenured and tenure-track counseling faculty and is chaired by a faculty member. Adjunct faculty members are also invited to attend the benchmarking review.

Reviews are conducted using the Benchmarking Assessment Rubric which focuses on academic performance, ethical behavior, and professional disposition. Each student will be notified in writing by the Department Chairperson regarding the outcome of the benchmarking review and a copy will be placed in the student's file. Students who receive an unsatisfactory evaluation will be placed on probation, provided with a remediation plan and given one semester to implement the remediation plan in order to improve their performance to a satisfactory level. A subsequent unsatisfactory evaluation after the probationary period will result in dismissal from the program.

## School Counseling, MS

College of Education

**Graduate Coordinator:** Shirlene Coopwood      **Email:** sdsmith@ncat.edu      **Phone:** (336) 334-7916

**Department Chair:** Shirlene Coopwood      **Email:** sdsmith@ncat.edu      **Phone:** (336) 334-7916

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The School Counseling program is designed for individuals seeking a professional career in elementary or secondary school counseling. The School Counseling program is a flexible and high-quality evening program which offers students the opportunity to create an individualized rate of matriculation in either part-time or full-time enrollment. The School Counseling program is nationally accredited by the Council on the Accreditation of Counseling and Related Educational Programs (CACREP). Curricular experiences encompasses each of CACREP's eight core areas of professional counseling which include Professional Identity, Social and Cultural Diversity, Human Growth and Development, Career Development, Helping Relationships, Group Work, Assessment, and Research and Program Evaluation. Students are prepared to take the PRAXIS II Specialty test in School Guidance and Counseling and the National Counseling Examination (NCE) of the National Board for Certified Counselors (NBCC) which is administered twice annually at NCA&T and apply for licensure as a licensed professional counselor through the North Carolina Board of Licensed Professional Counselors upon completion of the program. Students who pass the NCE prior to graduation are recognized as board eligible by NBCC.

**Teacher Education Licensure:** Completing this master's degree and obtaining a teaching license are separate processes. Applicants and current students should visit the Department of Educator Preparation website <https://www.ncat.edu/ced/departments/educator-preparation/index.php> to review admission and licensure information or visit the College of Education for guidance on specific requirements.

### Additional Admission Requirements

- Statement of purpose: Describe career goals, research interests and a list of publications, professional and volunteer experience relevant to intended program of study, academic honors and organizations.
- Three professional letters of recommendation from persons who know the applicant in either an academic or supervisory capacity. Letters from family members, acquaintances, and friends are not acceptable
- A current resume or curriculum vita
- Interview: After initial review of all applications, the applicants with greatest potential are also expected to participate in a pre-admission interview with the Counseling faculty.

### Program Outcomes

- Research Evaluation: Students will demonstrate proficiency in evaluating empirical and non-empirical research. Students will be able to review the professional literature and glean from the review relevant information for both research and practice. Students will be able evaluate research and its application to field experiences. Students will develop a research paper that reflects their knowledge of this content. The specifics of the research paper along with the grading rubric are presented in the achievement summary.
- Research and Design: Graduate community counseling students will demonstrate proficiency in designing quantitative, qualitative, single case designs, action, and outcome based research, as well as co-occurring and support software packages (e.g., SPSS). Students will understand ethics surrounding Human Subjects Social and Behavioral Science research procedures and Responsible Conduct in Research.
- Statistics: Students will demonstrate proficiency in basic statistics methods including scales of measurement, measures of central tendency, indices of variability, shapes and type of distributions, correlations, reliability and validity. Students will understand the use and availability of supportive software packages (e.g., MS Excel, SPSS).

- Oral Communication Skills: Students will demonstrate proficiency in communicating in individual dyads and small and large group settings.
- Written Communication: Students will demonstrate proficiency in academic and scientific writing, professional documentation, and report writing: with emphasis on APA publishing guidelines.
- Cultural Awareness and Sensitivity: Students will demonstrate awareness of self, including knowledge of macro, micro, and meso ecological systems.
- Cultural Competence: Students will demonstrate an understanding of the cultural context of relationships, issues, and trends in a multicultural society.
- Ethical Practice: Students will demonstrate understanding and application of relevant professional ethical standards.
- Professionalism: Students will demonstrate professional maturity, integrity, and discipline consistent with professional standards of practice.
- Technological Competence: Students will demonstrate proficiency in implementing best technology practices.

### **Degree Requirements:**

Total credit hours: 60

- Core courses (18 credits): COUN 702, 713, 736, 740, 750, 770
- Take 21 credits: COUN 704, 710, 712, 714, 717, 760, 763
- Electives: Select 12 credit hours with approval of advisor
- Practicum (COUN 784: 3 credits)
- Internship I (COUN 785: 3 credits)
- Internship II (COUN 786: 3 credits)
- Pass comprehensive exam

### **Comprehensive Exam**

The CPCE examination is a standardized test developed by the Center for Credentialing in Education (CCE) of the National Board for Certified Counselors (NBCC) and is the required test for all counseling master's students. Upon completion of all required curriculum courses (not including electives), students will apply to take the Comprehensive Examination. Students must complete and submit the Application for Comprehensive Exam form and be cleared by their advisor by the end of the third week of classes in the semester in which they intend to take the exam.

- *Students may take the Comprehensive Examination (CPCE) **no more than twice** and must pass the Comprehensive Examination in order to graduate. Should a student not receive a passing score on the first attempt, the student must take the examination in a subsequent semester.*
- *A recommendation for **academic dismissal** will be sent to the Graduate College for any student who fails the CPCE twice.*

### Practicum and Internships

Internships COUN 785 and 786 involve supervised professional experiences in settings appropriate to the student's vocational objectives. The internships will provide practical work in the student's area of specialization. Internships include 600 hours of field experience. Students must complete a minimum of 240 hours of direct services with clients. Each week, students receive one hour of individual supervision from their site supervisors and one and one-half hours group supervision from their university supervisors during seminar. Students in all field experience placements are required to create program-appropriate audio recordings and/or participate in live supervision of their interactions with clients for review by their University Supervisor

### Double major (School Counseling and Mental Health Counseling – Clinical)

Regulations on pursuing double majors are presented elsewhere in the catalog and must be followed. The student will be required to complete requirements of both programs. The programs require the following unique (minimum 18 credit hour requirements):

School Counseling:

COUN 704, 710, 712, 714, 717, 784, 785, 786

Mental Health Counseling – Clinical:

COUN 707, 758, 759, 784, 785, 786

### Double major (School Counseling and Mental Health – Rehabilitation)

Regulations on pursuing double majors are presented elsewhere in the catalog and must be followed. The student will be required to complete requirements of both programs. The programs require the following unique (minimum 18 credit hour requirements):

School Counseling:

COUN 704, 712, 714, 717, 760, 763, 784, 785, 786

Mental Health Counseling – Rehabilitation:

COUN 708, 709, 731, 738, 743, 764, 775, 784, 785, 786

### **Licensure**

The student who has completed all requirements for graduation will also be eligible to apply for state certification/licensure in School Counseling by taking the PRAXIS II Specialty test in School Guidance and Counseling. Students are also eligible to become Nationally Certified Counselors by taking the National Counselor Examination offered by the National Board of Certified Counselors prior to graduation. In addition, the North Carolina Board for Licensed Professional Counselors recognizes this exam as their licensure exam. Student pursuing a licensure in School Counseling must take the PRAXIS II Specialty test in School Guidance and Counseling. Scores needed to pass: Specialty Area Exam (School Guidance and Counseling) 570. For further information consult the PRAXIS Booklet or the College of Education Dean's Suite, 380 Proctor Hall, (336) 334-7757 or visit the PRAXIS II website.

### **Program Specific Academic Policies**

#### Endorsement

The Department stipulates endorsement for employment or credentialing only in the program area in which a student received training.

#### Program Academic Eligibility

A student will be required to maintain semester GPA of at least 3.0 at the end of every semester irrespective of total attempted hours otherwise the student will be placed on probation for one semester. If the semester GPA and/or the cumulative GPA at the end of the probationary semester remains less than 3.0, the student will be recommended for dismissal.

A grade of "B" or higher is required in the following courses:

COUN 702, 712, 713, 736, 740, 750, 760, 770

#### Program Code of Conduct and Ethical Standards of Practice

As pre-professional counselors, graduate students abide by the code of ethics and standards of practice as described in the *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on*

*Rehabilitation Counselor Certification (CRCC), The American Psychological Association, the Student Handbook, the Graduate Catalog, and Department of Human Development and Services Ethical Conduct Policy.*

Consequences of violation of the codes of conduct or ethical standards of practice include but are not limited to one or more of the following:

- Dismissal from the program
- Removal from the course or the field placement and a grade of “F” or “U”
- Referral to authorized campus authorities for further discipline.

#### Program Academic Progression and Retention Standards

The academic progression and retention standards for counselor education programs are in keeping with Council for the Accreditation of Counseling and Related Educational Programs (CACREP) standards, along with the standards set forth by the Council on Rehabilitation Education (CORE), the American Rehabilitation Counseling Association (ARCA), *Ethical Standards of the American Counseling Association (ACA)*, the *Commission on Rehabilitation Counselor Certification (CRCC)*, *The American Psychological Association*, the *Student Handbook*, the *Graduate Catalog*, and *Department of Human Development and Services Ethical Conduct Policy*.

#### The Benchmarking Review Process

Once each academic semester a benchmarking review of all enrolled students is conducted. The benchmarking committee is comprised of all full-time tenured and tenure-track counseling faculty and is chaired by a faculty member. Adjunct faculty members are also invited to attend the benchmarking review.

Reviews are conducted using the Benchmarking Assessment Rubric which focuses on academic performance, ethical behavior, and professional disposition. Each student will be notified in writing by the Department Chairperson regarding the outcome of the benchmarking review and a copy will be placed in the student’s file. Students who receive an unsatisfactory evaluation will be placed on probation, provided with a remediation plan and given one semester to implement the remediation plan in order to improve their performance to a satisfactory level. A subsequent unsatisfactory evaluation after the probationary period will result in dismissal from the program.

## School Administration, MSA

College of Education

**Graduate Coordinator:** Karlin Burks **Email:** [kjburks@ncat.edu](mailto:kjburks@ncat.edu) **Phone:** (336) 256-2342

**Department Chair:** Sydney Richardson **Email:** [sdrichardson1@ncat.edu](mailto:sdrichardson1@ncat.edu) **Phone:** (336) 256-2342

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The Master of School Administration (MSA) program is designed to prepare school executives to assume leadership roles in schools and school systems, primarily as superintendents, central office administrators, principals, and assistant principals. Graduates of the School Administration program are eligible for licensure from the North Carolina State Department of Public Instruction (SDPI) and may be qualified for administration certification in other states. Program content is aligned with the North Carolina Standards for School Executives, the National Educational Leadership Preparation Standards (NELP), the Professional Standards for Educational Leadership (PSEL) and the Council for the Accreditation of Educator Preparation (CAEP).

### Additional Admission Requirements

- Four years of successful teaching experience
- Three years of Adult Leadership experience (e.g., department chair, grade-level chair)
- Continuing Professional License (CPL)
- Three official letters of recommendation, signed and sealed by the writer. One of the letters must be from the current administrator (e.g., principal or assistant principal).
- Faculty Interview
- Electronic portfolio that includes evidence in the following areas:
  - Support for all students achieving high standards of learning
  - Accomplished classroom instruction which shall include data providing evidence of two years of student growth and learning within the last 5 years
  - Significant leadership roles in past positions
  - Strong oral and written communication skills
  - Analytic abilities needed to collect and analyze data for student improvements
  - Demonstrated respect for family and community
  - Strong interpersonal skills
  - Knowledge of curriculum and instructional practices
- Written Statements -- please see College of Education website for writing prompts.
- A copy of the most recent NC Teacher Evaluation (or its equivalent) with at least a minimum rating of Proficient in all standards.
- Current resume

### Degree Requirements

Total credit hours: 30

- Core courses (18 credits): MSA 770, 771, 774, 776, 778, 765
- Yearlong Field-based Internship
  - First Semester Internship
    - Internship Supervision I (MSAL 784)
    - Internship Seminar I (MSAL 789) \*
  - Second Semester of Internship
    - Internship Supervision II (MSAL 785)
    - Internship Seminar II (MSAL 792) \*
- Earn a passing score of the School Leadership Licensure Assessment (SLLA 6990)
- Earn a minimum rating of proficient on NCDPI (North Carolina Department of Public Instruction Certificate of Competency

*\*Required for NCDPI State Internship Stipend*

*The field-based internship must be completed during the fall and spring semesters.*

## Certificate - Community College Teaching, PB

College of Education

**Graduate Coordinator:** Geleana Alston

**Email:** [gdalston@ncat.edu](mailto:gdalston@ncat.edu)

**Phone:** (336) 285-2150

**Department Chair:** Sydney Richardson

**Email:** [sdrichardson1@ncat.edu](mailto:sdrichardson1@ncat.edu) **Phone:** (336)256-2342

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### **Additional Admission Requirements**

- Available only as an add-on certificate to students admitted to the MS in Adult Education program at North Carolina A&T State University.

### **Certificate Requirements**

Total credit hours: 15

- Take 15 credit hours: ADED 714, 719, 773, 778, 784

## Certificate - Marriage and Family Counseling, PB

College of Education

**Graduate Coordinator:** Shirlene Coopwood    **Email:** [sdsmith@ncat.edu](mailto:sdsmith@ncat.edu)    **Phone:** (336) 334-7916

**Department Chair:** Shirlene Coopwood    **Email:** [sdsmith@ncat.edu](mailto:sdsmith@ncat.edu)    **Phone:** (336) 334-7916

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The Marriage and Family certificate will further prepare students to work in settings that specialize in counseling couples, children, and families.

### **Additional Admission Requirements**

Only students formally admitted to the Department of Counseling at North Carolina A & T State University program are eligible to apply for the Marriage and Family Counseling certificate program.

### **Program Requirements**

Total credit hours: 12

- Take 9 credit hours: HDSV 754, 756, 774
- Select 3 credit hours from: HDSV 753, 757, 769

## Certificate - Rehabilitation Counseling and Behavioral Addictions, PB

College of Education

**Graduate Coordinator:** Glacia Ethridge

**Email:** gethridg@ncat.edu

**Phone:** (336) 285-4391

**Department Chair:** Shirlene Coopwood

**Email:** sdsmith@ncat.edu

**Phone:** (336) 334-7916

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The Certificate in Rehabilitation Counseling and Behavioral Addictions (RCBA) imparts specific knowledge and skills to its students that are required to effectively assist and counsel those who are impacted by behavioral addictions (i.e., alcohol and drugs, sexual addiction, eating disorders, criminal behaviors, and gambling). The specific emphasis on ethnic minorities serves to address the unique needs of these individuals, which may be overlooked or misunderstood during the treatment process. The RCBA Certificate has been approved by North Carolina Addictions Specialist Professional Practice Board (NCASPPB) and meets the reduction in NCASPPB requirements for the Licensed Clinical Addictions Specialist credential.

### **Additional Admission Requirements**

Only students formally admitted to the Department of Counseling at North Carolina A & T State University program are eligible to apply for the Rehabilitation Counseling and Behavioral Addictions certificate program.

### **Certificate Requirements**

Total credit hours: 12

- COUN 716, 767, 768, 769

## Certificate - Rehabilitation Psychology and Behavioral Medicine, PB

College of Education

**Graduate Coordinator:** Glacia Ethridge

**Email:** gethridg@ncat.edu

**Phone:** (336) 285-4391

**Department Chair:** Shirlene Coopwood

**Email:** sdsmith@ncat.edu

**Phone:** (336) 334-7916

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The Certificate Program in Rehabilitation Psychology and Behavioral Medicine prepares counselors who focus on the application of psychological knowledge and skills on behalf of individuals with disabilities and chronic health conditions in order to maximize health and welfare, independence, and functional abilities. The certificate also prepares specialists who are concerned with behavioral approaches relevant to the understanding of physical health and illness, and the application of disease prevention, health promotion, treatment, and rehabilitation. There is specific emphasis on the psychological impact of disability, types of assessment tools and procedures utilized to diagnose individuals with various psychological conditions, and the appropriate techniques utilized to treat individuals with psychopathological disorders. This certificate program is no longer offered.

### **Additional Admission Requirements**

Only students formally admitted to the Department of Counseling at North Carolina A & T State University program are eligible to apply for the Rehabilitation Counseling and Behavioral Addictions certificate program.

### **Certificate Requirements**

Total credit hours: 12

- COUN 761, 768, 773, 778

## Certificate - Vocational Evaluation and Work Adjustment, PB

College of Education

**Graduate Coordinator:** Paige Dunlap

**Email:** pdunlap@ncat.edu

**Phone:** (336) 285-4381

**Department Chair:** Shirlene Coopwood

**Email:** sdsmith@ncat.edu

**Phone:** (336) 334-7916

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The Certificate in Vocational Evaluation and Work Adjustment (VEWA) prepares students to administer, score, and interpret a variety of Psychological, Cognitive, Intelligence, Aptitude, and Career tests, especially for persons with disabilities. The certificate also prepares specialists who focus on pre-employment and employment skill development along with reintegrating persons with disabilities into the community. The VEWA program prepares students to become board eligible to obtain national certification as a Professional Vocational Evaluator (PVE).

### **Additional Admission Requirements**

Only students formally admitted to the Department of Counseling at North Carolina A & T State University program are eligible to apply for the Vocational Evaluation and Work Adjustment certificate program

### **Program Requirements**

Total credit hours: 12

- COUN 771, 772, 776
- Select one course from: COUN 752, 762, 777

## Certificate - School Administration, PM

College of Education

**Graduate Coordinator:** Karlin Burks **Email:** [kjburks@ncat.edu](mailto:kjburks@ncat.edu) **Phone:** (336) 256-2342

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The School Administration Endorsement Licensure Program is designed for individuals who currently hold a graduate degree from a public school administration program that meets the public school administration program approval standards established by the State Board of Education, and have a minimum of four years of teaching, or have been employed by an LEA as an assistant principal. Graduates of School Administration Certificate program are eligible for licensure from the North Carolina State Department of Public Instruction (SDPI) and may be qualified for administration certification in other states. The program content aligns with the North Carolina Standards for School Executives, the National Educational Leadership Preparation Standards (NELP), the Professional Standards for Educational Leadership (PSEL), and the Council for the Accreditation of Educator Preparation (CAEP) for advanced programs in educational leadership.

### Additional Admission Requirements

- Earned master's degree in public school administration from an accredited university
- Four years of successful teaching experience (or educational-related experience).
- Three years of Adult Leadership experience (e.g., department chair, grade-level chair)
- Continuing Professional License (CPL)
- Three official letters of recommendation signed and sealed by the writer. One of the letters must be from the current administrator (e.g., principal or assistant principal).
- Faculty Interview
- Electronic portfolio that includes evidence in the following areas:
  - Support for all students achieving high standards of learning
  - Accomplished classroom instruction, which shall include data providing evidence of two years of student growth and learning within the last 5 years
  - Significant leadership roles in past positions
  - Strong oral and written communication skills
  - Analytic abilities needed to collect and analyze data for student improvements
  - Demonstrated respect for family and community
  - Strong interpersonal skills
  - Knowledge of curriculum and instructional practices
- Written Statements -- please see College of Education website for writing prompts.
- A copy of the most recent NC Teacher Evaluation (or its equivalent) with a minimum rating of Proficient in all standards.
- Current resume

### Certificate Requirements

Total credit hours: 21

- Take 12 credit hours: MSA 773, 774, 776, 778
- Yearlong Internship
  - Internship Seminar: MSAL 789
  - Internship Practicum: Take 6 credit hours: MSAL 784, 785
- Passing Score on the School Leadership Licensure Assessment (SLLA)
- Earn a minimum rating of proficient on North Carolina Department of Public Instruction Certificate of Competency

The field-based internship must be completed during the fall and spring semesters.

## **COURSE DESCRIPTIONS: College of Education**

### **Counseling**

#### **COUN 702 - Human Development**

This course provides a comprehensive look at human development from neonatal development to death. The psycho-social, physical, and cognitive aspects of development at every stage are studied in depth, as are various developmental theories describing growth and maturation. Students emerge with a complete understanding of human development across the lifespan and are able to use this knowledge to facilitate the optimum development of people in their future counseling work. A grade of B or better is required in this course. Prerequisites: None. (F;S;SS)

3.000 Credit hours

#### **COUN 704 - School Counseling**

This course covers aspects of counseling as they apply to school settings. Prerequisite: None. (F;S;SS)

3.000 Credit hours

#### **COUN 705 - Interna Expe in Human De Ser I**

This course focuses on increasing student's awareness and understanding of cultural diversity and social justice in international counseling and educational settings. This course is a faculty led study abroad experience which includes learning activities and immersion experiences. Prerequisites: COUN 702 or ADED 707 or MSA 778 or Permission of instructor. (F;S;SS)

3.000 Credit hours

#### **COUN 707 - Pro Ori Eth Clin Menta Health**

This course provides an introduction to the field of clinical mental health counseling. Historical foundations, ethical and legal standards, professional organizations and credentialing, and current trends of the profession are also discussed as well as mental health counseling roles, treatment models, and delivery systems. Prerequisites: None. (F;S;SS)

3.000 Credit hours

#### **COUN 708 - Pro Ori Eth in Reha Counseling**

This course explores the field of clinical rehabilitation counseling including a history and philosophy of rehabilitation, legislation affecting individuals with disabilities, organizational structure of the rehabilitation systems, and rehabilitation counseling practice. Ethics, standards, and credentialing for professional rehabilitation counselors is also presented in this course. A grade of B or better is required in this course. Prerequisites: None. (F;S;SS)

3.000 Credit hours

#### **COUN 709 - Statistics and Research Method**

This course addresses advanced statistical methods and the tools of research. Prerequisite: None. (F;S;SS)

3.000 Credit hours

#### **COUN 710 - Pro Ori Ethics in Counseling**

This course addresses ethics, standards, and credentials for professional counselors with emphasis on the standards of the American Counseling Association and the American School Counselor Association. A grade of B or better is required in this course. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 712 - Counseling School Age Chil**

This course examines how counselors can be effective in addressing the developmental, mental, and psychological needs of elementary, middle, and high school students. A grade of B or better is required for this course. Prerequisites: COUN 713. (F;S;SS)

3.000 Credit hours

**COUN 713 - Theories and Meth in Counsel**

This course introduces the primary theories and techniques in the field of counseling and their underlying components. Laboratory experiences for the observation and application of these counseling skills is provided. A grade of B or better is required in this course. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 714 - Counseling Exceptional Chil**

This course will examine the assessment and placement needs of exceptional children in the school setting and explore strategies for counseling and guidance. Prerequisite: COUN 713. (F;S;SS)

3.000 Credit hours

**COUN 716 - Founda and Theo of Addiction**

This course introduces students to a wide range of theories and models of addiction, culturally competent treatment practices, and other topics related to addictions including, but not limited to, alcohol and other drug abuse, gambling addiction, sex addiction, eating disorders, and criminal offense. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**COUN 717 - Trau, Grief, Loss in K-12 Scho**

This course will explore the school counselor roles and responsibilities in relation to the school emergency management plans, and crises, disasters, and trauma. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 721 - Human Sexuality**

This course is an overview of the clinical study of human sexuality. Sexual and psychosexual development, sexual health and disease, sexual dysfunctions, and cultural norms are discussed. Counseling best practices are also emphasized. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 728 - Counseling Women and Girls**

This course is a foundational course for aspiring counselors who have a desire to provide counseling services to adolescent females and women. Students will be offered an overview of appropriate counseling theories and practices and the course will examine various social, political, economic, and cultural issues that impact women and families. Prerequisite: COUN 713. (F;S;SS)

3.000 Credit hours

**COUN 731 - Addiction in the Workplace**

This course will focus on addiction and the impact that it has on employment including the role of Employee Assistance Programs. Students will learn the importance of EAP programs, the history of EAP programs, and how working with clients on substance abuse and co-occurring disorders can impact employment. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**COUN 732 - Inte Clin Spir Di Counseling**

This course explores spirituality as a component of a holistic approach to counseling to include finding meaning in challenging situations and hope for a better life. The history of spirituality and the orientations of various religious groups will be explored. Counselors will enhance their orientation to spirituality as it relates to a continuum of care. Prerequisite: COUN 713. (F;S;SS)

3.000 Credit hours

**COUN 733 - Trauma Theory and Treatment**

This course will provide an introduction to theoretical frameworks of trauma throughout the life span. Types of trauma, the history of traumatology, and the impact of trauma on the individual, family, and community will be examined. Treatment methods and evidenced-based practices will be provided.

Prerequisite: COUN 765. (F;S;SS)

3.000 Credit hours

**COUN 735 - Counseling Methods**

The fundamentals of general counseling skills are addressed as a foundation for further study. This course includes laboratory experiences for the observation and application of counseling skills. A grade of B or better in this course is required. Prerequisites: Completion of the Personal Counseling Requirements and COUN 713 and (COUN 708 or COUN 710). (F;S;SS)

3.000 Credit hours

**COUN 736 - Multicultural Counseling**

This course provides an overview of issues and trends for counselors in a diverse society. A grade of B or better is required for this course. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 737 - Counsel Older Adults Agi Fami**

This course focuses on the rapidly aging American population and the counseling-related challenges of individuals and families in later life. Students will complete a service learning project. Prerequisite:

COUN 735. (F;S;SS)

3.000 Credit hours

**COUN 738 - Psy Treat Plan Reha Counseling**

This course provides a comprehensive analysis of the Diagnostic and Statistical Manual (DSM) for report-writing and treatment plan development in rehabilitation counseling settings. Accepted treatment approaches and outcome-based assessments are evaluated. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**COUN 740 - Appraisal**

This course will introduce evaluation and assessment tools, including relevant statistics and computer applications. A grade of B or better is required in this course. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 743 - Medi and Psycho Aspects of Dis**

This course is an orientation to the characteristics of a range of medical and psychological disabilities and their psychological, social, familial, and vocational implications. It explores medical terminology, common diagnostic procedures, and the role of health professionals. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**COUN 750 - Group Counseling**

Theories, techniques, and procedures appropriate for counseling groups will be included, as well as topics to build understanding of group development and dynamics. This course includes laboratory experiences for observation and application of group counseling skills. A grade of B or better is required in this course. Prerequisites: COUN 713. (F;S;SS)

3.000 Credit hours

### **COUN 753 - Play Therapy**

This course will introduce students to theories and techniques related to counseling children and adolescents with an emphasis on play and creative therapies. Prerequisite: COUN 713. (F;S;SS)

3.000 Credit hours

### **COUN 754 - Ad Theo Prac in Fam Counseling**

This course focuses on selected emerging family systems theories with an emphasis on the cognitive behavioral approach and the respective techniques and assessments. Prerequisite: COUN 763. (F;S;SS)

3.000 Credit hours

### **COUN 756 - Counseling Couples**

This course will examine the relationships of couples, their role in the family system and evidenced based theories and techniques for effective counseling. Prerequisite: COUN 763. (F;S;SS)

3.000 Credit hours

### **COUN 758 - Psychopa Diagnosis and Treat**

This course familiarizes students with psychopathology and clinical evaluation using the most recent edition of the DSM and ICD classification systems, as well as other diagnostic tools. There is an additional emphasis on case conceptualization, biopsychosocial treatment planning, continuum of care, pharmacological interventions, and the impact of diversity, crisis, and trauma on the assessment and treatment processes. Prerequisites: COUN 704 or COUN 707 or COUN 708. (F;S;SS)

3.000 Credit hours

### **COUN 759 - Addictions Counseling**

This course will examine multiple components of substance use and addictive disorders including etiology, assessment, treatment models, and preventive clinical mental health settings. There is an emphasis on the major substances and behaviors of addiction, diverse populations, co-occurring disorders/illnesses, and social-cultural implications of addictions. Prerequisite: COUN 713. (F;S;SS)

3.000 Credit hours

### **COUN 760 - Career Counseling**

This course includes career development theories, applied and related counseling procedures and technological applications. This course includes laboratory experiences for observation of and practice in career counseling. A grade of B or better is required in this course. Prerequisites: COUN 713. (F;S;SS)

3.000 Credit hours

### **COUN 761 - Behavioral Medicine**

This course explores the utilization of behavioral health techniques to treat a variety of medical and behavioral health conditions. There is an emphasis on the treatment of conditions that are associated with habits and lifestyle, as well as medical conditions that are exacerbated by stress and other psychological factors. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **COUN 763 - Family Counseling**

This course discusses the history, philosophy, professional issues, and trends in family counseling with an emphasis on the roles and functions, models and theories, and ethical and legal considerations of the counselor working with families. In addition, family development across the lifecycle, families in crisis, and specific issues facing families are examined. Prerequisites: COUN 735. (F;S;SS)

3.000 Credit hours

#### **COUN 764 - Caseload Manage Voca Planning**

This course covers the case management process (including case finding, service coordination, referral to and utilization of the other disciplines and client advocacy), planning for the provision of independent living services, vocational rehabilitation services, computer applications, and technology for caseload management. Prerequisite; COUN 708. (F;S;SS)

3.000 Credit hours

#### **COUN 766 - Ad Clin Mental Health Counsel**

This course is a laboratory course with a focus on culturally responsive principles of mental health counseling including prevention, intervention, consultation, education, advocacy, and crisis management. Students have the opportunity to demonstrate skill related areas. Students also learn about clinical mental health service delivery, program development and management, and the importance of policy and community support systems to treatment. Prerequisites: COUN 713. (F;S;SS)

3.000 Credit hours

#### **COUN 767 - Psychopathology and Addictions**

This course will familiarize students with criteria, co-morbidity rates, co-existing disorders, and issues of differential diagnosis based on the Diagnostic and Statistical Manual (DSM). Various behavioral addictions will be explored within a cultural framework. Prerequisites: COUN 738. (F;S;SS)

3.000 Credit hours

#### **COUN 768 - Psychopharm Addictive Behav**

This course addresses the ways in which alcohol and other addictive substances affect the brain and behavior. Addictions addressed include, but are not limited to, alcohol and other drug abuse, gambling addiction, sex addiction, eating disorders, and criminal offense. This course will also explore the different classes of drugs and the associated street names for each drug. Prerequisites: COUN 743. (F;S;SS)

3.000 Credit hours

#### **COUN 769 - Marriage Fam Counsel Addiction**

This course will introduce the student to systems theory and the effects of the cycle of addictions on the family. The specific addictions addressed include, but are not limited to, alcohol and other drug abuse, gambling addiction, sex addition, eating disorders, and criminal offense. Culturally relevant values and practices in providing services to the family will also be addressed. Prerequisites: COUN 750. (F;S;SS)

3.000 Credit hours

#### **COUN 770 - Applied Research in Counseling**

This course focuses on research design and the elements of empirical research including the hypothesis, review of literature, methodology, data collection, and statistical analysis relevant to empirical research. Research culminates in a technical research report. A grade of B or better is required in this course.

Prerequisites: COUN 740. (F;S;SS)

3.000 Credit hours

#### **COUN 771 - Foundations of Vocational Eval**

This course will explore the basic philosophies, practices, and processes of vocational evaluation when working with individuals with disabilities. Specific topics will include assessment tools and instruments,

refinement of clinical skills, analysis of information for career planning, and identification of relevant behaviors. Prerequisite: COUN 740. (F;S;SS)  
3.000 Credit hours

#### **COUN 774 - Coun Poor and Eth Diverse Fami**

This course will introduce students to sociocultural issues impacting families, the historical and political context of their dilemmas, and strategies for intervention in contemporary society. Emphasis will be placed on understanding ethnicity and socioeconomic status. Prerequisites: COUN 763. (F;S;SS)  
3.000 Credit hours

#### **COUN 775 - Career Counseling Employ Devel**

This course provides an overview of career development theory, psychological assessment for career planning, and sources and uses of career information in counseling. Cutting edge strategies for job development and placement, employer consultation, vocational planning and assessment, and computer-based assessment tools will be explored. Prerequisite: COUN 708. (F;S;SS)  
3.000 Credit hours

#### **COUN 778 - Psychodiagnos Report Writing**

This course focuses on the application of the psychodiagnostic process of individuals with cognitive and social-emotional problems, including psychopathological problems. This course includes the administration and scoring of selected psychological assessment instruments; the interpretation of results from these instruments; and the ability to write an integrative report of test findings. Prerequisite: COUN 740. (F;S;SS)  
3.000 Credit hours

#### **COUN 784 - Counseling Practicum**

This is a laboratory course in which students will engage in a 100 clock hours supervised practice in the use of counseling skills. Prerequisites: COUN 713. Corequisite: COUN 750. (F;S;SS)  
3.000 Credit hours

#### **COUN 785 - Internship**

This course requires three hundred (300) clock hours of supervised internship in an appropriate field placement. Students must apply to take this course one semester before enrollment. Class meetings are scheduled and announced by the professor. Individual conferences will be required. All required courses by track must be completed before enrolling in this course. Prerequisite: COUN 784. (F;S;SS)  
3.000 Credit hours

#### **COUN 786 - Internship II**

Three hundred (300) clock hours of advanced supervised in appropriate counseling setting required. Students must apply to take this course one semester before placement. Class meetings are scheduled and announced by the professor. Individual conferences are required. All required courses by track must be completed before enrolling in this course. Prerequisites: COUN 784, COUN 785. (F;S;SS)  
3.000 Credit hours

#### **COUN 790 - Independent Study**

With the supervision of an approving professor, a student may carry out a special project of particular interest, which has appropriate relationship to his counseling specialization. Students must apply for and obtain approval of the supervising professor and the department chairperson one semester before registering for this course. The work of the course must be submitted in the form of a written report. Prerequisite: None. (F;S;SS) Note: May be repeated for credit.  
1.000 TO 3.000 Credit hours

**COUN 800 - Advanced Pro Ori Ethic in Reha**

This professional course explores central professional, legal, and ethical issues surrounding contemporary counseling practice. The counselor's leadership and advocacy roles are stressed, topics include: gender, ethnicity, religion, spirituality, disability, guild issues, and utilizing the legislative process to better serve clients. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**COUN 802 - Advanced Multicul Counsel Dis**

This professional course examines theories, research, and pedagogy and best practices for counseling culturally different clients. Exploration of cultural biases in existing counseling theories and current research is facilitated throughout this experience. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 810 - Descriptive and Inferen Statis**

This doctoral level statistics course equips students with the principles of descriptive and inferential statistics and the essential concepts for developing and analyzing statistical research designs.

Additionally, students acquire skills in hypothesis testing, analysis of variance, nonparametric statistics, and simple linear prediction. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**COUN 812 - Instructional Theory and Meth**

This course prepares students to become culturally competent counselor educators. Adult learning theories, diverse learning styles, cultural dynamics, and diversity in the counseling profession are explored. Prerequisite: COUN 800. A minimum grade of "B" must be earned. (F;S;SS)

3.000 Credit hours

**COUN 815 - Multivariate Anal in Research**

This course provides students with an introduction to common multivariate statistical analyses as applied to research in education and the social sciences. Prerequisite: COUN 810. (S)

3.000 Credit hours

**COUN 818 - Theory and Prac of Couns Super**

This course explores the major conceptual approaches, counseling methods, culturally competent techniques, and legal and ethical issues related to clinical supervision for counselors and counselors in training. Prerequisite: COUN 800. (F;S;SS)

3.000 Credit hours

**COUN 825 - Grant Writing**

Students are equipped with effective tools to identify, understand, write, and manage available grants. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**COUN 830 - Design Methodology and Imple**

This research course provides students with core knowledge and skills for understanding, analyzing, and designing research at the doctoral level using quantitative, qualitative, and mixed method research designs. Prerequisites: COUN 815. (SS)

3.000 Credit hours

**COUN 850 - Foun of Trau Inform Care Manag**

This course prepares students to learn about the prevalence of different types and diagnostic criteria for trauma across populations and the fundamental aspects of trauma informed care as a best practice philosophy to counseling and service provision. Prerequisite: None. (F)  
3.000 Credit hours

### **COUN 860 - Family Violence**

This course provides clinical theory on the assessment and treatment of different forms of family violence (e.g., child maltreatment, intimate partner violence, adult survivors of abuse) from a trauma-informed care perspective. Safety planning and treatment modalities, including when to use single versus conjoint treatment, are reviewed in detail so that students are well-equipped to address these issues in their places of employment. Prerequisite: COUN 850. (F;S;SS)  
3.000 Credit hours

### **COUN 865 - Analysis of Qualita Research**

This course explores advanced principles of qualitative research and approaches in counseling and development, including grounded theory, phenomenology, case study, and ethnography. Additionally, students will engage in central concepts, issues, dilemmas, and ethical issues associated with qualitative research. Prerequisites: COUN 830. (F;S;SS)  
3.000 Credit hours

### **COUN 870 - Models and Meth of Assessment**

This course addresses needs assessment, formative research, process evaluation, monitoring of outputs and outcomes, impact assessment, experimental, quasi-experimental, and non-experimental study designs. A minimum grade of "B" must be earned. Prerequisites: COUN 830. (F;S;SS)  
3.000 Credit hours

### **COUN 880 - Leadership Consulta and Advoca**

This course explores leadership theories, management, administration, and the models and competencies for advocating on behalf of the profession and the client. Prerequisites; None. (SS)  
3.000 Credit hours

### **COUN 984 - Advanced Rehab Counsel Pract**

This course requires doctoral students to participate in a supervised doctoral-level practicum of a minimum of 100 hours in counseling, which include hours for direct service with clients and group counseling. Prerequisites: COUN 800, COUN 802, and 989. (F;S;SS) Note: May be repeated for credit.  
3.000 Credit hours

### **COUN 985 - Counsel Edu and Supervi Intern**

Doctoral students are required to complete doctoral-level counseling internship with a minimum of 300 hours including supervised experiences in counselor education and supervision. The models and ethical issues surrounding consultation are also emphasized. Prerequisites: COUN 870, COUN 880, COUN 984. (F;S;SS)  
3.000 Credit hours

### **COUN 986 - Counse Ed and Supv Internsh II**

Doctoral students are required to complete doctoral-level supervised experiences in counselor education and supervision. The models and ethical issues surrounding consultation are also emphasized. Prerequisites: COUN 815, COUN 818, COUN 984, COUN 989. (F;S;SS) Note: May be repeated for credit.  
3.000 Credit hours

**COUN 989 - Semi in Ad Theo of Reha Coun**

In this professional seminar course, students explore and evaluate traditional and contemporary theories, group processes, and career exploration within the rehabilitation counseling profession. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 990 - Independent Study**

The doctoral independent study course offers students the opportunity to explore an area of interest. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**COUN 997 - Dissertation**

This course offers doctoral students the opportunity to integrate their program of study into an in-depth exploration of a research study. Students complete the dissertation with the guidance of a chair and committee members. Students work with a dissertation chair to write the prospectus, complete an approved proposal, complete an application for Institutional Review Board approval, collect and analyze data, and complete the dissertation. During the final semester, students conclude with an oral defense of their dissertation. Prerequisites: COUN 991, COUN 984. (F;S;SS) Note: May be repeated for credit.

3.000 TO 12.000 Credit hours

**COUN 999 - Continuation Residency**

Note: May be repeated for credit.

1.000 Credit hours

### **Educator Preparation**

**CUIN 612 - Social Studies Elem Schools**

This course addresses the instructional program in social studies for grades K-6. Emphasis is on content, resources, and materials in this course. F,S.

3.000 Credit hours

**CUIN 613 - Science in Elementary School**

This course stresses an integrated discovery-centered program with developmentally appropriate experiences for children in grades K-6. Emphasis is on the processes of science and assessment of student learning.

3.000 Credit hours

**CUIN 618 - Learn Theo World Par Prac 21st**

This course examines learning theories in the context of the 21st century classroom and addresses the significant shifts that have occurred in the conceptualization of constructs of learning and instruction.

Prerequisite: None. (F;SS)

3.000 Credit hours

**CUIN 620 - Foundations in Reading**

Basic reading course which considers the broad field of reading - its goal and nature; factors affecting its growth; sequential development of skills, attitudes and interests; types of reading approaches; organization and materials in teaching fundamentals of reading. (F;S;SS)

3.000 Credit hours

**CUIN 627 - Literacy in the Content Areas**

This course is designed to prepare secondary school teachers to plan and deliver literacy-focused instruction in all content areas. Students will examine current research and instructional models for improving 21st century literacy skills. Prerequisite: None.

3.000 Credit hours

**CUIN 640 - Meth of Teach 21st Cen Class**

This course provides the opportunity for teacher candidates to design, deliver and assess effective instruction. Emphasis will be placed on the use of multiple methodologies to inform instruction to meet the needs of culturally and linguistically diverse populations. A 60-hour field experience in an approved PK-12 school is required. Prerequisites: CUIN 410 and Cuin 520 and admission to Teacher Education.

(F;S)

3.000 Credit hours

**CUIN 660 - Clinical Prac in Teacher Educa**

This course is the culminating clinical experience for teacher candidates. Teacher candidates must complete a full-time supervised teaching experience in an approved PK-12 classroom. This course must be taken in conjunction with the capstone experience. Prerequisites: CUIN 640 or equivalent and admission to Teacher Education. Corequisite: CUIN 670. (F;S)

6.000 TO 9.000 Credit hours

**CUIN 670 - Capstone Experi in Teach Educa**

Teacher candidates will analyze topics related to professional practice, in the context of their culminating clinical experience. They will refine evidences of professional knowledge, skills, and the dispositions through presentation in a capstone portfolio. Prerequisites: CUIN 640 and admission to Teacher Education. Corequisite: CUIN 660. (F;S)

3.000 Credit hours

**CUIN 681 - Issues In Education**

A critical review of the background and functions of the school as a social institution. (F,S,S)

3.000 Credit hours

**CUIN 711 - Meth & Technol of Research**

This course is designed to teach students to be able to locate, read, understand, critique, and use the results of research to become more effective professional and make sound educational decisions. Students will develop an understanding of the researcher's methodologies, the procedures, and results. Students will analyze and evaluate research, judge the usefulness of the findings for educational practice, and plan research to improve educational practice. (F;S;SS)

3.000 Credit hours

**CUIN 715 - Assess and Eval 21st Cen Learn**

This course is designed to equip the learner with the knowledge, skills and dispositions to create balanced assessments in the 21st century classroom. This course will focus on differentiating assessments including: traditional, authentic, portfolios, and performance assessments. Prerequisite: None. (F;SS)

3.000 Credit hours

**CUIN 721 - Advance Methods of Instruction**

This course will focus on using and understanding of child development, diversity issues and motivational strategies to plan interdisciplinary units of instruction and assessment and implement these plans.

Internship is required. Prerequisites: Admission to the School of Graduate Studies. (F,S,S)

3.000 Credit hours

**CUIN 729 - Diversity Issues K-12 Schools**

This course is designed to examine issues of diversity including economic, gender, ethnic, cultural, political, physical and cognitive diversities, and how they impact classroom practices. (F;S;S)

3.000 Credit hours

**CUIN 785 - Clin Teaching in P-12 Schools**

This course is the culminating clinical experience for MAT teacher candidates. Teacher candidates must complete a full-time supervised teaching experience in an approved P-12 classroom. The clinical experience will emphasize the development and use of teaching strategies, methods, skills, and assessments as they relate to the principles of teaching and learning, and the decision-making process.

The candidate will use a variety of teaching strategies, methods, skills, and instructional resources.

3.000 Credit hours

**EDPR 600 - The Learner and Learning Envi**

The course examines learning theories that are central to cognitive, social, and personal development of learners in P-12 schools. The course makes a connection between these theories and essential instructional practices for diverse learners, such as classroom management, instructional planning, and classroom assessment. (F, S, SS)

3.000 Credit hours

**EDPR 601 - Teaching for Diverse Learners**

This course explores how P-12 classroom teachers can leverage student diversity as an asset in the instructional process. The course examines various forms of responsive instruction that P-12 teachers may use such as differentiated instruction and culturally relevant pedagogy to engage students from diverse backgrounds. (F, S, SS)

3.000 Credit hours

**EDPR 611 - Instructional Planning**

This course examines effective models of short- and long- term instructional planning that supports varied student learning needs. Candidates will use knowledge of students to inform teaching and learning as well as planning assessments to monitor and support student learning. (F, S, SS)

3.000 Credit hours

**EDPR 612 - Planning and Assessing Literac**

This course introduces candidates to explicit literary instruction that develops the literacy skills of P-12 students in content area classrooms. Candidates learn to diagnose student literary proficiency and respond to these data through focused literacy instruction that improves literacy abilities. (F, S, SS)

3.000 Credit hours

**EDPR 615 - Assessment of Learning**

This course examines various forms of assessment P-12 classroom teachers employ to further student learning including the use of digital technologies as assessment tools. The course orients candidates to student data analysis and implications for continuous instructional improvement that deepens student learning. (F, S, SS)

3.000 Credit hours

**EDPR 620 - Advanced Pedagogical Strateg**

This course examines learning taxonomies and pedagogical strategies that promote the learner's higher order thinking skills. Emphasis is placed on leadership skills in developing, analyzing, and evaluating

effective curriculum. (F, S, SS)  
3.000 Credit hours

**EDPR 784 - Clinical Pract. I P12 Schools**

This course provides education candidates with a structured, supervised field experience in an appropriate discipline in an approved P-12 school (60 hours minimum). Emphasis is placed on instructional planning, engaging students in learning, providing feedback to guide learning, and using assessment to inform instruction. (F, S, SS)  
3.000 Credit hours

**EDPR 785 - Clinical Pract. II P12 Schools**

This course provides education candidates with a structured, supervised clinical teaching experience in an appropriate discipline in an approved P-12 school (minimum of 15 consecutive weeks). Emphasis is placed on instructional planning, engaging students in learning, providing feedback to guide learning, and using assessment to inform instruction. (F, S, SS)  
6.000 Credit hours

**EDPR 786 - Teacher Licensure Seminar**

This course meets the requirement for continuous enrolment during final term prior to graduation when all course credit requirements have been completed. Candidates will focus on passing licensure requirements. The course is non-graded (Pass/Fail) and credit for this course does not count toward the degree. Master of Arts in Teaching - Upon Completion of all other courses. (F;S;SS)  
1.000 Credit hours

**ELED 611 - Balanced Lit for Ele Learns I**

This course provides a framework for understanding the development of language and literacy in children. It is designed to help students learn to build on what children bring to oral language, reading and writing, and to enhance developmentally appropriate language and literacy activities. Prerequisites: SPED 661, INST 605. (F;S;SS)  
3.000 Credit hours

**ELED 612 - Mathe Curricu and Pedagogy I**

This course is designed to develop the knowledge and skills to effectively teach math concepts to the young child through grade six. Methods will be presented in a developmental sequence that supports children's construction of the concepts essential to understanding mathematics. Specifically, this course will provide elementary education candidates with an activity and project-based exploration of informal geometry in two and three dimensions. Prerequisites: INST 605, SPED 661 and ELED 610. (F;S;SS)  
3.000 Credit hours

**ELED 616 - Social Stud Sci Curric and Ped**

This course explores the scope and sequence of the elementary curriculum areas of science, social studies and health. Prerequisite: ELED 610. (F;S;SS)  
3.000 Credit hours

**ELED 618 - Clin Prac 21st Cen ELE Class**

A field experience which emphasizes the development and use of teaching strategies, methods, skills, and assessments as they relate to the principles of teaching and learning, and the decision-making process. The student will use a variety of teaching strategies, methods, skills, and instructional resources. Prerequisites: All Phase I Course work. (F;S;SS)  
6.000 Credit hours

**ELED 619 - Action Re for Elemen Ed Class**

This course will provide candidates an opportunity to examine the role of teachers as researchers, utilizing an embedded field experience that emphasizes research and its influence on teaching practices.

Prerequisite: Successful completion of Phase I requirements. (F;S;SS)

3.000 Credit hours

**ELED 740 - Di Learn Dif 21st Cen El Class**

This course focuses on ethnically, linguistically, and culturally diverse learners in the elementary classroom, systemic issues that impact their learning, and culturally responsive practices needed to teach these learners. Prerequisite: Completion of Phase I of the MAED Degree Program in Elementary Education. (F;S;SS)

3.000 Credit hours

**ELED 789 - The Capstone Experience**

0.000 Credit hours

**MSA 770 - Research for School Adminis**

This course will examine the quantitative and qualitative research methodologies appropriate to school settings and the evaluation of research, data analysis, and its application to schools. (F;S;SS)

3.000 Credit hours

**MSA 771 - Diversity Is Com Re School Ex**

This course will focus on the skills school Executives need to build professional learning communities. School leaders must address the needs of diverse student populations. Candidate will develop a greater awareness of diverse school culture that is rooted in the community which he/she serves. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**MSA 774 - Curriculum Leader and Assess**

This course will focus on the application of current theories of learning and psychological research in educational leadership of classroom instruction. This course is designed to study practices of applied curriculum leadership, curriculum planning, curriculum design and trend analysis. Instructional models to improve instruction and student achievement will be examined. (F;S;SS)

3.000 Credit hours

**MSA 776 - Educa Law Policy and Politics**

This course will cover the influence of the laws, educational policies, and power structures of communities on the goals and operations of schools. Examining state statues, administrative policies, and regulations as court decisions regarding public school personnel functions is essential for school administrators. Legal and ethical issues relatives to equity, quality, gender, ethnicity and appropriate application of legal principles are also discussed. (F;S;SS)

3.000 Credit hours

**MSA 778 - The School Principalship**

The principalship course will examine different management perspectives of school operations, organization, team leadership, school-based collaboration, business management, public school, finance, and school-based budgets. The way school districts operate, district level decision making, and elements of school quality that impact on operating programs, and the relationship of schools to other community agencies will be discussed. (F;S;SS)

3.000 Credit hours

**MSA 765 - School Finance**

This course explores how school administrators can allocate limited resources to achieve prioritized goals and objectives. Emphasis is placed on both the understanding of the methods of financing public schools, as well as the basic overview of budgeting and evaluation principles that are needed to ensure that resources are allocated with optimum efficiency and effectiveness. Candidates explore the primary revenue sources for Pre-K-12 education and the mechanism for distributing revenues to individual school districts at the state and local level. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**MSAL 784 - Internship Supervision I**

Internship Supervision I is the initial level of the internship experience. The internship provides an opportunity for skill development in key leadership areas. Each student will complete an internship in a school setting with joint supervision by a university faculty member and a cooperating principal mentor for each individual intern. Internship Supervision I is the first half of a year-long (ten month) clinical experience that is taken by permission of the advisor/program coordinator only. The internship supervision course is capped at six students. Prerequisite: MSA 778, MSA 771, MSA 770, MSA 774. (F;S;SS)

6.000 Credit hours

**MSAL 785 - Internship Supervision II**

Internship Supervision II is the advanced level of the internship. Students will complete their action research projects and North Carolina Department of Public Instruction requirements for licensure certification. Each student will complete the internship in a school setting to put into action leadership skills mastered in Internship Supervision I. Internship Supervision II is the second half of a year-term (ten month) clinical experience that is taken by permission of the advisor/program coordinator only. The internship supervision course is capped at six students. Prerequisite: MSAL 784 Internship Supervision I. (F;S;SS)

1.000 TO 20.000 Credit hours

**MSAL 789 - Internship Seminar I**

The Administrative Internship Seminar is the culminating experience in the MSA Program. The central purpose of the Internship is to offer interns opportunities to develop and document their achievements and mastery of the performance standards necessary for effective school leadership. Designed to facilitate the application of knowledge and the development of leadership skills, the internship provides intentionally planned and supervised "real world" opportunities for aspiring administrators to impact learning for all students. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**MSAL 792 - Internship Seminar II**

The internship seminar is conducted once a week during the full-time internship. This seminar complements field activities and provides interns the opportunity to share experiences, develop concepts, and broaden their knowledge of school administration. Students will develop case studies, and portfolios to demonstrate acquisition of skills. Prerequisites: MSAL 789 Internship Seminar I, MSA 780 (Internship Seminar I) and Co-requisite: MSA 783 (Internship Supervision II). (F;S;SS)

3.000 Credit hours

**READ 735 - Organi and Super of Liter Prog**

This course focuses on administrative acts requisite to the creation and guidance of well-balanced, school-wide literacy programs. It includes managing and implementing Reading/Language Arts programs in the classrooms. The course is for all school personnel who are in a position to make administrative decisions regarding the school literacy program. It incorporates teacher inquiry and presentation of research from

participatory action research. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**READ 736 - Language and Erly Literacy Dev**

The course addresses theories on the development of language and literacy of young children. It covers issues relating to instruction as well as the socialization patterns and practices that facilitate learning in young children. In addition, it offers opportunities for the collection, analysis and interpretations of data from inquiry and participatory action research in the home and schools of early learners.  
3.000 Credit hours

**READ 738 - Lit for the English Lan Learn**

This course examines theories, research, and empirical-based practices used in effective reading instruction with English Language Learners. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**READ 755 - Foundations Of Literacy**

This course focuses on the broad field of literacy-its goal and nature; its theories; factors affecting its growth; sequential development of skills, attitudes and interests; types of reading approaches; organization and materials in teaching the fundamentals of literacy. It incorporates teacher inquiry into appropriate literacy instruction and provides opportunities for classroom participatory action research. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**READ 756- Integra Lite In The Cont Areas**

This course focuses on the best approach to integrate literacy in content area classrooms. It incorporates research-based practices that emphasize the use of multi-literacies to integrate the communication skills in the content areas. It provides opportunities to improve quality teaching through observation, experimentation and action research in the classroom. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**READ 757 - Literacy Assessment and Instru**

This course addresses assessment and intervention procedures of literacy problems. It offers opportunities for candidates to explore and analyze literacy research data that report on best practices and findings relevant to struggling readers. It covers techniques and materials candidates can utilize in assessment and instruction of reading in the classroom and clinical settings. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**READ 774 - Research in Literacy Instruc**

This course focuses on the evaluation of recent research concerning findings, approaches, innovations and organizations of literacy instruction. It includes selected topics for reports and research projects. It provides the forum for candidates' presentations of research projects from, inquiry, experimentation, and participatory action research. Prerequisites: None. (F;S;SS)

**SPED 639 - Lit Devl Strat In Stru Readers**

This course focuses on planning and modifying classroom instruction for students experiencing challenges in acquiring basic literacy skills. Assessment of student strengths and weaknesses to guide instructional decision making and use of explicit research-based instructional techniques and implementation of proven comprehensive reading strategies and programs are discussed. (F;S;SS)  
3.000 Credit hours

**SPED 661 - Introduction to Exceptionality**

This course gives an overview of the characteristics of individuals with disabilities along with discussion of essential trends, issues and theories relating to special education and lifespan development.

Educational, multicultural, humanistic, and legal issues are addressed. (F;S;SS)

3.000 Credit hours

**SPED 670 - Clinical Practice in Spe Edu**

This field based course serves as partial fulfillment for the Phase I culminating experience. Candidates are required to teach in a supervised setting with learners in K-12 special education environments under the direct supervision of a mentor teacher and university supervisor. A semester long (minimum ten week) clinical experience is required in an approved setting. Prerequisite: SPED 764. (F;S;SS)

6.000 Credit hours

**SPED 748 - Special Edu Assess and IEP De**

This course focuses on culturally responsive assessment, IEP development, state required paperwork and interventions for students with special needs and diverse families. (F;S;SS)

3.000 Credit hours

**SPED 760 - Teach Stu with Learn Be Prob**

This course is designed to provide evidence-based strategies to improve the academic and behavioral performance of students with disabilities in inclusive settings. A broad range of academic and behavioral approaches will be discussed, including instructional adaptation and modification, effective collaboration, transition planning and non-violent crisis intervention for disruptive and aggressive students. A 30-hour internship in a supervised setting is required. (F;S;SS)

3.000 Credit hours

**SPED 763 - Clsrm Behav Manage in Spe Ed**

This course is a survey of relevant proven research and techniques that are applicable for positive behavior support systems in learning environments for children and youth. This course will include functional behavioral assessment and intervention planning necessary to effectively manage classroom behaviors of individuals or groups of students with learning and behavioral disabilities to promote success in the learning environment. (F;S;SS)

3.000 Credit hours

**SPED 764 - Meth Cur Pro Stu Ex Learn Need**

This course is designed to promote culturally responsive instruction through linking classroom content to students' lives and community experiences in the design and delivery of lesson plans. An array of evidence based strategies will be emphasized. A 60-hour internship in a supervised setting is required.

Prerequisite: SPED 760. (F;S;SS)

3.000 Credit hours

**SPED 765 - Collaboration Consult in Educ**

3.000 Credit hours

**SPED 772 - Current Issue Re Lead Spec Ed**

This capstone course is designed to address current issues and practices informed by research in special education including leadership, collaboration and impact on student learning. Prerequisite: SPED 670.

(F;S;SS)

3.000 Credit hours

## **Leadership Studies and Adult Education**

### **ADED 707 - Foundations of Adult Education**

This course will introduce and address the philosophical, sociological and psychological foundations of adult education, and develop a view of the subject as a broad, diverse, and complex field of study, research, and professional practice. Students will survey many institutions, programs, and individual activities. The range of methods and materials used to enable adults to learn will be discussed. Program candidates MS in Adult Education must earn the grade of B or better in this course. Prerequisites: None. (F;S)

3.000 Credit hours

### **ADED 708 - Instruc Methods in Adult Educa**

This course introduces learners to a variety of methods and strategies needed to facilitate adult learning in formal, non-formal, and informal settings and examines the unique characteristics of adult educational contexts. Special attention is given to adult education philosophical perspectives, teaching/learning styles. Program candidates MS in Adult Education must earn the grade of B or better in this course.

Prerequisites: None. (F;S)

3.000 Credit hours

### **ADED 709 - Adult Development and Learning**

This course examines the unique characteristics, motivation, and educational participation of the adult learner. Emphasis is placed on theories of adult learning and intelligence and models of adult cognitive and psychosocial development. Program candidates MS in Adult Education must earn the grade of B or better in this course. Prerequisites: None. (F;S)

3.000 Credit hours

### **ADED 710 - Found Human Resource Dev**

Human Resource Development (HRD) is concerned with the human resources within both public and private sector organization and is defined as the integrated use of employee training and development, organization development, and career development, to improve individual, group, and organizational effectiveness in attaining strategic goals and objectives. This course addresses concepts, practices, and issues in HRD with a focus on workplace learning organizational analysis.

3.000 Credit hours

### **ADED 711 - Social Gerontology**

This is an introductory course engaging participants in the study of cultural, sociological, and economic factors affecting older adults and their implications for adult education and lifelong learning practices.

Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **ADED 714 - Community College/Post Sec Ed**

This is a study of the purposes, organization, functions, current trends and historical evolution of the comprehensive community college, and its role within adult, community and higher education. The North Carolina Community College System is emphasized.

3.000 Credit hours

### **ADED 715 - Women in Adult Education**

This course examines the progression of women professionals in the adult education discipline within a cultural and soci political context. The emphasis is placed on initial exclusion, marginalization, and evolving, participation, scholarship and leadership.

3.000 Credit hours

**ADED 716 - Research in Adult Education**

This research course provides students with an examination of goals, purpose, principles, and methods of current research in the field of adult education. Quantitative, qualitative, and mixed-methods research design will be introduced as used in applied research in adult education. Program candidates MS in Adult Education must earn the grade of B or better in this course. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**ADED 719 - Assessment and Evaluation**

This course instructs participants on how to identify, design, and develop assessment methods appropriate to adult learners. With emphasis on contexts of higher education, topics include quantitative and qualitative classroom assessment; formative vs. summative assessment; test interpretation; social, legal and ethical implementations of assessment; reliability and validity; norm vs. criterion tests; placement tests; program evaluation models; as well as formative and summative evaluation. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**ADED 721 - Organi and Admin in Adult Edu**

This course is an examination of theories, concepts and practices as they relate to organizational dynamics and functions of administrators within various adult education context. Emphasis is placed on tasks of planning, organizing, staffing, financing, motivating, decision-making, evaluating and delegating, which are key components of adult education programs. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**ADED 722 - Diverse Perspec in Adult Educa**

This course explores a broad range of topics related to diversity within various adult education contexts. Course readings and assignments related to a wide variety of settings including colleges and universities, adult basic education, GED programs, adult literacy programs, community-based educational programs, workplace learning, and continuing professional education. Prerequisites: ADED 707, ADED 709, permission from professor. (F;S;SS)

3.000 Credit hours

**ADED 729 - Designing Edu Prog for Adults**

This course will teach learners how to effectively plan and deliver educational activities for diverse adult learners with various abilities, identities, and positionalities. Prerequisites: None. (F;S;S)

3.000 Credit hours

**ADED 773 - Leadership in Adult Higher Ed**

This course explores leadership theories, styles, ethics, values, principles, and perspectives. Case studies and other methods are used to examine leadership situations as a means of demonstrating and exercising practical applications of the concepts studied to various settings of adult higher education. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**ADED 776 - Principles of College Teaching**

This course provides an in-depth understanding of the framework and mechanics essential to community college and university teaching. Topics include course planning and organization, syllabus design, diversity appreciation, integration of technology, and the evaluation of learning. Prerequisites: ADED 708, ADED 709. (F;S)

3.000 Credit hours

**ADED 778 - Introduct to Student Sup Servic**

This course introduces students to the field of student support services with consideration of adult learners in higher education. Topics included are history of higher education and student affairs; theoretical perspectives in student development; and the mission, goals, and various functions of student support services in postsecondary educational contexts. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**ADED 784 - Practicum Experi In Adult Edu**

This course engages participants in a supervised field experience with an agency, business, institution or organization, to enable praxis of adult education theory and methodology. The course offers shared reflection, integration, and discussion of theoretical application, and methodological implementation within the practicum experience. The practicum experience consists of (125) clock hours. Program candidates MS in Adult Education and Certificate in Community College Teaching must earn the grade of B or better in this course. Restrictions: Must be enrolled in the MS in Adult Education or PB Certificate in Community College Teaching. Prerequisites: Master's Comprehensive Examination; or permission by supervising professor. (F;S)

3.000 Credit hours

**ADED 797 - Master's Thesis**

This course provides direction and guidance in the completion of the Master's thesis research. This course is available only to thesis option participants and is completed under the supervision of a thesis advisor in collaboration with a thesis committee as approved by the department chairperson. Prerequisites: Students must apply and obtain approval of the supervising professor and the department chairperson one semester before registering for this course. Prerequisites: ADED 716, ADED 794. (F;S;SS) Note: May be repeated for credit.

1.000 TO 6.000 Credit hours

**ADED 799 - Continuation Residency**

Meets requirement for continuous enrollment during final term prior to graduation when all course credit requirements (including thesis or dissertation) have been completed. This course is non-graded, may receive a grade of S/U, and credit for this course does not count toward the degree. May be repeated twice. Prerequisites: ADED 797. (F;S;SS) ) Note: May be repeated for credit.

1.000 to 3.000 Credit hours

**LEST 800 - Leadership Theories**

This course explores the theoretical nature of leadership. The emphasis is on the application of theories of leadership in political, economic, social, and global contexts. A critical examination of the leadership literature and research are used to develop an appreciation for the contingency and interdisciplinary nature of leadership.

3.000 Credit hours

**LEST 802 - Decision Making Theor/Strat**

This course focuses on the development and enhancement of strategic decision-making capabilities. It explores the theories and principles of executive decision-making processes such as qualitative decision-making models and techniques. A related emphasis is on effective communication with diverse groups, and implementation and evaluation of strategic decisions. Other topics include power and politics, managerial cognition, strategy formulation, organizational learning, organizational information processing, ethical decision-making, and the influence of technology on strategic decisions.

3.000 Credit hours

**LEST 810 - Ethics & Social Responsibility**

This course focuses on the ethical and legal dimensions of leadership, including multiple philosophies and theories. The course will provide an examination and interpretation of complex issues from the perspective of ethical leadership and diversity.

3.000 Credit hours

**LEST 811 - Execu Leader and Group Dynam**

This course focuses on personal/professional development relative to executive leadership. The scholarship of engagement is combined with practical experiences including individual projects, invited guest presentations, individual and group self-assessments of leadership effectiveness, and other developmental activities, and seminar type roundtables with leaders from the healthcare, business, economic development, politics and philanthropy industries. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**LEST 812 - Contemp Issues Cul Diversity V**

This course focuses on current issues in diverse cultures and the development of cultural understanding and knowledge of the literature, history, language, art, music, and social/political systems of a diverse culture.

3.000 Credit hours

**LEST 813 - Leadership Devel Prin and Prac**

This course focuses on the theory, concepts and methods of leadership development, leadership development and evaluation research, and developmental leadership assessment. The course provides grounding in adult development theory and learning theory and applications to leader development both on and off the job. Student opportunities for research and leadership self-development are major features of the course. Prerequisites: LEST 800, or permission of the instructor. (F;S;SS)

3.000 Credit hours

**LEST 815 - Research Design and Methodolo**

This course provides an overview of quantitative, qualitative, and mixed methods research paradigms and introduces students to tools necessary for the design of a methodologically sound study. Prerequisites: LEST 801 and 802, or permission of the instructor. (F;S;SS)

3.000 Credit hours

**LEST 817 - Field Studies in Global Leader**

Students work side-by-side with faculty in globally-dispersed field settings to acquire practical experience in leadership, service and problem-solving in diverse cultural, social and political contexts. Prerequisite: Instructor Approval. (F;S;SS)

3.000 TO 6.000 Credit hours

**LEST 818 - Strategic Planning Orga Dynam**

This course explores the leadership implications of strategic planning in formal organizations across a variety of settings. It critically examines strategic planning constructs ranging from SWOT/PEST analyses to goal setting as well as major theories in the study of effective organizational designs. Emphases include analysis of (a) the leadership dynamics inherent in the strategic planning process and (b) vertical and horizontal interdependent relationships among components of organizational structures. Prerequisites: LEST 800. (F;S;SS)

3.000 Credit hours

**LEST 830 - Higher Education Fi and Budget**

This course is designed to provide students with an overview of the economics and finance of higher education and community colleges in the United States, with an emphasis on school finance case laws, analysis of financial policies at the local, state, and national levels. Students will explore sources of revenues, fund raising and development, types of expenditures, tuition and financial policies, budgeting and accounting practices in higher education and community colleges. Prerequisites: LEST 800: Leadership Theories, or permission of instructor. (F;S;SS)  
3.000 Credit hours

### **LEST 831 - Higher Educa Policy and Gover**

This course addresses external and internal models of governance and policy development at the local, state, and federal levels. Students will explore policy and governance strategies within local and state levels. These strategies are critical to higher education and community college effectiveness. Prerequisites: LEST 800: Leadership Theories, or permission of instructor. (F;S;SS)  
3.000 Credit hours

### **LEST 832 - Com College Leadership and Adm**

This course introduces students to the leadership and management concepts and practices in community colleges. Students will explore leadership styles, the use of power, community college culture, and organizational behavior. They will examine administrative practices and responsibilities within instructional and student services divisions and operational services units as well as the management of human, fiscal, and material resources within the community college system. Prerequisites: LEST 800: Leadership Theories, or Permission of instructor. (F;S;SS)  
3.000 Credit hours

### **LEST 835 - Leadership for Di and So Jus**

This course examines culturally relevant leadership and social justice leadership as approaches to leadership in K-20 settings. The examination is guided by relevant social science theories and leadership theories. Prerequisites: LEST 800. Leadership Theories. (F;S;SS)  
3.000 Credit hours

### **LEST 841 - Leadership and Politics**

This course examines political leadership at the state level, emphasizing how political and personal ideology as well as external influences frame policy decisions. Course activities will include research and applied scholarship projects. Prerequisites: LEST 800: Leadership Theories. (F;S;SS)  
3.000 Credit hours

### **LEST 842 - Psyc of the African Ameri Expe**

This course is designed to provide students with an in- depth examination of the factors that have historically, culturally, politically, educationally, and scientifically shaped the consciousness of African Americans. Specific attention will be given to an analysis of groundbreaking issues faced by early African American psychologists as well as contemporary issues facing African American communities. Prerequisites: LEST 800: Leadership Theories and LEST 810 Ethics & Social Responsibility. (F;S;SS)  
3.000 Credit hours

### **LEST 843 - Race and Health Equity**

This course provides students with an understanding of how social factors contribute to racial/ethnic, socioeconomic and gender disparities in health and health care. Students will also examine the ways in which neighborhood and community context, as well as inequalities in socioeconomic status, materially shape health and access to health care services. Prerequisites: LEST 800: Leadership Theories and LEST 810 Ethics & Social Responsibility. (F;S;SS)

3.000 Credit hours

**LEST 845 - Women and Leadership**

This course is designed to examine (A) theories (e.g., feminist, womanist, critical, critical race, etc.), (b) leadership models (e.g., servant, transformative, authentic, adaptive, etc.), and (c) issues (e.g., sexism, racism, glass ceiling, ethics of caring, double jeopardy, gender roles, etc.) related to women in leadership positions across different environments. Prerequisites; LEST 800. (F;S;SS)

3.000 Credit hours

**LEST 850 - Leadership Global Econ Society**

This course will focus on effective and ethical global leadership in the areas of decision-making, problem-solving, competencies for addressing relationships, communication, teambuilding, leading visions into actions. Additionally, the course will emphasize stress and conflict management, interdependent thinking, valuing the ability to advance the work of the institution's place in global society, communities and cultural awareness technology and global perspectives.

3.000 Credit hours

**LEST 860 - Qualitative Research**

This course focuses on methods and tools of inquiry of qualitative research, including but not limited to developing case studies, surveys, interviews and narrative observations. Strategies for determining the intertextuality of trends and relationships as revealed in the research will be developed.

3.000 Credit hours

**LEST 861 - Computer Aided Research**

This course provides students with background for determining which statistical test to use, running that test, and interpreting results, given a set of data. Though math will be emphasized, major emphasis is on understanding statistical tests. Prerequisites: LEST 862, or permission of the instructor. (F;S;SS)

3.000 Credit hours

**LEST 862 - Quantitative Research**

This course provides a fundamental introduction to the field of quantitative research through the development of a knowledge base and an application of research skills and methodologies required to select, read, and interpret relevant professional literature.

3.000 Credit hours

**LEST 863 - Statistical Appli and Interpre**

This course focuses on the use of SPSS as a way to run statistical analyses. Determining the appropriate statistical test and interpretation of results are also emphasized. Prerequisites: LEST 862, or permission of the instructor. (F;S;SS)

3.000 Credit hours

**LEST 864 - Ethnographic Methods So Sci Re**

This course provides experience in fieldwork methods of observation, interviewing, discourse analysis, and other research strategies from the ethnographic tradition that has developed in anthropology and sociology over the past century. The course examines the ontological assumptions, theoretical perspectives, and ways of writing that are essential for conducting this type of research. Prerequisites: LEST 860, or permission of the instructor. (F;S;SS)

3.000 Credit hours

**LEST 865 - Mixed Methods Research**

This course provides a foundation for planning, conducting, and evaluating mixed methods research studies. Prerequisites: LEST 860 and 862, or permission of the instructor. (F;S;SS)  
3.000 Credit hours

### **LEST 885 - Special Topics**

This course allows the introduction of new topics on a trial basis at the doctoral level. The topic of this course will be determined prior to registration. Note: May be repeated for credit.  
3.000 Credit hours

### **LEST 900 - Dissertation Research**

This course focuses on the development of the dissertation proposal. The dissertation research is embedded in the internship experience that ensures a comprehensive application and utilization of research.  
3.000 Credit hours

### **LEST 930 - Dissertation Writing**

Dissertation writing is the culminating course in the student's doctoral program. The student will demonstrate high levels of scholarly and intellectual activity. Dissertation writing is an original contribution to knowledge in the field of study through disciplined inquiry. This course prepares a student for conducting, writing, and defending the dissertation in accordance with the highest professional standards.  
3.000 Credit hours

### **LEST 984 - Internship in Leadership**

This course provides inquiry, exploration, and hands-on opportunities to observe and participate in leadership decisions. The internship will be one of professional practice internship in a leadership environment. The internship will be with a recognized business, industry, government or non-governmental leader or in an organization that emphasizes leadership. It will inform the student of current practice and support the dissertation research. Prerequisite: LEST 800. (F;S;SS)  
3.000 Credit hours

### **LEST 991 - Qualifying Exam**

Students planning to take the qualifying exam should register at the beginning of the semester in which the student plans to take the exam. Prerequisite: Completion of core courses. (F;S;SS)  
0.000 Credit hours

### **LEST 992 - Pro-Seminar Leadership Studies**

This professional seminar provides students with an overview of the LEST doctoral program and an introduction to inquiry and research design in social and behavioral sciences research. Prerequisite: None. (F;S;SS)  
1.000 Credit hours

### **LEST 995 - Doctoral Preliminary Examinations**

In this course dissertation advisors will guide their students towards completing the preliminary examination. The preliminary examination will consist of a written proposal and oral defense of the student's dissertation proposal. Grading is pass/fail evaluation only. Prerequisites: Completion of core and research course; completion LEST 991. (F;S;SS)  
2.000 Credit hours

### **LEST 997 - Dissertation**

This course represents the supervised research leading to the dissertation. Doctorial dissertation research will be conducted under the supervision of the dissertation committee chairperson and include regular meetings with the dissertation committee to evaluate progress on the dissertation. Students may enroll for 3-12 credit hours per semester but must complete a total of 12 dissertation credit hours. Prerequisite: LEST 995. (F;S;SS) Note: May be repeated for credit  
3.000 TO 12.000 Credit hours

**LEST 999 - Continua of Doctoral Disser**

This course meets the Graduate School requirement for continuous enrollment during final term prior to graduation when all degree requirements (including dissertation hours) have been completed. This course is non-graded. Credit for this course does not count toward the degree. May be repeated twice.

Prerequisites: LEST 997. (F;S;SS)

1.000 TO 6.000 Credit hours

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## COLLEGE OF ENGINEERING

<http://www.ncat.edu/coe/index.html>

Stephanie Luster-Teasley, Interim Dean  
Clayton Clark, Jr., Associate Dean for Academic Affairs  
Leotis Parrish, Assistant Dean for Student Affairs

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The College of Engineering at NC A&T State University is proud of our rich legacy of academic and research excellence and civic engagement. The College consists of the Departments of Chemical, Biological, and Bioengineering; Civil, Architectural, and Environmental Engineering; Computer Science; Electrical & Computer Engineering; Industrial & Systems Engineering; and Mechanical Engineering; and the interdisciplinary Computational Data Science & Engineering program. These departments together offer ten (10) Bachelor of Science, eight (8) Master of Science and five (5) Doctor of Philosophy degree programs.

The College of Engineering at North Carolina A&T State University is the nation's leading producer of African American engineers at the undergraduate level, and ranks 14<sup>th</sup> in the percentage of undergraduate degrees awarded to women. Also, the College is 1<sup>st</sup> in the nation in the number of African-American tenured and tenure-track faculty (2015 ASEE survey).

### DEGREE PROGRAMS OFFERED

#### Doctoral Degrees

- Ph.D. Computational Data Science and Engineering
- Ph.D. Computer Science
- Ph.D. Electrical Engineering
- Ph.D. Industrial and Systems Engineering
- Ph.D. Mechanical Engineering

#### Masters Degrees

- MS Bioengineering
- MS Chemical Engineering
- MS Civil Engineering
- MS Computational Data Science and Engineering
- MS Computer Science
- MS Electrical Engineering
- MS Industrial and Systems Engineering
- MS Mechanical Engineering

## Computational Data Science and Engineering, PhD

College of Engineering

**Graduate Coordinator:** Balakrishna Gokaraju **Email:** [bgokaraju@ncat.edu](mailto:bgokaraju@ncat.edu) **Phone:** (336)285-3210  
**Department Chair:** Marwan Bikdash **Email:** [bikdash@ncat.edu](mailto:bikdash@ncat.edu) **Phone:** (336)285-3249

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The PhD in Computational Data Science and Engineering (CDSE) is an interdisciplinary graduate program designed for students who seek to use advanced computational methods to solve problems involving big data, extensive computations, and complex modeling, simulation, optimization and visualization.

The mission of the Department of Computational Data Science and Engineering is to graduate professionals who (a) have expertise in developing novel computational methodologies and products, and/or (b) have extended their expertise in specific disciplines (in science, technology, engineering, and socioeconomics) with computational tools.

Research in Computational Data Science and Engineering includes: big data and computational statistics, AI and Machine Learning, internet of things, large and complex systems, intelligent transportation and infrastructure systems, remote sensing, autonomous vehicles, virtual and augmented reality, e-commerce, image and video processing, scientific and interactive visualization, high-performance computing, scalable algorithms, bioinformatics, and multi-scale multi-physics engineering systems.

### Additional Admission Requirements

- Master of Science or Engineering degree in computational, computer, or data science and engineering or in an allied field in science, engineering, business, economics, and technology.
- Admission to the PhD program is also possible with a B.S. in computational, computer, or data science and engineering or in an allied field in science, engineering, business, economics, and technology, with additional requirements for admission and graduation.

### Program Outcomes:

- Graduates shall demonstrate expertise, critical thinking and the ability to conduct research and development in scalable computing, computational methods, artificial and computational intelligence, complex system modeling and simulation, and data science and engineering.
- Graduates shall have mastery of communicating, planning, and implementing solutions and research and development products in computational approaches in various applications in science, technology, engineering, and mathematics, including the use of advanced visualization and analytics techniques.
- Graduates shall develop skills and abilities to be effective educators in computational and data science and engineering disciplines at the university level.
- Graduates shall demonstrate the ability to conduct novel and independent research and scholarly activity.

### Degree Requirements

Total credit hours: 44 (post MS)

- Core courses (12 credits): CSE 702, 703, 801, 804
- Electives (24 credits): Take 24 credit hours from engineering, computer science, mathematics, physics, chemistry, biology, economics, business, agricultural science, or other courses approved by the CDSE Department, with approval of Advisor
- Take 3 additional credit hours to complete the requirement of a total of 44 credit hours. These credit hours can be from Dissertation-CSE 997, Continuation of Dissertation-CSE 999,

Supervised Teaching-CSE 993, Supervised Research-CSE 994, or approved graduate level courses, with approval of Advisor

- At least 26 credit hours should be at 800-900 level
- Seminar (CSE 992: 2 credits)
- Dissertation (CSE 997: 15 credits)
- Pass the Qualifying Exam, Preliminary Exam, and Dissertation Defense
- If the student was admitted based on a BS degree only, the student must take 18 additional credit hours from engineering, computer science, mathematics, physics, chemistry, biology, economics, business, agricultural science, or other courses approved by the CDSE Department, with approval of Advisor. For post-BS admission, a total of 62 credit hours is required for graduation.

#### **Dissertation Research:**

A student may not register for dissertation credits before passing Qualifying Examination. No more than 15 dissertation credits are counted toward the total credit hours requirement for the degree.

#### **Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

#### **Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

#### **Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary oral Exam.

#### **Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

#### **Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate College's guidelines for theses and dissertations.

## Computer Science, PhD

College of Engineering

**Graduate Coordinator:** Huiming (Anna) Yu    **Email:** [cshmyu@ncat.edu](mailto:cshmyu@ncat.edu)    **Phone:** (336)285-3699

**Department Chair:** Kaushik Roy    **Email:** [kroy@ncat.edu](mailto:kroy@ncat.edu)    **Phone:** (336)285-3693

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The Ph.D. program in Computer Science presents both advanced instruction and opportunities for independent research. The Ph.D. degree is the highest academic degree offered, and graduates typically find employment as researchers in government or industry laboratories or as university faculty. Earning a Ph.D. degree requires initiative and responsibility, and the student is expected to make a significant contribution to computer-science knowledge by investigating a topic that is recognized as significant.

### Additional Admission Requirements

- Bachelor of Science in computer science with a minimum GPA of 3.5 over the last 60 course credit hours of the undergraduate degree or Master of Science degree in Computer Science with a minimum GPA of 3.25.
- GRE test scores

### Program Outcomes

- Graduates of the Ph.D. program will conduct advanced research in such computer science areas as cybersecurity, cyber identity, software engineering, data science, big data, computer vision, and artificial intelligence.
- Graduates will develop the ability to identify research problems in computer science and to develop solutions for them.
- Graduates will develop the ability to address important computing problems from a variety of areas, including business, the environment, the State's economy, healthcare, and law enforcement.
- Graduates will develop the ability to examine certain grand challenge problems in the discipline.
- Graduates will acquire the skills and abilities to be effective educators in computer science at the university level.

### Degree Requirements

Total credit hours: 63 (post baccalaureate)

- Core courses (9 credits): COMP 710, 755, 775
- COMP electives (24 credits): Take 24 credits of additional COMP 700-899 courses with approval of advisor
- Electives (6 credits): Take 6 credit hours from COMP 700-899 or other departments with approval of advisor
- Take 6 credit hours: COMP 892, 994
- Dissertation (18 credits): COMP 997
- Pass qualifying exam, preliminary exam, dissertation defense

### Degree Requirements

Total credit hours: 45 (post MS degree)

- Core courses\* (9 credits): COMP 755, 775, 892
- COMP electives (9 credits): Take 9 credits of additional COMP 700-899 courses with approval of advisor
- Electives (6 credits): Take 6 credit hours from COMP 700-899 or other departments with approval of advisor
- Take 3 credit hours: COMP 994

- Dissertation (18 credits): COMP 997
  - Pass qualifying exam, preliminary exam, dissertation defense
- \* If a student has already taken a core course then the student must substitute this course with an elective course with approval of the advisor.

**Dissertation Research:**

A student may not register for dissertation credits before passing Qualifying Examination. No more than 18 dissertation credits are counted toward the total credit hours requirement for the degree.

**Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

**Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary Oral Exam.

**Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate College's guidelines for theses and dissertations.

## Electrical Engineering, PhD

**School/College:** College of Engineering

**Graduate Coordinator:** John Kelly **Email:** jck@ncat.edu **Phone:** (336) 285-3712

**Department Chair:** Abdullah Eroglu **Email:** aeroglu@ncat.edu **Phone:** (336) 285-2458

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The Doctoral Program in Electrical Engineering offers the following four tracks: Computer Engineering, Communications and Signal Processing, Electronic and Optical Materials and Devices, and Power Systems and Control.

### Additional Admission Requirements

- Bachelor's degree in electrical and/or computer engineering from an ABET accredited university or from an acceptable institution of higher learning with an earned GPA of 3.5 or higher over the last 60 course credit hours of undergraduate degree or Master of Science in Electrical Engineering, Computer Engineering, or a related discipline from an acceptable institution of higher learning, and prior research experience.
- GRE scores
- At least one of the letters of recommendations must come from an individual knowledgeable of the student's graduate performance and potential.

### Degree Requirements

Total credit hours: 60 (post baccalaureate)

- Required courses (12 credits): ECEN 621, ECEN 629, ECEN 650, ECEN 668
- ECEN electives (27 credits): Take 27 credits from ECEN 600-800 with approval of advisor
- Technical Electives (9 credits): Take 9 credit hours with approval of advisor
- Attend doctoral seminar
- Dissertation (ECEN 997: 12 credits)
- Pass qualifying exam, preliminary exam, dissertation defense
- All doctoral students must take at least 12 credit hours of 800 level courses

Total credit hours: 36 (post MS)

- ECEN electives (15 credits): Take 15 credits from ECEN 600-800 with approval of advisor
- Technical Electives (9 credits): Take 9 credit hours with approval of advisor
- Attend doctoral seminar
- Dissertation (ECEN 997: 12 credits)
- Pass qualifying exam, preliminary exam, dissertation defense
- All doctoral students must take at least 12 credit hours of 800 level courses

### Dissertation Research:

A student may not register for dissertation credits before passing Qualifying Examination. No more than 12 dissertation credits are counted toward the total credit hours requirement for the degree.

### Qualifying Examination:

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

**Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary oral Exam.

**Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate College's guidelines for theses and dissertations.

## Industrial and Systems Engineering, PhD

College of Engineering

**Graduate Coordinator:** Younho Seong    **Email:** [yseong@ncat.edu](mailto:yseong@ncat.edu)    **Phone:** 336-285-3734  
**Department Chair:** Om Prakash Yadav    **Email:** [oyadav@ncat.edu](mailto:oyadav@ncat.edu)    **Phone:** 336-285-3735

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The Doctor of Philosophy (Ph.D.) in Industrial and Systems Engineering (ISE) program prepares students for successful careers as teachers, researchers, and leaders in academia, industry and the public sector. The program emphasizes the systems engineering, collaboration and engagement skills critical to addressing the complex societal problems of tomorrow. ISE graduate students tackle these problems in a supportive environment working with nationally-recognized faculty.

### **Additional Admission Requirements**

- At least one degree in Engineering or Computer Science.
- Bachelor of Science degree in Engineering or Computer Science from an ABET accredited program with a cumulative GPA of 3.5 or above or Master of Science degree in a discipline related to Industrial & Systems Engineering with a cumulative GPA of 3.3
- A Graduate Record Exam (GRE) Aptitude Exam score
- Evidence of English language proficiency for international applicants.

### **Program Outcomes:**

The Doctor of Philosophy in Industrial and Systems Engineering program will prepare graduates to

- Demonstrate broad knowledge of industrial and systems engineering sub-disciplines and deep knowledge of a specific sub-discipline.
- Effectively teach industrial and systems engineering methods and tools.
- Independently perform research with mentoring from a faculty member.
- Decompose systems into component parts and logically model and evaluate using mathematical, statistical and computational tools.
- Construct and improve integrated systems or processes consisting of people, materials, information, equipment and energy considering life cycle factors.
- Formulate and solve multi-objective problems using industrial and systems engineering methods and tools.
- Communicate Industrial and Systems Engineering research information in written, oral, and presentation formats.

### **Degree Requirements:**

Total credit hours: 69 (post baccalaureate)

- Core courses (12 credits): ISEN 625, 655, 665, 675
- ISEN specified courses (12 credits): Select 12 credit hours from ISEN 721, 812, 813, 814, 821 or ISEN 833, 841, 852, 853
- ISEN courses (12 credits): Take additional 12 credit hours of graduate level ISEN courses with approval of advisor
- Engineering courses (12 credits): Take 12 credit hours of additional engineering courses at 700 or 800 level with approval of advisor
- At least 21 course credits should be at 800 level

- Seminar (3 credits): Take ISEN 992 three times in three semesters
- Dissertation (18 credits): ISEN 997
- Pass qualifying exam, preliminary exam, dissertation defense

### **Dissertation Research:**

A student may not register for dissertation credits before passing Qualifying Examination. No more than 18 dissertation credits are counted toward the total credit hours requirement for the degree.

### **Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

### **Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary Oral Exam.

### **Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate College's guidelines for theses and dissertations.

## Mechanical Engineering, PhD

College of Engineering

**Graduate Coordinator:** John Kizito

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**Phone:** 336-285-3747

**Department Chair:** Frederick Ferguson

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**Phone:** 336-285-2135

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The Ph.D. degree in Mechanical Engineering provides both advanced instruction and independent research opportunities for students. Graduates are typically employed in research environments in government laboratories and industries, and as university faculty. The Ph.D. degree program is highly individualistic in nature, and the student is expected to make a significant contribution to the reservoir of human knowledge by investigating a significant topic within the domain of mechanical engineering.

### Additional Admission Requirements

- Bachelor of Science degree in Mechanical Engineering with a minimum cumulative GPA of 3.5 or Master of Science degree in Mechanical Engineering or a closely related engineering discipline with a minimum GPA of 3.3
- GRE score

### Program Outcomes

- Graduates of the Ph.D. program will apply their critical thinking skills to invent, analyze, and model complex engineering systems and make novel contributions to the discipline.
- Graduates of the Ph.D. program will demonstrate effective communication skills through project and dissertation work and conference presentations.
- Graduates of the Ph.D. program will perform research or undertake advanced projects in an area of mechanical engineering such as mechanical systems and materials, energy and thermal-fluid sciences, and aerospace and make novel contributions in their respective areas of research.
- Graduates of the Ph.D. program will be active and effective leaders in their professional societies.

### Degree Requirements

Total credit hours: 60 (post baccalaureate)

- Core courses<sup>1</sup> (9 credits): MEEN 613, 631, 716
- MATH electives<sup>2</sup> (3 credits): Take 3 credit hours from MATH 650, 651, 652
- MEEN electives<sup>3</sup> (30 credits): Take 30 credits of additional MEEN 600-899 courses with approval of advisor. Sixty percent of these courses (18 credits) must be at the 800 level
- Technical electives<sup>4</sup> (6 credits): Take additional 6 credit hours with approval of advisor
- Graduate Seminar (0 credits)<sup>4</sup>: Take two seminars in two semesters
- Dissertation (12 credits): MEEN 997
- Pass three exams<sup>5</sup>: qualifying exam, preliminary exam, dissertation defense

<sup>1</sup>All direct BS-PhD students must take 9 credits of core courses from MEEN 613, 631, 716.

<sup>2</sup>All direct BS-PhD students must take 3 credits of MATH elective course from 650, 651, or 652

<sup>3</sup>Post-BS to PhD students must take at least six MEEN 800 level courses.

<sup>4</sup>Refer to the ME Graduate Handbook for acceptable courses and/or guidance.

<sup>5</sup>All BS-PhD students must pass the three departmental examinations in the following sequence: qualifying exam, preliminary exam, dissertation defense

### Degree Requirements: Post MS to PhD

Total credit hours: 36 (post MS)

- MEEN PhD Courses<sup>6</sup> (18 credits): Take 12 credits of additional MEEN 800-899 courses with remaining courses at 600/700/800 level as approved by the advisor including 0 to 9 core credits and 0 to 3 math elective credits depending on the students' academic records.

- Technical electives<sup>7</sup> (6 credits): Take additional 6 credit hours with approval of advisor
- Graduate Seminar (0 credits)<sup>8</sup>: Take two seminars in two semesters
- Dissertation (12 credits)<sup>8</sup>: MEEN 997
- Pass three exams: qualifying exam, preliminary exam, dissertation defense

<sup>6</sup>Incoming MS-PhD students are required to take 0 to 9 core credits and 0 to 3 credits of Math electives depending on their previous academic record. The core course and math elective credits will be counted towards the required 18 credits of MEEN PhD course requirements. Post-MS to PhD students must take at least four 800 level courses.

<sup>7</sup>Refer to the ME Graduate Handbook for acceptable courses and/or course guidance.

<sup>8</sup> Refer to the ME Graduate Handbook for acceptable courses and/or guidance.

<sup>9</sup>All MS-PhD students must pass the three departmental examinations in the following sequence: qualifying exam, preliminary exam, dissertation defense

### **Dissertation Research:**

A student may not register for dissertation credits before passing Qualifying Examination. No more than 18 dissertation credits are counted toward the total credit hours requirement for the degree.

### **Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

### **Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary oral Exam.

### **Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate

College's guidelines for theses and dissertations.

## Bioengineering, MS

College of Engineering

**Graduate Coordinator:** Yecheung Yun

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**Phone:** (336)285-3226

**Department Chair:** Stephen B. Knisley

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The Master of Science in Bioengineering program prepares graduates for Ph.D. level studies or for advanced bioengineering practice in industry, consulting, or government service. The program emphasizes advanced research and education in the application of engineering principles, methods, and technologies to problems in health care. The Bio Engineering Masters students and faculty conduct research in a variety of medical and life science areas such as biosystems analysis, implantable medical devices, artificial organs, tissue engineering, biomaterials, biomechanics, biosignals and biosensors.

### **Additional Admission Requirements**

- Unconditional admission requires undergraduate degree from an ABET accredited Engineering program

### **Program Outcomes:**

- The graduates will perform effectively in an advanced bioengineering (biomedical) related position in industry or in advance graduate/professional schools.
- The graduates will demonstrate research leadership skills in using interdisciplinary and advance approaches or techniques for solving their research or project problems in the bioengineering field.
- The graduates will be active in leadership positions of the professional societies.
- The graduates will enhance their professional credentials through conference presentations, publications and understanding the importance of lifelong learning.
- Be prepared to join the workforce and contribute to economic development.

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credits): BMEN 711, 712, 713

#### Thesis option:

- Engineering electives: Take 9 credits from BMEN; CHEN; CIEN; ECEN; ISEN; MEEN; NANO; CSE; COMP with approval of advisor
- Life Sciences electives: Select 6 credit hours from BIOL; ANSC with approval of advisor
- Participate in BMEN Seminar
- Thesis (BMEN 797: 6 credits)
- Pass thesis defense

#### Project Option:

- Engineering electives: Take 12 credits from BMEN; CHEN; CIEN; ECEN; INEN; MEEN; NANO; CSE; COMP with approval of advisor
- Life Sciences electives: Select 6 credit hours from BIOL; ANSC with approval of advisor
- Participate in BMEN Seminar
- Project (BMEN 796: 3 credits)

#### Course Option:

- Engineering electives: Take 15 credits from BMEN; CHEN; CIEN; ECEN; INEN; MEEN; NANO; CSE; COMP with approval of advisor
- Life Sciences electives: Select 6 credit hours from BIOL; ANSC with approval of advisor
- Participate in BMEN Seminar

## Chemical Engineering, MS

College of Engineering

**Graduate Coordinator:** Vinayak Kabadi

**Email:** kabadi@ncat.edu

**Phone:** 336-334-7564

**Department Chair:** Stephen Knisley

**Email:** sbknisle@ncat.edu

**Phone:** 336-285-2653

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The graduate Chemical Engineering program prepares students for further study at the doctoral level or for advanced chemical engineering practice in industry. Graduates of the program work in a broad range of fields and create innovative solutions to important industrial and societal problems. Active areas of research include Thermodynamics and Molecular Computation, Catalysis and Reaction Engineering, Transport Processes, Polymers, Energy and Fuels, Environmental Chemical Engineering and Biological Engineering.

### Additional Admission Requirements

- Undergraduate degree in STEM discipline
- Unconditional admission requires an engineering undergraduate degree from an ABET accredited Chemical Engineering program

### Program Outcomes:

- The graduates will perform effectively in an advanced chemical engineering related position in industry or in advanced graduate/professional schools.
- The graduates will demonstrate research leadership skills in using interdisciplinary and advanced approaches or techniques for solving their research or project problems.
- The graduates will be active in professional societies.
- The graduates will enhance their professional credentials through lifelong learning.

### Degree Requirements

Total credit hours: 30

- Core courses (9 credits): CHEN 720, 750, 760

#### Thesis option

- CHEN elective (3 credits): Select 3 credits from CHEN 705, 710, 715
- CHEN electives (6 credits): Select 6 credits from CHEN 600-799
- Engineering electives (6 credits): Select 6 credit hours from CHEN, BMEN, ELEN, ISEN, MEEN, PHYS, CHEM, BIOL, MATH, NANO, EES with approval of advisor
- Participate in CHEN seminar
- Thesis (CHEN 797: 6 credits)
- Pass thesis defense

#### Project option

- CHEN elective (3 credits): Select 3 credits from CHEN 705, 710, 715
- CHEN electives (6 credits): Select 6 credits from CHEN 600-799
- Engineering electives (9 credits): Select 9 credit hours from CHEN, BMEN, ELEN, ISEN, MEEN, PHYS, CHEM, BIOL, MATH, NANO, EES with approval of advisor.
- Project (CHEN 796: 3 credits)
- Participate in CHEN seminar

#### Course option

- CHEN elective (3 credits): Select 3 credits from CHEN 705, 710, 715
- CHEN electives (9 credits): Select 9 credits from CHEN 600-799
- Engineering electives (9 credits): Select 9 credit hours from CHEN, BMEN, ELEN, ISEN, MEEN, PHYS, CHEM, BIOL, MATH, NANO, EES with approval of advisor.
- Participate in CHEN seminar

## Civil Engineering, MS

College of Engineering

**Graduate Coordinator:** Taher Abu-Lebdeh

**Email:** taher@ncat.edu

**Phone:** (336)285-3670

**Department Chair:** Leotis Parish (Interim)

**Email:** parrishL@ncat.edu

**Phone:** (336)285-2648

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The Master of Science in Civil Engineering program provides advanced study and research in the following areas: Environmental/Water Resources, Structures/Geotechnical, Transportation/Regional Development, Construction Management, and Energy Resources/ Systems.

### Additional Admission Requirements

- Unconditional admission requires undergraduate degree from an ABET accredited Civil Engineering, Architectural Engineering, or Environmental Engineering program

### Degree Requirements

Total credit hours: 30

- Core courses (9 credits): CIEN 700, 702, Advanced Mathematics course (CIEN approval)

#### Thesis option

- CIEN electives (9 credits): Take 9 credits from CIEN 600-799 with approval of advisor
- Electives (6 credits): Take 6 credit hours from CIEN 600-799 or other departments with approval of advisor
- Take CIEN 792 CIEN Masters Seminar
- Thesis (CIEN 797: Masters Thesis: 6 credits)
- Pass thesis defense

#### Project option

- CIEN electives (9 credits): Take 9 credits from CIEN 600-799 with approval of advisor
- Electives (9 credits): Take 9 credit hours from CIEN 600-799 or other departments with approval of advisor
- Take CIEN 792 CIEN Masters Seminar
- Project (CIEN 796: Masters Project 3 credits)

#### Course option

- CIEN electives (9 credits): Take 9 credits from CIEN 600-799 with approval of advisor
- Electives (12 credits): Take 12 credit hours from CIEN 600-799 or other departments with approval of advisor
- Take CIEN 792 CIEN Masters Seminar
- Comprehensive exam

## Civil Engineering – Systems Engineering, MS

College of Engineering

**Graduate Coordinator:** Taher Abu-Lebdeh

**Email:** taher@ncat.edu

**Phone:** (336)285-3670

**Department Chair:** Leotis Parish (Interim)

**Email:** parrishl@ncat.edu

**Phone:** (336)285-2648

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The Master of Science in Civil Engineering program provides advanced study and research in the following areas: Environmental/Water Resources, Structures/Geotechnical, Transportation/Regional Development, Construction Management, and Energy Resources/ Systems.

### **Additional Admission Requirements**

- Unconditional admission requires undergraduate degree from an ABET accredited Civil Engineering, Architectural Engineering, or Environmental Engineering program

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credits): CIEN 700, 702, Advanced Mathematics Course (advisor approval)
- Systems Engineering Core (9 credit hours): SYEN 605, 710, 715
- Systems Engineering Electives: Take 9 credit hours CIEN 614, 670, 785
- Electives (3 credits): Take 3 credit hours from CIEN 600-799 or other departments with approval of advisor
- Take CIEN 792 CIEN Masters Seminar

## Data Science and Engineering, MS

College of Engineering

**Graduate Coordinator:** Balakrishna Gokaraju **Email:** [bgokaraju@ncat.edu](mailto:bgokaraju@ncat.edu) **Phone:** (336)285-3210  
**Department Chair:** Marwan Bikdash **Email:** [bikdash@ncat.edu](mailto:bikdash@ncat.edu) **Phone:** (336)285-3249

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The MS in Data Science and Engineering (CDSE) is an interdisciplinary graduate program designed for students who seek to use computing and data science and engineering to solve problems involving big data, extensive computations, and complex modeling, simulation, optimization and visualization.

The mission of the Department of Computational Data Science and Engineering is to graduate professionals who (a) have expertise in developing novel computational and data science methodologies and products, and/or (b) have extended their expertise in specific disciplines (in science, technology, engineering, and socioeconomics) with data science and engineering tools.

Research in Data Science and Engineering includes: big data and computational statistics, AI and Machine Learning, internet of things, large and complex systems, intelligent transportation and infrastructure systems, remote sensing, autonomous vehicles, virtual and augmented reality, e-commerce, image and video processing, scientific and interactive visualization, high-performance computing, scalable algorithms, bioinformatics, and multi-scale multi-physics engineering systems.

### Additional Admission Requirements

- An approved Bachelor of Science or Engineering degree with a minimum GPA of 3.00/4.00 is required. A working knowledge of statistics, matrices, or linear algebra, and experience in programming are desirable

### Program Outcomes:

- Graduates shall demonstrate expertise, critical thinking and the ability to conduct research and development in scalable computing, computational methods, artificial and computational intelligence, complex system modeling and simulation, and data science and engineering.
- Graduates shall have mastery of communicating, planning, and implementing solutions and research and development products in computational approaches in various applications in science, technology, engineering, and mathematics, including the use of advanced visualization and analytics techniques.
- Graduates shall develop skills and abilities to be effective educators and practitioners in data science and engineering
- Graduates shall acquire the ability to conduct significant research and development projects.

### Degree Requirements

Total credit hours: 30

- Core courses (12 credits): CSE 620, 704, 708, 817

#### Thesis option

- Electives (9 credits): Take 9 credits from engineering, computer science, mathematics, physics, chemistry, biology, economics, business, agricultural science or other courses approved by the CSE department, with approval of advisor
- Select 2 additional credits to complete 30 credit requirement with approval of advisor. This can be thesis hours, continuation/residency credits, supervised teaching, supervised research, or approved graduate courses with approval of advisor
- At least 18 credit hours should be at 600-700 level
- Seminar (CSE 792: 1 credit)
- Thesis (CSE 797: 6 credits)
- Pass thesis defense

#### Project option

- Electives (12 credits): Take 12 credits from engineering, computer science, mathematics, physics, chemistry, biology, economics, business, agricultural science or other courses approved by the CSE department, with approval of advisor
- Select 2 additional credits to complete 30 credit requirement with approval of advisor. This can be continuation/residency credits, supervised teaching, supervised research, or approved graduate courses with approval of advisor
- At least 18 credit hours should be at 600-700 level
- Seminar (CSE 789: 1 credit)
- Project (CSE 796: 3 credits)

#### Course-only option

- Electives (15 credits): Take 15 credits from engineering, computer science, mathematics, physics, chemistry, biology, economics, business, agricultural science or other courses approved by the CSE department, with approval of advisor
- Select 2 additional credits to complete 30 credit requirement with approval of advisor. This can be continuation/residency credits, supervised teaching, supervised research, or approved graduate courses with approval of advisor
- Seminar (CSE 789: 1 credit)
- At least 18 credit hours should be at 600-700 level

## Data Science and Engineering – Systems Engineering, MS

College of Engineering

**Graduate Coordinator:** Balakrishna Gokaraju **Email:** [bgokaraju@ncat.edu](mailto:bgokaraju@ncat.edu) **Phone:** (336)285-3210

**Department Chair:** Marwan Bikdash **Email:** [bikdash@ncat.edu](mailto:bikdash@ncat.edu) **Phone:** (336)285-3249

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The Systems Engineering Concentration in the MS in Data Science and Engineering is a focused course-only one-year graduate program designed for students who seek to use computing and data science and engineering to solve systems-engineering problems involving big data, extensive computations, and complex modeling, simulation, optimization and visualization.

The mission of the Department of Computational Data Science and Engineering is to graduate professionals who (a) have expertise in developing novel computational and data science methodologies and products, and/or (b) have extended their expertise in specific disciplines (in science, technology, engineering, and socioeconomics) with data science and engineering tools.

Research in Data Science and Engineering includes: big data and computational statistics, AI and Machine Learning, internet of things, large and complex systems, intelligent transportation and infrastructure systems, remote sensing, autonomous vehicles, virtual and augmented reality, e-commerce, image and video processing, scientific and interactive visualization, high-performance computing, scalable algorithms, bioinformatics, and multi-scale multi-physics engineering systems.

### Additional Admission Requirements

- An approved Bachelor of Science or Engineering degree with a minimum GPA of 3.00/4.00 is required. A working knowledge of statistics, matrices, or linear algebra, and experience in programming are desirable

### Program Outcomes:

- Graduates shall demonstrate expertise, critical thinking and the ability to conduct research and development in scalable computing, computational methods, artificial and computational intelligence, complex system modeling and simulation, and data science and engineering.
- Graduates shall have mastery of communicating, planning, and implementing solutions and research and development products in systems engineering including the use of advanced visualization and analytics techniques.
- Graduates shall develop skills and abilities to practice in and conduct significant research and development projects in a systems-engineering context.

### Degree Requirements

Total credit hours: 30

- Core courses (12 credits): CSE 620, 704, 708, 817
- Systems Engineering Core (9 credit hours): SYEN 605, 710, 715

Systems Engineering Electives: Take 9 credit hours from: BMEN 695, COMP 722, CSE 805, 806, ECEN 674, ISEN 658

## Computer Science, MS

College of Engineering

**Graduate Coordinator:** Huiming (Anna) Yu    **Email:** cshmyu@ncat.edu    **Phone:** (336)285-3699  
**Department Chair:** Kaushik Roy    **Email:** kroy@ncat.edu    **Phone:** (336)285-3691

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The MS in Computer Science program combines computer science fundamentals with practical knowledge and technical excellence in the most advanced technologies. Research is funded by agencies including the National Science Foundation, the Department of Defense, the National Security Agency, the Department of Energy and national laboratories, and others. The research interests of the faculty include cyber security, cyber identify, artificial intelligence and data science, big data, visual analytics and virtual reality, software engineering and formal methods, distributed and web-based systems, multiagent systems, trustworthy cloud computing and high performance computing. In addition to a general area, students can take elective courses in three focus areas: Cyber Security, Software Engineering, and Artificial Intelligence and Data Science.

### **Additional Admission Requirements**

- Unconditional admission requires a BS in Computer Science

### **Program Outcomes:**

Graduates of the Computer Science Master's program will be able to: (1) apply knowledge of complex mathematics and computer science to develop software solutions to real world problems, (2) analyze and synthesize novel solutions to critical problems within the area of computer science, (3) design and implement software systems, (4) understand professional, legal and ethical issues, (5) effectively communicate, both orally and in writing, and (6) engage in lifelong learning.

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credits): COMP 710, 755, 775

#### Thesis option

- COMP electives (9 credits): Take 9 credits of additional COMP 700-899 courses with approval of advisor
- Electives (6 credits): Take 6 credit hours from COMP 700-899 or other departments with approval of advisor
- Thesis (COMP 797: 6 credits)
- Pass thesis defense

#### Project option

- COMP electives (12 credits): Take 12 credits of additional COMP 700-899 courses with approval of advisor
- Electives (6 credits): Take 6 credit hours from COMP 700-899 or other departments with approval of advisor
- Project (COMP 796: 3 credits)

#### Course option

- COMP electives (15 credits): Take 15 credits of additional COMP 700-899 courses with approval of advisor
- Electives (6 credits): Take 6 credit hours from COMP 700-899 or other departments with approval of advisor

## Electrical Engineering, MS

**School/College:** College of Engineering

**Graduate Coordinator:** John Kelly    **Email:** jck@ncat.edu    **Phone:** (336) 285-3712

**Department Chair:** Abdullah Eroglu    **Email:** aeroglu@ncat.edu    **Phone:** (336) 285-2458

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The Master of Science Program in Electrical Engineering provides graduate level education for advanced professional practice or further graduate studies. The program offers the following four tracks: Computer Engineering, Communications and Signal Processing, Electronic and Optical Materials and Devices, and Power Systems and Control.

### **Additional Admission Requirements:**

- Unconditional admission requires an undergraduate degree in Electrical Engineering from an ABET accredited institution with an overall 3.0 GPA in all engineering courses.

### **Degree requirements**

Total credit hours: 30

- Required courses (12 credits): ECEN 621, ECEN 629, ECEN 650, ECEN 668

#### Thesis Option

- ECEN electives (6 credits): Take 6 credits from ECEN 600-800 with approval of advisor
- Technical Electives (6 credits): Take 6 credit hours with approval of advisor
- Thesis (ECEN 797: 6 credits)
- Attend master's seminar
- Pass thesis defense
- At least 60% of the 30 credits (18) should be at 600-700 level

#### Project Option

- ECEN electives (6 credits): Take 6 credits from ECEN 600-800 with approval of advisor
- Technical Electives (9 credits): Take 9 credit hours with approval of advisor
- Project (ECEN 796: 3 credits)
- Attend master's seminar
- At least 60% of the 30 credits (18) should be at 600-700 level

#### Course Only Option

- ECEN electives (6 credits): Take 6 credits from ECEN 600-800 with approval of advisor
- Technical Electives (12 credits): Take 12 credit hours with approval of advisor
- Attend master's seminar
- Pass MSEE degree exit examination (ECEN 791: 0 credits)

At least 60% of the 30 credits (18) should be at 600-700 level

## Certificate – Autonomy, PB

College of Engineering

**Graduate Coordinator:** Ali Karimoddini

**Email:** akarimod@ncat.edu

**Phone:** 336-285-3313

**Department Chair:** Abdullah Eroglu

**Email:** aeroglu@ncat.edu

**Phone:** 336-285-2458

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The graduate certificate program in Autonomy is a multidisciplinary program designed for ECE and non-ECE (such as ECE, CS, CSE, ISE, CAEE, etc) graduate students to gain Autonomy-related knowledge and skills in order to meet the diverse requirements of Autonomy-related positions.

### **Applying to the Certificate Program:**

A student interested in this program must submit a certificate plan of study to the program coordinator along with a current transcript that is used to verify the following. Students must have a B.S degree in an associated field of study. His/her current GPA must be 2.8 or above. The current transcript will be used to verify the above.

### **Summary of Certificate Course Requirements**

- This certificate requires four 3-credit courses and 0-credit seminar course:
  - One 3-credit required course (ECEN-668).
  - Two elective 3-credit courses from the selected track chosen from: Track 1: Smart Transportation and Autonomous Vehicles; Track 2: Intelligent Control Systems; or Track 3: Cyber Physical Human Systems
  - One elective 3-credit course from any of the autonomy tracks other than the selected track where autonomy tracks are described below.
  - A 0-credit seminar course, which requires attendance in weekly seminars and be the presenter at least in one of the seminars.
- The student should receive B or better for all required and elective courses.
- The student should complete all requirements within 3 years.

The certificate committee will continuously review the contents of the courses to make sure the objectives of the certificate are met.

### **Details of Certificate Course Requirements**

- **Core Courses:**
  - ECEN668- Theory of linear control systems
- **Elective Courses (student has to select 2 courses from one of the autonomy tracks (As the selected track) and one course from any of the autonomy tracks other than the selected track)**
  - **Track 1: Smart Transportation and Autonomous Vehicles**
    - ECEN885/685- Autonomous Mobile Robotic Sys.
    - CSE 819 – Computational Transportation
    - ECEN672: Modeling and Control of Drones
    - ECEN 657: Digital Image Processing
    - ECEN 850 Multi-Dimensional Signal Processing
    - ECEN 674- Genetic Algorithms and its applications
    - ECEN 865: Optimal Control Systems
    - ECEN 885/685: System of Systems Modeling and Analysis

- ECEN 885/685: Multidisciplinary Design Optimization
- ECEN885/685: Games and Autonomy
- CIEN 656 - Traffic Engineering
- CIEN 754 - Modeling of Trans Systems
- MEEN 652 - Aero Vehi Stabili and Control
- **Track 2: Intelligent Control Systems**
  - ECEN 685/885- Mach. Learn. Algo. & Artf. Int
  - ECEN 870- Fuzzy Logic with Applications
  - ECEN 885- Comp Vision Intel. Robotic App
  - ECEN 674- Genetic Algorithms and its applications
  - ECEN 865: Optimal Control Systems
  - ECEN885/685: Optimization, Games and Learning
  - CSE 805 - Machine Learn and Data Mining
- **Track 3: Cyber Physical Human Systems**
  - ECEN885/685: Cyber-Physical Systems
  - COMP881-Advanced Multiagent Systems
  - MEEN 648 - Computer Control Manufacturing
  - ECEN 872: Decision Making and Supervisory Control of Discrete Event systems
  - ECEN 865: Optimal Control Systems
  - ECEN 685: Machine Learning in Cyber Sec.
  - ECEN 647: Introduction to Telecommunication Networks
  - ECEN-885/685: Hybrid Systems: Theory and Applications
  - ECEN885/685: Nonlinear Systems and Control
  - MEEN 845: Feedback Control of Mechan Sys
  - COMP883: Concurrency Formalisms
  - COMP681 Formal Methods
  - ISEN 665 - Human Machine Systems
  - ISEN 721 - Systems Engineering Models
  - ISEN814- Adv Topics Human Machine Sys
  - CSE 826 - Modeling and Simulation of Physical Systems
- **0-credit seminar course:**

**A 0-credit hour seminar course will be required that involves attendance in weekly seminars that reinforce the core autonomy concepts and be the presenter at least in one of the seminars.**

## Industrial and Systems Engineering, MS

College of Engineering

**Graduate Coordinator:** Younho Seong

**Email:** [yseong@ncat.edu](mailto:yseong@ncat.edu)

**Phone:** (336)285-3734

**Department Chair:** Om Prakash Yadav

**Email:** [oyadav@ncat.edu](mailto:oyadav@ncat.edu)

**Phone:** (336)285-3735

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The Master of Science (M.S.) in Industrial and Systems Engineering (ISE) program prepares students for successful careers in industry and continuation to doctoral study. The program emphasizes the systems engineering, collaboration and engagement skills critical to addressing the complex societal problems of tomorrow. ISE graduate students tackle these problems in a supportive environment working with nationally-recognized faculty. ISE programs are inclusive of many undergraduate majors. Any engineering major may choose graduate education in ISE to expand systems skills. Many related non-engineering majors might choose ISE with some background courses to expand technical capability.

### **Program Outcomes:**

The Master of Science in Industrial and Systems Engineering program will prepare graduates to:

- Decompose systems into component parts and logically model and evaluate using mathematical, statistical and computational tools.
- Construct and improve integrated systems or processes consisting of people, materials, information, equipment and energy considering life cycle factors.
- Formulate and solve multi-objective problems using industrial and systems engineering methods and tools.
- Apply systems analysis, synthesis, and problem-solving to real world settings to reduce cost and improve productivity and quality.
- Perform presentable research under the supervision of a faculty member.
- Communicate Industrial and Systems technical information a professional level in written, oral, and business graphics formats.

### **Additional Admission Requirements**

- A Bachelor's degree from a college or university recognized by a regional or general accrediting agency and its cumulative Grade Point Average of 2.8 or above on a 4-point scale is required.
- Evidence of English language proficiency for international applicants.

### **Degree Requirements:**

Total credit hours: 30

- Core courses (12 credits): ISEN 625, 655, 665, 675
- ISEN Seminar: Take twice in two semesters

#### Thesis option

- ISEN electives (12 credits): Take 12 credits of additional ISEN courses with approval of advisor
- Thesis (ISEN797: 6 credits)

#### Project option

- ISEN electives (15 credits): Take 15 credits of additional ISEN courses with approval of advisor
- Project (ISEN 796: 3 credits)

Course option

- ISEN electives (18 credits): Take 18 credits of additional ISEN courses with approval of advisor
- Capstone Project

## Industrial and Systems Engineering – Systems Engineering, MS

College of Engineering

**Graduate Coordinator:** Younho Seong

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**Phone:** (336)285-3734

**Department Chair:** Om Prakash Yadav

**Email:** [oyadav@ncat.edu](mailto:oyadav@ncat.edu)

**Phone:** (336)285-3735

---

The Master of Science (M.S.) in Industrial and Systems Engineering (ISE) program prepares students for successful careers in industry and continuation to doctoral study. The program emphasizes the systems engineering, collaboration and engagement skills critical to addressing the complex societal problems of tomorrow. ISE graduate students tackle these problems in a supportive environment working with nationally-recognized faculty. ISE programs are inclusive of many undergraduate majors. Any engineering major may choose graduate education in ISE to expand systems skills. Many related non-engineering majors might choose ISE with some background courses to expand technical capability.

### **Program Outcomes:**

The Master of Science in Industrial and Systems Engineering program will prepare graduates to:

- Decompose systems into component parts and logically model and evaluate using mathematical, statistical and computational tools.
- Construct and improve integrated systems or processes consisting of people, materials, information, equipment and energy considering life cycle factors.
- Formulate and solve multi-objective problems using industrial and systems engineering methods and tools.
- Apply systems analysis, synthesis, and problem-solving to real world settings to reduce cost and improve productivity and quality.
- Perform presentable research under the supervision of a faculty member.
- Communicate Industrial and Systems technical information a professional level in written, oral, and business graphics formats.

### **Additional Admission Requirements**

- A Bachelor's degree from a college or university recognized by a regional or general accrediting agency and its cumulative Grade Point Average of 2.8 or above on a 4-point scale is required.
- Evidence of English language proficiency for international applicants.

### **Degree Requirements:**

Total credit hours: 30

- Core courses (12 credits): ISEN 625, 655, 665, 675
- Systems Engineering Core (9 credit hours): SYEN 605, 710, 715
- Systems Engineering Electives: Take 9 credit hours: ISEN 658, 664, 721
- ISEN Seminar: Take twice in two semesters

## Certificate – Data-driven Modeling and Analysis of Complex Systems, PB

College of Engineering

**Graduate Coordinator:** Younho Seong

**Email:** [yseong@ncat.edu](mailto:yseong@ncat.edu)

**Phone:** 336-285-3734

**Department Chair:** Om Prakash Yadav

**Email:** [oyadav@ncat.edu](mailto:oyadav@ncat.edu)

**Phone:** (336)285-3735

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The Certificate Program in Data-Driven Modeling and Analysis of Complex Systems (DMACS) is designed to meet the growing demand for data-driven modelers and analysts. The DMACS program provides the training needed to capture, analyze and visualize large-scale datasets for data-driven decision-making. The DMACS Certificate offers two pathways: the *systems data modeling and analysis track* is designed for students and professionals that have no prior experience in programming or statistics and desires a more focused certificate in a specific complex system area; and the *system data management track* is designed for students and professionals that have prior statistics and programming background and desire a deep understanding of big-data management and cloud technologies..

### Certificate Requirements

Total credit hours: 13

- Take 13 credit hours:

- ISEN662 (1 hour)
- Statistics (3 credit hours) \*
- Complex Systems / Technical Elective (3 credit hours) \*
- Data Engineering and Analysis (6 credit hours) \*
- A list of acceptable courses for the selected pathway can be provided by the contacts above.

## Mechanical Engineering, MS

College of Engineering

**Graduate Coordinator:** John Kizito

**Email:** jpkizito@ncat.edu

**Phone:** 336-285-3747

**Department Chair:** Frederick Ferguson

**Email:** fferguso@ncat.edu

**Phone:** 336-285-2135

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The Mechanical Engineering master's program provides advanced level study in distinct areas of specialization such as mechanics and materials, energy and thermal/fluid systems, design and manufacturing, and aerospace. The program prepares the graduate student for doctoral level studies or for advanced mechanical engineering practice in industry, consulting or government service.

### Additional Admission Requirements

- Unconditional admission requires an engineering undergraduate degree from an ABET accredited mechanical engineering program

### Program Outcomes

- Students will develop advanced critical thinking skills by solving complex and challenging problems in mechanical engineering, mathematics and the physical sciences
- Students will communicate effectively by conveying their ideas, both orally and in written form, in accordance with acceptable published standards
- Students will demonstrate their ability to perform research by generating a thesis of an original idea and publishing technical papers under the guidance of an academic advisor
- Graduates will engage in professional activities by attending conferences, presenting papers and serving various roles in professional organizations

### Degree Requirements

Total credit hours: 30

- Core courses (9 credits): MEEN 601, 643, 716

#### Thesis option

- MATH electives (3 credits): Take 3 credit hours from MATH 650, 651, 652
- MEEN electives (9 credits): Take 9 credits of additional MEEN 600-899 courses with approval of advisor
- Technical electives (3 credits): Take additional 3 credit hours with approval of advisor
- Thesis (MEEN 797: 6 credits)
- Pass thesis defense

#### Project option

- MATH electives (3 credits): Take 3 credit hours from MATH 650, 651, 652
- MEEN electives (9 credits): Take 9 credits of additional MEEN 600-899 courses with approval of advisor
- Technical electives (6 credits): Take additional 6 credit hours with approval of advisor
- Project (MEEN 796: 3 credits)

#### Course option

- MATH electives (3 credits): Take 3 credit hours from MATH 650, 651, 652
- MEEN electives (9 credits): Take 9 credits of additional MEEN 600-899 courses with approval of advisor
- Technical electives (9 credits): Take additional 9 credit hours with approval of advisor
- Pass comprehensive exam

## Mechanical Engineering – Systems Engineering, MS

College of Engineering

**Graduate Coordinator:** John Kizito

**Email:** jpkizito@ncat.edu

**Phone:** 336-285-3747

**Department Chair:** Frederick Ferguson

**Email:** fferguso@ncat.edu

**Phone:** 336-285-2135

---

The Mechanical Engineering master's program provides advanced level study in distinct areas of specialization such as mechanics and materials, energy and thermal/fluid systems, design and manufacturing, and aerospace. The program prepares the graduate student for doctoral level studies or for advanced mechanical engineering practice in industry, consulting or government service.

### **Additional Admission Requirements**

- Unconditional admission requires an engineering undergraduate degree from an ABET accredited mechanical engineering program

### **Program Outcomes**

- Students will develop advanced critical thinking skills by solving complex and challenging problems in mechanical engineering, mathematics and the physical sciences
- Students will communicate effectively by conveying their ideas, both orally and in written form, in accordance with acceptable published standards
- Students will demonstrate their ability to perform research by generating a thesis of an original idea and publishing technical papers under the guidance of an academic advisor
- Graduates will engage in professional activities by attending conferences, presenting papers and serving various roles in professional organizations

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credits): MEEN 601, 643, 716
- Systems Engineering Core (9 credit hours): SYEN 605, 710, 715
- Systems Engineering Electives: Take 9 credit hours from: MEEN 614, 619, 652, 669, 680, 815
- MATH electives (3 credits): Take 3 credit hours from MATH 650, 651, 652

## COURSE DESCRIPTIONS: College of Engineering

### Chemical, Biological & Bioengineering

#### **BMEN 695 - Computational Systems Biology**

This course covers computational systems physiology and biology. Students will learn how to develop biomedical metabolism tissue models, cellular physiological models, and network models for intracellular signaling pathways using Matlab and COMSOL. Also covered will be biological data mining, physiological modeling and simulation. Prerequisite: Graduate Student. (F)  
3.000 Credit hours

#### **BMEN 711 - Biomaterials and Biocompatibility**

This course examines the fundamental and advanced topics in biomaterials and biocompatibility applications and assumes some background in organic chemistry and biology. The first half of the course connects material chemical properties to performance issues relevant to biomaterial applications. The second part of the course introduces biocompatibility issues as they follow from protein adsorption. Prerequisites: BMEN 310 or equivalent course. (F;S)  
3.000 Credit hours

#### **BMEN 712 - RE Meth Design Exper Bio Engi**

This course addresses research methods and protocols and introduces experimental designs and data analysis for research projects. Specific topics covered include Latin Squares; complete and incomplete block designs; one, two, and three variable factorials; fractional factorials; nested designs; and 2K designs will be covered. Prerequisite: Graduate Student Standing. (F;S)  
3.000 Credit hours

#### **BMEN 713 - Biotechnology Entrepreneur**

This course introduces students to innovation and entrepreneurial skills development oriented toward a biotechnology and bioengineering enterprise. Topics covered include intellectual property development, technology transfer, evaluation of market viability, financing, marketing and operations. The course will also cover government regulations. Prerequisite: Graduate Student Standing. (F;S)  
3.000 Credit hours

#### **BMEN 714 - Funda of Cell Biology for Engi**

This course examines the molecular events in cell function using molecular genetics, cell biology, and fundamental biochemistry. Prokaryotic and Eukaryotic systems are examined. Prerequisites: Graduate Student or consent of instructor. (F;S)  
3.000 Credit hours

#### **BMEN 733 - Musculoskeletal Biomechanics**

This course will provide students with a detailed understanding of the structure and function of the tissues in the musculoskeletal system. Specific topics will include the kinematics, muscle forces and joint loads during human movement and the mechanics of the musculoskeletal connective tissues such as ligament, tendon, bone, cartilage and muscle. Special emphasis will be placed on the relationship between function and material properties of these tissues as revealed in the current scientific and engineering literature. A research paper that includes a computational analysis will be required as a term project. Prerequisite: Graduate Students Standing. (F;S)  
3.000 Credit hours

**BMEN 741 - Medical Imaging Systems I**

A systems perspective introduction to the fundamentals of medical imaging techniques used to generate cross-sectional images of patients. Emphasis is on use of multi-dimensional Fourier transforms to develop the generalized central-section theorem used in tomography at the imaging equation used in MRI. The critical concepts of image SNR and image quality will also be introduced. MRI and x-ray CT are used as two sample modalities to explore these basic concepts. Prerequisites: Graduate Student Standing, BMEN 311 or equivalent. (F;S)

3.000 Credit hours

**BMEN 785 - Selected Topics in Bioengineer**

This course includes selected Bioengineering topics of interest to students and faculty. The topics will be selected before the beginning of the course and will be pertinent to the programs of the students enrolled. Prerequisite: Graduate Student Standing. (F;S;SS)

3.000 Credit hours

**BMEN 792 - Master Seminar**

This course will introduce students to current government regulations, industry practices, global issues, project management approaches and current issues in bioengineering. Lectures will also include biomedical engineering ethics. External and internal speakers will be invited. Prerequisite: Graduate Student Standing. (F;S) Note: May be repeated for credit.

0.000 Credit hours

**BMEN 794 - Graduate Special Projects**

Study arranged on a special engineering topic of interest to student and faculty member, who will act as advisor. Topics may be analytical and/or experimental and encourage independent study. Prerequisites: Consent of instructor, M.S. Students only. (F;S;SS) Note: May be repeated for credit.

1.000 TO 3.000 Credit hours

**BMEN 796 - Master's Project**

A bioengineering project of interest to student and faculty member who will act as MS project advisor. Student is encouraged to develop skills in analytical or experimental research, innovative design or in-depth scholarly work. This course fulfills the MS capstone experience for students in the project option. Students must produce a written proposal and report. Prerequisites: Consent of instructor, Student must be in the MS Project Option. (F;S;SS)

3.000 Credit hours

**BMEN 797 - Master Thesis**

Master of Science thesis research will be conducted under the supervision of the thesis committee chairperson leading to the completion of the Master's thesis. This course is only available to thesis option students. Prerequisite: Graduate Student Standing in BMEN. (F;S;SS) Note: May be repeated for credit.

1.000 TO 6.000 Credit hours

**BMEN 799 - Continuation of Masters Thesis**

This course will enable masters students who have completed all required coursework and all project/thesis credits, to complete their project/thesis work. Prerequisite: Graduate Student Standing in BMEN. (F;S)

1.000 Credit hours

**CHEN 605 - Biochemical Engineering**

This course explores the use of living organisms or parts of them (e.g., enzymes) for the production of chemical or biological materials. The course emphasis is upon bioreactor design. Topics covered include enzyme kinetics and biocatalysts, microbial growth and product formation, immobilization of enzymes and whole cells, bioreactor scale-up and design of batch and continuous bioreactors, heat and mass transfer in bioreactors, bioproduct recovery, and bioprocess design and modeling. Students are required to complete a bioprocess design and a project on a topic of national and/or international significance.

Prerequisites: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

### **CHEN 608 - Bioseparations Fundamentals**

The course deals with fundamentals of bioseparation processes which are characterized as removal of insolubles, isolation of products, and purification or polishing. Processes covered include filtration, centrifugation, cell disruption, extraction, absorption, elution chromatography, precipitation, ultrafiltration, electrophoresis and crystallization. Students are required to complete a design project on a bioseparation process. Prerequisites: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

### **CHEN 615 - Energy and Fuels Fundamentals**

Topics important to the exploration, production and processing of fuels are covered. Types of fuels covered include fossil fuels, synfuels, and fuels from renewable resources, such as, wind, solar and biomass. Students learn about processing of fuels by distillation, refining, fermentation, catalytic reactions, and removal of undesirable by-products. The design of fuel processes includes emphasis on economic and environmental impact. Prerequisites: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

### **CHEN 618 - Air Pollution Control**

The economic, social and health implications of air pollution and its control are covered. To understand the problems better, the sources, types and characteristic of man-made air pollutants will be discussed. The course will review some of the main regulations and engineering alternatives for achieving different levels of control. An air pollution control system will be designed. Prerequisite: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

**CHEN 660 - Selected Topics in CHEN** Topics covered include selected chemical engineering topics of interest to students and faculty. The topics will be selected before the beginning of the course and will be pertinent to the programs of the students enrolled.

3.000 Credit hours

**CHEN 665 - Fundamentals of Polymer Engi** This course involves a treatment of engineering and technology of polymeric materials. Students learn about control of significant variables in polymer synthesis, and physical methods for characterization of molecular weight, morphology, rheology and mechanical behavior. Engineering applications include additives, blends and composites, natural polymers and fibers, thermoplastics, elastomers and thermosets, polymer degradation and stability, polymers in the environment, and polymers for advanced technologies, such as, membrane separations, biomedical devices, electronic and photonic industry. Prerequisites: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

### **CHEN 666 - Special Projects in CHEN**

Study is arranged on a special chemical engineering topic of interest to both the student and faculty member, who will act as supervisor. Topics may be analytical and/or experimental and should encourage independent study. Prerequisite: Consent of instructor.

1.000 TO 3.000 Credit hours

### **CHEN 670 - Solids Process and Parti Tech**

This course provides the fundamentals of solids processing and particle technology. Topics included are properties of particles, transport of particles, size reduction, size enlargement, filtration, centrifugation, clarification, drying of solids, crystallization, flotation, and safety hazards of fine powders. Industrial examples will be emphasized. Prerequisite: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

### **CHEN 705 - Transport Phenomena I**

This course presents a unified treatment of momentum, energy and mass transport with an emphasis on the microscopic approach. Students learn to develop and solve differential transport equations with defined boundary conditions, and apply this knowledge for solution of some simple chemical process problems. Prerequisites: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

### **CHEN 715 - Advanced Chemi Engi Analy**

In this course students learn how to solve chemical engineering problems by advanced mathematical techniques. The topics covered include uncoupled and coupled momentum, heat and mass transfer problems, matrix analysis of linearized dynamic equations representing stage operations, and advanced design and optimization of chemical processes. Prerequisites: Graduate standing in CHEN or consent of instructor. (F;S)

3.000 Credit hours

### **CHEN 720 - Adv Chem Reaction Engineering**

This course includes an advanced treatment of chemical reaction engineering including effect of non-ideal flow and fluid mixing on reactor design, as well as multi-phase reaction system and heterogeneous catalysis and catalytic kinetics. (F;S)

3.000 Credit hours

### **CHEN 750 - Separation Processes**

Differential and equilibrium stage operations involving non- isothermal and multi-component systems are covered. Other topics covered include simultaneous mass transfer and chemical reaction and dispersion effects. Applications to operations such as absorption, extraction, chromatography, distillation, ion exchange, and membrane separation are also studied. (F;S)

3.000 Credit hours

### **CHEN 760 - Adv Chem Engr Thermodynamics**

This is an advanced course covering topics in molecular thermodynamics of fluid phase equilibria. Statistical thermodynamics and thermodynamics of nonequilibrium processes are introduced. (F;S)

3.000 Credit hours

### **CHEN 789 - Special Topics**

A course design to allow the introduction of potential new courses on a trial basis or offering of special course topics on a once only basis. The course may be offered to individuals or groups of students. A definite topic and the title must be agreed upon by the advisor before the student registers for the course.

1.000 TO 3.000 Credit hours

**CHEN 792 - Master's Seminar**

This course provides a forum for the presentation and discussion of selected topics of interest to chemical engineering graduate students such as faculty research interests, communication, safety, job prospects and research results. Prerequisites: None. (F;S)  
0.000 Credit hours

**CHEN 794 - Master Supervised Research**

This course is supervised research under the mentorship of a faculty member. It is not intended to serve as the project nor thesis topic of the masters students.  
3.000 Credit hours

**CHEN 796 - Master's Project**

This is an independent project involving research or design in an area of interest to the instructor and the student. This course must be completed by, and only by, Master of Science in Chemical Engineering project option students. A written proposal and a report is required. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**CHEN 797 - Master's Thesis**

3.000 Credit hours

**CHEN 799 - Continua of Master's Thesis** This is a continuation course for Master's thesis.

Prerequisite: Graduate standing in CHEN. (F;S;SS) Note: May be repeated for credit.  
1.000 Credit hours

**Civil, Architectural & Environmental Engineering****CAAE 654 - Facility Planning & Site Analy**

This course covers the land development process including zoning, site constraints, engineering administration, and site inventory and analysis. The analysis, planning, and design of transportation, drainage, potable waste, and sanitary sewer systems will be covered. Structural orientation and location, accessibility, site lighting, and provisions for power and communication services will be discussed. Other topics will include sedimentation and erosion control, site grading, project specifications and reviews by the appropriate agencies. Prerequisites: Senior standing or consent of instructor. (F)  
3.000 Credit hours

**CIEN 614 - Stream Water Quality Modeling**

This course includes mathematical modeling of water quality in receiving streams. Topics include the generation of point and nonpoint sources of pollutants, modeling and prediction oth the reaction, transport and fate of pollutants in the stream, and the formulation and solution of simulation models. Prerequisite: CIEN 410. (DEMAND)  
3.000 Credit hours

**CIEN 616 - Solid Waste Management**

This course emphasizes the study of the collection, storage, transport and disposal of solid wastes. Examination of various engineering alternatives with appropriate consideration for air and water pollution control and land reclamation are considered. Prerequisite: Senior or graduate standing. (DEMAND)  
3.000 Credit hours

**CIEN 620 - Foundation Design I**

This course will introduce the following topics: behavior and design of retaining walls and shallow foundations, earth pressure, bearing capacity and settlement, stress distribution and consolidation theories, and settlement of shallow foundations. Prerequisite: CIEN 520. (DEMAND)

3.000 Credit hours

**CIEN 640 - Advanced Structural Analysis**

This course emphasizes the more complex concepts of structural analysis for determinate and indeterminate structural systems using both hand calculations and computer software. Prerequisite: CAAE 325. (F;S)

3.000 Credit hours

**CIEN 658 - Pavement Design**

This course is the study of the design of highway and airport pavement structures. Topics include flexible and rigid pavement, cost analysis and pavement selection, drainage, earthwork, pavement evaluation and maintenance. Prerequisite: CIEN 350. (DEMAND)

3.000 Credit hours

**CIEN 670 - Construction Engin & Mgmt**

This course concentrates on the solution to problems in construction engineering and management. A variety of problems from the construction industry are presented to the students. The students form teams to develop solutions to these problems. Topics vary with available projects and student interest. Graduate students select a project in their area of interest for intensive study and submit a report. Prerequisite: Senior or graduate standing. (DEMAND)

3.000 Credit hours

**CIEN 699 - Special Projects**

This course provides study arranged on a special civil engineering topic of interest to the student and faculty. Topics may be analytical and/or experimental with independent study encouraged. Prerequisite: Consent of instructor. Note: May be repeated for credit.

3.000 Credit hours

**CIEN 700 - Emerging Technologies in CIEN**

Provides an overview of the applications of emerging technologies (such as decision support systems and Geographic Information Systems) in civil engineering. The students are required to complete a project which includes the design and implementation of one of the types of systems covered in the course.

3.000 Credit hours

**CIEN 702 - CIEN Systems Analysis**

Introduces mathematical modeling techniques for the solution of civil engineering problems. These include the formulation of mathematical representation of complete civil engineering systems and their evaluation via linear programming, dynamic programming and the use of formal heuristics.

Multiobjective analysis, project management and civil engineering planning and design are also presented.

3.000 Credit hours

**CIEN 735 - Wind & Earthquake Design**

3.000 Credit hours

**CIEN 754 - Modeling of Trans Systems**

This course is concerned with the development and use of system models associated with transportation decision making. The modeling techniques that will be used are the following: multiple  
3.000 Credit hours

**CIEN 758 - Emerg Techniques in CIEN**

3.000 Credit hours

**CIEN 785 - Selected Topics**

Allows a student to select a civil engineering topic of interest to the student to investigate in depth. The topic will be selected by the student and a faculty advisor before the beginning of the semester. The topic must be pertinent to the study program of the student and must be approved by the faculty advisor. Note: May be repeated for credit.

3.000 Credit hours

**CIEN 786 - Special Projects**

Student must select a project on a special civil engineering topic of interest to the student and a faculty member, who will act as an advisor. The student and faculty advisor must agree upon the project and scope of work before the beginning of the semester. The project may be analytical and/or experimental and encourage independent work. The topic must be pertinent to the program in which the student is enrolled and approved by the faculty advisor. (F;S) Note: May be repeated for credit.

3.000 Credit hours

**CIEN 792 - CIEN Masters Seminar**

Discussion and presentations of reports of subjects in Civil Engineering and allied fields are included.

Prerequisites: Graduate Standing. (F;S)

1.000 Credit hours

**CIEN 793 - Masters Supervised Teaching**

Students will gain teaching experience under the mentorship of faculty who assist the student in planning for the teaching assignment, observe and provide feedback to the student during the teaching assignment, and evaluate the student completion of the assignment.

3.000 Credit hours

**CIEN 796 - Masters Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal, which outlines the nature of the project, must be submitted for approval. This course is only available to project option students. 100 Uncompromising Excellence: A Blueprint for the Future.

3.000 Credit hours

**CIEN 797 - Masters Thesis**

Master of Science thesis research will be conducted under the supervision of the thesis committee chairperson leading to the completion of the Master's Thesis. This course is only available to thesis option students. Note: May be repeated for credit.

3.000 TO 6.000 Credit hours

**CIEN 799 - Con't of Thesis for CIEN**

This optional course allows the student to maintain full-time enrollment status after the completion of the Masters' Project (CIEN 796) or Masters' Thesis (CIEN 797) credit-hour requirements. The course may also be taken to allow the student time to complete a Masters' project, thesis write-up and preparation for Masters' project or thesis defense. Completion of all required course work and Masters' project or thesis credit-hour requirements. (F;S) Note: May be repeated for credit.

1.000 Credit hours

## Computer Science

### **COMP 611- System Testing and Evaluation**

This course will focus on the methods, techniques, procedures for system testing and evaluation. The main topics include reliability measurement, testing small and large systems, black box software testing, white box software testing, testing of concurrent and real-time systems, client-server testing, test case design methods, and automated testing tools.

3.000 Credit hours

### **COMP 620 - Information, Privacy & Security**

This course examines the security and privacy issues associated with information systems. There are cost/risk tradeoffs to be made. Topics discussed include technical, physical, and administrative methods of providing security, access control, identification, and authentication. Encryption is examined, including Data Encryption Standards (DES) and public key cryptosystems. Management considerations such as key protection and distribution, orange book requirements, and OSI data security standards are covered. Privacy legislation is covered, as is current cryptographic research.

3.000 Credit hours

### **COMP 621 - Web Security**

This course focuses on the technologies that provide security services for the World Wide Web. It introduces a set of procedures, practices, and technologies for protecting web servers, web users, and their surrounding organizations. We discuss, understand and use various security technologies for the World Wide Web (WWW). How to use these technologies to secure WWW applications will be addressed.

3.000 Credit hours

### **COMP 651 - Data Analytics Techniques**

This course develops skills for data analytics including use of a high-level language widely used by the data-science community as well as libraries or packages in that language for numerical computing, statistics, plotting, data manipulation, and machine learning. Linear algebra and statistical reasoning using these packages will be covered.

3.000 Credit hours

### **COMP 681 - Formal Methods**

In this course, formal methods that model the software development process will be studied. Fundamental and practical methodologies and theories, including set theory and the foundations of software engineering will be emphasized. Applications to formal specifications, object-oriented programming and data modeling will be examined. Topics include set theory, relations and functions, induction and recursion, symbolic logic, complex models, and application case studies.

3.000 Credit hours

### **COMP 710 - Specifications and Design**

This course examines the formalization of software requirements and the analysis of the flow of data through a proposed large software system. Methodologies covered include Structured Analysis (data flow diagramming), hierarchy charts, entity-relationship data diagrams, procedure specifications, and Information Engineering. Additional methodologies addressed include Jackson Structured Diagrams, Harlan Black Boxes, and Object- Oriented Analysis techniques. Prerequisite: Graduate student standing.

3.000 Credit hours

**COMP 725 - Software Security Testing**

This course focuses on software security testing techniques and tools. It covers security testing techniques such as code reviews and static analysis, creating test plans based on risk analysis, black-box, white-box and gray-box security testing and fault injection. Security testing tools will be introduced. Prerequisite: Graduate student standing.

3.000 Credit hours

**COMP 726 - Network Security**

The course covers various aspects of securing data during their transmission. It includes the following topics: vulnerabilities in software and hardware systems; cyber attack methods and their defense mechanisms; symmetric ciphers; public key ciphers; hash functions; message authentication and digital signature; public key infrastructure and web of trust; email security; web security; IPSec; firewall; intrusion detection system. Prerequisite: Graduate student standing.

3.000 Credit hours

**COMP 727 - Secure Software Engineering**

This course discusses how to incorporate security throughout the software development lifecycle. The main topics include threats to the software, software vulnerabilities, risk management, security requirements, secure design principles and patterns, an overview of secure programming and security testing. Prerequisite: Graduate student standing.

3.000 Credit hours

**COMP 755 - Advanced Operating Systems**

This course centers on operating systems for multi- processing environments: concurrent processes, mutual exclusion, job scheduling, memory, storage hierarchy, file systems, security, and distributed processing. Also discussed are virtual resources management strategies. A design project involving the construction of operating facilities is produced. Prerequisite: Graduate student standing.

3.000 Credit hours

**COMP 765 - Data Mining**

The theory of data mining is presented as well as applications of its principles in industry. This course covers the basics of techniques and applications such as cluster detection, market basket analysis, decision tree derivation, genetic algorithms, artificial neural networks, memory-based reasoning and data warehouses. Students learn a variety of algorithms for discovering meaningful patterns and rules in large quantities of data. Prerequisites: Graduate student standing.

3.000 Credit hours

**COMP 775 - Advance Design and Analysis of Algorithms**

This course discusses the design and analysis of efficient algorithms and algorithmic paradigms. Applications include sorting, searching dynamic structures, graph algorithms, computationally hard problems, and NP completeness. Prerequisite: Graduate student standing.

3.000 Credit hours

**COMP 790 - Independent Study**

This course can be used for study of advanced topics in computer science pertinent to the student's interest under supervision of a faculty member. Prerequisites: Graduate student standing and permission of instructor.

3.000 Credit hours

**COMP 796 - Master's Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal, which outlines the nature of the project and the deliverables, must be submitted for approval. This course is only available to project option students. Prerequisite: Graduate student standing and permission of advisor.

3.000 Credit hours

**COMP 797 - Master's Thesis**

Master of science thesis research will be conducted under the supervision of the thesis committee chairperson leading to the completion of the master's thesis. This course is only available to thesis option students. Prerequisite: Permission of advisor. Note: May be repeated for credit.

1.000 to 6.000 Credit hours

**COMP 799 - Continuation of Research**

Continue incomplete thesis or project work. Note: May be repeated for credit.

1.000 Credit hour

**COMP 823 - Secure Social Computing**

Social Computing involves computational facilitation of social studies and human social dynamics as well as design and use of information and communication technologies that consider social context. Social computing is a central theme across a number of information and communication technology fields and attracts interest from researchers in computing and social sciences, software and online game vendors, web entrepreneurs, political analysts and digital government practitioners. This course focuses on the privacy, security, risk, and trust aspects of social computing. Prerequisites: Graduate student standing.

3.000 Credit hours

**COMP 826 - Security for Emerging Networks**

This course discusses Software Defined Network (SDN)/Network Functions Virtualization (NFV), and other emerging network technologies. It covers advanced attacks to SDN/NFV and other emerging networking paradigms and defense techniques in the current research. Prerequisite: COMP726 or permission of the instructor.

3.000 Credit hours

**COMP 851 - Big Data Analytics**

This course provides a basic understanding of big data analytics and data science. The course also focuses on various advanced large-scale data analytic methods and tools required to handle vast amounts of unstructured data produced daily by users and systems in various fields. Prerequisites: Graduate student standing.

3.000 Credit hours

**COMP 852 - Web-based Visual Analytics**

The course introduces interactive web-based data visualization and analysis. Topic includes: visual representation, web-based visualization, front and back ends for visual analytics systems, and data analysis. Prerequisites: Graduate student standing.

3.000 Credit hours

**COMP 871 - Advanced Network Science**

This course introduces rigorous definitions and applications of network properties, node and edge centrality measures, models of networks generated by random processes, and diffusion models. One area covered is social network analysis, including the application of game theory. Network analysis is extended into statistical methods and applications of linear algebra. A standard software package for

network analysis is introduced along with the language providing the package and packages for allied tasks, including machine learning. Cloud resources are used, and public network libraries are used. Assignments have conceptual, formal, and especially programming components. This course requires a group project. Prerequisites: Graduate student standing.

3.000 Credit hours

### **COMP 872 - Social Semantic Web**

This course covers the use of concepts and techniques from the Semantic Web used to facilitate social computing and the establishment and maintenance of online social networks. It also addresses emerging standards and ontologies related to social networks. Prerequisites: Graduate Standing. (F;S;SS)

3.000 Credit hours

### **COMP 881 - Advanced Multiagent Systems**

This course addresses the key concepts behind multiagent systems, including logical foundations, topics from microeconomics (including game theory and negotiation), and topics from the social sciences more generally. It also addresses problem solving protocols and inter-agent communication and collaboration.

Prerequisite: COMP 786.

3.000 Credit hours

### **COMP 892 - Doctoral Research Methods**

Students are taught research techniques and the skills for writing publishable papers. Prerequisite: Graduate student standing.

3.000 Credit hours

### **COMP 895 - Special Topics**

This course introduces computer science topics of current interest. Prerequisites: Graduate student standing. (F;S;SS) Note: May be repeated for credit.

3.000 Credit hours

### **COMP 991 - Doctoral Qualifying Examination**

This is a supervised program for students who are preparing for the written qualifying examination and should be taken the semester before the student takes that examination. Prerequisites: Doctoral Standing and Consent of Advisor. (F;S;SS)

0.000 Credit hours

### **COMP 993 - Doctoral Supervised Teaching**

This course will introduce the student to classroom teaching under the guidance of a faculty member. The student will gain experience in course planning, lecture preparation, classroom teaching, and student evaluation. Prerequisite: Doctoral Standing. (F;S;SS)

3.000 Credit hours

### **COMP 994 - Doctoral Research Examination**

This is required for students who have completed the doctoral qualifying examination and who are taking the written in-depth examination during the semester. This is a supervised program to help prepare the student for that examination under the mentorship of the academic advisor. Upon passing without conditions or after fulfilling any conditions specified by the student's PH.D. advisory committee, the doctoral student is admitted to candidacy. Prerequisites: COMP 892 and consent of advisor. (F;S;SS)

3.000 Credit hours

### **COMP 997 - Doctoral Dissertation**

This supervised research leads to the dissertation of the doctoral student. Eighteen credits of dissertation are required for graduation. Prerequisite: Consent of advisor. (F;S;SS) Note: May be repeated for credit. 3.000 TO 18.000 Credit hours

### **COMP 999 - Continued Residency**

Continue incomplete doctoral thesis work. Note: May be repeated for credit.

1.000 Credit hour

## **Computational Data Science and Engineering**

### **CSE 620 - Introduction to Computational Software Tools**

This course covers the introduction and application of commonly used computational tools including computer algebra systems, interpreted languages used as scripting languages, and programming. This course also covers the basics of computational science including finite precision arithmetic, logic, and algorithmic design. Prerequisite: None. (F;S)

3.000 Credit hours

### **CSE 701 - Appl Probability & Statistics**

This course addresses probability and statistics theory and techniques with common application in computational science and engineering. The course will include exploratory data analysis techniques, statistical standard distributions, one-and-two sample tests with continuous data, regression analysis, analysis of variance, analysis of tabular data, sample size calculations, hypothesis testing, linear regression, and design of experiments. Statistical languages such as R will be used to implement the concepts learned in the course. Prerequisites: None. (F;S)

3.000 Credit hours

### **CSE 702 - Computational Methods for Algebraic Systems**

This course presents and discusses computational methods and their reliability, accuracy, and scalability, and computational implementations, with special emphasis on the solution, analysis, and optimization of linear and nonlinear algebraic systems. Topics include computational aspects of matrix theory, solution of large sparse linear systems, matrix decompositions such as the eigenvalue and singular value decomposition, linear and nonlinear programming, and function approximations. Prerequisites: None. (F;S)

3.000 Credit hours

### **CSE 703 - Program for Scalable Computing Systems**

This course presents the concepts, principles of hardware and software, communications and computational strategies for scalable, parallel computing systems, the associated computer data structures, programming libraries for parallel programming paradigms. This course is to bridge the gap between the parallel algorithms and applications which are often designed and described in abstract terms and the actual parallel computer architectures and their programming interfaces. Prerequisites: CSE 620. (F;S)

3.000 Credit hours

### **CSE 704 - Data Processing and Visualization**

This course deals with the process of data development through computational thinking and methodologies. Processing techniques such as generating, describing, cleaning, verifying and formatting data will be covered. Various approaches to visualization such as exploration, explanation, and spatio-temporal representations will also be covered. Prerequisites: None. (F;S);

3.000 Credit hours

**CSE 708 – Data Analytics and Engineering Applications**

This is a project-based course where the students will consider the challenges, issues, and approaches of solving various data analytics and engineering problems in a variety of applications in business, e-commerce, bioinformatics, social media, intelligent transportation, and image and video libraries. The course will also introduce and review concepts in data analytics and engineering such as the data ingestion cycle, the 5Vs of big data, data structures and formats, and hardware and software requirements. Prerequisites: None. (F;S);

3.000 Credit hours

**CSE 720 - Research Computing Environments**

This course includes high performance computing environments, ranging from extreme high-end desktop systems to scalable computing with clusters and MPP systems. Emphasis is on environments possessing the following elements: the Linux operating system, multi-core and GPGPU combined systems, large storage management, remote execution and schedulers for shared resource management. Prerequisites: Consent of Instructor. (F;S);

3.000 Credit hours

**CSE 785 - Special Topics**

This course is designed to allow the introduction of potential new courses on a trial basis or special content courses on a once only basis at the Master's level. The topic of the course and title are determined prior to registration. Prerequisites: Consent of Instructor, Graduate Standing. (F;S;SS); Note: May be repeated for credit.

1.000 TO 4.000 Credit hours

**CSE 792 - Graduate Seminar**

Discussions and reports of subjects in Computational Science and Engineering and allied fields will be presented. Prerequisite: Master's level standing. (F;S);

1.000 Credit hours

**CSE 794 - Master's Supervised Research**

This is supervised research under the mentorship of a member of the graduate faculty. It is not intended to serve as the dissertation topic of the doctoral student. Prerequisite: Consent of Instructor. (F;S;SS);

2.000 TO 3.000 Credit hours

**CSE 796 – Master's Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal, which outlines the nature of the project, must be submitted for approval. This course is only available to project option students. Prerequisite: Masters level standing. (F;S;SS);

3.000 Credit hours

**CSE 797 - Master's Thesis**

Master of Science thesis research will be conducted under the supervision of the thesis committee chairperson leading to the completion of the Master's Thesis. This course is available only to thesis option students and can be repeated. Prerequisite: Consent of advisor. Note: May be repeated for credit. (F;S;SS);

1.000 TO 6.000 Credit hours

**CSE 799 - Continuation of Master's Thesis**

This course is a continuation of CSE 797. The course is for master's students who have completed all required credit hour requirements. Prerequisite: Completion of all Thesis/Dissertation Credits. (F;S;SS);  
Note: May be repeated for credit.  
1.000 Credit hours

### **CSE 801 - Computational Statistics**

This course covers computational statistical concepts for analyzing large data sets including. Topics include: maximum likelihood, generating random variables, estimating distributions via simulation, expectation maximization, data partitioning including bootstrapping, jackknifing and cross-validation, multivariate, parametric and non-parametric regression, principle components, classification and regression trees, and multivariate analysis of variance (MANOVA). Statistical packages such as MATLAB will be utilized to implement the concepts learned in the course. Prerequisites: None. (F;S);  
0.000 OR 3.000 Credit hours

### **CSE 802 – Computational Methods for Differential Equations**

This course presents and discusses computational methods and their reliability, accuracy, and scalability, and computational implementations, with special emphasis on initial and boundary value problems in ordinary and partial differential equations. Topics include sampling issues, discretization and truncation errors, marching, finite differences, finite elements, grids and meshes, and function approximations.  
Prerequisites: None. (F;S);  
3.000 Credit hours

### **CSE 803 - High-Performance and Scalable Computing**

This course discusses computing paradigms, hardware and software implementations and communication and computational strategies for high-performance scalable and parallel computing systems; including clusters, grid computing, GPGPU computing and remote storage. Examples include MPI, OpenMP and GPU libraries for scalable computing and programming on available clusters. Prerequisites: CSE 703 or Consent of Instructor. (F;S);  
3.000 Credit hours

### **CSE 804 - Computational Modeling and Visualization**

This course introduces students how to model linear, nonlinear, deterministic, and stochastic systems with help of discrete event simulation and exploratory/explanatory visualization. The instructor will cover various state-of-the-art modeling, analysis and visualization techniques. It will emphasize practical challenges involving complex real-world data and include several case studies and hands-on work with the several programming languages.  
Prerequisites: CSE 620 or Consent of Instructor. (F;S);  
3.000 Credit hours

### **CSE 805 - Machine Learning and Data Mining**

This course covers machine-learning and data-mining concepts for analyzing very large, complex data sets. Topics include data preprocessing, measuring data similarity, mining frequent patterns, association rule mining, classification/prediction, cluster analysis, neural-network, decision trees, discriminant analysis, rule-based decisions, nearest-neighbor and naive Bayes classifier, outlier detection and others. Machine learning tools like WEKA will be introduced to augment the course materials. Prerequisites: Consent of the instructor. (F;S);  
3.000 Credit hours

### **CSE 806 – Computational System Theory**

This course covers the fundamentals of general, qualitative, and linear system theories such as the classification of signals, models, and systems, and problems of system theory such as simulation, system

identification, and inversion. Computational themes such as decomposition, continuation, and prediction/correction are discussed. The computational requirements and complexity of basic algorithms of system theory are also discussed. Prerequisites: Consent of Instructor. (F;S);  
3.000 Credit hours

### **CSE 815 – Bioinformatics**

This course examines fundamental concepts and methods in bioinformatics, including computational methods for analyzing DNA, RNA, and the protein data, with explanations of underlying algorithms, the advantages and limitations of each method, and strategies for their application to biological problems. Various tools for Next-Generation sequence data analysis are introduced. Prerequisites: Consent of Instructor. (F;S);  
3.000 Credit hours

### **CSE 816 Concepts in Multi-Scale and Multi-Physics Modeling is missing**

This course focuses on multi-scale, multi-physics modeling approaches, associated computational techniques involving quantum, atomistic, micro-level, meso-level, macro-level models and the coupling of such models and related applications in engineering, materials and physical sciences. Prerequisites: Consent of Instructor. (F;S);  
3.000 Credit hours

### **CSE 817 – Fundamentals of Big Data Analysis**

This course covers the concepts of big data analysis such as variety, velocity, veracity, and value. The course focuses on issues of storage, processing, analysis, visualization and application of big data. Technologies such as MapReduce and Hadoop are discussed, in addition to the newest trends. Prerequisites: None. (F;S);  
3.000 Credit hours

### **CSE 824 – Advanced Interactive Visualization**

This course emphasizes advanced aspects of various approaches to visualization such as scientific visualization, 3D stereo vision, visualization of complex data, models, and relationships, augmented reality, and virtual reality. Prerequisites: None. (F;S);  
3.000 Credit hours

### **CSE 826 - Modeling and Simulation of Physical Systems**

This course will apply numerical methods to design and implement models for a variety of physical systems that are based on both continuum and particle paradigms. Both deterministic and stochastic approaches will be presented. Example applications include satellite trajectories, acoustics, electromagnetic fields and or others. Implementations using high-end scalable computing will be pursued. Prerequisites: Consent of Instructor. (F;S);  
3.000 Credit hours

### **CSE 885 - Specials Topics**

This course is designed to allow the introduction of potential new courses on a trial basis or special content course as required at the doctoral level. Prerequisite: Consent of the Instructor. (F;S); Note: May be repeated for credit.  
1.000 TO 4.000 Credit hours

### **CSE 991 - Doctoral Qualifying Exam**

This supervised program is for students who are taking the CSE Ph.D. program qualifying examination to demonstrate the understanding of the core areas of CSE and their domain research area. It culminates in a scheduled written examination administered on a Pass/Fail basis and must be passed after the completion

of the first year of Ph.D. coursework or an unconditional basis. Prerequisites: Doctoral student in CSE with unconditional admission status and consent of academic advisor. (F;S);  
3.000 Credit hours

**CSE 992 - Doctoral Seminar**

Seminars delivered by student researchers, faculty, and invited speakers. The student receives a Pass/Fail and no letter grade is given upon completion. This course can be taken more than once. Prerequisites: None. (F;S); Note: May be repeated for credit.  
1.000 Credit hours

**CSE 993 - Doctoral Supervised Teaching**

This course introduces the doctoral student to classroom or laboratory teaching under the supervision of a faculty mentor. Prerequisites: Consent of Instructor. (F;S;SS);  
2.000 TO 3.000 Credit hours

**CSE 994 - Doctoral Supervised Research**

This is supervised research under the mentorship of a member of the graduate faculty. It is not intended to serve as the dissertation topic of the doctoral student. Prerequisites: None. (F;S;SS);  
2.000 TO 3.000 Credit hours

**CSE 995 - Doctoral Preliminary Exam**

This is required for students who have completed the CSE doctoral qualifying examination and who are taking the preliminary examination (oral preliminary defense). The student receives a Pass/Fail and no letter grade is given upon completion. Prerequisite: CSE 991. (F;S;SS);  
3.000 Credit hours

**CSE 997 - Doctoral Dissertation**

This represents the supervised research leading to the dissertation for the doctoral student. The student receives a Pass/Fail grade only after the completion of the final Ph.D. oral defense. Prerequisite: Doctoral standing. (F;S;SS) Note: May be repeated for credit.  
1.000 TO 12.000 Credit hours

**CSE 999 - Continuation of Dissertation**

This course is for doctoral students who have completed all required credit hour requirements. This can be repeated by the students as required. The student receives a Pass/Fail and no letter grade given upon completion. Prerequisite: Completion of all dissertation credits. (F;S;SS); Note: May be repeated for credit.  
1.000 Credit hours

**Electrical and Computer Engineering**

**ECEN 602 – Fundamentals of Semiconductor Physics**

This course will introduce the basics of semiconductor materials physics. The physics of semiconductor in thermal equilibrium and transport phenomena of the charge carrier in a semiconductor will be described. The nonequilibrium excess carrier characteristics, an important component of understanding the device physics, are then developed. Electrostatics of the basic pn junction will also be covered in detail. Prerequisites: None. (F)  
3.000 Credit hours

**ECEN 608 - Analog Electronics**

This course covers the analysis, design and application of analog integrated circuits. These circuits may include operational amplifiers, voltage comparators, voltage regulators, Monolithic power amplifiers, Digital to Analog (D/A) and Analog to Digital (A/D) converters, voltage-controlled oscillators, phase-locked loops, other special-function integrated circuits. Prerequisites: ECEN 460 or consent of instructor. (F;S;SS)

3.000 Credit hours

**ECEN 621 - Embedded System Design**

This course is an in-depth study of both programmable hardware and software-based application specific systems, using high-level and low-level languages. Topics covered include hardware/software codesign, scheduling, performance, memory, and power optimizations, and real-time operating systems. Usage of contemporary hardware and software development tools is emphasized. Prerequisites: None. (F)

3.000 Credit hours

**ECEN 623 - Advanced Digital Systems**

Digital system top-down design and analysis will be presented. Topics include timing, power and performance issues in digital circuits, Very High Speed Integrated Circuit Hardware Description Language (VHDL)-based system analysis and synthesis, hardware-software co-design, data-flow models, and digital system primitives. This course includes experience with Field Programmable Gate Array (FPGA) based project implementations. Prerequisites: None. (F)

3.000 Credit hours

**ECEN 625 - Microwave Circuits**

This course will cover RF and microwave circuits appropriate for wireless communications and radar sensing. It emphasizes the theoretical and practical aspects of microstrip design of highly integrated systems. Matrix analysis and computer-aided design techniques are introduced and used for the analysis and design of circuits. Impedance transformer, power combiner, couplers, mixers, and calibrated measurements techniques are also covered. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**ECEN 626 - Electronic Design Automation**

This class introduces Electronic Design Automation (EDA) and explores performance-driven approaches to the following concepts: technology mapping, circuit partitioning, chip floor planning, cell placement, and wire routing. Also discussed are applications of a number of important optimization techniques, such as network flow, Steiner tree, scheduling, simulated annealing, and linear programming. Prerequisites: None. (F;S;SS)

3.000 Credit hours

**ECEN 629 - Very Large Scale Integrat Cir**

This course introduces CMOS technology and devices for design and implementation of digital integrated circuits. Propagation delay and power dissipation of static and dynamic combinational and sequential logic circuits are studied. Method of Logical Effort is introduced for predicting path delays. Layout design rules and verification tools are introduced. Design examples include Arithmetic Units and Memory and Array Structures. Prerequisites: None. (S)

3.000 Credit hours

**ECEN 647 - Introduction to Telecommunica**

This course introduces telecommunication networks utilization and design. Emphasis is on using and designing voice, video and image digital networks. Prerequisites: ECEN 400 or consent of instructor.

(F;S;SS)

3.000 Credit hours

### **ECEN 649 - Digital Communications**

The fundamental theory and applications of the digital communications are introduced. Topics in digital communications include sampling, quantizing, coding detection, modulation/demodulation, signal-to-noise ratio, and error probability. Prerequisites: None. (F)

3.000 Credit hours

### **ECEN 650 - Digital Signal Processing**

This course introduces a fundamental theory and applications for digital signal processing including topics such as digital signals and systems, digital filtering, spectral analysis, and Discrete Fourier transform (DFT). (F)

3.000 Credit hours

### **ECEN 656 - Probability and Random Process**

This course covers sample space and events, conditional probabilities, independent events, Bayes formula, discrete random variables, expectation of random variables, joint distribution, conditional expectation, Markov chains, stationary processes, ergodicity, correlation and power spectrum of stationary processes, and Gaussian processes. Prerequisites: ECEN 400 or consent of instructor. (F;S;SS)

3.000 Credit hours

### **ECEN 657 - Digital Image Processing**

This course deals with concepts and techniques for digital image analysis and processing. Topics include image representation, image enhancement, edge extraction, image segmentation, geometric structure, feature extraction, knowledge representation, and image understanding. Prerequisites: ECEN 400 or consent of instructor. (F;S;SS)

3.000 Credit hours

### **ECEN 661 - Power Systems Analysis**

The course studies power system representation, transmission lines, symmetrical and asymmetrical faults, electrical power flow, power systems control and stability. Prerequisites: ECEN 430. (F;S;SS)

3.000 Credit hours

### **ECEN 668 - Theory of Linear Control Sys**

The aim of a control system is to influence the system's behavior to achieve a desired performance. Many control systems can be described by a linear model for which there are well developed analysis and synthesis tools. The focus of this course will be on linear time invariant lumped systems which are described either by state space equations or rational transfer functions. Different analysis and design techniques will be discussed. Prerequisites: None. (F)

3.000 Credit hours

### **ECEN 672 – Modeling and Control of Drones**

This course introduces a systematic approach to modeling and control of Unmanned Aerial Vehicles (UAVs). The course explores different topics including UAV kinematics, rigid body dynamics, UAV mathematical model, automatic control, flight sensing and control mechanisms, and flight control design. In addition, the course will have some lab session for actual implementation of flight control systems on a small drone and/or software development and flight simulations. Prerequisites: None (F;S)

3.000 Credit hours

### **ECEN 674 - Genetic Algorithms**

This course covers the theory and application of genetic algorithms. Genetic algorithms combine a Darwinian survival of -the-fittest with a randomized, yet structured, information exchange to form an improved search mechanism with surprising robustness. Engineering applications of genetic algorithms for design and control will be presented. Prerequisites: ECEN 410 or consent of the instructor. (F;S;SS)  
3.000 Credit hours

**ECEN 678 - Intro to Artificial Neural network**

This course introduces neural network design and development. Emphasis is on designing and implementing information processing systems that autonomously develop operational capabilities in adaptive response to an information environment. Prerequisites: ECEN 400 or consent of instructor. (F;S;SS)  
3.000 Credit hours

**ECEN 685 - Selected Topics in Engineering**

This lecture course is used to introduce engineering topics of current interest to students and faculty. The subject matter will be identified before the beginning of the course. Prerequisites: Consent of instructor. (F;S;SS)  
3.000 Credit hours

**ECEN 686 - Special Projects**

This is an investigation of an engineering topic, which is arranged between a student and a faculty advisor. Project topics may be analytical and/or experimental and should encourage independent study. Prerequisites: Consent of instructor. (F;S;SS)  
1.000 to 3.000 Credit hours

**ECEN 701 - Electronic Ceramics**

This course introduces the properties of ceramic materials in electronic applications. The effects or processing parameters on the ultimate device characteristics will be investigated. Prerequisites: ECEN 602 or consent of instructor. (F;S;SS)  
3.000 Credit hours

**ECEN 724 - Mixed Signal VLSI Design**

This course will introduce CMOS circuit techniques for low- power, low-voltage mixed-signal integrated circuits. Continuous-time signal processing, sampled-data analog filters, delta-sigma data converters, and mixed analog- digital layout techniques will be introduced. Prerequisites: None. (S)  
3.000 Credit hours

**ECEN 791 - MSEE Degree Exit Examination for Course Only Option**

This course is for students who are preparing for and taking the written or oral MS degree exit examination for Course Only Option. Prerequisites: Master standing. (F;S;SS)  
0.000 Credit hours

**ECEN 792 - Master Seminar**

Discussions and reports of subjects in electrical engineering and allied fields will be presented. Prerequisite: Master level standing. (F;S;SS)  
1.000 Credit hour

**ECEN 796 - Master Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal, which outlines the nature of the project, must be submitted for approval. This course is only available to project option students. Prerequisite: Masters standing and Consent of advisor. (F;S;SS)

3.000 Credit hours

**ECEN 797 - Master's Thesis**

Master of Science thesis research will be conducted under the supervision of the thesis committee chairperson leading to the completion of the Master's thesis. This course is only available to thesis option students. (F;S;SS) Note: May be repeated for credit.

3.000 to 6.000 Credit hours

**ECEN 799 - Master Thesis Continuation**

The course is for Master's students who have completed all required course works and all Master Project or Thesis credits. This optional course assists the student in maintaining full-time enrollment following completion of the Master Project, ECEN 796 or Master Thesis, ECEN 797. The course may be taken to allow time for the student to complete the final project or thesis write-up and to prepare for the masters project or thesis defense. Prerequisites: Completion of all required course works and master project or thesis credits for Master standing students and Consent of advisor. Note: May be repeated for credit.

(F;S;SS)

1.000 Credit hour

**ECEN 801 - Solid State Devices**

This course deals with p-n junction and Schottky barrier diodes, bipolar junction and field effect transistors, heterostructure devices (e.g. heterojunction bipolar transistors and solar cells), and device modeling and simulation. Prerequisite: ECEN 602 or consent of instructor. (F;S;SS)

3.000 Credit hours

**ECEN 805 - Thin Film Tech for Device Fab**

The course will provide the principles and practices of different film deposition techniques, high vacuum technology, nucleation and growth of thin films as well as epitaxial growth of films. Prerequisites: None. (S)

3.000 Credit hours

**ECEN 812 - RF CMOS Integrated Circuits**

This course covers the design of RF CMOS integrated circuits. Passive and active RF components and their modeling using modern CAD tools, high-frequency circuit design techniques, noise analysis and RF circuits such as low-noise amplifiers (LNA), mixers, voltage-controlled oscillators (VCO), power amplifiers, and wireless transceiver architectures will be presented. Prerequisites: None. (S)

3.000 Credit hours

**ECEN 824 - Fault-Tolerant Digital System**

This course covers reliability, test generation, self-checking techniques, principles and applications of fault-tolerant design techniques. Prerequisites: ECEN 623. (S)

3.000 Credit hours

**ECEN 825 - Pervasive Computing Systems**

This course involves the study of the seamless integration of computing and communication technology into human-centered environments. Topics include the programming of context aware systems, smart devices, intelligent environments, human computer interaction, environment tagging and sensing, distributed computing, wearable computing, and ubiquitous communication. Prerequisites: ECEN 621.

(F;S)

3.000 Credit hours

**ECEN 827 - System Design Using Programmab**

This course will cover Programmable Logic Devices as applied to sequential logic system design. Students will be familiarized with FPGA design flow, best FPGA design practices, and be introduced to the Quartus II Software Environment (Quartus Prime Lite). Students will also be introduced to DE2i-150 FPGA Development Kit which includes the Altera Cyclone IV GX FPGA. Prerequisites: ECEN 623. (S)  
3.000 Credit hours

### **ECEN 857 - Pattern Recognition**

This course covers classical topics in statistical decision function, Bayesian learning, error probability estimation, cluster-seeking, and deterministic approach. Several related topics are discussed, including stochastic approximation, feature selection and ranking, syntactic and structural pattern recognition. Prerequisites: ECEN 657 or consent of instructor. (F;S;SS)  
3.000 Credit hours

### **ECEN 864 – Advanced Robotic Systems**

This course will cover recent developments in control of mobile robotic systems by utilizing different techniques such as positioning, navigation, localization, motion control. Available toolboxes and techniques for control of robotic systems will be reviewed. The course materials will be applied to robotic platforms and simulators. Prerequisites: Masters or Doctoral student. (F;S)  
3.000 Credit hours

### **ECEN 865 - Optical Control Systems**

In many practical control problems it is required to find a control technique to optimally improve the dynamical system's performance while satisfying different physical constraints. The system performance can be quantified as a performance index or a cost function. Then, the problem will be reduced to find a control law to optimize a given cost functions. This course explores theory and application of optimal control for linear and nonlinear systems. The course uses optimal control theory and computational optimal control algorithms to improve the system's performance, reduce the control energy, and stabilize the system. Prerequisites: ECEN 668 or consent of instructor. (S)  
3.000 Credit hours

### **ECEN 870 - Fuzzy Logic with Applications**

The course objective is to understand the basic theory and the foundations of fuzzy sets. Fuzzy logic is shown to contain evidence, possibility, and probability logic. This course emphasizes engineering applications in control, decision-making, and pattern recognition. The hardware/ software implementation of those applications is also demonstrated. Prerequisites: ECEN 668 or consent of instructor. (F;S;SS)  
3.000 Credit hours

### **ECEN 885 - Doctoral Special Topics**

This lecture course is used to introduce engineering topics of current interest to doctoral students and faculty. The subject matter will be identified before the beginning of the course. Prerequisites: Doctoral student and consent of instructor. (F;S;SS)  
3.000 Credit hours

### **ECEN 991 - Doctoral Qualifying Exam**

This course is for students who are preparing for and taking the written qualifying examination. Prerequisite: Doctoral student and consent of instructor. (F;S;SS)  
1.000 Credit hour

### **ECEN 992 - Doctoral Seminar**

In this course, doctoral students attend colloquia or seminars. These consist of presentations by doctoral students on dissertation topics and works-in-progress and by guests on important classical, contemporary,

or research problems in electrical engineering. Prerequisite: Doctoral level standing. (F;S;SS) Note: May be repeated for credit.

1.000 Credit hour

#### **ECEN 994 - Doctoral Supervised Research**

This is supervised research under the mentorship of a member of the graduate faculty. It is not intended to serve as the dissertation topic of the doctoral student. Prerequisites: Doctoral student and consent of instructor. (F;S;SS)

3.000 Credit hours

#### **ECEN 995 - Doctoral Preliminary Examina**

This course is for students who are preparing for and taking the written and/oral preliminary examination. Prerequisites: Doctoral student and consent of instructor. (F;S;SS)

3.000 Credit hours

#### **ECEN 997 - Doctoral Dissertation**

This supervised research serves as the dissertation of the doctoral student. Twelve credits of dissertation are required for graduation. Prerequisites: Doctoral student and consent of instructor. (F;S;SS) Note: May be repeated for credit.

3.000 to 12.000 Credit hours

#### **ECEN 999 - Doctoral Dissertation Continua**

The course is for doctoral students who have completed all required course works and all dissertation credits. This optional course assists the student in maintaining full-time enrollment following completion of the Doctoral Dissertation, ECEN 997. The course may be taken to allow time for the student to complete the dissertation write-up and to prepare for the dissertation defense. Prerequisites: Completion of all required course works and dissertation credits for Doctoral student and Consent of advisor. (F;S;SS) Note: May be repeated for credit.

1.000 Credit hour

### **INDUSTRIAL & SYSTEMS ENGINEERING**

#### **ISEN 600 - Survey of Indust Engin Topics**

This course will introduce topics in the following areas of Industrial and Systems Engineering: Engineering Economy, Linear Programming, Production Control, Methods Engineering, and Statistical Process Control. Prerequisites: Senior/Graduate Standing. (F;S)

3.000 Credit hours

#### **ISEN 625 - Information Systems**

This course introduces the planning, design, implementation and evaluation of industrial information systems. Analysis and design techniques, organization of data, current software tools, client-server architectures, and current database technologies are presented. The role of information systems in global manufacturing, distribution, and services is addressed. Design projects are required. Prerequisites: Senior/Graduate Standing. (F;S)

3.000 Credit hours

#### **ISEN 628 - Six Sigma Quality**

This course covers the current Six Sigma body of Knowledge for process engineering and improvement as well as Lean concepts and tools. Topics covered include problem identification

and implementation of improved operations and processes. This course prepares students to take the SIX Sigma Certification Exam. A project is required. Prerequisites: Consent of Instructor. (F;S)

3.000 Credit hours

### **ISEN 648 - Biomechanics**

This course covers human biomechanical and physiological behavior during work. Quantitative methods using engineering mechanics principles and computer simulation are emphasized.

Prerequisites: Senior/Graduate Standing. (F;S)

3.000 Credit hours

### **ISEN 655 - Prod Planning & Scheduling**

This course focuses on the design, control and underlying behavior of manufacturing and service systems with emphasis on quantitative and information technology methods. Topic covered in this course include demand forecasting, inventory management, aggregate planning, operations scheduling, Material Requirements Planning and Manufacturing Resource Planning. Just-in-time, Theory of Constraints and Supply Chain Management. Projects will be required.

Prerequisite: Senior/Graduate Standing. (F;S)

3.000 Credit hours

### **ISEN 658 - Project Management**

This course addresses project proposal preparation, resource and cost estimation, project planning, organizing and controlling, network diagrams, and computerized project planning systems. Prerequisite: Senior/Graduate Standing. (F;S)

3.000 Credit hours

### **ISEN 662 – Programming for Data Analysis**

This course provides an introduction to programming for data and statistical analysis. Specific topics include data structures, data visualization, data cleansing, and programming to analyze large datasets. Datasets related to real world systems are emphasized. (F;S)

1.000 Credit hours

### **ISEN 664 - Systems Safety Eng & Risk Anal**

This course presents the principles and methods of system safety management and risk analysis. Quantitative and qualitative methods and their applications in safety and risk analysis of human-machine systems are emphasized. Prerequisites: Senior/Graduate Standing. (F;S)

3.000 Credit hours

### **ISEN 665 - Human Machine Systems**

This course introduces behavioral and psychological factors such as sensory, perception and attention, decision-making and cognitive processes. This course emphasizes the applications of these factors to the design and development of man-machine systems. Design projects are required. Prerequisites: Senior/Graduate Standing in ISE or Consent of Instructor. (F;S)

0.000 OR 3.000 Credit hours

### **ISEN 675 - Design and Analysis of Experi**

This course addresses various experimental designs, to analyze data for research projects, process improvements, human factors studies, and surveys. Designs covered include Latin Squares, complete and incomplete block designs, one, two and three variable factorials, fractional factorials, nested designs, and 2k designs. Suitable laboratory apparatus will be set up to study to effect of design parameters on selected response. Statistical software will be utilized to analyze results. Parametric statistics such as analysis of variance (ANOVA) are introduced.  
Prerequisites: Senior/Graduate Standing. (F;S)  
3.000 Credit hours

### **ISEN 685 - Selected Topics in ISEN Engi**

Selected engineering topics of interest to students and faculty. The topics will be selected before the beginning of the course and will be pertinent to the programs of the students enrolled.  
Prerequisites: Senior/Graduate Standing. (F;S) Note: May be repeated for credit.  
1.000 TO 3.000 Credit hours

### **ISEN 694 - Special Projects**

Study arranged on a special engineering topic of interest to student and faculty member, who will act as advisor. Topics may be analytical and/or experimental and encourage independent study.  
Prerequisite: Consent of the instructor. M.S. and Ph.D. students only. (F;S) Note: May be repeated for credit.  
1.000 TO 3.000 Credit hours

### **ISEN 721 - Systems Engineering Models**

This course presents an overview of modern quantitative and computational techniques for system modeling, design and control. Topics include fuzzy set theory, neural network, control theory, optimization search methods, Petri-nets, and knowledge-based systems. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

### **ISEN 731 - Engineering Cost Control**

This course is designed to emphasize the use of cost data by engineers in support of the financial management function. Cost functions, cost behavior, cash control, budgeting, and cash-flow analysis are discussed. Prerequisites: Graduate Standing. (F;S)  
3.000 Credit hours

### **ISEN 735 - Human Computer Interface**

This course provides a fundamental coverage of topics in human-computer interface (HCI). The primary emphasis is on the impact of human characteristics and the use of information processing models for HCI-design, usability evaluation, virtual reality, and multimedia systems. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

### **ISEN 742 - Linear Optimization**

This course addresses formulation, solution techniques and applications of linear programming problems. Topics covered include simplex-method, revised simplex method, duality, sensitivity analysis, large scale liner programs, column generation, Dantzig-Wolf decomposition, interior

point methods, and computer solutions. Prerequisites: Consent of Instructor. (F;S)  
3.000 Credit hours

### **ISEN 745 - Advanced Com Inte Produc Sys**

This course addresses the principles relating to integration issues for an automated manufacturing enterprise. Topics include control architectures, communication networks and standards for graphical information interchange. Current research areas will be discussed. Design projects are required. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

### **ISEN 792 - Indus Sys Engi Master's Semi**

This course introduces contemporary industrial and systems engineering topics via talks by individuals from industry, government, and academe. Prerequisites: Graduate Standing in ISE. (F;S) Note: May be repeated for credit.  
1.000 Credit hours

### **ISEN 794 - Masters Supervised Research**

This course provides students with the experience of assisting in all aspects of planning and completing research projects. Prerequisites: Graduate Standing in ISE. (F;S)  
3.000 Credit hours

### **ISEN 796 - Masters Project**

This course provides the student an opportunity to complete a comprehensive Industrial and Systems Engineering project of their choice under the supervision of a faculty advisor. A project is an application of Industrial and Systems Engineering methods and techniques to a specific problem. Students are required to complete a project proposal and a final defense in accordance with departmental guidelines. Prerequisites: Graduate Standing in ISE. (F;S)  
3.000 Credit hours

### **ISEN 797 - Master's Thesis**

This course provides the student an opportunity to complete a piece of original research, of their choice, in Industrial and Systems Engineering, under the supervision of a faculty advisor. Students are required to complete a thesis proposal and a final defense in accordance with departmental guidelines. Prerequisites: Graduate Standing in ISE. (F;S) Note: May be repeated for credit.  
1.000 TO 6.000 Credit hours

### **ISEN 799 - Continuation/Residency**

Meets Graduate School requirements for continuous enrollment during final term prior to graduation when all degree requirements (including thesis or project) have been completed. This course is non-graded, and credit for this course does not count toward the degree. May be repeated twice. Prerequisites: Graduate Standing in ISE. (F;S) Note: May be repeated for credit.  
1.000 TO 3.000 Credit hours

### **ISEN 813 - Cognitive Systems Engineering**

This course examines the principles, theories, and applications of the cognitive basis of system design. Topics include models of human and machine information processing, mental models, human error, human-centered design, abstraction hierarchy, ecological interface, cognitive task analysis, multi-flow models, activity-behavior models, and theories of complexity in human machine systems. Prerequisite: Graduate Standing and Consent of Instructor. (F;S)  
3.000 Credit hours

#### **ISEN 814 - Adv Topics Human Machine Sys**

This course examines advanced topics in human-machine systems. Topics covered include supervisory control, human aspects of fixed and programmable automation, theories and models of complex systems, collaborative work support systems, human attention and cognitive control of dynamic actions, and tele-operations. Applications include supervisory control in transportation, process, space operations, waste and hazardous handling, manufacturing, and other applications of automated systems. Prerequisites: Graduate Standing and Consent of Instructor. (F;S)  
3.000 Credit hours

#### **ISEN 821 - Multivariate Stat for Engineer**

This course focuses on methods for statistical analysis of multivariate data. Topics include: dimensionality, multidimensional classification and clustering, unstructured multi-response sampling, analysis of covariance structures, such as principal components, factor analysis and canonical correlation analysis, and multivariate normal distribution and analysis of multivariate means. Prerequisite: Graduate Standing and Consent of Instructor. (F;S)  
3.000 Credit hours

#### **ISEN 831 - Service Sector Engineering**

This course focuses on the application of modeling and analysis of enterprises in the service sector of an economy. Topics include the role of the service sector in an economy, special characteristics of service operations, structuring the service enterprise, facility design for services, service quality, and quantitative models for managing services. Applications in the financial services, health care, and other sectors will be emphasized. Prerequisite: Graduate Standing and Consent of Instructor. (F;S)  
3.000 Credit hours

#### **ISEN 833 - Supply Chain Syst Engineering**

This course addresses the analysis and design of logistics and supply chain systems. Topics covered include: logistics and supply chain characterization, site location, mode selection, distribution planning, vehicle routing, demand management, replenishment management, geographic information systems and real-time logistics control issues. Prerequisites: Graduate Standing and Consent of Instructor. (F;S)  
3.000 Credit hours

#### **ISEN 841 - Integer and Network Optimiza**

This course addresses formulation and solution techniques for integer programming problems and network optimization problems. Topics covered include integer programming models, branch and bound method, transportation, assignment, and transshipment problems, and network

flow problems such as shortest-path, maximum-flow, activity networks, minimum-cost network flow, and minimum spanning tree. Prerequisites: Graduate Standing and Consent of Instructor. (F;S)

3.000 Credit hours

### **ISEN 843 - Queuing Theory**

This course presents stochastic models and solution techniques for such models. Specific topics include elements of queuing systems, measures of performance, arrival processes, steady state analysis, stationary arrivals, controlling service processes, priority queues, and queuing networks. Prerequisite: Graduate Standing and Consent of Instructor. (F;S)

3.000 Credit hours

### **ISEN 844 - Reliability and Maintenance**

This course reviews the statistical concepts and methods underlying procedures used in reliability engineering. Topics include the nature of reliability and maintenance, life failure and repair distributions, life test strategies, and complex system reliability including: series/parallel/standby components with preventive maintenance philosophy. Analytical models are emphasized. Prerequisite: Graduate Standing and Consent of Instructor. (F;S)

3.000 Credit hours

### **ISEN 851 - Integrated Manu Control Sys**

This course provides an advanced study of systems used for manufacturing execution and shop floor control. Traditional control and adaptive control algorithms and applications for manufacturing are explored. Integrated control system functions include scheduling, execution planning, supervisor control, human machine interface, process control, quality control, and information acquisition. Prerequisite: Graduate Standing and Consent of Instructor. (F;S)

3.000 Credit hours

### **ISEN 852 - Integrated Product & Proc Desi**

This course provides an integrated approach to the design and manufacture of a new product. Topics include product requirements, concept generation and selection, design, product optimization, tolerances, prototype 32 development, design for manufacturability and assembly, process optimization, and quality function deployment. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

### **ISEN 853 - Enterprise Integration**

This course is directed toward development and contribution to the advancement of a unified framework for conceptualizing, designing, modeling, and operating advanced integrated manufacturing systems. It builds upon emerging developments in computer and communications technologies and conceptual breakthroughs regarding the nature and behavior of integrated enterprises. Prerequisites: Graduate Standing and Consent of Instructor. (F;S)

3.000 Credit hours

### **ISEN 861 - Nano Micro and Bio Manufactur**

This course addresses the translation of fundamental nano and bio technology concepts to practical industrial applications. Topics include the design , prototyping and development of

nano/micro and bio manufacturing techniques. Supporting infrastructure, measurement tools, characterization devices, and positioning systems needed for nano/micro and bio manufacturing are discussed. current state-of-the-art research areas are discussed. Prerequisites: Consent of Instructor. (F;S)  
3.000 Credit hours

### **ISEN 862 – Data Prep Vis Ana for Soc Imp**

This course provides a systematic approach to collecting, cleaning, and consolidating data, graphically representing information and data, and making conclusions about the information through data analysis with a focus on applications to societal issues of equity and quality of life. Topics include measuring societal impact of data, predictive modeling, data mining and visualization, and social network analysis. (F;S)  
3.000 Credit hours

### **ISEN 863 – Data Analytics Practicum**

This practicum course provides the student an opportunity to work with real world datasets that focus on societal impact to apply the knowledge and skills obtained to a data analytics focused project. The student is expected to demonstrate a clear understanding of the problem, prepare and analyze the data and present a solution. (F;S)  
3.000 Credit hours

### **ISEN 885 - Ad Spe Topics in ISEN SYS EN**

The course will address a current body of knowledge in Industrial and Systems Engineering with a research orientation. Term papers and projects will be required. Prerequisites: Graduate Standing and Consent of Instructor. (F;S) Note: May be repeated for credit.  
3.000 Credit hours

### **ISEN 992 - Doctoral Sem in Indus Sys Engi**

The course will present potential dissertation topics and research work-in-progress by faculty members and doctoral students, and talks by eminent practitioners and researchers on classical and contemporary topics in Industrial Engineering. Pass/Fail evaluation only, no letter grade will be given. Prerequisites: Doctoral Standing in ISE. (F;S) Note: May be repeated for credit. Note: May be repeated for credit.  
1.000 TO 3.000 Credit hours

### **ISEN 994 - Doctoral Supervised Rsrch**

This is supervised research under the direction of a member the Graduate Faculty. This research should lead to the identification of a dissertation topic. Pass/Fail evaluation only, no letter grade will be given. Prerequisites: Doctoral Standing in ISE. (F;S)  
3.000 Credit hours

### **ISEN 995 - Doctoral Preliminary Exam**

3.000 Credit hours

### **ISEN 997 - Doctoral Dissertation**

This course provides the student an opportunity to complete a significant piece of original research, of their choice, in industrial engineering, under the supervision of a faculty advisor. Students are required to complete a dissertation proposal and a final defense in accordance with departmental guidelines. Prerequisites: Doctoral Standing in ISE and INEN 995. (F;S) Note: May be repeated for credit.  
1.000 TO 18.000 Credit hours

**ISEN 999 - Continuation/Residency**

Meets Graduate School requirement for continuous enrollment during final term prior to graduation when all degree requirements (including dissertation) have been completed. This course is non-graded, and credit for this course does not count toward the degree. May be repeated twice. Prerequisites: Doctoral Standing in ISE. (F;S) Note: May be repeated for credit.  
1.000 TO 3.000 Credit hours

**Mechanical Engineering**

**MEEN 601 - Continuum Mechanics**

This course covers the applications of the laws of mechanics and thermodynamics to the continuum. Topics include a rigorous development of the general equations applied to a continuum and the application and reduction of the general equations for specific cases of both solids and fluids. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 606 - Interme Mechanical Vibrations**

This is a course in modeling, analysis and simulation of free and forced vibration of damped and indamped, single and multi-degree of freedom systems. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 613 - Mechanics of Composite Materi**

This course covers micro and macro mechanics failure theories and design of multilayered-multidirectional fiber reinforced composites. Topics include 2-D and 3-D theory of anisotropy, elasticity, micromechanics, failure theories, classical laminate theory and stress analysis of multidirectional laminates under mechanical and hygrothermal loading. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 626 - Advanced Fluid Dynamics**

This course presents general development of basic equations of fluid motion including Navier-Stokes equations, continuity and energy equation. Exact and approximate solutions of the basic equations are presented. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 631 - Conduction Heat Transfer**

This course presents the development of the general heat conduction equation and its application to one-, two-, and three-dimensional steady and unsteady boundary value problems. Closed form and numerical solution techniques are addressed. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 643 - Mechanical Instrumentation**

Principles and practices of industrial measurement are presented in this course. Topics include: instrument dynamics and response characteristics; theory of transducers for temperature, pressure, flow, motion, force; and other physical phenomena. Special topics in instrumentation, data acquisition and data reduction are covered. A project is assigned in an instrumentation application. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 654 - Advanced Propulsion**

This covers the analysis and design of individual components and complete air-breathing propulsion systems including turbo fans, turbo jets, ram jets, and chemical rockets. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 668 - Compressible Fluid Flow**

The course covers the equations of motion of compressible fluid flow including normal shocks, flow with friction, heating and cooling, supersonic flow; unsteady wave motion, velocity potential equation; linearized flow; conical flow and slender body theory. Prerequisite: Graduate Standing. (F;S)  
3.000 Credit hours

**MEEN 685 - Special Topics**

This course is designed to allow the introduction of potential new courses on a trial basis or special content courses on a once only basis at the Master's level. The topic of the course and title are determined prior to registration. Prerequisite: Graduate Standing. (F;S) Note: May be repeated for credit.  
3.000 Credit hours

**MEEN 712 - Theory of Elastic Stability**

3.000 Credit hours

**MEEN 716 - Finite Element Methods**

This course covers fundamental concepts of the finite element method for linear stress and deformation analysis of mechanical components. Topics include the development of truss, beam, frame, plane stress, plane strain, axisymmetric isoparametric, solid, thermal, and fluid elements. ANSYS and NASTRAN software will be used for solving particle stress analysis problems. Prerequisite: Consent of instructor.  
3.000 Credit hours

**MEEN 792 - Master's Seminar**

This course provides a forum for discussions and reports of subjects in mechanical engineering and allied fields. Prerequisite: Master level standing. Note: May be repeated for credit.  
1.000 Credit hours

**MEEN 794 - Master's Supervised Research**

This course is supervised research under the mentorship of a faculty member. It is not intended to serve as the project nor thesis topic of the master's student. Prerequisite: Consent of instructor. Note: May be repeated for credit.  
3.000 Credit hours

**MEEN 797 - Master's Thesis**

Master of Science thesis research will be conducted under the supervision of thesis committee chairperson leading to the completion of the Master's thesis. This course is only available to thesis option students. Prerequisite: Consent of instructor. Note: May be repeated for credit.  
3.000 Credit hours

3.000 Other hours

**MEEN 799 - Continuation of Thesis**

This is a continuation of the Master of Science thesis research. This course is only available to thesis option students who have completed 6 credit hours of thesis work. Prerequisite: MEEN 797. (F;S;SS)

Note: May be repeated for credit.

1.000 Credit hours

**MEEN 820 - Advanced Thermodynamics**

This is an advanced course covering special topics in classical thermodynamics, statistical thermodynamics and thermodynamics of non-equilibrium processes. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

**MEEN 827 - Multiphase Flow**

This course covers the physics governing multiphase flow. Particle-fluid interaction, particle-particle interaction, and particle-wall interaction are discussed. It includes the description of the macroscopic properties of multiphase systems as a function of its microstructure. Electromechanics of particles are also studied. Prerequisite: Graduate Student Standing. (F;S)

3.000 Credit hours

**MEEN 835 - Physiochemical Hydrodynamics**

This course deals with advanced principles of physicochemical hydrodynamics with special emphasis on topics relevant to microfluidics. The topics covered include viscous flow coupled with molecular diffusion and Brownian motion, electrokinetic phenomena and its applications in electrophoretic separation and colloidal suspension, surface tension and its effects on microstructure wetting and electrohydrodynamic flows. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

**MEEN 845 - Feedback Control of Mechan Sys**

This course covers theory and application of linear systems and feedback control. Topics include: spaces and linear operators, eigenvalues and eigenvectors, state equations, transfer functions, controllability, observability, realizations, decomposition, stability of mechanical systems including robotics and machine tool vibrations. This course will also cover control design concepts for linear multivariable systems, pole placement and observer design. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

**MEEN 847 - Computational Engi Dynamics**

This course introduces computer-oriented methods for the analysis and design of engineering dynamic systems. Topics include: analytical and experimental techniques for model development, design refinement of components in flexible dynamics systems (machine tools, robots, moving vehicles, etc), and optimization techniques for transient response analysis on both constrained and unconstrained systems. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

**MEEN 852 - Surface and Subsurface Studies**

This course covers thermodynamics of surfaces and subsurfaces, surface energy, surface reconstruction and electronics. Topics include Terrace-Ledge-Kink Model, Kinetic theory and vacuum concepts, UHV hardware, pumping and system designs. In-situ experiments structural, chemical analysis and microcopy, diffraction techniques and scanned probe microscopy are included. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

**MEEN 854 - Advances in Nanomaterials**

This course deals with the structural, mechanical and physical properties of nanostructured materials as well as their relevant functions. The course presents a variety of fabrication techniques for nanostructures, related transport phenomena and kinetics at the nanoscale. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

**MEEN 860 - Fracture Mechanics**

This course introduces the student to the concept of stress and strain singularities and their effect on fracture strength and fatigue life of isotropic and anisotropic materials. Topics covered include: computation of the stress-strained field around a crack-tip, stress-intensity-factor, strain energy release rate, J-integral, fracture toughness, residual strength, and fatigue crack propagation life. The course concepts are applied to the design of damage tolerant structures. Prerequisite: Graduate Standing. (F;S)

3.000 Credit hours

**MEEN 885 - Special Topics**

This course is designed to allow the introduction of potential new courses on a trail basis or special content courses on a once only basis at the doctorate level. The topic of the course and the title are determined prior to registration. Prerequisite: Consent of instructor.

3.000 Credit hours

**MEEN 992 - Doctoral Seminar**

In this course, doctoral students attend colloquia or seminars. They consist of presentations by doctoral students on dissertation topics and work-in-progress and by guest on important classical, contemporary, or research problems in mechanical engineering. Prerequisite: Doctoral level standing.

1.000 Credit hours

**MEEN 993 - Doctoral Supervised Teaching**

This course is designed to introduce the doctoral student to classroom or laboratory teaching under the supervision of a faculty mentor. Doctoral students who serve as teaching assistants or as instructors are required to take this course during first semester they teach. Others planning to undertake a teaching career are also strongly encouraged to take it. Topics covered include: course planning, classroom teaching, lecture preparation, student evaluation, and grading. The supervisor(s) will observe and provide feedback to the student and evaluate the student's performance. Prerequisite: Doctoral level standing.

3.000 Credit hours

**MEEN 994 - Doctoral Supervised Research**

This is supervised research under the mentorship of a member of the graduate faculty. It is not intended to serve as the dissertation topic of the doctoral student. Prerequisite: Consent of instructor. Note: May be repeated for credit.

3.000 Credit hours

**MEEN 997 - Doctoral Dissertation**

This supervised research serves as the dissertation of the doctoral student. Twelve credits of dissertation are required for graduation. Prerequisite: MEEN 995. (F;S;SS) Note: May be repeated for credit.

3.000 Credit hours

**MEEN 999 - Continuation of Dissertation**

This is a continuation of the doctoral dissertation research. This course is only available to students who have completed 12 credit hours of dissertation work. Prerequisite: MEEN 997. (F;S;SS) Note: May be

repeated for credit.  
1.000 Credit hours

## **Systems Engineering**

### **SYEN 605 - Introduction to System Engi**

This course provides a comprehensive overview of systems engineering processes, methods, tools, and environments. Processes include needs analysis, technology assessment, requirements planning, and system design and improvement. Methods are covered to promote life cycle goals of producibility, usability, supportability and disposability. The course surveys systems tools spanning engineering disciplines that include quantitative, qualitative, computational, experimental, and model-based approaches. Prerequisites: Graduate Standing. (S)

3.000 Credit hours

### **SYEN 710 - Interdisciplin Capstone Pro I**

This course prepares students to plan and implement a systems engineering endeavor. The goal is to engage students in team-based organizational efforts, project management, interpersonal and professional skills development activities, and other project-based preparatory work. Prerequisites: SYEN 605. (SS)

3.000 Credit hours

### **SYEN 715 - Interdisciplin Capstone Pro II**

This course is designed to provide students with an opportunity to apply the knowledge, skills and abilities gained across the systems engineering curriculum to address a problem using a systems engineering methodology, which includes the examination of processes, methods, tools, and environments. Prerequisites: SYEN 710. (SS) Note: May be repeated for credit.

3.000 Credit hours

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**JOHN R. AND KATHY R. HAIRSTON COLLEGE OF HEALTH AND HUMAN  
SCIENCES**

<http://www.ncat.edu/chhs/index.html>

Elimelda Moige Onger, Interim Dean

Anna Lee, Interim Associate Dean of Student and Faculty Affairs

Sharon Parker, Interim Associate Dean of Research and Innovation

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The College of Health and Human Sciences has a cadre of highly qualified and accomplished faculty who are committed to exemplary teaching, scholarship and service. We deliver innovative educational programs that capitalize on the strengths of a diverse group of faculty who prepare our students to solve complex population health and human concerns, while improving the quality of life for individuals and communities. The interaction between and among the disciplines allows students, faculty, and graduates to gain a more comprehensive understanding of social and human conditions, leading to more creative and impactful teaching and learning, research and discovery opportunities and graduate outcomes.

**DEGREE PROGRAMS OFFERED**

Doctoral Degrees

- Ph.D. Social Work (Joint with UNCG)

Masters Degrees

- MSW Social Work (Joint with UNCG)
- MS Health Psychology

## Social Work (Joint with UNCG), Ph.D.

College of Health and Human Sciences

**Graduate Coordinator:** Jay Poole

**Email:** kjpoole@uncg.edu

**Phone:** (336)-334-5147

**Department Chair:** Arnold Barnes

**Email:** abarnes@ncat.edu

**Phone:** (336)-285-2298

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North Carolina Agricultural and Technical State University and the University of North Carolina at Greensboro offers a joint doctoral degree in social work (Ph.D.). Grounded in two richly historic universities, one a historically Black college or university (NCATSU) and the other the historical women's college of the University of North Carolina system (UNC Greensboro), the program is built on the cornerstones of diversity, multicultural responsiveness, and community engagement. Students in the program will receive the benefits and privileges of being enrolled on both campuses and the degree will include the seals and official signatures from both universities. The curriculum encourages students to explore several aspects of research including quantitative, qualitative, and community-engaged approaches. Additionally, students are encouraged to use electives to explore other areas or specialization in a particular area. Using the teacher/scholar model, the joint Ph.D. program encourages students to prepare for careers in academia and as leaders in the community.

### Admission Requirements

Applicants to the Joint Ph.D. in Social Work must have earned a master's degree and usually have earned a master's degree in social work from an accredited institution and demonstrate potential for doctoral studies.

### Program Outcomes

Upholding a commitment to the values and ethics of the social profession, joint Ph.D. students have four learning outcomes.

Learning Outcome 1: Written Communication - Students will be able to apply and communicate understanding of the importance of research approaches and methods that are culturally responsive at the micro, mezzo, and macro levels

Learning Outcome 2: Analyze Models - Students will be able to critically analyze models of research and evaluation

Learning Outcome 3: Integrate Social Work Ethics - Students will be able to integrate ethical decision-making skills to issues specific to social work research and evaluation

Learning Outcome 4: Participate in Research - Students will be able to design responsive research and evaluation methods to evaluate programs and/or generate new knowledge

### Degree Requirements

Total credit hours: 48 (full-time and part-time)

- Full time – 9 credits hours per semester for coursework (4 semesters); 3 credit hours per semester once in candidacy (48 credit hours total)
- Part time – 6 credit hours per semester for coursework (4 semesters and 4 summer sessions); 3 credit hours per semester once in candidacy (48 credit hours total)

#### Full-time option (9 credits hours in fall and spring semesters)

- Required Courses: Take 15 credit hours: SOWK 851, 853, 854, 855
- Elective Courses: Take 24 credit hours: choose from SOWK 885, 886, 890, open electives from other disciplines with at least 3 credits being a research elective
- Dissertation: 12 credit hours: SOWK 997 (3 credit hours per semester - must be in candidacy)

#### Part-time option (6 credit hours in fall and spring semesters and 6 credit hours in summer sessions)

- Required Courses: Take 15 credit hours: SOWK 851, 853, 854, 855
- Elective Courses: Take 24 credit hours: choose from SOWK 885, 886, 890, open electives from other disciplines with at least 3 credits being a research elective
- Dissertation: 12 credit hours: SOWK 997 (3 credit hours per semester - must be in candidacy)

## Social Work (Joint with UNCG), MSW

College of Health and Human Sciences

**Graduate Coordinator:** Jeffrey Shears

**Email:** jkshears@ncat.edu

**Phone:** (336)-285-2361

**Department Chair:** Arnold Barnes

**Email:** abarnes@ncat.edu

**Phone:** (336)-285-2298

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The Joint Master of Social Work (MSW) program represents the efforts of faculty at North Carolina Agricultural and Technical State University (NCA&TSU) and The University of North Carolina at Greensboro (UNCG). This is a single academic program with participation in instruction by faculty from each department. Instruction is conducted on the campuses of both universities. The program is accredited by The Council on Social Work Education and the curriculum has been designed by the joint faculty to provide students with a multicultural clinical social work education. The model for the curriculum is based on CSWE social work competencies, and contemporary, state-of-the-art theory and practice methods. The curriculum is organized by generalist year, specialist year, and field instruction. The primary purpose of the MSW program is to prepare students for multicultural clinical social work practice.

### Additional Admission Requirements

- Evidence of a liberal arts foundation to include the following minimum 30 credit hours: 18 Social and Behavioral Sciences (Political Science, Psychology, Anthropology, Economics, Ethnic/Global Studies, History, and Sociology); 6 Humanities; 3 Human Biology or Human Development; 3 Statistics
- Applicants must demonstrate intellectual and personal qualifications considered essential to the successful practice of social work, such as sensitivity and responsiveness in relationships, concern for the need of others, adaptability, good judgment, creativity, integrity, and skill in oral and written communication. This determination shall be based on a review of the applicant's references and written personal statement.
- Applicants to the Advanced Standing plan of study must have earned a Bachelor of Social Work degree from a Council on Social Work Education accredited program, have a GPA in social work courses of 3.5 or better, and provide a letter of recommendation from his/her B.S.W. field supervisor (as one of the three recommendations required).

### Program Outcomes

The JMSW Program's competency-based curriculum has been designed to comply with the Council on Social Work Education's (CSWE) Educational Policy and Accreditation Standards (EPAS), as revised in 2015. CSWE has delineated 9 core competencies, listed below, that must be adequately addressed in all BSW and MSW curricula.

- Competency 1: Demonstrate Ethical and Professional Behavior
- Competency 2: Engage Diversity and Difference in Practice
- Competency 3: Advance Human Rights and Social, Economic, and Environmental Justice
- Competency 4: Engage in Practice-informed Research and Research-informed Practice
- Competency 5: Engage in Policy Practice
- Competency 6: Engage with Individuals, Families, Groups, Organizations, and Communities
- Competency 7: Assess Individuals, Families, Groups, Organizations, and Communities
- Competency 8: Intervene with Individuals, Families, Groups, Organizations, and Communities
- Competency 9: Evaluate Practice with Individuals, Families, Groups, Organizations, and Communities

### Degree Requirements

Total credit hours: 60 (two year and three year options), 42 (advanced standing option)

#### Two year option

- Generalist Courses: Take 30 credit hours: SOWK 609, 618, 619, 621, 622, 623, 624, 626, 784, 785
- Specialist Courses: Take 24 credit hours: SOWK 634, 644, 652, 653, 786, 787, 789, 792
- Electives: Select 6 credit hours: SOWK 600-799

Advanced standing option

Requires full time enrollment by students with Bachelor of Social Work Degrees.

- Summer Bridge/Transition Courses: Take 12 credit hours: SOWK 632, 624, 626, 631
- Take 12 credit hours: SOWK 634, 644, 652, 653
- Take 12 credit hours: 786, 787, 789, 792
- Electives: Select 6 credit hours from: SOWK 600-799

**Internships**

The JMSW Field Instruction Program provides directed learning opportunities through social work internships. Upon completion of the of field instruction program, two year students will have a total of 1,008 hours in field internships. Advanced Standing students will have to complete a total of 672 hours.

## Health Psychology, M.S.

College of Health and Human Sciences

**Graduate Coordinator:** Phyllis Ford-Booker **Email:** [bookerp@ncat.edu](mailto:bookerp@ncat.edu) **Phone:** (336)285-2269

**Department Chair:** George S. Robinson, Jr. **Email:** [grobins@ncat.edu](mailto:grobins@ncat.edu) **Phone:** (336)285-2275

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The Master of Science Program in Health Psychology prepares students for employment and Ph.D. programs that emphasize mental and physical illness prevention, health promotion, and strategies to identify and address health disparities. Graduates will be prepared for a variety of employment opportunities such as behavioral health evaluators, survey specialist, research associate, neuropsychological associates, psychometrists, behavioral health case manager, behavioral health and research consultants, and behavioral health science writers. The U.S. Bureau of Labor Statistics predict that opportunities in psychology will continue to grow markedly because of the increased demand for psychological services in various agencies throughout this and other countries. This program is an excellent precursor for those students who would like to pursue a Ph.D. in psychology, especially health or clinical psychology.

### Admission Requirements

1. B.A. or B.S. degree in psychology, biology, neuroscience, public health, or related field from an accredited college or university.
2. A cumulative GPA of 3.0 in the bachelor's degree program or a previously earned graduate degree with a GPA of 3.0 in at least 12 credit hours in psychology courses including at least one statistics and one research methods course (in addition to the other criteria outlined in the Graduate Catalog for unconditional admission).
3. Completed Graduate College application and pay application fee.
4. Official transcripts from all colleges and/or universities attended.
5. Three letters of recommendation submitted online.
6. Writing sample (Statement of Interest in the program).
7. English language proficiency test for non-native speakers (e.g., TOEFL, IELTS or PTE).

### Program Outcomes

Learning Outcome 1: Theoretical Models: Apply the biopsychosocial approach to health; emphasis on the relationship between social, cultural, biological, and neuropsychological factors.

Learning Outcome 2: Synthesize changes in health across the lifespan, and design interventions and preventions.

Learning Outcome 3: Analytic Proficiency: Demonstrate knowledge of scientific writing, research, and statistical analysis.

Learning Outcome 4: Demonstrate knowledge of psychological health assessment and evaluation.

Learning Outcome 4: Demonstrate awareness of sociocultural diversity.

### Degree Requirements

Total credit hours: 36

#### Full-time Two-Year Option

Year 1: Fall: 9 hours of required courses (PSYC700, PSYC750, PSYC710)

Spring: 9 hours of requires courses (PSYC720, PSYC765, PSYC715)

Year 2: Fall: 6 hours of elective courses + 3 hours of thesis (PSYC797) or practicum (PSYC798)

Spring: 6 hours of elective courses + 3 hours of thesis (PSYC797) or practicum (PSYC798)

Elective Courses: PSYC705, PSYC725, PSYC735, PSYC730, PSYC740, PSYC745, PSYC760, PSYC755, PSYC785.

Thesis versus Non-thesis Option

Thesis Option: Students who elect the thesis option may select 9 hours of electives, 3 hours of practicum, and 6 hours of thesis.

Non-Thesis Option: Student who elect the non-thesis option may select 12 hours of electives and 6 hours of practicum.

## **COURSE DESCRIPTIONS: John R. and Kathy R. Hairston College of Health and Human Services**

### **Social Work and Sociology**

#### **SOSW 600 - Seminar in Social Planning**

Personal and social values as related to social planning: "systems" theories program planning and evaluation are studied. Prerequisite: Senior or graduate standing.

3.000 Credit hours

#### **SOSW 601 - Seminar in Urban Studies**

An analysis of the nature and problems of cities, urban development will be included. (DEMAND)

3.000 Credit hours

#### **SOSW 670 - Law and Society**

This course examines selected and representative forms of social justice and injustices; and barriers to and opportunities for legal redress, as related to contemporary issues. Prerequisite: Senior or graduate standing. (F;S;SS)

3.000 Credit hours

#### **SOWK 609 - Family Theory and Intervention**

This first year course prepares students for advanced study in clinical social work practice with families. The purpose of this course is to better prepare students for the current and future professional social work job market and to enhance the quality of clinical social work services they will be able to provide.

Prerequisite: SOWK 622. (F)

3.000 Credit hours

#### **SOWK 618 - Social Work and Social Justice**

This course will teach knowledge and skills students need for social justice work, including advocacy and community organization, within the scope of multicultural clinical practice. The purpose of this course is to better prepare students for the current and future professional social work job market and to enhance the quality of social work services they will be able to provide. Prerequisite: None. (S;SS)

3.000 Credit hours

#### **SOWK 619 - Founda of Clini So Work Prac**

This course will teach knowledge and skills students need for social justice work, including advocacy and community organization, within the scope of multicultural clinical practice. Prerequisite: SOWK 621. (S)

3.000 Credit hours

#### **SOWK 621 - Foundations of Social Work Pol**

Explores the history and development of social welfare institutions and social work. Examines the relationships between social problems, social policies, and social work practice from historical and contemporary perspectives. Prerequisite: None. (F;SS)

3.000 Credit hours

#### **SOWK 622 - Social Work with Individuals**

Defines and describes direct social work practice; knowledge, skills and values necessary to provide a wide scope of developmental, preventive and therapeutic services to individuals and families.

Prerequisite: None. (F)  
3.000 Credit hours

**SOWK 623 - Social Work with Groups**

Advanced course designed to teach group process and strategies, techniques, and skills for working with groups such as support groups and task groups in human services settings. Prerequisite: None. (F;S)  
3.000 Credit hours

**SOWK 624 - Social Work with Prac Human Di**

Examines cultural and social diversity; addresses theoretical and practical dimensions of social work practice with oppressed people of color, women, the aged, the sexually diverse, and the physically disabled. Prerequisite: None. (F)  
3.000 Credit hours

**SOWK 626 - Research Methods**

Research methodology as it relates to the professional practice of social work. Examines quantitative and qualitative methods as means for solving social problems. Prerequisite: None. (S;F)  
3.000 Credit hours

**SOWK 631 - Social Work Indi Fam Theo Prac**

This is a summer bridge course for students in the 1 year program. This course will place emphasis on the practice of social work in assessment and intervention using personality theory, family theory and the family life cycle, and social work theory. Prerequisites: None. (S)  
3.000 Credit hours

**SOWK 632 - Social Work Fam Group Theo Pra**

Theories related to group and family dynamics and functioning and social work assessment and intervention with families and group from a multicultural clinical perspective. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

**SOWK 634 - Research Methods & Data Analy**

Advanced skills in (a) conceptualizing research problems, (b) completing research in the social work domains: needs assessment, program evaluation, and single subject research, and (c) using inferential skills for data analysis. Prerequisite: None. (F)  
3.000 Credit hours

**SOWK 644 - Organi Con of Clin So Work Pra**

This course prepares students for working within organizations as clinical social workers and administrators by focusing on professional and organizational issues associated with clinical practice. The course also examines how to develop clinically-focused organizations to become more culturally responsive to various diverse constituencies. Prerequisite: SOWK 652. (S)  
3.000 Credit hours

**SOWK 652 - Advanced Clin So work Prac I**

The first of two advanced level courses in clinical social work practice, this course will focus on building competencies in clinical assessment and diagnosis of mental and substance abuse disorders. Prerequisite: SOWK 619. (F)  
3.000 Credit hours

**SOWK 653 - Advanced Clin So Work Prac II**

The second of two advanced level courses in clinical social work practice, this course will focus on building competencies in clinical assessment and diagnosis of mental and substance abuse disorders, as well as applying culturally responsive clinical interventions. Prerequisite: SOWK 652. (S)  
3.000 Credit hours

### **SOWK 669 - Small and Lg Group Intervent**

Elements and characteristics of small and large group behavior and process will be studied. Prerequisites: Senior or graduate standing; or permission of the instructor. (F;S;SS)  
3.000 Credit hours

### **SOWK 674 - Evaluation of Social Programs**

The main focus is on evaluative research methodology; research designs, measurement of program effectiveness and cost effectiveness analysis. Include case studies of needs assessments, program monitoring and impact measurement in human services. Prerequisites: Social Statistic(S203) and Research Methods (S403).(S)  
3.000 Credit hours

### **SOWK 706 - Social Policy Welfare Analy II**

This course, the second foundation course in social welfare policy, presents social welfare policy analysis as another form of social work practice, with a repertoire of roles, functions, and skills as in other practice concentrations such as interpersonal or planning and management. As a part of this school's professional curriculum, the course will embody the primary value of social justice as it examines policies, current programs and current delivery systems in addressing issues affecting families, mental and health care. Strategies to shape and frame policy at various levels are addressed.  
3.000 Credit hours

### **SOWK 710 - Soc Work w/ Families I & Yth I**

This is the first course in the concentration on Social Work with Families and Youth at Risk. This course will integrate elements of social policy that affect families with the theory, knowledge, and skills necessary to work with diverse family forms at different stages of life. Building on foundation year content regarding the families, this course will prepare students to assess and intervene with families at an advanced level. An ecological systems perspective will be utilized to help students understand the relationships between individuals and their families and between families and the various social systems with which they interact.  
3.000 Credit hours

### **SOWK 711 - Soc Work w/ Families & Yth II**

This is the second course in the concentration sequence on Social Work with Families and Youth at Risk. This course will build on the advanced knowledge and skill gained in the previous course and allows students to apply that knowledge to specific problems faced by families across the life span. by participating in this problem-focused course, students will have an opportunity to learn more about the types of problems families face in the United States and how to use various interventive models most appropriate to specific types of problems.  
3.000 Credit hours

### **SOWK 733 - Independent Study**

This course permits a participant to develop and execute a learning contract with the instructor to analyze a problem in social work or social welfare through supervised study, outside the classroom setting. The problem must be selected from the scholarly literature of social work or social welfare. The work of the course must be submitted in the form of a written report. Prerequisites: Graduate Standing in Social Work, SOWK 707. (F;S;SS)

3.000 Credit hours

**SOWK 734 - Clinical Assessment**

This elective course permits skill-building for competency-based assessment and diagnosis using a biopsychosocial social work framework to assess client strengths and disorders. Prerequisites: Graduate Standing in Social Work, SOWK 710 or SOWK 712. (F;S;SS)

3.000 Credit hours

**SOWK 735 - School Social Work-Ad Practice**

This elective course permits skill-building for social work practice in the schools with emphasis on culturally sensitive student assessment and intervention, and professional standards and accountability. Prerequisites: Graduate Standing in Social Work, SOWK 710 or SOWK 712. (F;S;SS)

3.000 Credit hours

**SOWK 784 - Field Education and Seminar I**

Application of theories and concepts to the role of a professional social work practitioner within a field agency. Assists students to integrate theory and classroom knowledge into their agency field practice.

Prerequisite: None. (F;SS)

3.000 Credit hours

**SOWK 785 - Field Education and Seminar II**

Application of theories and concepts to the role of a professional social work practitioner within a field agency. Assists students to integrate theory and classroom knowledge into their agency field practice.

Prerequisite: SOWK 784. (S;SS)

3.000 Credit hours

**SOWK 786 - Field Education III**

Application of theories and concepts to the role of a professional social work practitioner within a field agency. Prerequisite: SOWK 785. (F)

5.000 Credit hours

**SOWK 787 - Field Education IV**

Application of theories and concepts to the role of a professional social work practitioner within a field agency. Prerequisite: SOWK 786. (S)

5.000 Credit hours

**SOWK 789 - Field Seminar III**

Assists student to integrate theory and classroom knowledge into their agency field practice. Includes capstone project. Prerequisite: None. (F)

1.000 Credit hours

**SOWK 792 - Field Seminar IV**

Assists student to integrate theory and classroom knowledge into their agency field practice. Includes capstone project. Prerequisite: None. (S)

1.000 Credit hours

**SOWK 851 - Foundations and Theories of Multiculturally Informed Inquiry in Social Work**

This doctoral level course explores foundational theories that inform research and inquiry in social work. Prerequisite: Admission to the JPHD program. 3.00 Credit hours

**SOWK 853 - Quantitative Methods in Social Work**

This doctoral level course explores quantitative research methods relative to social work. Prerequisite: Admission to the JPHD program. 3.00 Credit Hours

**SOWK 854 - Qualitative Methods in Multicultural Social Work**

This doctoral level course explores qualitative research methods in a multicultural context that are used in social work research. Prerequisite: Admission to the JPHD program. 3.00 Credit hours

**SOWK 855 – Quantitative Data Analysis in Social Work**

This doctoral level course explores statistical and other quantitative analytical processes that are used in social work research. Prerequisite: Admission to the JPHD program. 3.00 Credit hours

**SOWK 856 – Community Engaged Research in Social Work**

This doctoral level course explores approaches to community engaged research that are used in social work research. Prerequisite: Admission to the JPHD program. 3.00 Credit hours

**SOWK 885 – Issues and Trends in Social Work (Special Topics)**

This doctoral level course explores current issues and trends in social work including practice and research contexts. Prerequisite: Admission to the JPHD program. 3.00 Credit hours (can be repeated once for credit)

**SOWK 886 – Intervention Design**

This graduate level elective course explores current designs for social work intervention practice and research contexts. Prerequisite: Admission to a graduate program at NCAT or UNCG. 3.00 Credit hours

**SOWK 890 – Independent Study**

This doctoral level course allows students to work with faculty members to design and conduct an independent study relative to the student's area of inquiry. Prerequisite: Admission to the JPHD program. 3.00 Credit hours (can be repeated up to five times credit)

**SOWK 997 – Dissertation**

Doctoral students who have passed written and oral comprehensive examinations and who have successfully defended a dissertation proposal will enroll in dissertation hours (3 credits each semester) in order to complete the dissertation. Prerequisite: Admission to candidacy

**Health Psychology**

**PSYC 700 – Foundations of Health Psychology**

This course provides an introduction to health psychology theory and research and consists of a general overview of the discipline of health psychology, including its concepts and methods. Students will acquire skills and knowledge that enhance their understanding of the relationship of cognition, emotion, culture, motivation, behavior and biology on health, prevention, and wellness. Prerequisites: graduate student standing. (F;S)  
3.000 Credit hours

**PSYC 705 – Behavioral Neuroscience**

This course provides an overview of basic adult brain functioning, theories of brain function, basic anatomy of the central nervous system, neurodevelopment, the effects of traumatic brain injury, the effects of vascular disorders and dementia, and the principles of neuropsychological assessment of health conditions. Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

**PSYC 710 - Ethics and Equity in Health Psychology**

This course focuses on the ethical standards in professional practice, testing and research, and expectations and problems confronting health psychologists in the field. The course will also include an in-depth analysis of health disparities, structural and environmental factors that contribute to disparities, and approaches to promoting health equity. Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

**PSYC715 - Multicultural Frameworks in Preventive Health**

An exploration of the health issues and problems that confront minority populations in the United States. In particular historical, demographic, ecological, behavioral, and religious aspects of select ethnic groups will be investigated from the perspective of their impact on overall morbidity and mortality outcomes. Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

### **PSYC 720 – Psychology of Health Intervention**

The purpose of this course is to provide an understanding of how behavior contributes significantly to health, well-being and longevity. Existing research studies show the efficacy of behavioral health changes (e.g., regular physical activity; the maintenance of appropriate weight; the avoidance of tobacco products and illicit drugs; dietary intake of fruits, vegetables, and fiber, coupled with low consumption of saturated fats; moderate use of alcohol; and the ability to cope effectively with stress) for numerous illnesses and diseases. Students in this course will gain knowledge and expertise in implementing health-promoting behaviors, emphasizing behavior change to improve health and prevent disease. As such, the major focus of this course will be utilizing psychological approaches for conceptualizing and changing behaviors to improve health. We will accomplish this by learning about individual and group level interventions, as well as covering public health approaches for change at community levels. There will be a specific focus on issues regarding health equity among Black/African American populations. This course focuses on theories and methods used in the assessment and intervention of health  
Prerequisites: graduate student standing. (F;S). 3.000 Credit hours

### **PSYC 725 - Applied Neuropsychology and Neuropsychological Assessment**

This course examines the effects of human brain diseases, injury, and both normal and abnormal developmental conditions on mental/cognitive processes. Coverage will include neuro-assessment techniques, treatments, and rehabilitation. Prerequisites: graduate student standing. (F;S)  
3.000 Credit hours

### **PSYC 730 - Applied Cognitive Neuroscience**

This course will examine the neuroscientific bases for cognition and higher mental functions. Topics will include memory, attention, spatial and visual functions, language, decision making, social cognition, psychopathology, brain development and plasticity, generalized cognitive disorders, and the application of cognitive neuroscience methods to real world situations.  
Prerequisites: graduate student standing. (F;S) 3.000 Credit hours

### **PSYC735 – Psychopharmacology**

This course takes an interdisciplinary approach in exploring the psychological, physiological, pharmacological, and cellular properties of substances acting within the nervous system. Coverage includes drug use, abuse, screening, and regulation as well as drug treatment of psychopathology. Prerequisites: graduate student standing. (F;S)  
3.000 Credit hours

### **PSYC 740 - Program Development and Evaluation**

This course presents methods for the identification of population-based needs for health intervention, development of programs to meet those needs, and evaluation of the effectiveness of these health interventions. The course integrates several knowledge and skill areas including research methods, epidemiology, biostatistics, proposal writing, budget planning, project management, and program evaluation. Prerequisites: graduate student standing. (F;S)  
3.000 Credit hours

### **PSYC 745 - Health Promotion and Wellness across the Lifespan**

The purpose of this course is to provide an understanding of the issues related to health and aging across the lifespan, with a focus on adulthood. The course will cover conceptual frameworks in the foundations, assessment, interventions, and applications of health promotion and prevention of disease. There will be a specific focus on issues regarding health equity among Black/African American populations. Prerequisites: graduate student standing. (F;S) 3.000 Credit hours

### **PSYC 750 – Data Analytics for Behavioral Sciences**

This course will cover quantitative and qualitative data analyses and interpretations related to health psychology. Topics include multivariate statistics, multiple and logistic regression, path, factor, and discriminant analyses, text analysis, and statistical analyses appropriate for mixed methods research designs. Statistical tools such as SAS, SPSS, Excel, and R will be covered.

Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

### **PSYC 755 – Community Health**

This course will focus on how physical health is affected by psychological processes in late life. Students will have a grasp of the role that aging plays in the mind-body dynamic and how changing psychological processes affect older persons' health behaviors. A biopsychosocial approach will be used to examine leading theories of aging and their application to specific topics relevant to health of older adults. Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

### **PSYC760 - Health and Aging**

This course will focus on how physical health affects and is affected by psychological processes in late life. A biopsychosocial approach will examine leading theories of aging and their application to specific topics relevant to health of older adults. Students will have a grasp of the role that aging plays in the mind-body dynamic, and how changing psychological processes affect older persons' health behaviors.

Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

### **PSYC 765 - Research Methods for Behavioral Sciences**

This course gives a broad coverage of research methodologies, quantitative and qualitative mix methods and interpretation related to health psychology. Topics include health research strategies and design, sampling, hypothesis testing, ethics, and APA writing. Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

### **PSYC 785 - Special Topics in Health Psychology**

This course is an in-depth course of selected current topics in aging health (COVID19, social isolation, poverty, access to health care, health disparities, health promotion and policy).

Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

### **PSYC 797 – Thesis**

This course will offer students the opportunity to work on a comprehensive, individual research project that demonstrates mastery of health psychology under the supervision of their research mentor. Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

**PSYC 798 – Practicum in Health Psychology**

This course is intended provide students with the opportunity to apply professional competencies by participating in a health psychology field experience. Additionally, a weekly seminar class will be required to discuss workplace issues, professional practices, career exploration, and practicum related non-thesis capstone projects. Prerequisites: graduate student standing. (F;S)

3.000 Credit hours

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## COLLEGE OF SCIENCE AND TECHNOLOGY

Abdellah Ahmidouch, Dean

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The College of Science and Technology combines departments formerly located in the School of Technology and the College of Arts and Sciences. The new college will increase the production of science, technology, engineering and mathematics (STEM) graduates thereby fulfilling the national and statewide demand for qualified STEM professionals. The primary focus of the College of Science and Technology is to prepare individuals who are uniquely proficient in the application of basic science and technology. Thus, faculty of the college are interested in what industry, business and education want and need. As a result, our goal is to educate the whole person. Students develop not only their technical skills but their personality, cooperativeness, innovativeness, concern for the organization, and communications skills. Graduates of the College are prepared to meet the new and emerging challenges of a modern high technological society.

### DEGREE AND CERTIFICATE PROGRAMS OFFERED

#### Doctoral Degrees

- Ph.D. Applied Science and Technology
  - Atmospheric, Environmental and Energy Science
  - Applied Physics
  - Bioscience
  - Applied Chemistry
  - Data Science and Analytics
  - Information Technology
  - Technology Management
  - STEM Education

#### Masters Degrees

- MS Applied Mathematics
- MS Biology
- MS Chemistry
- MS Information Technology\*
- MS Physics
- MS Technology Management\*

\*Approved for distance education

## Applied Science and Technology, Ph.D.

College of Science and Technology

**Program Director:** Jenora Waterman **Email:** jdwaterm@ncat.edu **Phone:** (336)285-2329

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The mission of the Applied Science & Technology Ph.D. program is to prepare students for high-level science and technology careers in industry, research, and government. Graduates will be able to conceive, develop, and conduct original research that applies physical, mathematical, and technological methods to provide solutions to a broad range of emerging local, national, and global problems related to Atmospheric, Environmental and Energy Science; Applied Physics; Bioscience; Applied Chemistry; Data Science and Analytics; Applied Engineering Technology; Information Technology; Technology Management; Geomatics; and STEM Education.

### Admission Requirements

- B.S. degree in a science, technology, engineering, math (STEM) or related discipline with a  $GPA \geq 3.25/4.0$  or a M.S. degree in a science, technology, engineering, math (STEM) or related discipline with a  $GPA \geq 3.0/4.0$  from a college or university recognized by a regional or general accrediting agency
- GRE verbal and quantitative scores, no minimum score requirement

### Program Outcomes

- Communication Skills – Students completing the Applied Science & Technology Ph.D. program will exhibit effective oral communication skills in terms of customizing presentations to the audience, displaying information, and delivering the presentations.
- Critical Thinking Skills - Students completing the Applied Science & Technology Ph.D. program will effectively use quantitative and qualitative analytical problem-solving skills in terms of defining hypotheses/research questions, reviewing research literature, developing a research plan, identifying the broader impacts of research, and developing a research timetable.
- Disciplinary Expertise - Students completing the Applied Science & Technology Ph.D. program will demonstrate discipline specific expertise in terms of the scientific method, applying technical knowledge to answer research questions, experimental plans and data analysis, analytical methods, and research ethics.
- Research/Creative Engagement - Students completing the Applied Science & Technology Ph.D. program will demonstrate ability to engage productively in the review and conduct of disciplinary research in terms of making conference presentations and publishing refereed journal publications.

### Degree Requirements

Total credit hours: 66 (post B.S.), 42 (post M.S.)

- Core courses (9 credits):
  - AST 830 Foundations of Scientific Research
  - AST 831 Math and Computational Modeling (or other graduate analytical modeling course that builds upon a student's previous background)
  - MATH 721 Multivariate Statistical Analysis (or other graduate statistics course that builds upon a student's previous background)
- Seminar (6 credits post B.S., 3 credits post M.S.): AST 992 Doctoral Seminar
- Dissertation (21 credits post B.S., 15 credits post M.S.): AST 997 Doctoral Dissertation
- Pass qualifying exam, preliminary exam, and dissertation defense
- In consultation with advisor, take 18 credit hours (15 credits post M.S.) within one of the following concentrations:
  - Applied Chemistry
  - Applied Physics

- Atmospheric, Environmental and Energy Science
- Bioscience
- Data Science and Analytics
- Information Technology
- Technology Management
- STEM Education
- General – no specified concentration
- In consultation with advisor, take 12 credit hours (post B.S.) of additional courses relevant to research area

### **Concentration Courses**

For each program concentration, students will typically take courses that are included in the following lists with additional courses possible with approval of research adviser and program director:

#### **Applied Chemistry**

|          |   |
|----------|---|
| CHEM 611 | Advanced Inorganic Chemistry  |
| CHEM 621 | Intermediate Organic Chemistry                                      |
| CHEM 624 | Qualitative Organic Chemistry                                       |
| CHEM 631 | Electroanalytical Chemistry   |
| CHEM 641 | Instrumentation of the Modern Sciences                              |
| CHEM 642 | Techniques in X-ray Crystallography                                 |
| CHEM 643 | Introduction to Quantum Mechanics                                   |
| CHEM 651 | General Biochemistry  |
| CHEM 652 | General Biochemistry Lab  |
| CHEM 673 | Introduction to Computational Chemistry                             |
| CHEM 674 | Computational Methods/Protein Modeling Drug Design                  |
| CHEM 716 | Selected Topics in Inorganic Chemistry                              |
| CHEM 722 | Advanced Organic Chemistry  |
| CHEM 732 | Advanced Analytical Chemistry                                       |
| CHEM 743 | Chemical Thermodynamics   |
| AST 812  | Environmental Chemistry   |
| BMEN 711 | Biomaterials and Biocompatibility                                   |
| ECEN 701 | Electronic Ceramics   |
| NANO 701 | Simulation Modeling Methods in Nanoscience and Nanoengineering      |
| NANO 702 | Fundamentals of Nanoengineering Physical Principles                 |
| NANO 703 | Fundamentals of Nanoengineering Chemical and Biochemical Principles |
| NANO 704 | Fundamentals of Nanomaterials                                       |
| NANO 705 | Nano Safety   |
| NANO 711 | Introduction to Nanoprocessing                                      |
| NANO 721 | Nanobioelectronics  |
| NANO 731 | Introduction to Nanomodeling and Applications                       |
| NANO 811 | Polymeric Materials Engineering                                     |
| NANO 812 | Process Modeling in Composites                                      |
| NANO 821 | Advanced Nanosystems  |
| NANO 851 | Computational Nano Modeling Lab                                     |
| NANO 852 | Nanoelectronics Laboratory  |
| NANO 853 | Nano-Bio Electronics Lab  |
| NANO 854 | Nanomaterials Laboratory  |
| NAN 601  | Nanochemistry   |
| CHEM 811 | Physical Methods for Inorganic Chemistry                            |
| CHEM 812 | Inorganic Chemical Kinetics and Mechanisms                          |

|          |   |
|----------|---|
| CHEM 818 | Introduction to Soft Matter                             |
| CHEM 823 | Integrative Medicinal Chemistry                         |
| CHEM 827 | Organic Structural Spectroscopy                         |
| CHEM 833 | Biosensors and Bioanalytical Technologies               |
| CHEM 841 | Advanced Mass Spectrometry Instrumentation              |
| CHEM 856 | Protein Structure and Function                          |
| CHEM 885 | Special Topics  |
| NAN 615  | Intro Spectroscopy Methods in Nanoscience               |
| NAN 630  | Advances in Nano-biosensors                             |
| NAN 705  | Macromolecular and Supramolecular Chemistry Nanoscience |
| NAN 730  | Nanoscale Reactions                                     |
| NAN 771  | Computational Quantum Nanochemistry                     |

### **Applied Physics**

|          |  |
|----------|--|
| PHYS 600 | Classical Mechanics                            |
| PHYS 605 | Mathematical Methods                           |
| PHYS 615 | Fundamentals of Electromagnetic Theory         |
| PHYS 620 | Quantum Mechanics I                            |
| PHYS 630 | Statistical Mechanics                          |
| PHYS 715 | Advanced Electromagnetic Theory                |
| PHYS 720 | Quantum Mechanics II                           |
| PHYS 730 | Optical Properties of Matter                   |
| PHYS 737 | Physics of Solids                              |
| PHYS 738 | Nuclear Physics                                |
| PHYS 745 | Computational Physics                          |
| PHYS 746 | Methods in Radiation Detection and Measurement |
| PHYS 843 | Experimental Methods                           |
| PHYS 850 | Quantitative Analysis in Biophysics            |
| PHYS 885 | Special Topics                                 |
| NAN 603  | Nanophysics                                    |

### **Atmospheric, Environmental and Energy Science**

|         |   |
|---------|---|
| AST 812 | Environmental Chemistry                         |
| AST 813 | Sustainable Energy Systems                      |
| AST 814 | Life Cycle Analysis                             |
| AST 821 | Environmental Energy Econometrics I             |
| AST 841 | Biomaterials Characterization                   |
| AST 842 | Biomass Thermal Conversion Processes            |
| AST 843 | Biomass Biological Conversion Processes         |
| AST 844 | Environmental and Policy Studies of Biomass Use |
| AST 850 | Physical Meteorology                            |
| AST 851 | Dynamic Meteorology                             |
| AST 852 | Climatology                                     |
| AST 853 | Numerical Weather Prediction                    |
| AST 854 | Advanced Synoptic Weather Analysis              |
| AST 855 | Principles of Air Quality                       |
| AST 856 | Atmospheric Aerosols                            |
| AST 857 | Advanced Remote Sensing                         |
| AST 858 | Tropical Meteorology                            |
| AST 859 | Advanced Mesoscale Analysis                     |
| AST 885 | Special Topics                                  |

|      |     |  |
|------|-----|--|
| NANO | 761 | Introduction to Nano Energy                          |
| NANO | 861 | Advanced Nano Energy Systems                         |
| CM   | 704 | Special Topics in Renewable Energy Technology        |
| CM   | 679 | Environmental Issues in Construction Management      |
| EPT  | 687 | Electrical Power Generation using Nuclear Technology |

### **Bioscience**

|      |     |   |
|------|-----|---|
| BIOL | 615 | Principles of Virology                              |
| BIOL | 630 | Molecular Genetics                                  |
| BIOL | 640 | Introduction to Bioinformatics and Genomic Research |
| BIOL | 651 | Principles and Practice of Immunology               |
| BIOL | 700 | Environmental Biology                               |
| BIOL | 703 | Experimental Methods Biology                        |
| BIOL | 704 | Cell and Molecular Biology                          |
| BIOL | 720 | Environmental Influences on Human Diseases          |
| BIOL | 749 | Recent Advances in Cell Biology                     |
| BIOL | 762 | Molecular Pathogenesis of Cancer                    |
| AST  | 843 | Biomass Biological Conversion Processes             |
| ANSC | 771 | Bioinformatics Genome Analysis                      |
| ANSC | 782 | Cellular Pathobiology                               |
| BMEN | 713 | Biotechnology Entrepreneurship                      |
| BIOL | 830 | Advanced Techniques in Integrative Biosciences      |
| BIOL | 831 | Cellular and Molecular Biology of Disease           |
| BIOL | 832 | Microbial Pathogenesis                              |
| BIOL | 833 | Recent Advances in Immunology                       |
| BIOL | 834 | General Physiology I                                |
| BIOL | 835 | General Physiology II                               |
| BIOL | 855 | Advances in Systems Biology                         |
| BIOL | 885 | Special Topics                                      |
| STAT | 824 | Biostatistics Health Analytics                      |
| NAN  | 602 | Nanobiology   |
| NAN  | 620 | Immunology Nanoscience                              |
| NAN  | 625 | Molecular Biology in Nanosciences                   |
| NAN  | 626 | Introduction to Stem Cell Biology and Ethics        |
| NAN  | 745 | Nanoimaging   |
| NAN  | 750 | Nanomedicine  |

### **Data Science and Analytics**

|      |     |  |
|------|-----|--|
| MATH | 612 | Advanced Linear Algebra                            |
| MATH | 623 | Probability Theory and Applications                |
| MATH | 624 | Theory and Methods of Statistics                   |
| MATH | 665 | Principles of Optimizations                        |
| MATH | 675 | Graph Theory                                       |
| MATH | 690 | Scientific Programming for Mathematical Scientists |
| MATH | 706 | Categorical Data Analysis                          |
| STAT | 707 | Introduction to Data Science                       |
| STAT | 708 | Linear Models for Data Science                     |
| MATH | 709 | Disc and Combi Math for Data Sci                   |
| STAT | 710 | Statistical and Deep Learning                      |
| STAT | 711 | Stat Comp & Algorithm Analysis                     |
| MATH | 712 | Numerical Linear Algebra                           |

|          |   |
|----------|---|
| STAT 719 | Statistical Computing and Algorithm Design & Analysis |
| MATH 721 | Multivariate Statistical Analysis                     |
| MATH 723 | Advanced Topics Stochastic Modeling                   |
| MATH 733 | Advanced Probability and Stochastic Processes         |
| MATH 782 | Statistical Data Analytics and Visualization          |
| CST 764  | Advanced Big Data Analytics                           |
| COMP 751 | Data Analytics Tools and Techniques                   |
| COMP 765 | Data Mining   |
| STAT 777 | The Practice of Stat Consulting                       |
| STAT 808 | Advanced Regression Methods for Data Science          |
| STAT 823 | Time Series Analysis Business Analytics               |
| STAT 824 | Biostatistics Health Analytics                        |
| MATH 885 | Special Topics  |
| NAN 605  | Mathematical Methods                                  |

### **Information Technology**

|          |  |
|----------|--|
| CST 700  | Project Management for IT Professionals          |
| CST 702  | Statistical Methods                              |
| CST 714  | Reconfigurable Computing                         |
| CST 717  | Health Informatics System Architecture           |
| CST 725  | Wide Area Networks                               |
| CST 729  | Data Warehousing                                 |
| CST 731  | Knowledge Discovery Systems                      |
| CST 732  | Text Mining                                      |
| CST 733  | Data Visualizations                              |
| CST 735  | Telecom Management Issues                        |
| CST 745  | Network Services for the Enterprise              |
| CST 750  | Computer System Security                         |
| CST 752  | Advanced Computer Forensics                      |
| CST 755  | Enterprise Management Systems                    |
| CST 760  | Intermediate Enterprise Systems                  |
| CST 764  | Advanced Big Data Analytics                      |
| CST 765  | Advanced Enterprise System Operation             |
| CST 770  | Survey of Virtualization Technology              |
| CST 850  | Advanced Wireless Communication Systems          |
| CST 855  | Advanced Optical Communication Systems           |
| CST 885  | Special Topics                                   |
| COMP 727 | Secure Software Engineering                      |
| COMP 823 | Secure Social Computing                          |
| CSE 703  | Data Structure Software Principles & Programming |
| CSE 806  | Computational System Theory                      |

### **Technology Management**

|         |   |
|---------|---|
| AET 710 | Manufacturing Materials                   |
| AET 720 | Industrial Economics                      |
| AET 721 | Industrial Operational Management         |
| AET 735 | Manufacturing Organization and Management |
| AET 745 | Managing New Product Development          |
| AET 755 | Production Management and Control         |
| AET 760 | Advanced CNC Machines                     |
| AET 770 | Managing Total Quality Systems            |

|      |     |   |
|------|-----|---|
| AET  | 772 | Strategic Concepts in Quality                                 |
| AET  | 780 | Reliability Testing and Analysis                              |
| AET  | 810 | Project Management Essentials                                 |
| AET  | 820 | Managing R&D Process  |
| AET  | 830 | Internet of Things Technology                                 |
| AET  | 840 | Industrial Fire Protection                                    |
| AET  | 885 | Special Topics  |
| MSTM | 701 | Strategic Management of Technology and Innovation             |
| MSTM | 702 | Enterprise Resource Plan Systems                              |
| MSTM | 703 | Statistics and Probability in Technology Management           |
| MSTM | 704 | Research Methods for Technology Management                    |
| MSTM | 705 | Advanced Applied Statistics and Probability                   |
| MSTM | 779 | Statistical Research in Technology Management                 |
| LAND | 781 | Risk Management in Construction                               |
| CM   | 710 | Advanced Construction Practices & Organization                |
| CM   | 715 | Productivity & Methods Improvement in Construction Management |
| CM   | 720 | Construction Contracts Administration                         |
| CM   | 764 | Risk Management in Construction                               |
| CM   | 780 | Emerging Trends in CM of International Projects               |
| CM   | 786 | Construction Trends & Analysis                                |
| TECH | 708 | Impacts of Technology   |
| ECEN | 885 | Advanced Robotic Systems                                      |
| INEN | 833 | Supply Chain System Engineering                               |
| INEN | 861 | Nano Micro and Bio Manufacturing                              |

### **STEM Education**

The STEM Education PhD course requirements are:

***STEM Education Foundations*** (9 credit hours) The purpose of the Foundation requirements is to provide a bridge into this interdisciplinary field by integrating STEM and education concepts:

|     |     |   |
|-----|-----|---|
| AST | 801 | History and Philosophy of STEM Education  |
| AST | 802 | Theories of Development and STEM Thinking |
| AST | 803 | STEM Education Methods                    |

### ***STEM Expertise*** (3 credit hours)

Students are required to complete a coherent sequence of graduate courses in a STEM field other than STEM Education. The purpose of this requirement is to provide depth of understanding of STEM concepts, in particular, STEM concepts that may be the focus of STEM Education research activities.

### ***STEM Education Research Specialization*** (3 credit hours)

The purpose of the Specialization requirement is to develop depth of knowledge in one area of STEM Education.

|      |     |   |
|------|-----|---|
| AST  | 804 | Cognitive Devices in STEM Learning Environments |
| TECH | 719 | Technology Education: Design in Construction    |
| TECH | 720 | Technology Education: Design in Manufacturing   |
| TECH | 722 | Technology Education: Design in Transportation  |
| TECH | 730 | Diversity Issues in Education and Industry      |
| TECH | 762 | Evaluation of Technological Education Programs  |
| TECH | 763 | Technology Education for Elementary Grades      |
| TECH | 765 | Evaluation of Training in Industrial Settings   |

|          |  |
|----------|--|
| TECH 772 | Curriculum Development in Technology Education       |
| LEST 860 | Qualitative Research                                 |
| LEST 862 | Quantitative Research                                |
| LEST 864 | Ethnographic Methods in Social Science Research      |
| LEST 865 | Mixed Methods Research                               |
| ADED 708 | Instructional Methods in Adult Education             |
| ADED 719 | Assessment and Evaluation                            |
| ADED 722 | Diverse Perspectives in Adult Education              |
| ADED 776 | Principles of College Teaching                       |
| CUIN 724 | Problems and Trends in Teaching Science              |
| CUIN 727 | Workshop Method of Teaching Math                     |
| CUIN 753 | Teaching Engineering and Technology in Middle School |
| CUIN 784 | Current Research in Secondary Education              |
| AGED 703 | Scientific Methods in Education Research I           |
| AGED 704 | Foundations and Philosophy of Agricultural Education |
| AGED 711 | Advanced Teaching & Assessment Methodology           |
| AGED 751 | Agricultural Education Across the Curriculum         |
| AGED 752 | Special Populations in Agricultural Education        |

### **General**

|          |   |
|----------|---|
| GEOM 612 | Applied Geospatial Mthd Anal                                |
| GEOM 620 | Advanced Computer Applications in Geomatics                 |
| GEOM 640 | Applied Adjustment Computation                              |
| GEOM 650 | Land Information Systems and Management                     |
| GEOM 660 | Applied Geodetic Measurements                               |
| GEOM 670 | Advanced Boundary Research                                  |
| GEOM 710 | Geospatial Techniques and Analysis                          |
| GEOM 720 | Advanced Imaging  |
| GEOM 831 | Advanced Geospatial Analysis                                |
| GEOM 845 | Methodologies of Applied Remote Sensing                     |
| GEOM 885 | Special Topics  |
| EHS 600  | Environmental and Occupational Toxicology                   |
| EHS 613  | Industrial Hygiene Ventilation                              |
| EHS 704  | Environmental and Occupational Epidemiology                 |
| EHS 708  | Environmental and Occupational Safety and Health Management |
| EHS 711  | Current Issues in Environmental and Occupational Health     |
| EHS 885  | Special Topics  |
| STAT 824 | Biostatistics Health Analytics                              |

### **Dissertation Research**

A student may not register for dissertation credits before passing the Qualifying Examination.

### **Qualifying Examination**

The Qualifying Examination with both written and oral components is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

### **Preliminary Oral Examination**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a written and oral defense of the student's dissertation proposal. Failure on the examination may result in dismissal from the doctoral program. The student's Dissertation Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

#### **Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary Exam. After admission to candidacy and before Final Oral Examination, a student may be dismissed from the doctoral program if the student's dissertation committee determines that the student is not making satisfactory progress.

#### **Final Oral Examination**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Dissertation Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

#### **Submission of Dissertation**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's Dissertation Committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar and must conform to the Graduate College's guidelines for theses and dissertations.

## Applied Mathematics, MS

College of Science and Technology

**Graduate Coordinator:** Alexandra Kurepa

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**Department Chair:** Guoqing Tang

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The Applied Mathematics program provides a thorough background and research training in one of the key areas of Applied Mathematics, such as Mathematical Modeling and Analysis, Dynamics Systems and Differential Equations, Numerical Analysis and Fluid Dynamics, Probability and Statistics, Control Theory and Optimizations. The program also gives the students hands-on experience in current important applications in these areas, along with the statistical and computational skills to apply their knowledge to real world applications.

### Additional Admission Requirements

A Bachelor's degree in Mathematics or a closed related field from an accredited institution

### Program Outcomes:

- Students will develop research expertise in one of the areas of Applied Mathematics.
- Students will proficiently apply mathematical knowledge, technology skills, and logical reasoning and proof skills, in solving problems or developing new techniques in Applied Mathematics.
- Students will communicate effectively and with confidence using accurate symbolic representation and correct mathematical terminology orally, in writing, and when using technology according to the standards of the field of mathematics.
- Students will develop the ability to use mathematical reasoning and analysis to acquire a comprehensive understanding of Applied Mathematics. Students will be able to apply analytical reasoning skills in decision making as well as mathematics based problem solving skills in an interdisciplinary context.
- Students will demonstrate computational skills and knowledge of current technology, software and hardware used in Applied Mathematics.

### Degree Requirements

Total credit hours: 30

- Core courses (9 credit hours): MATH 603, 651, and 690

#### Thesis option:

- Take 9 credit hours of 700 level MATH or STAT courses with approval of advisor
- Take 6 credit hours of graduate electives with approval of advisor
- Master's Thesis (MATH 797: 6 credit hours)
- Pass Master's Comprehensive Exam
- Pass thesis defense

#### Project Option:

- Take 9 credit hours of 700 level MATH or STAT courses with approval of advisor
- Take 9 credit hours of graduate electives with at least 3 credit hours at 700 level and approval of advisor
- Graduate Design Project (MATH 796: 3 credit hours)
- Pass Master's Comprehensive Exam
- Pass Graduate Design Project oral examination

## Biology, MS

College of Science and Technology

**Graduate Coordinator:** Scott Harrison

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**Department Chair:** Checo J. Rorie

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**Phone:** (336)285-2160

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The primary objective of the Masters of Science program in Biology is to prepare students to enter and complete doctoral and health professional programs in order to become productive teachers, researchers, and health professionals. To support this objective, this program will develop in all participants, through research experiences and other enrichment activities, independent thinking, creativity, critical judgment, and personal integrity. Specifically, this program is designed to enhance the student's ability to design experiments, to analyze results, to become competent using state-of-the-art research equipment, enhance manipulative skills, and to improve the student's proficiency in oral and written communication. Students will have opportunity to conduct research in various areas, including cancer research, diabetes research, molecular genetics, microbiology/immunology, genomics/bioinformatics, physiology, evolution, toxicology, and health disparities research. An additional critical objective is to enable students to score at or above the 50th percentile on the GRE Subject Test in Biology after their first year in residency.

### **Additional Admission Requirements**

A Bachelor's Degree in Biology or a related discipline from an accredited institution.

Considerations of performance in discipline-related coursework is a critical factor in the holistic admissions review process, along with a competitive cumulative Grade Point Average (typically 3.0 or above).

Three or more of the following pre-requisites are required:

- One semester of Calculus
- One year of Physics
- One year of Cellular and Molecular Biology
- Chemistry through Organic Chemistry II

Two or more letters of recommendation from academic and professional references, that describe the applicant's background, strengths, and aptitudes for graduate study, should be submitted with the application. Letters of recommendation should be submitted by the same individuals who complete the recommendation form included in the standard Graduate College application. For more information about eligibility, interested applicants should contact the departmental graduate program coordinator.

### **Program Outcomes**

- SLO 1: Knowledge of the Biological Discipline. During the course of study in the Master of Science Degree Program in Biology, students integrate biological concepts from a variety of sub-disciplines on the required comprehensive examination prepared by instructors of courses that students have taken in the first year.

- SLO 2: Communication. During the course of study in the Master of Science Degree Program in Biology, students will present research findings in standard formats used by biological scientists and the guidelines of the NC A&T Graduate College.
- SLO 3: Critical Thinking (Masters Level). During the course of study in the Master of Science Degree Program in Biology, students will conduct critical reviews of scientific papers according to guidelines of the instructor.
- SLO 4: Scientific Research. During the course of study in the Master of Science Degree Program in Biology, students will implement an original research project based on the standard guidelines for biological research and a proposal approved by a faculty research advisor and committee.

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credits): BIOL 749, 761; CHEM 651

#### Thesis option:

- Take 3 credit hours: BIOL 703
- Electives: Select 4 credit hours from BIOL, ANSC, CSE or other with approval of graduate program coordinator
- Seminar (2 credit hours): BIOL 789, 792
- Supervised Research (BIOL 794: 6 credits)
- Thesis (BIOL 797: 6 credit hours)
- Pass thesis defense
- Pass comprehensive exam

#### Project Option:

- Take 3 credit hours: BIOL 703
- Electives: Select 10 credit hours from BIOL, ANSC, CSE or other with approval of graduate program coordinator
- Seminar (2 credit hours): BIOL 789, 792
- Project (BIOL 796: 6 credit hours)
- Pass comprehensive exam

## Biology – Industrial Biosciences PSM, MS

College of Science and Technology

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**Department Chair:** Checo J. Rorie

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**Phone:** (336)285-2160

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The primary objective of the Professional Science Master's concentration in Industrial Biosciences is to provide students with advanced technical skills, industry-guided knowledge, and business training to prepare them for work in the commercial sector. To support this objective, this program will develop in all participants, through training experiences and other enrichment activities, scientific understanding, understanding of the commercialization process, critical judgment, and personal integrity. Specifically, this program is designed to enhance the student's ability to manage scientific projects, to understand regulatory, ethical and legal dimensions of science-based work, to become competent using state-of-the-art research equipment, and to improve the student's proficiency in oral and written communication. Students will have opportunity to pursue training in various project areas, including genetics, microbiology, biotechnology, bioinformatics, physiology, evolution, toxicology, and health disparities research.

### **Additional Admission Requirements**

A Bachelor's Degree in Biology or a related discipline from an accredited institution. Considerations of performance in discipline-related coursework is a critical factor in the holistic admissions review process, along with a competitive cumulative Grade Point Average (typically 3.0 or above).

Three or more of the following pre-requisites are required:

- One semester of Calculus
- One year of Physics
- One year of Cellular and Molecular Biology
- Chemistry through Organic Chemistry II

Two or more letters of recommendation from academic and professional references, that describe the applicant's background, strengths, and aptitudes for graduate study, should be submitted with the application. Letters of recommendation should be submitted by the same individuals who complete the recommendation form included in the standard Graduate College application. For more information about eligibility, interested applicants should contact the departmental graduate program coordinator.

### **Program Outcomes**

- **Communication skills:** Students completing the MS degree program in Biology will exhibit effective communication skills (written, oral, graphic and interpersonal) appropriate for professionals in this field of study at the master's or doctoral level
- **Critical Thinking skills:** Students completing the MS degree program in Biology will effectively use quantitative and/or qualitative analytical problem-solving skills appropriate for professionals in this field of study at the master's or doctoral level

- **Disciplinary Expertise:** Students completing the MS degree program in Biology will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in this field of study at the master's or doctoral level
- **Research/Creative Engagement:** Students completing the MS degree program in Biology will demonstrate ability to engage productively in the review and conduct of disciplinary research and creative professional activity appropriate for professionals in this field of study at the master's or doctoral level

### **Degree Requirements**

Total credit hours: 30

- **Core courses (9 credits):** BIOL 749, 761; CHEM 651
- **Disciplinary Electives:** Select 6 credit hours from BIOL with approval of PSM coordinator
- **Business/Management Electives:** Select 6 credit hours from graduate courses in business and economics with approval of advisor
- **Ethics Electives:** Select 3 credit hours from: MKTG 636; WMI 617, or other course with approval of advisor

Experiential component: Project (BIOL 796: 6 credit hours)

## Chemistry, MS

College of Science and Technology

**Graduate Coordinator:** Divi Venkateswarlu **Email:** [divi@ncat.edu](mailto:divi@ncat.edu)

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**Department Chair:** Zerihun Assefa

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The mission of the MS in Chemistry program at North Carolina Agricultural and Technical State is to provide the theoretical and experimental training for post-baccalaureate students leading to Masters level degrees in chemistry and teaching. The graduate degree program prepares students to pursue advanced professional and doctoral degrees. In addition, courses are offered that may be used for renewal of teacher certificates.

### **Additional Admission Requirements**

- An undergraduate major in chemistry that includes one year of physical chemistry and one year of differential and integral calculus.
- Undergraduate coursework in all of the major areas of Chemistry including physical analytical, organic and inorganic chemistry.
- Two of the three letters of recommendation should be from former science or math professors.

### **Program Outcomes:**

- **Communication:** M.S. candidates will demonstrate the ability to comprehend, apply and evaluate information from chemistry literature which is to be orally presented and validated in a seminar.
- **Chemical Knowledge:** M.S. candidates will demonstrate chemistry proficiency in all four sub-disciplines of chemistry: analytical, inorganic, organic, and physical.
- **Research Training:** M.S. candidates will acquire the basic tools needed to carry out independent chemical research. Students should become proficient in their specialized area of chemistry and successfully complete a written graduate level research project or thesis.

### **Degree Requirements**

Total credit hours: 30

- Core courses (12 credits): CHEM 711, 722, 732, 743

#### Thesis option:

- Seminar (CHEM 792: 1 credit)
- Take 8 credits of additional CHEM courses with approval of advisor
- Supervised Research (CHEM 794: 3 credits)
- Thesis (CHEM 797: 6 credits)
- Pass thesis defense

#### Non-Thesis Option:

- Seminar (CHEM 792: 1 credit)
- Take 14 credits of additional CHEM courses with approval of advisor
- Project (CHEM 796: 3 credits)

## Information Technology, MS

College of Science and Technology

**Graduate Coordinator:** Qing-An Zeng

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285-3148

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The Master of Science in Information Technology prepares students to pursue technical, as well as management careers in all employment sectors. The program emphasizes acquisition of sound theoretical concepts with intensive “hands-on” experience in the area of information technology. The courses are taught by faculty with high level expertise gained through their research activity, affiliations with industry and professional experience. Graduates of the program work in a variety of positions, some of which include: database administrator, network administrator, system analyst, IT consultant, and project manager. Recent graduates are employed with John Deere, IBM, USAA, EMC, Accenture, BB&T, First Citizens, Met Life, AT&T, General Electric, Northrop Grumman, BlueCross BlueShield, and local, state, and federal agencies. Students also have the opportunity to pursue Doctoral study.

### Learning Outcomes

- **Communication Skills:** Students completing the MS degree program in Information Technology will exhibit effective communication skills (written, oral, graphic and interpersonal) appropriate for professionals in this field of study at the master’s level.
- **Critical Thinking Skills:** Students completing the MS degree program in Information Technology will effectively use quantitative and/or qualitative analytical problem-solving skills appropriate for professionals in this field of study at the master’s level.
- **Disciplinary Expertise:** Students completing the MS degree program in Information Technology will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in information technology at the master’s level.
- **Research/Creative Engagement:** Students completing the MS degree program in Information Technology will demonstrate an ability to engage productively in the review and conduct of disciplinary research and creative professional activity appropriate for professionals in information technology at the master’s level.

### Degree Requirements

Total credit hours: 30

- Core courses (9 credit hours): ITT 700, 702, 703

#### Thesis option

- Select 15 credit hours from: ITT 605, 610, 615, 620, 625, 650, 655, 665, 685, 725, 729, 731, 735, 745, 750, 752, 789; ECT 759
- Thesis: Select 6 credit hours from: ITT 791, 792, 793, 794

#### Non-Thesis option

- Select 21 credit hours from: ITT 605, 610, 615, 620, 625, 650, 655, 665, 685, 725, 729, 731, 735, 745, 750, 752, 789; ECT 759

## Chemistry – Applied Chemistry and Chemical Sciences PSM, MS

College of Science and Technology

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**Phone:** 336-285-2255

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The Professional Science Master's program in Chemistry has the objective of advancing technical skills, industry-guided knowledge and business management. The program prepares students for career opportunities in businesses utilizing chemical and/or biochemical processes and instrumentation.

### Additional Admission Requirements

- An undergraduate degree in science
- At least one year of physical chemistry and calculus courses consisting of differential and integral equations.
- Two of the three letters of recommendation should be from former science or math professors.

### Program Outcomes:

- Communication: M.S. candidates will demonstrate the ability to comprehend, apply and evaluate information from chemistry literature which is to be orally presented and validated in a seminar.
- Applied Chemistry Knowledge: M.S. candidates will demonstrate chemistry proficiency in the sub-disciplines of chemistry: analytical, inorganic, organic, biochemistry and physical as it pertains to real life applications and product development
- Research Training and Ethics: M.S. candidates will acquire the basic tools needed to carry out independent chemical research. Students should become proficient in their specialized area of chemistry and successfully complete a written graduate level research project designed to address industrial and other collaborative needs.

### Degree Requirements

Total credit hours: 30

- Core courses (12 credits): CHEM 711, 722, 732, 743
- Select 6 credit hours from: BIOL, CHEM, CHEN, MATH, PHYS with approval of advisor
- Select 9 credit hours from: ACCT 708, 714; ECON 706; MGMT 705, 712, 718
- Internship (CHEM 784: 3 credits)

## Information Technology, MS

College of Science and Technology

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The Master of Science in Information Technology prepares students to pursue technical, as well as management careers in all employment sectors. The program emphasizes acquisition of sound theoretical concepts with intensive “hands-on” experience in the area of information technology. The courses are taught by faculty with high level expertise gained through their research activity, affiliations with industry and professional experience. Graduates of the program work in a variety of positions, some of which include: database administrator, network administrator, system analyst, IT consultant, and project manager. Recent graduates are employed with John Deere, IBM, Cisco, USAA, EMC, Accenture, BB&T, First Citizens, Met Life, AT&T, General Electric, Northrop Grumman, BlueCross BlueShield, and local, state, and federal agencies. Students also have the opportunity to pursue Doctoral study.

### **Additional Admission Requirements**

- A Bachelor’s degree in Science, Arts, or Technology etc.

### **Program Outcomes**

- **Communication Skills:** Students completing the MS degree program in Information Technology will exhibit effective communication skills (written, oral, graphic and interpersonal) appropriate for professionals in this field of study at the master’s level.
- **Critical Thinking Skills:** Students completing the MS degree program in Information Technology will effectively use quantitative and/or qualitative analytical problem-solving skills appropriate for professionals in this field of study at the master’s level.
- **Disciplinary Expertise:** Students completing the MS degree program in Information Technology will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in information technology at the master’s level.
- **Research/Creative Engagement:** Students completing the MS degree program in Information Technology will demonstrate an ability to engage productively in the review and conduct of disciplinary research and creative professional activity appropriate for professionals in information technology at the master’s level.

### **Degree Requirements**

Total credit hours: 30

- Core courses (9 credit hours): CST 700, 702, 703

#### Thesis option

- Select 15 credit hours from: CST 605, 610, 615, 620, 625, 650, 655, 690, 725, 729, 731, 750, 764
- Thesis: Select 6 credit hours from: CST 797

#### Non-Thesis option

- Select 21 credit hours from: CST 605, 610, 615, 620, 625, 650, 655, 690, 725, 729, 731, 750, 764

## Physics, MS

College of Science and Technology

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**Department Chair:** Ashot Gasparian

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The Masters of Science program in Physics prepares students for professional careers in industrial and governmental research, developmental applications of physics, teaching, and further study toward a Ph.D. in physics. Physics Masters are trained to use their advanced knowledge and analytical skills to solve complex problems in industry and research labs. Experimental Low and Medium Energy Physics, Atmospheric Science, Chemical Physics, Physics Education, Seismic Data Processing, Computational Atomic Molecular and Optical Physics. Opportunities to collaborate exist with major research institutions such as Duke University, the University of North Carolina at Chapel Hill, North Carolina State University, Wake Forest University, Stanford University, Pennsylvania State University, Hampton University, the University of Virginia and others. Collaborations with national laboratories include the Thomas Jefferson National Accelerator Facility (JLab), NOAA-Earth System Research Laboratory (NOAA-ESRL), Lawrence Berkeley National Laboratory (LBNL), National High Magnetic Field Lab-Florida, Los Alamos National Laboratory (LANL), and Oak Ridge National Laboratory (ORNL). International collaborations include the University of Marseilles in France, the Addis Ababa University in Ethiopia, ITEF Moscow, Russia, and the Institute for High Energy Physics at Protvino, Russia.

### **Additional Admission Requirements**

- An undergraduate degree in physics or its equivalent
- Applicant's background reflects maturity in physics from junior and senior level undergraduate courses in classical mechanics, electromagnetism, thermodynamics and statistical mechanics, and quantum physics

### **Program Outcomes**

- **Critical Thinking:** Students at the MS-Physics program will be able to think critically and use relevant physics concepts to solve physics problems and analyze situations involving physics.
- **Communication:** MS-Physics students will be able to articulate physical concepts, research work, and findings with tact and professionalism, both orally and in writing.
- **General Physics Knowledge and Analytical Reasoning:** Students will acquire an in-depth knowledge and thorough understanding of physical principles. Students will develop analytical skills to combine them with their working knowledge to explain the world around us and how things work at the fundamental level.
- **Physics Specialty Expertise:** Students will develop a physics specialty area of expertise through course work and research.
- **Scientific Methodology:** Students will develop an understanding of scientific methodology, through data collection from observations, setting up laboratory experiments and data acquisition, data analysis, data interpretation and testing of model/hypothesis, and reporting of data.
- **Computer and Computational Expertise:** MS-Physics students will develop competency in using computers and computational methods through:
  1. use or write software code to acquire/analyze/visualize data
  2. data analysis

3. computer simulations

### **Degree Requirements**

Total credit hours: 30

- Core courses (12 credits): PHYS 600, 615, 620, 630

#### Thesis option:

- Take 12 credits of additional PHYS or technical electives with approval of advisor
- Thesis (PHYS 797: 6 credits)
- Pass thesis defense

#### Project Option:

- Take 15 credits of additional PHYS or technical electives courses with approval of advisor
- Project (PHYS 796: 3 credits)

#### Course Option:

- Take 18 credits of additional PHYS or EES courses with approval of advisor

## Technology Management (TEMG), M.S.

Department of Applied Engineering Technology, College of Science and Technology

**Graduate Coordinator:** Dr. James D. Kribs      **Email:** [jdkribs@ncat.edu](mailto:jdkribs@ncat.edu)      **Phone:** (336)285-3162  
**Department Chair:** Dr. Aixi Zhou      **Email:** [azhou@ncat.edu](mailto:azhou@ncat.edu)      **Phone:** (336)285-3158

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The [Master of Science in Technology Management](#) (TEMG) program provides graduate level education for highly motivated professionals concerned with the supervision of personnel across the technical spectrum and a wide variety of complex technological systems. Graduates of this program play leadership roles involving technology innovation, development and deployment of new technologies, and decision-making to improve business performance. Students have the option to choose one of the following three concentrations: Six Sigma, Advanced Manufacturing, and Construction Management.

**Degree Requirements:** **30** credit hours after a B.S. degree

- Program Core Courses - 12 hours: **AET 701, AET 702, AET 703, AET 704**
  - AET 701 Technology Management Principles
  - AET 702 Technology Management Strategies
  - AET 703 Technology Management Analytics
  - AET 704 Technology Management Research

- Program Elective Courses - 18 hours

*Students by default have no concentration. They can take any additional graduate level courses (a total of 18 hours) with the approval of her/his advisor. If a student desires to have a concentration, she/he must choose one from the following three concentrations and take their required courses. The name of the concentration will show on the student's transcript.*

| Concentration           | Required Courses  |
|-------------------------|---|
| Six Sigma               | <ol style="list-style-type: none"><li>1. AET 610 Six Sigma</li><li>2. AET 705 Design of Experiments</li><li>3. AET 722 Six Sigma Advanced Topics</li><li>4. AET 772 Strategic Concepts in Quality</li></ol>   |
| Advanced Manufacturing  | <ol style="list-style-type: none"><li>1. AET 674 Automation and Control Systems</li><li>2. AET 675 Digital and Smart Manufacturing</li><li>3. AET 710 Advanced Manufacturing</li><li>4. An elective graduate course related to Advanced Manufacturing</li></ol>       |
| Construction Management | <ol style="list-style-type: none"><li>1. CM 692 Project Management</li><li>2. CM 708 Construction Cost Estimating and Project Controls</li><li>3. CM 710 Advanced Construction Practices and Organization</li><li>4. CM 764 Risk Management in Construction</li></ol> |

### B.1. Non-thesis Option (Open elective courses)

Student can take any graduate courses at N.C. A&T, with approval from the advisor.

### B.2 Thesis Option (Must complete a M.S. thesis)

Student must take AET 791 (1-6 hours) and meet all thesis completion requirements.

## **Applied Engineering Technology**

### **AET 610 - Six Sigma**

This course introduces students to the concepts of Six Sigma and the impact of Six Sigma on Quality improvements of enterprises. The course focuses on the body of knowledge required for ASQ certification, DMAIC and supporting quality tools are presented and explored. Prerequisite: None.

### **AET 611 - Enterprise Re Planning Systems**

This course introduces students to seamless integration of all the information flow through an enterprise. Topics includes: financial and accounting information, product planning, parts purchasing, maintaining inventory, and tracking orders, etc. Prerequisite: Graduating Standing.

### **AET 612 - Manufacturing Execution System**

This course introduces students to the Manufacturing Execution System (MES) background information, and MES functionalities. Topics include: making product, turning machines on and off, measuring parts, keeping track of product schedule, and inventory availability. Prerequisite: Graduate Standing.

### **AET 613 - Supply Chain Management Sys**

This course introduces to students the functionalities and execution of Supply Chain management (SCM) systems. In addition, it shows how information technology and Internet can be integrated into management process. Prerequisite: Graduate Standing.

### **AET 614 - Industrial Logistics**

This course focuses on the planning, organizing, and controlling of physical distribution, materials management, transportation management, logistics, supply chain. Concepts, principles, and methods to make products and services available to customers at the time, place, and in the condition and form desired, in the most profitable and cost-effective way will be introduced. Prerequisite: Graduating Standing.

### **AET 616 - Glass Technology**

This course presents topics in glass technology, including history of glass, glass families, glass formation, glass structure and characterization, glass raw materials, glass production, glass properties, and applications of modern glass technology.

### **AET 621 - Manufacturing Operation Model**

This course is to provide students with a conceptual understanding of the roles that the quantitative methods play in the decision-making process. It describes many quantitative methods used in manufacturing and how the decision makers can apply these methods to develop manufacturing operation models. Prerequisite: Graduating Standing.

### **AET 650 - Thermal and Vibra Analy Test**

This course covers topics in electronic components testing including failure mode, overheating, thermal stress and vibration analysis. Environmental stress screening including thermal and vibration cycling will also be studied. Prerequisite: Graduating Standing.

### **AET 651 - Advanced Industrial Robotics**

This course emphasizes the study of robotics principles, robot actuators and sensors, industrial applications of robots, and the latest development in robotics including aerial robots, soft robots, bio-inspired robots, collaborative robots, and micro/nano robots. Prerequisite None.

#### AET 673 - Industrial Pro Measurement Analysis

This course examines the work measurement and method analysis to establish work standards for quality and productivity. Prerequisite: Graduate Standing.

3.000 Credit hours

#### AET 674 - Automation and Control Systems

This course emphasizes the study of automation and control system to include application of PLC, CAD, CAM, CNC, sensors and robotics to simulate a total computer-integrated manufacturing (CIM) environment. Prerequisite: Graduate Standing.

#### AET 675 - Digital And Smart Manufacturing

This course emphasizes the study of current development in digital and smart manufacturing including their principles, components, framework, tools and industrial applications. The key enabling technologies, including artificial intelligence, big data, virtual/augmented/mixed reality and the Industrial Internet of Things, will also be discussed. Prerequisite: None.

#### AET 681 - NDE Technologies

This course presents the industrial applications of various non-destructive evaluation (NDE) technologies. The following will be discussed for each technology: physical principles, testing procedures, application areas, equipment instruments, data acquisition, data analysis and interpretation, advantages and limitations. Prerequisite: None.

#### AET 690 - Special Prob in Tech Manage

This course is to provide a forum for dialogue about areas of interest to students pertaining to issues and or skill development. This will be accomplished through the definition, exploration, and tentative resolution of selected current and evolving industrial technology. This experience is targeted toward providing students the opportunity to think about a particular concern and/or interest then to develop a final product in the form of paper and presentation. Prerequisite: Graduate Standing.

#### AET 691 - Independ Study in Tech Manage

The student selects a problem, either management or technical, in consultation with a faculty member in this area of interest. This problem may be research or application oriented in nature. A standard report format will be required. Prerequisite: Graduate Standing.

#### AET 700 - Graduate Seminar

This course includes presentations delivered by graduate students, faculty, and invited speakers on topics related to technology management, technology innovation, leadership, entrepreneurship, engineering and technology research, and other related topics. Grading is satisfactory/unsatisfactory evaluation only. This course may be repeated twice for additional credit. Graduate Standing.

#### AET 701 - Technology Management Principles

This course addresses principles in leading and managing technology teams and organizations. Topics include fundamentals of technology management, individual behavior and decision-making, organizational behavior, leadership fundamentals, and decision-making in technology management. Graduate Standing.

#### AET 702 - Technology Management Strategies

This course will provide a critical review and analysis of current and emerging trends in managing technological innovations. It will emphasize the role of technology as a strategic means of achieving an organizational objectives. Topics of discussion will include, but not limited to technological innovation process, technological strategies, technological forecasting and assessment, management of research and development, managing new ventures and entrepreneurship. Prerequisites: Graduate Standing.

#### AET 703 - Technology Management Analytics

This course introduces the methods of statistics and probability used in technology management analysis. Topics include descriptive statistics, probability distributions, sampling distribution, linear and multiple regressions, auto- and cross-correlation confidence intervals, and data visualization. Graduate Standing.

#### AET 704 - Technology Management Research

This course introduces the various aspects of conducting research in technology management. Topics include methods, strategies, processes, and techniques in collecting data or evidence for analysis, reporting of research findings, and research proposal development. Graduate Standing. Prerequisite: None.

#### AET 705 - Design of Experiments

Course covers design of experiments. Single factor, randomized blocks, Latin squares, blocking and two-level fractional factorial designs are covered. Use of Mini-tab will be required in this course. Prerequisite: AET 703.

#### AET 710 - Advanced Manufacturing

This course covers a variety of advanced manufacturing processes and their applications. Students will learn how to leverage modern subtractive and additive processes for advanced manufacturing. Cutting-edge manufacturing technologies and applications are emphasized. Graduate Standing. Prerequisite: None.

#### AET 715 - Tool Technology

Includes coverage of tool layout, tool material, tool wear and failure, work holding principles, jig and die, specifications for press working, blanking, bending, forming, drawing, and forging, etc. Tooling for joining processes such as welding, soldering, brazing, mechanical joining, and adhesive bonding are covered, as well as the use of computers in tooling. Prerequisite: Graduate Standing.

#### AET 716 - Glass Processing

This course presents a range of modern glass processing methods, with an emphasis on industrial processes. Topics include industrial glass processing and fabrication, batch chemistry and reactions, glass shaping, modern glass processes and quality control, and glass recycling. Prerequisites: AET 616.

#### AET 720 - Industrial Economics

In this course students will be introduced to the concepts of industrial economics and theory, including: people's behavior in producing, consuming, and exchanging goods and services; supply and demand; business economics behavior; government's role in economic behavior; and gross national product. Prerequisite: AET 621.

#### AET 721 - Industrial Operational Manage

The course focuses on competitive management of an industrial organization, which provides products and/or services. Topics covered in this course include product process design, inventory management, quality management, forecasting and quality control. Prerequisite: AET 621.

#### AET 722 - Six Sigma Advanced Topics

This course introduces the concepts and methods of statistic at a level to support Six Sigma Black Belt activity. Included are descriptive statistics, probability theory, sampling distribution, interval estimation, hypothesis testing, statistical inferences, linear and multiple regressions, auto - and cross-correlation, and non-parametric statistical methods. Prerequisite: AET 703.

#### AET 735 - Manufac Organiza and Manage

This course surveys contemporary manufacturing organization and management issues, focusing on manufacturing aspects of the product cycle, research and development, product design, marketing, sales and distribution. This course explores new trends in technology management and quality of work life issues. Prerequisite: Graduate Standing.

#### AET 745 - Managing New Product Develop

This course covers the new product development cycle and emphasizes the benefits of Early Manufacturing Involvement (EMI) and Logistics Processes. Use of cross-functional teams in product development is also explored. Prerequisite: Graduate Standing.

#### AET 755 - Production Manage and Control

This course explores production scheduling, work flow, and inventory flow, Just-in-time (JIT), and Material Resources Planning (MRP) as techniques for structuring production as well as inventory management. Traditional

work design is compared to newer, more high participative work designs including self-managed teams.

Prerequisite: Graduate Standing.

AET 760 - Advanced (CNC) Machines

This course explores applications in advanced Computer Numerically Controlled (CNC) machine tool technology with precision work performed on lathes, mill, Electrostatic Discharge Machining (EDM), and surface drilling work stations. Prerequisite: Graduate Standing.

AET 770 - Managing a Total Quality Sys

The study of total quality control systems assists to reduce defects, lower costs, and increase productivity in a manufacturing environment. Study includes implementing quality through Statistical Process Control (SPC), managing quality, quality information systems, quality circles, and quality work-life concepts. Prerequisite: Graduate Standing.

AET 772 - Strategic Concepts in Quality

Part I, Introduce to core principles of Total Quality, and how they relate to management concepts. Part II, presents Total Quality and Organization Theory. The idea of customer-supplier relations and how TQ relates to topics of organization-environment relations, organizational design, and change. Part III, describes Total Quality and Organizational Behavior, the themes of teamwork and empowerment and relates TQ on both the content and process of competitive strategy. Prerequisite: Graduate Standing.

AET 775 - Decision Modeling and Analysis

This course covers model formulation and analysis for technology management. Contents include model building, optimization, risk and uncertainty, queues, simulation, and linear and non-linear optimization. A final project will be required demonstrating skills in model construction and optimization for business and technical decisions.

Prerequisite: AET 703.

AET 780 - Reliability Testing and Anal

This course study the metrology and reliability testing at various stages of manufacturing processes for zero failures. Includes failure analysis, exponential and Weibull Failure Law, and reliability prediction of components and/or systems. Prerequisites: AET 703 or equivalent or consent of instructor.

AET 784 - Internship

This course is designed to provide students with an internship experience. Students must be employed full-time for one semester or one summer. Evaluation is based on reports from the students industrial supervisor or the university coordinator. Prerequisite: 15 hours of graduate credits.

AET 788 - Master's Comprehensive Exam

This course will aid in the preparation of the graduate student to take the Master of Science in Technology Management (MSTM) comprehensive examination. The examination will be administered towards the end of the semester. This course will be graded on a Pass/Fail basis. The passing of this course is a requirement for graduation from the MSTM program. Prerequisites: 24 credit hours of graduate level courses.

AET 790 - Master's Degree Project

The master's degree project is applications oriented and focuses on an actual project related to the student's technical discipline. The course is intended to integrate the learning from the classes taken in the degree program.

Prerequisite: 15 hours of graduation credits.

AET 791 - Master's Thesis

This course represents the supervised research leading to the thesis for the graduate student. Research will be conducted under the supervision of the thesis committee chairperson and include regular meetings with the chairperson to evaluate progress. Grade is satisfactory/unsatisfactory evaluation only. Prerequisites: AET 704.

AET 799 - Special Topics in Tech Manage

This course will allow a group of students to work on special topics of interest which are not covered by an existing course. These are emerging themes that reflect the rapidly changing nature of environments and technologies.  
Prerequisite: Consent of the instructor.

#### AET 810 - Project Management Essen

The Project Management Essentials for course provides students with fundamental project management knowledge and skills and a strong start on the path toward becoming a certified Project Management Professional (PMP) through the Project Management institute (PM). Students may be project managers in the early stages of their careers who want to hone their skills and are considering or planning to take the PMP exam. Students will learn the project life cycle and the related processes to promote success at all levels. Prerequisite: Graduate Standing.

#### AET 820 - Managing R&D Process

Research and Development (R&D) is the source of competitiveness and key ingredient for leadership and innovation. This course will investigate components of R&D and key management issues around them. The course will cover R&D related technology management strategies, types of research and development, collaboration, transfer and integration of R&D, new product development, project selection as well as uncertainty around R&D projects. Prerequisite: Graduate standing.

#### AET 830 - IoTs and Industrial Applications

This course provides a comprehensive introduction to Internet of Things (IoT), related technologies, and common issues in the adoption of IoT on a large scale, with an emphasis on industrial applications. Topics include history common definitions, underlying technologies of IoT, technological advances and novel solutions in the IoT environment, and the utilization of IoT and its underlying technologies in critical industrial application areas. Prerequisite: Graduate standing.

#### AET 840 - Industrial Fire Protections

This course discusses fire protection in industrial settings. Topics include principles of fire protection; fire and explosion dynamics; fire and explosion investigation; fire risk assessment, fire protection strategies in industrial facilities; explosion prevention in processing facilities; and other emerging fire and explosion issues in industrial settings. Prerequisite: Graduate standing.

#### AET 885 - Special Topics

This course allows the introduction of potential new courses on a trial basis or special content courses on a one time basis at the doctoral level. The topic of the course and title are determined prior to registration. Prerequisites: None.

## Applied Science and Technology

#### **AST 822 - Environmental Energy Econom II**

This course presents interrelationships of natural resource use and the environment. Topics covered include applied welfare and benefit-cost analysis, externalities and pollution abatement, and quantitative methodologies for analyzing energy, natural resource, and environmental problems. Prerequisites: EES 821. (S)

3.000 Credit hours

#### **AST 830 - Foundations of Scientific Rese**

This course provides students the foundation needed to successfully design and communicate their dissertation research. Students will improve their ability to perform a literature search, read and understand scientific journal articles, develop clear hypotheses about issues for which there is no answer in the literature, design experiments to test hypotheses, and present them clearly in writing and orally.

Prerequisites: Graduate Standing and consent of instructor. (F;S;SS)

3.000 Credit hours

**AST 831 - Math and Computational Model**

This course explores how to mathematically model a system, select an appropriate numerical method, implement computer simulations, and assess the ensuing results. Topics include nonlinear, 2D, and 3D models; nonrectangular domains; systems of partial differential equations; and large algebraic problems requiring high-performance computing. Prerequisites: Graduate Standing and consent of instructor. (F;S;SS)

3.000 Credit hours

**AST 841 - Biomaterials Characterization**

This course presents the analytical and spectroscopic techniques and tools available for examining molecular and macroscopic structural features of naturally occurring materials with emphasis on the lignocellulosic substrate. Topics covered will provide an appreciation for the fundamental principles behind the available techniques. Prerequisites: Graduate standing. (F;S)

3.000 Credit hours

**AST 843 - Biomass Biological Conver Proc**

This course presents the available biological conversion methods and processes that are available to convert biomass into commodity chemicals and energy as part of a biorefinery concept. Topics covered will highlight the challenges of bioconversions in terms of cost, dewatering, and limited thermal and pH ranges. Prerequisites: Graduate standing. (F;S)

3.000 Credit hours

**AST 850 - Physical Meteorology**

This course presents physical principles related to atmospheric environmental systems, processes, and measurements. Topics covered include atmospheric thermodynamics, atmospheric radiation transfer, and cloud microphysical processes. Prerequisites: Graduate standing and consent of instructor. (F;S,SS)

3.000 Credit hours

**AST 852 – Climatology**

This course presents observed global climate and mechanisms that determine climate. Topics covered include earth climate history and present-day climate, atmospheric and oceanic general circulation, radiative processes, climate variability and change, and climate change processes. Prerequisite: Graduate standing. (F;S)

3.000 Credit hours

**AST 853 - Numerical Weather Prediction**

This course presents the physical and mathematical basis for numerical weather prediction with computer experiments to demonstrate principles and techniques. Topics covered include derivation of sets of prediction equations consistent with scale analysis and dynamical constraints, atmospheric waves and filtered equations, numerical methods and computational instabilities, filtered and primitive equation models, and National Weather Service operational models. Prerequisites: None. (F;S)

3.000 Credit hours

**AST 885 - Doctoral Special Topics**

This course allows the introduction of new topics on a trial basis at the doctoral level. The topic of the course will be determined prior to registration. Prerequisites: Graduate standing and consent of instructor. (F;S;SS) Note: May be repeated for credit.

2.000 TO 4.000 Credit hours

**AST 984 - Laboratory Internship**

This course allows a student to explore various research areas first-hand by performing multiple projects in different laboratories under the mentorship of members of the graduate faculty. It should be taken before a student passes the qualifying exam. Grading is satisfactory/unsatisfactory evaluation only.

Prerequisites: Doctoral standing and consent of instructor. (F;S)

3.000 Credit hours

**AST 985 - Doctoral Supervised Practicum**

This course represents the supervised internship for the doctoral student that satisfies the 3 credits of required professional development. Oral and written presentations professional development. Oral and written presentations on the experience will be provided to the faculty. Grading is

satisfactory/unsatisfactory evaluation only. Prerequisites: Doctoral standing and consent of instructor.

(F;S)

3.000 Credit hours

**AST 992 - Doctoral Seminar**

This course includes presentations delivered by the doctoral students, faculty, and invited speakers on topics related to energy and environmental issues and research. Grading is satisfactory/unsatisfactory evaluation only. May be repeated. (F;S;SS) Note: May be repeated for credit.

1.000 TO 6.000 Credit hours

**AST 993 - Doctoral Supervised Teaching**

This course represents the supervised teaching for the doctoral student that satisfies required professional development. This course introduces the under the supervision of a faculty mentor. Doctoral students who serve as teaching assistants or as instructors are required to take this course during the first year they teach. Grading is Satisfactory/ Unsatisfactory evaluation only. Prerequisites: Doctoral standing. (F;S)

3.000 Credit hours

**AST 994 - Doctoral Supervised Research**

This course is supervised research under the mentorship of a member of the graduate faculty before a student passes the preliminary exam. This research should lead to the identification of a dissertation topic and written research proposal. Grading is satisfactory/unsatisfactory evaluation only. Prerequisites:

Doctoral standing. (F;S;SS)

3.000 TO 9.000 Credit hours

**AST 997 - Doctoral Dissertation**

This course represents the supervised research leading to the dissertation for the doctoral student.

Doctoral dissertation research will be conducted under the supervision of the dissertation committee chairperson and include regular meetings with the dissertation committee to evaluate progress on the dissertation. Grade is satisfactory/unsatisfactory evaluation only. Prerequisites: Doctoral standing.

(F;S;SS) Note: May be repeated for credit.

1.000 TO 15.000 Credit hours

**AST 999 - Continuation/Residency**

Meets requirement for continuous enrollment during final term prior to graduation when all course credit requirements (including dissertation) have been completed. This course is non-graded, may receive a grade of S/U, and credit for this course does not count toward the degree. May be repeated twice.

Prerequisites: Doctoral standing. (F;S;SS) Note: May be repeated for credit.

1.000 TO 3.000 Credit hours

## **Biology**

### **BIOL 615 - Principles of Virology**

This course is a study of viruses and their effects on living organisms. Special emphasis will be placed on virus structure and classification, virus replication, viruses that infect bacteria, plants, and humans, and strategies for preventing virus infections. The contribution of viruses to the development of immunology, biotechnology, and other areas of science, and the role of viruses in evolution, the development of cancer, and bioterrorism will be examined. Prerequisites: BIOL 101, BIOL 221. (F;S)

3.000 Credit hours

### **BIOL 631 - Endocrine Physiology**

This course will provide a basic introduction to endocrine function and include recent advances in the field of endocrinology. Emphasis will be placed on general aspects of endocrine physiology, the organization of the endocrine system, mechanisms of hormone action, and control of endocrine secretion. Prerequisites: BIOL 401 and 466.

3.000 Credit hours

### **BIOL 640 - Intro Bioinformat & Genomi Rsc**

3.000 Credit hours

### **BIOL 671 - Prin & Pract of Immunology**

A study of mammalian immune response; particularly in humans. Special emphasis will be placed on the physiology, genetics, and regulation of immune responses. Interrelationships between nonspecific and specific immune reactions, humoral and cell-mediated immunity, effector cells, and diseases are also stressed; along with research and diagnostic methodologies. Prerequisites: Biology 221 and 466; Chemistry 221 and 222.

3.000 Credit hours

### **BIOL 685 - Special Topics in Biology**

3.000 Credit hours

### **BIOL 702 - Biological Seminar**

Oral and written presentations by students on special topics and recent advances in the field of Biology. Strategies for writing a thesis will be discussed, and the preparation by students of a short proposal for thesis research will be encouraged. Prerequisites: None.

1.000 Credit hours

### **BIOL 703 - Experimental Methods Biology**

An introduction to the scientific method basic techniques, and equipment used in experimental research in Biology. The course will provide a foundation for enabling students to initiate and conduct independent research. Prerequisites: None.

3.000 Credit hours

### **BIOL 710 - Intro to Re in the Biologi Sci**

This course is designed to provide graduate students the foundation needed to successfully design and implement their thesis research. Each student will focus on understanding the literature, the techniques, and the equipment that will be used to complete his/her thesis research. Prerequisite: Graduate Standing. (F;S;SS)

3.000 Credit hours

### **BIOL 722 - Advanced Concepts in Biology I**

This course focuses on the nature of scientific knowledge and critical biological processes. Emphasis will be placed on the interconnection between these biological concepts through the exploration of current research. Prerequisite: Restricted to MAT (Biology) majors. (F;S;SS)  
3.000 Credit hours

**BIOL 749 - Recent Adv in Cell Biology**

A course designed to present recent trends concerning functions of organized cellular and subcellular systems. Current research as it relates to the molecular and fine structure basis of cell function, replication, and differentiation will be discussed.  
3.000 Credit hours

**BIOL 755 - Systems Biology**

This is an advanced graduate level course designed to present recent trends on the systematic study of complex interactions in biological systems, and how these interactions give rise to function and behavior of the biological system. Genomics, transcriptomics, proteomics, cytomics, RNA interference, and relevant bioinformatics concepts and applications will be studied. The course will also focus on how high throughput data is analyzed, integrated and applied to the understanding of complex biological systems. Prerequisite: BIOL 749. (F;S;SS)  
3.000 Credit hours

**BIOL 762 - Molecular Pathogenesis of Can**

This course examines pathobiological features of cancer. An interdisciplinary approach will be utilized that will draw from epidemiology, genetics, molecular biology, and clinical medicine to investigate cancer etiology, pathogenesis, prevention, and treatment. Students in this course will also be required to develop innovative supplemental instruction materials for undergraduate students taking a concurrent course. Students in this course will also be required to present oral presentations based on cancer literature during the departmental journal club. Prerequisite: Graduate standing. (F;S;SS)  
4.000 Credit hours

**BIOL 785 - Writing for the Biologi Scien**

This is an advanced graduate level course designed to allow graduate students in the biological sciences to develop proficiency in writing scientific manuscripts and research proposals following the National Institutes of Health, National Science Foundation, and other federal agency guidelines. Students will improve their ability to read and understand scientific journal articles, ask questions, develop clear hypotheses about issues for which there is no answer in the literature, design experiments to test hypotheses and present them very clearly and concisely in writing. Prerequisite: Graduate Standing. (F;S;SS)  
3.000 Credit hours

**BIOL 789 - Biological Seminar I**

Faculty will present lectures on their research areas to acquaint students with research opportunities in the department. Prerequisites: None. (F;S;SS)  
1.000 Credit hours

**BIOL 794 - Biology Thesis I**

Master's level research in biology. Prerequisite: Consent of advisor. (F;S;SS)  
6.000 Credit hours

**BIOL 796 - Master's Project**

In this course the student will conduct a research project under the supervision of an advisor. A written proposal, a final report, and an oral presentation and defense of the project before the project committee

are required. Prerequisite: Graduate standing. (F;S;SS)  
6.000 Credit hours

**BIOL 797 - Biology Thesis II**

Master's level research in biology. Prerequisites: Biology 862 and consent of advisor. (F;S;SS)  
6.000 Credit hours

**BIOL 799 - Con't of Thesis for Biology**

Master's level research in biology. Prerequisites: BIOL 794, 797, consent of advisor and Graduate Program Coordinator. (F;S;SS)  
1.000 Credit hours

**BIOL 860 - Parasitology**

3.000 Credit hours

## Chemistry

**CHEM 611 - Advanced Inorganic Chemistry**

This is a course in the theoretical approach to the systematization of inorganic chemistry. Prerequisite: CHEM 442. (F)  
3.000 Credit hours

**CHEM 621 - Intermediate Organic Chemistry**

This course provides an in-depth examination of various organic mechanisms, reactions, structures, and kinetics. Prerequisites: CHEM 222 and CHEM 442. (F)  
3.000 Credit hours

**CHEM 624 Qualitative Organic Chemistry**

A course in the systematic identification of organic compounds. Prerequisite: One year of Organic Chemistry. (F, S)

**CHEM 631 Electroanalytical Chemistry**

A study of the theory and practice of polarography, chronopotentialmetry, potential sweep chronoamperometry and electrodeposition. The theory of diffusion and electrode kinetics will also be discussed along with the factors which influence rate processes, the double layer, adsorption and catalytic reactions. Prerequisite: Chemistry 431 or equivalent.

**CHEM 641 Instrumentation of the Modern Sciences**

This course is designed to provide students with practical experience and increase their aptitude in 3 specific Areas: 1 ) Knowledge of the background, fundamental theory, and practical application of a broad range of instrumentation 2 ) Oral and written scientific communication 3 ) Data collection and analysis. Prerequisites: CHEM 442 or graduate standing. (F;S)

**CHEM 642 Techniques in X-ray Crystallography**

Methods needed for basic understanding of the scattering of X-rays from atoms and production of diffraction pattern will be described. Fundamental information regarding crystal systems and space group identifications will also be discussed. Practical hands on laboratory experiments involving crystal growth techniques, crystal choice, mounting and data collection will be given. A laboratory method for solving at

least one crystal structure is incorporated in the course. Prerequisites: CHEM 411 or graduate standing. (F;S)

**CHEM 643 Introduction to Quantum Mechanics**

Non-relativistic wave mechanics and its application to simple systems of means of the operator formulation. Prerequisites (F,S).

**CHEM 651 - General Biochemistry**

This is a study of modern biochemistry. The course emphasizes chemical kinetics and energetics associated with biological reactions and includes a study of carbo- hydrates, lipids, proteins, vitamins, nucleic acids, hormones, photosynthesis, and respiration. Prerequisites: CHEM 431, 442 and 451. (S)  
3.000 Credit hours

**CHEM 652 - General Chemistry Lab**

This is a companion laboratory to CHEM 651. Experimentation will include isolation and characterization of biochemical substances and studies of physical properties. Students will be introduced to a variety of techniques including high performance liquid chromatography, electrophoresis, and centrifugation. Corequisite: CHEM 651. \*Students are required to purchase supplemental materials for these general education courses. (S)  
2.000 Credit hours

**CHEM 663 - Chemical Instruction I**

A study of the curriculum and educational materials developed for use in the Thirteen College Curriculum Program in Physical Science. (F;S)  
1.000 Credit hours

**CHEM 664 - Selected Topics CHEM Inst II** A continuation of Chemistry 663. (F;S)

1.000 Credit hours

**CHEM 711 - Structural Inorganic Chemistry**

A study of the stereochemistry and electronic properties of inorganic substances. Emphasis will be placed upon applications of group theory and upon spectroscopic and physical methods.  
3.000 Credit hours

**CHEM 715 - Spec Prob in Inorganic Chem**

A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in Inorganic Chemistry. May be taken for credit more than once.  
1.000 Credit hours

**CHEM 716 - Sel Topics in Inorganic Chemis**

A lecture course on advanced topics of inorganic Chemistry. Prerequisite: CHEM 611 or permission of the instructor.  
3.000 Credit hours

**CHEM 722 - Advanced Organic Chemistry**

Recent developments in the areas of structural theory, stereochemistry, molecular rearrangement and mechanism of reactions of selected classes of organic compounds. Prerequisite: One year of Organic Chemistry of Chemistry 721.  
3.000 Credit hours

**CHEM 725 - Special Prob in Organic Chemistry**

A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in Organic Chemistry. May be taken for credit more than once.

1.000 Credit hours

**CHEM 726 - Selected Topics Organic Chem**

A lecture course on advanced topics in Organic Chemistry.

3.000 Credit hours

**CHEM 727 - Organic Preparations**

An advanced laboratory course. Emphasis is placed on the preparation and purification of more complex organic compounds. Prerequisite: One year of Organic Chemistry.

1.000 TO 2.000 Credit hours

**CHEM 732 - Advanced Analytical Chemistry**

A lecture course in which the theoretical bases of Analytical Chemistry and their application in analysis will be reviewed with depth than is possible in the customary undergraduate courses. Equilibrium processes, including proton and electron transfer reactions and matter- energy interactions, will be considered. Prerequisite: One year of Analytical Chemistry. (F;S)

3.000 Credit hours

**CHEM 743 - Chemical Thermodynamics**

An advanced course in which the laws of thermodynamics will be considered in their application to chemical processes. Prerequisite: CHEM 442 or 742.

3.000 Credit hours

**CHEM 756 - Selected Topics in Biochemis**

A lecture course on advanced topics in Biochemistry.

3.000 Credit hours

**CHEM 794 - Supervised Research**

A course designed to permit qualified students to do original research in chemistry under the supervision of a senior staff member. May be taken for credit more than once. (F;S;SS) Note: May be repeated for credit.

2.000 TO 5.000 Credit hours

**CHEM 796 - Masters Project Research**

3.000 Credit hours

**CHEM 797 - Thesis Research**

A course designed for conducting thesis research under the supervision of the thesis committee chairperson leading to the completion of the master's thesis. This course is only available to thesis option students. Prerequisite: Permission of advisor.

3.000 Credit hours

**CHEM 799 - Continuation/Residency**

A course designed for conducting thesis research under the supervision of the thesis committee chairperson leading to the completion of the master's thesis. This course is only available to thesis option students. Prerequisite: Permission of advisor. Note: May be repeated for credit.

1.000 TO 6.000 Credit hours

**CHEM 811 - Physical Meth for Inorg. Chem**

In-depth survey of structure, group theory, spectroscopy and bonding in inorganic compounds. This is a course primarily designed to introduce students to techniques of chemistry instruction at the graduate level, primarily for PHD students with emphasis on mathematics, NMR spectroscopy dealing with  $^{31}\text{P}$  and  $^{19}\text{F}$  nuclei, EPR and vibrational spectroscopy (IR & NMR). Prerequisite: None. (F)

**CHEM 812 Inorganic Chemical Kinetics and Mechanisms**

Fundamentals of inorganic chemical kinetics and reaction mechanisms will be discussed along with ability to interpret rate laws to reaction mechanisms. Prerequisites: Chem 611 or Chem 711 (F, S)

**CHEM 818 Introduction to Soft Matter**

The course provides the basic knowledge related to scientific research of soft materials (Chemistry, Physics and Biology) and applied science (Material Science). It is intended to provide competence for the student aiming career at academia or Industry (F)

**CHEM 823 Integrative Medicinal Chemistry**

Medicinal chemistry explores the links between disease, mechanisms of action and the development of safe, effective commercial drugs. It approaches important biological and health-related problems through application of fundamental principles of organic chemistry, biochemistry, natural product chemistry, and molecular pharmacology.

**CHEM 827 Organic Structural Spectroscopy**

Spectroscopic determination of organic molecular structure using  $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{19}\text{F}$ , and  $^{31}\text{P}$  nuclear magnetic resonance, infrared, ultraviolet-visible spectroscopy, and mass spectrometry. (F)

**CHEM 833 Biosensors and Bioanalytical Technologies**

A PHD-level course in which the theoretical bases of Biosensors and bioanalytical Technologies and their applications in bioanalysis will be reviewed with depth than contents covered in the customary undergraduate courses. Biosensor design and principle, electrochemical biosensor, optical biosensor, nanomaterial-based biosensor, polymer/polymerization-based biosensor, nanofabrication in biosensor, microfluidics in biosensor, and bio-sensing applications (biomedical, defense, food, environmental, etc.) will be included. Graduate Students Only. Prerequisite: None. (F;S;SS)

**CHEM 841 Advanced Mass Spectrometry Instrumentation**

A course designed to focus on the applications of modern high-resolution HPLC/MS, GC/MS, and MALDI in the analytical biochemistry area, especially in various omics areas. This course will cover the roles of high-resolution mass spectrometry in metabolomics, lipidomics, and proteomics. Graduate Students Only. Prerequisites: None. (F;S;SS)

**CHEM 856 Protein Structure and Function**

The course will include basic principles of protein structure, dynamics and function. Specific topics include X-ray crystallography, NMR Spectroscopy, homology modeling and other techniques that are used to solve structures. (F)

**CHEM 885 Special Topics**

This course allows for the discussion, analysis and evaluation of cross-disciplinary topics in modern chemistry. (F;S;SS)

**Built Environment**

**CM 617 - Independent Studies I**

Study is arranged on a special construction topic of interest to the student and faculty member, who will act as advisor. Consent of Instructor Required. (F;S;SS)

3.000 Credit hours

**CM 618 - Independent Study II**

Study is arranged on a special construction topic of interest to the student and faculty member, who will act as advisor. Consent of Instructor Required. (F;S;SS)

3.000 Credit hours

**CM 708 - Constr Cost Esti and Proj Con**

This course focuses on estimating techniques and various cost control measures used in construction industry. Topics to be covered include: conceptual, budget, and definitive estimates; work break down structure; bidding strategies; computer applications; and cost analysis techniques. Also, the course addresses the impacts of cost control measures on construction productivity. Prerequisites: CM 371 or Consent of Instructor. (F;S;SS)

3.000 Credit hours

**CM 764 - Risk Management in Construc**

This course provides an in-depth study of various risks associated with construction projects and how those risks impact the construction industry. Topics of discussion will include analytical and management techniques used to identify, analyze and respond to risks. Students will review actual legal case studies and develop written opinion papers. Prerequisites: Graduate Standing. (F;S;SS)

3.000 Credit hours

**OSH 678 - Experiential Education I**

To satisfy the requirements of this course, students must engage in cooperative activities within industry, government agencies, or consulting firms. Work responsibilities must include significant hazard assessment activities. Conditions of experience are supervised by department faculty. (F;S)

3.000 Credit hours

**OSH 679 - Experiential Education II**

To satisfy the requirements of this course, students must engage in intern activities within industry, government agencies, or consulting firms. Work responsibilities must include significant hazard assessment activities. Conditions of experience are supervised by department faculty. (F;S)

3.000 Credit hours

## **Information Technology**

**ITT 605 - Prin of Computer Networking**

This course explores all the hardware and software that drives local and Internet computing. Special emphasis is placed on connectivity and throughput. Prerequisite: ECT 313

3.000 Credit hours

**ITT 792 - MS Rsrch Thesis for In Tech II**

This course is a continuation of ITT 791. Major activities conducted in the course include circulating the tentative proposal among committee members and carrying out the proposed investigation. ITT 791.

(F;S;SS)

1.000 Credit hours

### **ITT 793 - Master's Re The Infor Tech III**

This course is a continuation of ITT 792. Major activities conducted in the course include preparing a preliminary thesis document and conducting a preliminary oral examination defense of the document.

Prerequisites: ITT 792. (F;S;SS)

2.000 Credit hours

### **ITT 794 - Master's Re The Infor Tech IV**

This course is a continuation of ITT 793. Major activities conducted in the course include preparing the final thesis document and conducting the final oral examination defense of the document. Prerequisites:

ITT 793. (F;S;SS)

2.000 Credit hours

## **Computer Systems Technology**

### **CST 605 - Prin of Computer Networking**

This course focuses on the concepts and principles of computer network protocols. The topics include the fundamentals of computer networks and Internet, application layer, transport layer, network layer, link layer (links, access networks, and LANS), wireless and mobile networks, packet switching, addressing, routing and flow/ congestion control, multimedia networking, security in computer networks, network management, and emphasis on internet working protocols. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 610 - Digital Communications**

This course investigates the concepts of principles of digital communications systems for processing and transmitting different types of signals including audio, video and data. Topics include: sampling, quantization, multiplexing techniques, source coding, channel coding, modems, various compression schemes, signal impairments, and various digital modulation schemes. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 615 - Advanced Net Security Applica**

This course explores security terms, definitions, concepts, and issues that face industries today. This course also will examine how the concept of security, and being secure, integrates into the overall enterprise mission. The importance of user involvement, security training, ethics, trust, and informed management will be explored. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **CST 620 - Telecommunications Management**

This course addresses fundamental principles of telecommunications management, which includes network management and administration, the telecommunications marketplace, and the planning and evaluation of systems. The technology of modern telecommunications systems is also reviewed.

Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **CST 625 - Computer Database Management**

This course examines the fundamental concepts and theory of database management systems. Topics cover database system architectures, data models, query languages, conceptual database design, logical database design, normalization, and physical database design. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 650 - Wireless Comm Systems I**

This course covers the concepts and principles of wireless communication systems. The topics include the fundamentals and designs of radio propagation, channel coding, radio access protocols, cellular concepts, channel allocations, multiple access techniques, modulation schemes, satellite systems, ad hoc and sensor networks, and routing protocols. Existing and next generation wireless communication systems are also analyzed. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 655 - Optical Communica Systems**

This course covers free space and fiber optic technologies (including lasers, optical amplifiers and optical filters) with applications to high-speed long distance systems, local area networks and communication systems. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **CST 685 - Special Topics**

This course involves the study of a topic not addressed by an existing course in the department. Typically, a topic is selected from within a new or evolving area in the field. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 690 - Ethical Issues in Informa Tech**

This course explores issues on the interface between information technology and society, with a special focus on ethical issues. Topics include ethical theory, privacy and security, spam, electronic commerce, the digital divide, open source software, medical informatics, bioinformatics, actor-network theory, ethnomethodology, and some neo-classical economics. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **CST 700 - Project Management**

This course covers project life cycle, planning templates, project deliverables, project work breakdown structure, estimating resources and task costs, Gantt charts, PERT techniques, project team duties and responsibilities, project team management techniques, and software tools for large projects. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 702 - Statistical Methods**

This course introduces the concepts and methods of statistics and probability, which include descriptive statistics, probability theory, sampling distribution, probability distributions, linear and multiple regressions, auto- and cross-correlation, and confidence intervals, t-test, and ANOVA. The nature of hypothesis testing and inference making for both parametric and non-parametric statistical processes is introduced. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 703 - Tech Re Writing Communi Skills**

This course covers written and oral communications skills relevant to Information Technology (IT) management topics. It also covers ethical methods of IT research and analysis. Students are required to write a research paper on a discipline specific topic and present it either in the classroom or on line. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 725 - Wide Area Networks**

This course covers different WAN Technologies, architecture, protocols, switching and routing, congestion control and resource allocation. The course contents include advanced networking concepts such as multi-area routing protocols, interdomain routing and BGP, IPv6, multiprotocol label switching (MPLS) and multicast. Network security concepts are covered using cryptographic tools, the problems of key distribution, authentication techniques using both public and private keys. The course uses virtual lab assignments to enforce the topics covered. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

### **CST 729 - Data Warehousing**

This course introduces the fundamental concept of planning, designing, building, populating and maintaining a data warehouse. Topics include data warehousing architecture, star schema and dimensional modeling, Extract-Load-Transform processes, and query design. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

### **CST 731 - Knowledge Discovery Systems**

This course focuses on the underlying principles and algorithms for analysis, design, implementation, and evaluation of knowledge Discovery Systems. Topics include data preprocessing, visualization, predictive modeling, association analysis, clustering, and anomaly detection. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

### **CST 750 - Computer System Security**

This course focuses on the concepts and principles of computer security, cryptography, authentication, securing networks, threat environment, access control, firewalls, host hardening, application security, data protection, incident response, and a networking primer. A clear theoretical understanding supports a large practical component. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

### **CST 764 - Advanced Big Data Analytics**

The big data is affecting every industry and businesses are eager to uncover data insights to be competitive in the market-place. This course aims to provide powerful skills to the students to manage and manipulate data, visualize data from different business perspectives and make strategic predictions. This course covers the latest research trends and applications in big data domain. Prerequisites: None. (F;S;SS)  
3.000 Credit hours

### **CST 789 - Seminar**

This course covers a broad selection of topics in information technology. Students are required to make an oral presentation and attend guest lectures. S/U (Satisfactory/Unsatisfactory grade only) (F;S;SS)  
1.000 Credit hours

### **CST 790 - Independent Study**

The purpose of this course is to allow graduate students to pursue a specialized area of study if that area is not covered by the regular courses. S/U (Satisfactory/Unsatisfactory grade only). Prerequisites: None. (F;S;SS)  
3.000 Credit hours

### **CST 797 - Master's Thesis**

The student will select a research topic that is of special interest and approved by his/her graduate thesis advisor. Prerequisites: Advisor Approval. (F;S;SS)  
1.000 TO 6.000 Credit hours

**CST 799 - Continuation/Residency**

Meets requirement for continuous enrollment during final term prior to graduation when all course credit requirements (including thesis or dissertation) have been completed. This course is non-graded. May receive a grade of S/U, and credit for this course does not count toward the degree. May be repeated twice. S/U (Satisfactory/Unsatisfactory grade only) Prerequisites: Advisor Approval. (F;S;SS)

1.000 TO 3.000 Credit hours

**CST 885 - Special Topics**

This course allows the introduction of potential new courses on a trial basis or special content courses on a one time basis at the doctoral level. The topic of the course and title are determined prior to registration.

Graduate Standing. (F;S;SS)

1.000 TO 4.000 Credit hours

## Mathematics

**MATH 603 - Introduction to Real Analysis**

The following topics will be covered in this course: elementary set theory, functions, axiomatic development of the real numbers, metric spaces, convergent sequences, completeness, compactness, connectedness, continuity, limits, sequences of functions, differentiation, the mean value theorem, Taylor's theorem, Riemann integration, infinite series, the fixed point theorem, partial differentiation, and the implicit function theorem. Prerequisite: MATH 211 or consent of the instructor. (DEMAND)

3.000 Credit hours

**MATH 604 - Mod Geom for Sec School Teach**

Re-examination of Euclidean geometry, axiomatic systems and the Hilbert axioms, introduction to projective geometry and other non-Euclidean geometries will be included. Prerequisites: MATH 600 or consent of instructor. (DEMAND)

3.000 Credit hours

**MATH 606 - Mathematics for Chemists**

This course includes a review of those principles of mathematics which are involved in chemical computations and derivations from general chemistry through physical chemistry; topics covered include significant figures, methods of expressing large and small numbers, algebraic operations, trigonometric functions and an introduction to calculus.

3.000 Credit hours

**MATH 607 - Theory of Numbers**

Divisibility properties of the integers, the Euclidean algorithm, congruence, diophantine equations, number-theoretic functions and continued fractions will be studied. Prerequisites: MATH 411 or consent of instructor. (F;S;SS)

3.000 Credit hours

**MATH 608 - Methods of Applied Statistics**

This course introduces the SAS programming language, and uses it in the analysis of variance, both single and multifactor. It includes various methods of hypothesis testing and constructing confidence intervals.

The course covers simple and multiple linear regression, including model building and variable selection techniques. Elements of time series and categorical data analysis are covered. Prerequisite: MATH 224.  
3.000 Credit hours

### **MATH 623 - Probab Theory & Application**

This course begins with an introduction to sample spaces and probability, including combinatorics. It covers continuous and discrete random variables, including multivariate random variables and expectations; also marginal and conditional distributions are derived. The course introduces moment generating functions, and covers the central limit.  
3.000 Credit hours

### **MATH 624 - Theory Methods of Statistics**

This course introduces methods of statistical estimation and inference including the following topics: sufficient statistics, confidence sets, hypothesis tests, and maximum likelihood methods. The theory of uniformly most powerful tests and the Neyman-Pearson Lemma are covered. Other topics include least squares estimation, the linear model, and Bayesian methods. Prerequisite: MATH 623.  
3.000 Credit hours

### **MATH 650 - Ordinary Differential Equation**

This is an intermediate course in ordinary differential equations with emphasis on applications. Topics include linear systems and various phase plane techniques for non-linear ordinary differential equations. Prerequisite: MATH 332. (DEMAND)  
3.000 Credit hours

### **MATH 651 - Partial Differential Equations**

This course includes introduction to complex variables and residue calculus, transform calculus, higher order partial differential equations governing various physical phenomena, nonhomogeneous boundary value problems, orthogonal expressions, Green's functions and variational principles. Prerequisites: MATH 332, MATH 432 or consent of instructor. (F;S;SS)  
3.000 Credit hours

### **MATH 690 - Scientific Pro for Math Scien**

This course covers the implementation of the computer in the Mathematical sciences. MATLAB will be used to apply algorithms and solve problems in areas such as differential equations and Linear algebra. Probability and statistical problems will be studied through the "R" language. Prerequisite: None. (F;S)  
3.000 Credit hours

### **MATH 706 - Categorical Data Analysis**

This course will include the following topics: Two-Way Contingency Table Inference for Two-Way Table, Models for Binary Response Variables, Log-linear Models, Testing in Loglinear Models, Multinomial Response Models and Estimation Theory for Parametric Models, and Computer Analysis of Categorical Data. Prerequisite: MATH 624.  
3.000 Credit hours

### **MATH 708 - Nonparametric Statistics**

The following topics will be discussed in this course: Order Statistics, Run Test for Trend, Goodness of Fit Tests, Rank Tests for One and Two Populations, Linear Rank Statistics, One-Way and Two-Way Nonparametric Analysis of Variance, and applications to practical problems. Prerequisite: MATH 624.  
3.000 Credit hours

### **MATH 712 - Numerical Linear Algebra**

Numerical analysis for solution of linear systems, approximation methods foreign values and eigenvectors, least squares solutions, ill-posed and ill-conditioned systems and error analysis are covered. Prerequisite: One programming language, MATH 350 or equivalent. (F;S;SS)  
3.000 Credit hours

**MATH 721 - Multivariate Statistical Analy**

Multivariate Normal Distribution, Inference About a Man Vector, Comparison of Several Multivariate Means, Analysis of Covariance Structure, Analysis of Dispersion, classification and Clustering Techniques and Some Applications of Multivariate Tests will be discussed in this course. Also, practical examples of industrial use will be addressed. Prerequisites: MATH 608 and MATH 624.  
3.000 Credit hours

**MATH 723 - Adv Topics in Applied Math**

This course is designed to cover important topics in applied mathematics that may be desired from time to time for specific students in the graduate program. It may also be used as a vehicle for development of new courses for graduate program students. Prerequisite: consent of the instructor.  
3.000 Credit hours

**MATH 731 - Advanced Numerical Methods**

This course covers numerical methods for solution of parabolic, elliptic and hyperbolic boundary value problems. Problems are selected from engineering applications. Both finite difference and finite element methods are studied. Prerequisite: MATH 360 or equivalent. (F;S;SS)  
3.000 Credit hours

**MATH 761 - Interdis Comp Sci Proj I**

This course continues development of skills required for independent research of problem-solving in the realm of computational science. The course requires completion of a sound literature review on a topic in computational science, under the guidance of the instructor. Prerequisite: MATH 380. (F;S;SS)  
3.000 Credit hours

**MATH 781 - Math & Computational Modeling**

This course explores the steps required to model and simulate a system, including discussion of generic governing equations, grid generation, basic numerical schemes, simulation strategies, and data analysis. Both discrete and continuous methods used in scientific applications will be examined. Representative applications include weather prediction, molecular dynamics, scheduling problems, and engine combustion modeling. Prerequisite: MATH 380. (F;S;SS)  
3.000 Credit hours

**MATH 796 - Graduate Design Project**

This course requires independent project work on an advanced mathematical topic of interest to the student and a faculty member acting as the student's advisor. The topic must be approved by the advisor. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**MATH 797 - Thesis Research in Math**

Students who select the thesis option must do advanced research in an area of interest. The research topic must be approved by the thesis advisor. (F;S;SS)  
3.000 Credit hours

**MATH 799 - Con't of Thesis for Math**

Note: May be repeated for credit.

1.000 Credit hours

## Physics

### **PHYS 600 - Classical Mechanics**

This course is a theoretical treatment of particle and rigid body dynamics. Topics included are: variational principles, Lagrangian and Hamiltonian mechanics, the physics of rotation, oscillations, canonical transformations and Hamilton's equations, Hamilton-Jacobi theory. Prerequisites: PHYS 401 or Graduate Standing.

3.000 Credit hours

### **PHYS 615 - Electromagnetic Theory I**

This course is an advanced study of electromagnetic phenomena which along with Physics 715 covers: electromagnetic properties of matter; propagation, radiation, and absorption of electromagnetic waves; simple radiating systems, special relativity; covariant electrodynamics; radiation by moving charges. Prerequisites: PHYS 416 or Graduate Standing.

3.000 Credit hours

### **PHYS 620 - Quantum Mechanics I**

This is an advanced study of quantum theory which along with Physics 720 covers the fundamental concepts and formulations: theory of measurement with application to simple physical systems, operator formalism, symmetries and invariance, system of identical particles, angular momentum and the theory of spin, variational and perturbation approximation technique, time-dependent perturbation theory and radiation, scattering theory with applications. Prerequisite: PHYS 421 or Graduate Standing.

3.000 Credit hours

### **PHYS 630 - Statistical Mechanics**

This course covers fundamentals of classical and quantum statistical mechanics: statistical ensembles and distributions functions, non-interacting particles, ideal Fermi and Bose system, treatment of interacting systems, phase transitions, approaches to collective phenomena. Prerequisite: PHYS 430 or Graduate Standing.

3.000 Credit hours

### **PHYS 685 - Special Topics**

This course provides studies in physics under staff guidance.

1.000 TO 3.000 Credit hours

### **PHYS 715 - Electromagnetic Theory II**

This course continues the study of electromagnetic phenomena which along with Physics 615 covers: electromagnetic properties of matter; propagation, radiation, and absorption of electromagnetic waves; simple radiating systems; special relativity; covariant electrodynamics; radiation by moving charges. Prerequisite: PHYS 615.

3.000 Credit hours

### **PHYS 720 - Quantum Mechanics II**

This course continues the study of quantum theory which along with Physics 620 covers: theory of measurement with application to simple physical systems, operator formalism, symmetries and invariance, system of identical particles, angular momentum and the theory of spin, variational and

perturbation approximation technique, time-dependent perturbation theory and radiation, scattering theory with applications. Prerequisite: PHYS 620.

3.000 Credit hours

### **PHYS 738 - Nuclear Physics**

This course covers descriptions of properties of the nuclear structure: nucleon-nucleon scattering, nuclear scattering theory, phenomenological potential models, the shell model, collective motion, giant resonances, direct and compound relations, few body systems, and heavy ion physics.

3.000 Credit hours

### **PHYS 770 - Research**

This course is graduate level research in selected areas of physics. Topics may be analytical and/or experimental and encourage independent study. The amount of credit will be determined before the beginning of the course. Note: May be repeated for credit.

1.000 TO 9.000 Credit hours

### **PHYS 789 - Graduate Seminar**

This course is a survey of current developments in physics. The topics will be selected before the beginning of the course and will be pertinent to the programs of enrolled students. Note: May be repeated for credit.

1.000 TO 3.000 Credit hours

### **PHYS 796 - Master's Project**

This course involves student participation in research training in geophysical sciences conducted by faculty. It offers structured education and research training activities that guide experiences in geophysical topics, techniques and research projects involving geophysical surveys, physical modeling and numerical simulation. The course may be repeated to earn a maximum of six credit hours. The course is conducted in a lecture-laboratory format with one hour of lecture and four hours of laboratory per week. Prerequisite: PHYS 601 or permission of instructor.

1.000 TO 6.000 Credit hours

1.000 TO 6.000 Other hours

### **PHYS 797 - Masters Thesis**

This course involves student participation in research training in geophysical sciences conducted by faculty. It offers structured education and research training activities that guide experiences in geophysical topics, techniques and research projects involving geophysical surveys, physical modeling and numerical simulation. The course may be repeated to earn a maximum of six credit hours. The course is conducted in a lecture-laboratory format with one hour of lecture and four hours of laboratory per week. Prerequisite: PHYS 601 or permission of instructor.

1.000 TO 6.000 Credit hours

## **Graphic Design Technology**

### **TECH 708 - Impacts of Technology**

This course introduces the students to the pervasive nature of technological innovations and to increase their awareness of both the promises and the uncertainties associated with the use of technology as a creative human enterprise.

3.000 Credit hours

### **TECH 717 - Special Problems I**

This course is an advanced study in modern technology that deals with recent developments, trends, practices and procedures in industries. Learning activities include individual and group research and experimentation involving selection, design, development, and evaluation of technical reports and instructional materials.

3.000 Credit hours

**TECH 718 - Special Problems II**

Individual study related to modern technology including research and experimentation involving selection, design, development, and evaluation of instructional materials will be the focus of this course.

3.000 Credit hours

**TECH 719 - Tech Educa: Design in Construc**

This course examines design processes as applied to construction for the purpose of helping public school teachers prepare to teach those processes to their own students in technological education. Engineering, innovation, and design topics, as related to construction will be studied. This course will help to prepare the teaching candidate for the Praxis II exam. Prerequisite: Graduate standing. (F;S;SS)

3.000 Credit hours

**TECH 762 - Assessment of Tech Ed Pro Stu**

This course examines standards, criteria, and strategies for evaluating technological education programs and assessing student performance. Students must prepare and pass a review of their North Carolina Department of Public Instruction portfolios as part of the course. Prerequisite: Graduate Standing. (F;S;SS)

3.000 Credit hours

**TECH 770 - Sys Design Train/Dev Industry**

This course covers the strategic design factors of training and development programs. How to develop estimates of return on investment is covered.

3.000 Credit hours

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## JOINT SCHOOL OF NANOSCIENCE AND NANOENGINEERING

<https://jsnn.ncat.uncg.edu/>

Sherine Obare, Dean

Daniel Rabinovich Associate Dean

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The Joint School of Nanoscience and Nanoengineering (JSNN) is a collaboration between two high research universities: North Carolina A&T State University (NC A&T SU) and The University of North Carolina at Greensboro (UNCG). The Department of Nanoengineering is administered by North Carolina A&T State University, while the Department of Nanoscience is administered by the University of North Carolina at Greensboro. All students enrolled in the Nanoengineering degree programs received their degrees solely from North Carolina A&T State University.

JSNN offers all its students with a highly collaborative environment. Unlike traditional science or engineering disciplinary programs, Nanoengineering is highly interdisciplinary and integrates mathematics, science, technology and engineering to help students establish the skills needed to understand how to solve problems using nanoscale tools. JSNN faculty have strong productive collaborations with other academic institutions, industry and government organizations and engage students in these accelerating research and innovation.

The Department of Nanoengineering at JSNN recruits the best and brightest students from a variety of disciplines. Students are challenged to choose a research area that is expected to provide significant benefit to mankind. Beyond becoming exceptional researchers, students develop professional, leadership and communication skills that make them exceptional assets in any academic, industry or government organization, upon graduation.

In 2021 JSNN was recognized by Insights into Diversity as a national leader for promoting and supporting women in Nanotechnology and ensuring their success into competitive careers. JSNN is also recognized for its state of the art facilities and in partnership with the Georgia Institute of Technology, is one of 16 sites of the National Nanotechnology Coordination Infrastructure (NNCI) through which the Southeastern Nanotechnology Infrastructure Corridor (SENIC) was created. SENIC is a partnership between the Georgia Institute of Technology and JSNN (N.C. A&T and UNCG) with the purpose of strengthening the infrastructure needed to provide academic, industry and government users with affordable access to one of the largest and most modern nanofabrication and characterization tool sets in the country. JSNN is also a catalyst for economic development and has had its students launch STEM start-up companies.

### DEGREE AND CERTIFICATE PROGRAMS OFFERED

#### Doctoral Degrees

- Ph.D. Nanoengineering

#### Masters Degrees

- MS Nanoengineering

#### Post-baccalaureate Certificate Programs

- STEM Entrepreneurship

- Advanced Materials
- Systems and Synthetic Biology
- Micro and Nano Devices

## Nanoengineering, PhD

Joint School of Nanoscience and Nanoengineering

**Graduate Coordinator:** Lifeng Zhang

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**Department Chair:** Emanuel Waddell

**Email:** eawaddell@ncat.edu

**Phone:** (336)285-2864

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The Ph.D. program in Nanoengineering requires the completion of coursework, laboratory rotations and extensive dissertation research involving engineering at the nanoscale. It is designed for students with a strong academic track record who seek advanced-level education and training to pursue careers in academia, industrial or government organization that utilize nanotechnology. Students will have the opportunity to work in one or more of the following research areas: nanomaterials, nanometrology, nanobioelectronics, synthetic biology and computational nanotechnology.

### Admission Requirements

- Applicants must have a Master's degree in engineering, or a closely related field with a minimum 3.0 GPA on a 4.0 scale, and an acceptable GRE score OR a Bachelor's degree in engineering or a closely related field with a minimum 3.5 GPA on a 4.0 scale and an acceptable GRE score.
- Three letters of recommendation (at least two of the three letters must be from University faculty members)
- Curriculum vitae/Resume

### Degree Requirements

Total credit hours: 60 (post baccalaureate)

The PhD program in Nanoengineering is a 60-credit hour program beyond the BS degree with up to 24 transfer credits that can be transferred from prior MS degree in Nanoscience, Nanoengineering or other science and engineering disciplines with the approval of the Nanoengineering Graduate Coordinator and the Department Chairperson.

| Requirements                            | Credit hours |
|---|--------------|
| Common core courses                     | 9            |
| General/synthetic biology concentration | 18           |
| Lab rotations                           | 3            |
| Elective/domain                         | 6            |
| Supervised research                     | 6            |
| Dissertation research                   | 18           |
| <b>Total number of credits</b>          | <b>60</b>    |

### Other requirements (with no credit hour assigned)

- Qualifying exam – 1<sup>st</sup> attempt by 2<sup>nd</sup> semester and finish by 3<sup>rd</sup> semester
- Teaching: At least 1 semester
- Preliminary proposal defense
- Attend JSNN/nanoengineering seminars
- Dissertation defense

**Common Core Course Requirements:** Students must complete 9 credit hours from core courses in Nanoengineering. Students who have completed MS in Nanoengineering will take other domain/disciplinary courses in the place of the common core course as recommended and in consultation with their advisor.

| Course No. | Course Title  | Credit Hours |
|------------|---|--------------|
| NANO 701   | Mathematical Methods in Nanoscience and Nanoengineering           | 3            |
| NANO 702   | Fundamentals of Nanoengineering Physical Principles               | 3            |
| NANO 703   | Fundamentals of Nanoengineering Chemical – Biochemical Principles | 3            |
| NANO 704   | Fundamentals of Nanomaterials                                     | 3            |
| NANO 705   | Nano Safety   | 3            |
| NANO 706   | Systems and Computational Biology                                 | 3            |

**General Nanoengineering Course Requirements:** In addition to the common core courses, students must complete an additional 18 credit hours from concentration-specific courses. Students who have completed an MS in Nanoengineering will take other domain/disciplinary courses in the place of the General Nanoengineering course requirements, as recommended and in consultation with their advisor. Additionally, based on students' qualifications (undergraduate/masters major) and interests, as well as their advisor, graduate program director and department chair approval, students may take courses from other programs limited to 9 credits.

| Course No. | Course Title  | Credit Hours |
|------------|---|--------------|
| NANO 701   | Mathematical Methods in Nanoscience and Nanoengineering           | 3            |
| NANO 702   | Fundamentals of Nanoengineering Physical Principles               | 3            |
| NANO 703   | Fundamentals of Nanoengineering Chemical – Biochemical Principles | 3            |
| NANO 704   | Fundamentals of Nanomaterials                                     | 3            |
| NANO 705   | Nano Safety   | 3            |
| NANO 711   | Introduction to Nanoprocessing                                    | 3            |
| NANO 721   | Nanobioelectronics  | 3            |
| NANO 731   | Introduction to Nanomodeling and Applications                     | 3            |
| NANO 741   | Colloidal and Molecular Self-Assembly                             | 3            |
| NANO 771   | Intro to Nano Thermodynamics                                      | 3            |
| NANO 781   | Intro to Synthetic Biology  | 3            |
| NANO 782   | Techniques in Synthetic Biology                                   | 3            |
| NANO 811   | Polymeric Materials Engineering                                   | 3            |
| NANO 812   | Process Modeling in Composites                                    | 3            |
| NANO 814   | Nanomechanics-Mdlng and Expts                                     | 3            |
| NANO 821   | Advanced Nanosystems  | 3            |
| NANO 823   | Compound Semiconductors and Nanostructured Devices                | 3            |
| NANO 825   | Thin Film Technology for Device Fabrication                       | 3            |
| NANO 827   | Solid State Devices (cross listed with ECEN 802)                  | 3            |
| NANO 831   | Advanced Nanomodeling and Applications                            | 3            |
| NANO 841   | Intermolecular and Surface Forces                                 | 3            |
| NANO 861   | Advanced Nano Energy Systems                                      | 3            |
| NANO 871   | Advanced Nano Thermodynamics                                      | 3            |
| NANO 885   | Special Topics in Nanoengineering                                 | 3            |

**Synthetic Biology Concentration Course Requirements:** Students must complete 18 credit hours from concentration-specific courses in the Synthetic Biology Concentration. Students who have completed an MS in Nanoengineering will take other domain/disciplinary courses in the place of the Synthetic Biology Concentration course requirements, as recommended and in consultation with their advisor. Students must pass 18 credits based on students' qualifications (undergraduate/masters major) and interests, and advisor's recommendations, the student will be advised and will take courses from Synthetic Biology specific courses listed below. Additionally, students may take courses from other programs limited to 9 credits.

| Course No. | Course Title                                  | Credit Hours |
|------------|---|--------------|
| NANO 705   | Nano Safety                                   | 3            |
| NANO 706   | Systems and Computational Biology             | 3            |
| NANO 721   | Nanobioelectronics                            | 3            |
| NANO 781   | Intro to Synthetic Biology                    | 3            |
| NANO 782   | Techniques in Synthetic Biology               | 3            |
| NANO 783   | Evolutionary Biology for Nanoengineers        | 3            |
| NANO 784   | Professional Development                      | 3            |
| NANO 881   | Nano and Synthetic Biology                    | 3            |
| NANO 882   | Adv Biomedical Nanomaterials                  | 3            |
| NAN 612    | Food/Agricultural Nanotech                    | 3            |
| NAN 620    | Immunology                                    | 3            |
| NAN 626    | Intro Stem Cell Bio and Ethics                | 3            |
| NAN 630    | Advances in Nano-biosensors                   | 3            |
| NAN 655    | Biomimetics and Biomaterials                  | 3            |
| NAN 740    | Nonlinear Waves in Biological Excitable Media | 3            |
| NAN 741    | Nanoimaging                                   | 3            |
| NAN 750    | Nanomedicine                                  | 3            |

**Lab Rotations:** Students must choose 3 credit hours of lab rotations from lab course offerings including those from JSNN graduate programs, North Carolina A&T State University, and the University of North Carolina at Greensboro. Current graduate level course offering from the Department of Nanoengineering at JSNN are:

| Course No. | Course Title                          | Credit Hours |
|------------|---------------------------------------|--------------|
| NANO 851   | Computational Nanomodeling Laboratory | 1            |
| NANO 852   | Nanoelectronics Laboratory            | 1            |
| NANO 853   | Nano-Bio electronics Laboratory       | 1            |
| NANO 854   | Nanomaterials Laboratory              | 1            |
| NANO 855   | Nanoenergy Laboratory                 | 1            |
| NANO 856   | Interfacing with Nano Lab             | 1            |
| NANO 857   | Synthetic Biology Laboratory I        | 1            |
| NANO 858   | Synthetic Biology Laboratory II       | 1            |
| NANO 859   | Synthetic Biology Laboratory III      | 1            |

**Elective/Domain Courses** (6 Credit hours at the 800+ level): These are the courses that strengthen and build the technical background and proficiency to ensure appropriate depth of knowledge in the student's discipline. Appropriate courses will be selected with a student's program advisor. These graduate-level courses will come from course offerings including those from JSNN's graduate programs, North Carolina A&T State University, and the University of North Carolina at Greensboro in science, mathematics, and engineering. Current graduate-level course offerings from the nanoengineering department at JSNN are:

| Course No. | Course Title  | Credit hours |
|------------|---|--------------|
| NANO 701   | Mathematical Methods in Nanoscience and Nanoengineering           | 3            |
| NANO 702   | Fundamentals of Nanoengineering Physical Principles               | 3            |
| NANO 703   | Fundamentals of Nanoengineering Chemical – Biochemical Principles | 3            |
| NANO 704   | Fundamentals of Nanomaterials                                     | 3            |
| NANO 706   | Systems and Computational Biology                                 | 3            |
| NANO 711   | Introduction to Nanoprocessing                                    | 3            |

|          |  |   |
|----------|--|---|
| NANO 721 | Nanobioelectronics                                 | 3 |
| NANO 731 | Introduction to Nanomodeling and Applications      | 3 |
| NANO 741 | Colloidal and Molecular Self-Assembly              | 3 |
| NANO 771 | Intro to Nano Thermodynamics                       | 3 |
| NANO 781 | Intro to Synthetic Biology                         | 3 |
| NANO 782 | Techniques in Synthetic Biology                    | 3 |
| NANO 783 | Evolutionary Biology for Nanoengineers             | 3 |
| NANO 784 | Professional Development                           | 3 |
| NANO 790 | Independent Study                                  | 3 |
| NANO 811 | Polymeric Materials Engineering                    | 3 |
| NANO 812 | Process Modeling in Composites                     | 3 |
| NANO 814 | Nanomechanics-Mdlng and Expts                      | 3 |
| NANO 821 | Advanced Nanosystems                               | 3 |
| NANO 823 | Compound Semiconductors and Nanostructured Devices | 3 |
| NANO 825 | Thin Film Technology for Device Fabrication        | 3 |
| NANO 827 | Solid State Devices (cross listed with ECEN 802)   | 3 |
| NANO 831 | Advanced Nanomodeling and Applications             | 3 |
| NANO 841 | Intermolecular and Surface Forces                  | 3 |
| NANO 861 | Advanced Nano Energy Systems                       | 3 |
| NANO 871 | Advanced Nano Thermodynamics                       | 3 |
| NANO 881 | Nano and Synthetic Biology                         | 3 |
| NANO 882 | Adv Biomedical Nanomaterials                       | 3 |
| NANO 885 | Special Topics in Nanoengineering                  | 3 |

Course offerings in the Department of Nanoscience at JSNN are:

| <b>Course No.</b> | <b>Course Title</b>                                  | <b>Credit hours</b> |
|-------------------|--|---------------------|
| <i>NAN 612</i>    | <i>Food/Agricultural Nanotech</i>                    | <i>3</i>            |
| <i>NAN 620</i>    | <i>Immunology</i>                                    | <i>3</i>            |
| <i>NAN 626</i>    | <i>Intro Stem Cell Bio and Ethics</i>                | <i>3</i>            |
| <i>NAN 630</i>    | <i>Advances in Nano-biosensors</i>                   | <i>3</i>            |
| <i>NAN 655</i>    | <i>Biomimetics and Biomaterials</i>                  | <i>3</i>            |
| <i>NAN 710</i>    | <i>Science Integrity</i>                             | <i>1</i>            |
| <i>NAN 724</i>    | <i>Nanoscale Reactions</i>                           | <i>3</i>            |
| <i>NAN 735</i>    | <i>Nanomaterials &amp; Reactions by Design</i>       | <i>3</i>            |
| <i>NAN 740</i>    | <i>Nonlinear Waves in Biological Excitable Media</i> | <i>3</i>            |
| <i>NAN 741</i>    | <i>Nanoimaging</i>                                   | <i>3</i>            |
| <i>NAN 750</i>    | <i>Nanomedicine</i>                                  | <i>3</i>            |

In addition, the students are required to successfully complete the following as outlined in the Ph.D. program structure.

NANO 994: Doctoral Supervised Research (Research Methods) - 6 CR

NANO 997-999: Doctoral Dissertation – at least 18 CR

### **Preliminary Examination:**

The Preliminary Exam tests a Ph.D. student's ability to prepare and present a comprehensive overview of a topic based on the scientific and engineering literature. The Preliminary Exam includes a written review paper related to the student's field of study and written in the style of a peer-reviewed journal article. It

should be a comprehensive review of the literature, scientific theory, problems or theoretical deficiencies, and possible areas of research related to nanoengineering. The topic and format of the review paper should be decided by the student in collaboration with the student's academic advisor.

The Preliminary Exam will conclude with the delivery of a publication-worthy review paper and a short seminar on the topic, which will culminate with a closed presentation with the Dissertation Committee and a preliminary overview of the student's research project. The completion of the preliminary exam should occur by the end of the first year in the PhD program.

### **Candidacy Exam (Dissertation Research Proposal)**

The candidacy exams is a dissertation research proposal that consists of a written proposal and an oral exam. Successful completion of the research proposal and its defense will advance the student to candidacy in the Nanoengineering Ph.D. Program. The format for this examination is consistent with the highest standards and in accordance with the University Graduate Catalog. The proposal must be defended no later than the end of the student's fourth semester.

### **Admission to Ph.D. Candidacy**

A student will be admitted to candidacy upon successful completion of the Preliminary Examination and the Candidacy Exam.

### **Dissertation Research:**

A student may not register for dissertation credits before passing the Candidacy Examination. No more than 18 dissertation credits are counted toward the total credit hours requirement for the degree.

### **Final Oral Dissertation Defense:**

The Final Oral Dissertation Defense is scheduled after a written dissertation is completed. The examination may be held no earlier than six months after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Dissertation Committee may permit one re-examination if warranted by the committee. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Dissertation Defense, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate College's guidelines for theses and dissertations.

### **Program Specific Academic Policies:**

- The qualifying exam must be attempted for the 1<sup>st</sup> time by the end of the 2<sup>nd</sup> semester and must be passed by the end of the 3<sup>rd</sup> semester.
- Assist the instructor in teaching a course or laboratory for at least 1 semester.

## Nanoengineering, MS

Joint School of Nanoscience and Nanoengineering

**Graduate Coordinator:** Lifeng Zhang

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The Master of Science in Nanoengineering degree program is a research master's degree, featuring coursework involving engineering at the nanoscale. It is designed for students with a strong background in engineering or applied science who seek additional, specialized training for industrial or government positions in fields that utilize nanotechnology. Students will have the opportunity to work in one or more of the following research areas: nanomaterials, nanometrology, synthetic biology, nanobioelectronics, and computational nanotechnology.

### Additional Admission Requirements

- Bachelor's degree in engineering or a closely related field
- Two of the three recommendation letters must be from University faculty members
- Current curriculum vitae

### Degree Requirements

Total credit hours: 30

The MS degree in Nanoengineering is a 30-credit hour program. The Nanoengineering M.S. curriculum structure and program requirements are given below.

**Common Core Courses (9 credits):** The student will take three courses that will introduce them to fundamental concepts, methods, and discoveries in different areas of Nanoengineering. These courses include:

| I. Course No. | Course Title  | Credit Hours |
|---------------|---|--------------|
| NANO 701      | Mathematical Methods in Nanoscience and Nanoengineering           | 3            |
| NANO 702      | Fundamentals of Nanoengineering Physical Principles               | 3            |
| NANO 703      | Fundamentals of Nanoengineering Chemical – Biochemical Principles | 3            |
| NANO 704      | Fundamentals of Nanomaterials                                     | 3            |
| NANO 705      | Nano Safety   | 3            |
| NANO 706      | Systems and Computational Biology                                 | 3            |

### Disciplinary Foundation Courses (15 credits (thesis option) or 18 credits (non-thesis option)):

These courses build on the undergraduate degree to ensure appropriate depth of knowledge in the student's discipline. Appropriate courses will be selected with the student's program advisor. These graduate level courses will come from offerings at both North Carolina A&T State University and the University of North Carolina at Greensboro in science, mathematics and engineering. Current graduate level course offerings from the nanoengineering department at Joint School of Nanoscience and Nanoengineering are:

| II. Course No. | Course Title  | Credit hours |
|----------------|---|--------------|
| NANO 701       | Mathematical Methods in Nanoscience and Nanoengineering           | 3            |
| NANO 702       | Fundamentals of Nanoengineering Physical Principles               | 3            |
| NANO 703       | Fundamentals of Nanoengineering Chemical – Biochemical Principles | 3            |
| NANO 704       | Fundamentals of Nanomaterials                                     | 3            |
| NANO 705       | Nano Safety   | 3            |
| NANO 711       | Introduction to Nanoprocessing                                    | 3            |
| NANO 721       | Nanobioelectronics  | 3            |

|          |  |   |
|----------|--|---|
| NANO 731 | Introduction to Nanomodeling and Applications      | 3 |
| NANO 741 | Colloidal and Molecular Self-Assembly              | 3 |
| NANO 771 | Intro to Nano Thermodynamics                       | 3 |
| NANO 781 | Intro to Synthetic Biology                         | 3 |
| NANO 782 | Techniques in Synthetic Biology                    | 3 |
| NANO 811 | Polymeric Materials Engineering                    | 3 |
| NANO 812 | Process Modeling in Composites                     | 3 |
| NANO 814 | Nanomechanics-Mdlng and Expts                      | 3 |
| NANO 821 | Advanced Nanosystems                               | 3 |
| NANO 823 | Compound Semiconductors and Nanostructured Devices | 3 |
| NANO 825 | Thin Film Technology for Device Fabrication        | 3 |
| NANO 827 | Solid State Devices (cross listed with ECEN 802)   | 3 |
| NANO 831 | Advanced Nanomodeling and Applications             | 3 |
| NANO 841 | Intermolecular and Surface Forces                  | 3 |
| NANO 861 | Advanced Nano Energy Systems                       | 3 |
| NANO 871 | Advanced Nano Thermodynamics                       | 3 |
| NANO 885 | Special Topics in Nanoengineering                  | 3 |

**Option 1 - Thesis Option - 6 credit hours of thesis** (NANO 797), 9 credit hours of core courses and 15 credit hours of disciplinary foundation courses

**Option 2 – Non-thesis Option - 3 credit hours of project** (NANO 796), 9 credit hours of core courses and 15 credit hours of disciplinary foundation courses.

#### **Concentration in Synthetic Biology**

MS students in Nanoengineering in consultation with their advisor, graduate program coordinator and chair will be able to opt for concentration in synthetic biology and follow the concentration course requirements outlined below.

**Disciplinary Foundation Courses (15 credits (thesis option) or 18 credits (non-thesis option)):** These courses build on the undergraduate degree to ensure appropriate depth of knowledge in the student’s discipline. Appropriate courses will be selected with the student’s program advisor. These graduate level courses will come from offerings at both North Carolina A&T State University and the University of North Carolina at Greensboro in science, mathematics and engineering. Current graduate level course offerings from the nanoengineering department at Joint School of Nanoscience and Nanoengineering are:

| <b>Course No.</b> | <b>Course Title</b>   | <b>Credit Hours</b> |
|-------------------|---|---------------------|
| NANO 703          | Fundamentals of Nanoengineering Chemical – Biochemical Principles | 3                   |
| NANO 705          | Nano Safety   | 3                   |
| NANO 706          | Systems and Computational Biology                                 | 3                   |
| NANO 721          | Nanobioelectronics  | 3                   |
| NANO 781          | Intro to Synthetic Biology  | 3                   |
| NANO 782          | Techniques in Synthetic Biology                                   | 3                   |
| NANO 783          | Evolutionary Biology for Nanoengineers                            | 3                   |
| NANO 784          | Professional Development  | 3                   |
| NANO 881          | Nano and Synthetic Biology  | 3                   |
| NANO 882          | Adv Biomedical Nanomaterials                                      | 3                   |
| <i>NAN 612</i>    | <i>Food/Agricultural Nanotech</i>                                 | 3                   |
| <i>NAN 620</i>    | <i>Immunology</i>   | 3                   |
| <i>NAN 626</i>    | <i>Intro Stem Cell Bio and Ethics</i>                             | 3                   |

|         |  |   |
|---------|--|---|
| NAN 630 | <i>Advances in Nano-biosensors</i>                   | 3 |
| NAN 655 | <i>Biomimetics and Biomaterials</i>                  | 3 |
| NAN 740 | <i>Nonlinear Waves in Biological Excitable Media</i> | 3 |
| NAN 741 | <i>Nanoimaging</i>                                   | 3 |
| NAN 750 | <i>Nanomedicine</i>                                  | 3 |

**Option 1 - Thesis Option - 6 credit hours of thesis** (NANO 797), 9 credit hours of core courses and 15 credit hours of disciplinary foundation courses

**Option 2 – Non-thesis Option - 3 credit hours of project** (NANO 796), 15 credit hours of core courses and 12 credit hours of disciplinary foundation courses.

**Thesis Option:** This option is intended for students with strong research interests who desire to pursue further graduate studies or seek to work in research institutions. Students in the Thesis Option must complete the following requirements:

- a. 24 credit hours of course work with letter grades.
- b. 6 credit hours of Master’s Thesis (NANO 797). A research topic must be chosen in conjunction with the advisor culminating in the preparation of a scholarly thesis.
- c. Attend all JSNN/Nanoengineering seminars

An oral thesis defense/examination and a written thesis document are required. A student in the Thesis Option must pass the oral examination/thesis defense scheduled by the thesis committee. The thesis defense is scheduled after the thesis has been reviewed and approved by each member of the thesis committee. The defense is held at a public meeting. However, the deliberation following the public meeting is open only to the thesis committee members. At the deliberation, the committee will determine if the student passes or fails the oral defense, or to redo the oral defense at another date. An approved thesis must be submitted to the Graduate College by the deadline given in the academic calendar.

**Project Option:** This option is intended for students who have substantial industrial engineering experience. Students in the Project Option must complete the following requirements:

- a. 27 credit hours of course work with letter grades.
- b. 3 credit hours of Masters Project (NANO 796). A written project report must be approved by the advisor and an oral project presentation is suggested.
- c. Attendance and participation in all JSNN/Nanoengineering seminars is required.

## **Certificate – Systems and Synthetic Biology, PB**

Joint School of Nanoscience and Nanoengineering

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Degree Requirements: Total Credit hours: 12 credits

### **Core Courses (6 credits):**

NANO 703 Fundamentals of Nanoengineering: Chemical and Biochemical Principles

NANO 706 Systems and Computational Biology

### **Technical Electives (6 credits):** *Select 2 courses from the following list of options:*

NANO 781 Intro to Synthetic Biology

NANO 782 Techniques in Synthetic Biology

NANO 881 Nanosynthetic Biology

NANO 882 Advanced Biomedical Nanomaterials

*Students may select to substitute any of the above courses with an alternate course, with approval from the advisor*

## **Certificate - Micro and Nano Devices, PB**

Joint School of Nanoscience and Nanoengineering

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Degree Requirements: Total Credit hours: 12 credits

### **Core Courses (6 credits):**

NANO 702      Fundamentals of Nanoengineering: Physical Principles

NANO 721      Nanobioelectronics

### **Technical Electives (6 credits):** *Select from 2 of the following:*

NANO 821      Advanced Nanosystems

NANO 823      Compound semiconductor and nanostructured devices

NANO 827      Solid State Devices

*Students may select to substitute any of the above courses with an alternate course, with approval from the advisor*

## **Certificate – Advanced Materials: Nanoengineering, PB**

Joint School of Nanoscience and Nanoengineering

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Certificate Requirements: Total Credit Hours: 12 credits

### **Core Courses (6 credits):**

NANO 704 Fundamentals of Nanomaterials: Nanomaterial fundamentals

NANO 711 Introduction to Nanoprocessing: Nanomaterial processing

### **Technical Electives (6 credits):** *Select from 2 of the following:*

NANO 741 Colloidal and Molecular Self-Assembly: Colloidal materials

NANO 812 Process Modeling in Composites: Composite materials

NANO 882 Advanced Biomedical Nanomaterials: Biomedical materials

*Students may select to substitute any of the above courses with an alternate course, with approval from the advisor*

## **Certificate - STEM Entrepreneurship, PB**

Joint School of Nanoscience and Nanoengineering

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The post baccalaureate certificate in STEM Entrepreneurship is a program for any students who has an interest in learning how to establish or operate a business based on research and development in a STEM discipline. The certificate is open to any students who is interested in furthering their knowledge on technology transfer, commercialization, intellectual property, laws governing IP, marketing and entrepreneurship.

Certificate Requirements: Total Credit hours: 12 credits

Core Courses (6 Credit Hours): Select two (2) of the following

NANO 609: Entrepreneurship for Scientists, Technologists, Engineers and Mathematicians

NANO 668: Technology Transfer and Commercialization

NANO 669: The Laws of Intellectual Property

Electives (6 Credit Hours): Select two (2) of the following courses

NANO 669: The Laws of Intellectual Property

MGMT 612: Foundations of Enterprise Management

MKTG 716: Strategic Marketing

NANO 796: Project

Students may take select to take other electives from N.C. A&T with approval from the advisor.

## **COURSE DESCRIPTIONS: Joint School of Nanoscience and Nanoengineering**

### **Nanoengineering**

#### **NANO 701 - Simulation and Modeling Methods in Nanoscience and Nanoengineering**

This course covers first principles quantum-based methods, classical atomistic simulation methods interatomic potentials, modeling of bulk nanostructure metals, carbon nanotubes, soft matter and multiscale modeling techniques.

*Prerequisite: None.*

*Credits: 3 (3-0)*

#### **NANO 702 - Fundamentals of Nanoengineering: Physical Principles**

This course is an introduction to physical principles involved at the nanoscale due to quantum size effects, and energy band structure engineering for nanoelectronic devices.

*Prerequisite: None.*

*Credits: 3 (3-0)*

#### **NANO 703 - Fundamentals of Nanoengineering: Chemical-Biochemical Principles**

This course covers chemical and bio-chemical principles involved in design, synthesis, assembly, and performance of nanomaterials and devices. Also studied are the structure and function of biomolecules and their specific roles in nano-biomolecular interactions and signaling pathways, as well as application of chemical biological detection methods at the micro and nanoscales.

*Prerequisite: None.*

*Credits: 3 (3-0)*

#### **NANO 704 - Fundamentals of Nanomaterials**

The course introduces fundamentals of nanomaterials, brings in knowledge on frontiers of the rapidly developing interdisciplinary field of nanomaterials and help to develop skills to understand and communicate in the field of nano-engineering.

*Prerequisite: None.*

*Credits: 3 (3-0)*

#### **NANO 705 – Nano Safety**

This is an interdisciplinary course that explores the safety, environmental, and ethical issues surrounding the manufacture, distribution, use, and disposal of nanomaterials. Students will read and discuss the established principles of nano safety along with new material as it arises from the primary literature. The pedagogy utilized in this course fosters student critical thinking about the interaction of nanomaterials with the biological world.

*Prerequisite: None.*

*Credits: 3 (3-0)*

#### **NANO 706 – Systems and Computational Biology**

This course is focuses on teaching bioinformatics and statistics skills needed in academic, biomedical engineering, and pharmaceutical laboratories for analyzing laboratory data. The students will learn mainstream bioinformatics tools, as well as statistical concepts and their application to data collection, analysis, and data presentation. Students learn how to evaluate data sources and choose appropriate data analysis methods. Additional topics covered will include experimental design, statistical hypothesis testing,

and methods for comparing discrete and continuous data (e.g., ANOVA, t-test, correlation and regression). An emphasis of this course is on high throughput assays and multivariate analysis techniques.

### **NANO 711 - Introduction to Nanoprocessing**

This course introduces students to the field of nanoprocessing including basic fabrication and processing techniques to construct nanostructures and nanomaterials through both "bottom up" and "top down" strategies. Basic nanostructure characterization techniques are integrated as a start.

*Prerequisite: None.*

*Credits: 3 (3-0)*

### **NANO 721 - Nanobioelectronics**

This course introduces the emerging areas where biology, medicine, nanofabrication and electronics coverage. The course addresses fundamental concepts and current applications of biofabrication and bioelectronic devices such as biosensors, DNA electronics, protein based devices, analytical electrochemistry, biomolecular electronics, single molecule physics, BioNano machines, and biofuel cells. A special emphasis is placed on problem-based learning targeting current issues in nanobioelectronics.

*Prerequisite: NANO 702 or NANO 703 or consent of instructor.*

*Credits: 3 (3-0)*

### **NANO 731 - Introduction to Nanomodeling and Applications**

This graduate level course provides an introduction to nanomodeling and applications for students with background in engineering, physical, mathematical, and biological sciences focusing on atomistic and molecular dynamics modeling.

*Prerequisite: NANO 701 or consent of instructor.*

*Credits: 3 (3-0)*

### **NANO 741 - Colloidal and Molecular Self-Assembly**

This course offers an introduction to self-assembly in soft matter and the associated thermodynamic and chemical principles. Topics are covered from a materials-oriented perspective and include colloidal crystals, liquid crystals, surfactants and micelles, polymers and block copolymers, and biomolecule assembly.

*Prerequisite: None.*

*Credits: 3 (3-0)*

### **NANO 761 - Introduction of Nano Energy**

This course is a 3-credit comprehensive course of nanomaterials and devices for energy application. The course will introduce emerging energy technologies and the fundamentals required to design such a great technology at nanoscale and will cover the description of basic energy principle, nanoarchitected energy material and its device concept used in all forms of energy harvesting, conversion and storage.

*Prerequisite: None.*

*Credits: 3 (3-0)*

### **NANO 781 – Introduction to Synthetic Biology**

Synthetic Biology is the use of biological tools and engineering rules to make things, reprogram pathways and components, and provide non-existing solutions. Synthetic biology and genetic engineering is a modern approach to biotechnology that takes advantage of our knowledge of biology at the molecular level, which enables the changing of an organism's genes to introduce or remove a particular trait. Because our tools no longer rely upon breeding alone, it is now possible to transfer genes between different organisms. Further, DNA no longer needs to come from a living organism but can be entirely synthetic. In this course, we will use biological tools and engineering rules to understand and harness synthetic biology. This course is in synergy with national conversations about the opportunities and challenges that we will face as engineers,

scientists, technologists, and citizens. Along the way, we will learn about what other people have made out of biological systems, and the techniques currently at our disposal. We will also address safety and ethical considerations.

*Prerequisite: Graduate Student Standing*

*Credits: 3 (3-0)*

### **NANO 782 – Techniques in Synthetic Biology**

This graduate-level course focuses on research techniques in synthetic biology, including methods in DNA and protein synthesis, as well as genomic and proteomic analysis. Students will learn approaches to characterize materials on the atomic and molecular scale, as well as the application of optical and electron microscopy in synthetic biology. The course will focus on experimental design, data analysis, interpretation, and dissemination of data from each technique covered. Students will be required to participate in and lead discussions on the course material and relevant materials.

*Prerequisite: Graduate Student Standing*

*Credits: 3 (3-0)*

### **NANO 783 – Evolutionary Biology for Nanoengineers**

This course explores the discipline of evolutionary biology through the range of organization that exists within the biological sciences (molecular to societal). Students will read and discuss the established principles of evolution along with new material as it arises from the primary literature. The pedagogical approach utilized in this course introduces students to how topics in evolutionary biology are approached and solved. Furthermore it examines why and how evolutionary reasoning is essential to modern biology and fully integrated into the general scientific method.

*Prerequisite: Graduate Student Standing*

*Credits: 3 (3-0)*

### **NANO 784 – Professional Development**

This graduate level course focuses on research methods in nanoengineering, including the scientific method and experimental design, data analysis, presentation, and dissemination of results. Students will learn practical and accessible skills to develop their research topic as well as design, execute, analyze and interpret experiments that can be applied to their Master's or doctoral work. Concepts related to effective time management, working on a research team, writing and evaluating proposals will be explored. Students will be required to participate in, and lead discussions on the course material and relevant materials.

*Prerequisite: Graduate Student Standing*

*Credits: 3 (3-0)*

### **NANO 785 - Special Topics in Nanoengineering**

This course is designed to allow the introduction of potential new courses on a trial basis or special content courses on a once only basis at the Master's level. The topic of the course and title are determined prior to registration.

*Prerequisite: Consent of the instructor.*

*Credits: 3 (3-0)*

### **NANO 794 - Masters Supervised Research**

This course is supervised research under the mentorship of a faculty member. It is not intended to serve as the project nor thesis topic of the master's student.

*Prerequisite: Master's level standing.*

*Credits: 3 (3-0)*

### **NANO 796 - Master's Project**

The student will conduct advanced research of interest to the student and the instructor. A written proposal which outlines the nature of the project must be submitted for approval. This course is only available to project option students.

*Prerequisite: Master's level standing with project option.*

*Credits: 3 (3-0)*

#### **NANO 797 - Master's Thesis**

Master of Science thesis research will be conducted under the supervision of the thesis committee chairperson leading to the completion of the Master's thesis. This course is available only to thesis option students and can be repeated.

*Prerequisite: Master's level standing with thesis option.*

*Credits: 3 (3-0)*

#### **NANO 799 - Continuation of Master's Thesis**

This is a continuation of NANO 797. This course is for master's students who have completed all required credit hour requirements.

*Prerequisite: Completion of all Thesis Credits.*

*Credits: 1 (1-0)*

#### **NANO 811 - Polymeric Materials Engineering**

This course introduces polymer fundamentals, synthesis, structure and properties, and processing with an emphasis on applying basic knowledge in nanoengineering applications.

*Prerequisite: None.*

*Credits: 3 (3-0)*

#### **NANO 812 - Process Modeling in Composites**

This course provides an overview of composites, composite manufacturing processes followed by transport equations, constitutive laws and their characterization in composite processing. Process modeling applications to specific composite manufacturing processes involving short fibers, continuous and woven fibers for processing with thermoplastic and reactive thermoset resin systems are discussed. Transport issues in the processing of polymer nanocomposites are briefly discussed.

*Prerequisites: NANO 701 or consent of instructor.*

*Credits: 3 (3-0)*

#### **NANO 821 - Advanced Nanosystems**

This course is designed to teach advanced nanosystems, which are a result of hierarchical assembly and integration of diverse and heterogeneous components including materials, molecules and components at the nanoscale. This course discusses the fundamental concepts and current trends in such advanced nanosystems with examples from nanoelectronic/photonic devices, organic-inorganic assemblies, biomimetic devices, bio-nano machines, biofuel cells etc. A special emphasis is placed on problem-based learning targeting current issues in nanosystem integration.

*Prerequisites: NANO 721 or consent of instructor.*

*Credits: 3 (3-0)*

#### **NANO 823 - Compound Semiconductor and Nanostructure Devices**

This course covers physics of compound semiconductors, application of Schrodinger equation to nanoscale structures; heteroepitaxy layered and self-assembled nanostructures. The course also discusses strain and bandgap engineering, materials and device options for advanced optoelectronic devices at the nanoscale.

*Prerequisites: NANO 702 or consent of instructor.*

*Credits: 3 (3-0)*

### **NANO 825 - Thin Film Technology for Device Fabrication**

The course provides a fundamental understanding of the thin film deposition techniques and epitaxial growth of semiconductor materials. High vacuum technology and application of the deposition processes to the fabrication of heterostructure devices are also covered.

*Prerequisites: NANO 702 or consent of instructor.*

*Credits: 3 (3-0)*

### **NANO 827 - Solid State Devices**

This course deals with p-n junction and Schottky barrier diodes, bipolar junction and field effect transistors, heterostructure devices (e.g., heterojunction bipolar transistors and solar cells), and device modeling and simulation.

*Prerequisites: NANO 702 or consent of instructor*

*Credits: 3(3-0)*

### **NANO 831 - Advanced Nanomodeling and Applications**

This graduate level course is an advanced level treatment of atomistic and molecular modeling at nanoscale with a focus on the principles and background theory of the modeling methods and applications of relevance to crystalline, amorphous, ceramic, cementitious, and bio systems.

*Prerequisites: NANO 731 or consent of the instructor.*

*Credits: 3 (3-0)*

### **NANO 841 - Intermolecular and Surface Forces**

This course covers the theory and principles of forces between molecules, particles, and surfaces typically relevant at micrometer and nanometer length scales. Topics include: detailed treatment of dispersion, polar, and electrostatic interactions; solvation, hydration and steric forces; adhesion and surface tension; and relevance to real material systems.

*Prerequisite: Basic courses in thermodynamics recommended.*

*Credits: 3 (3-0)*

### **NANO 851 - Computational Nanoscale Modeling Laboratory**

This is a laboratory rotation course to expose and educate the students on computational modeling analysis, and enabling technologies available for nanoscale modeling.

*Prerequisites: Student in Nanoengineering/Nanoscience Ph.D. program.*

*Credits: 1 (0-1)*

### **NANO 852 - Nanoelectronics Laboratory**

This is a laboratory rotation course to expose and educate the students on the equipment and tools available in the nanoelectronics laboratory.

*Prerequisites: Student in Nanoengineering/Nanoscience Ph.D. program.*

*Credits: 1 (0-1)*

### **NANO 853 - Nano-Bio Electronics Laboratory**

This is a laboratory rotation course to expose and educate the students on the equipment and tools available in the nano-bio electronics laboratory.

*Prerequisites: Student in Nanoengineering/Nanoscience Ph.D. Program.*

*Credits: 1 (0-1)*

### **NANO 854 - Nanomaterials Laboratory**

This is a laboratory rotation course to expose and educate the students on the equipment and tools available in the nanomaterials laboratory.

*Prerequisites: Student in Nanoengineering/Nanoscience Ph.D. program.*

*Credits: 1 (0-1)*

### **NANO 855 - Advanced Nano Laboratory**

NANO-855 is a 1-credit practical and more hand-on oriented laboratory course of energy storage material and device. The laboratory course will provide hands-on experiences with the specific topics regarding advanced nanomaterials such as battery anode and cathode material for energy storage application. Student will learn how to design and synthesize energy storage material for battery and how to assemble its device and finally how to evaluate battery performance.

*Prerequisites: Student in Nanoengineering/Nanoscience Ph.D. program.*

*Credits: 1 (0-1)*

### **NANO 857 – Rotation in Synthetic Biology I**

This graduate-level course is intended for students in the PhD program in Nanoengineering with a concentration in Synthetic Biology. The students will learn how to conduct new or ongoing research on and interact with biomaterials, cellular and molecular biology reagents, protocols, methods and materials. The subjects will be selected based on discussions with the course instructor and determined at the beginning of the course, based on the background of the students and in accordance with the instructor's determination. These subjects are intended to increase knowledge on diverse and state-of-the-art methodologies in the mentioned fields.

*Prerequisites: Instructor permission.*

*Credits: 1 (0-1)*

### **NANO 858 – Rotation in Synthetic Biology II**

This graduate-level course is intended for students in the PhD program in Nanoengineering with a concentration in Synthetic Biology. The students will learn how to conduct new or ongoing research on and interact with biomaterials, cellular and molecular biology reagents, protocols, methods and materials. The subjects will be selected based on discussions with the course instructor and determined at the beginning of the course, based on the background of the students and in accordance with the instructor's determination. These subjects are intended to increase knowledge on diverse and state-of-the-art methodologies in the mentioned fields.

*Prerequisites: Instructor permission.*

*Credits: 1 (0-1)*

### **NANO 859 – Rotation in Synthetic Biology III**

This graduate-level course is intended for students in the PhD program in Nanoengineering with a concentration in Synthetic Biology. The students will learn how to conduct new or ongoing research on and interact with biomaterials, cellular and molecular biology reagents, protocols, methods and materials. The subjects will be selected based on discussions with the course instructor and determined at the beginning of the course, based on the background of the students and in accordance with the instructor's determination. These subjects are intended to increase knowledge on diverse and state-of-the-art methodologies in the mentioned fields.

*Prerequisites: Instructor permission.*

*Credits: 1 (0-1)*

### **NANO 861 - Advanced Nano Energy System**

NANO-861 is a 3-credit advanced and more practical oriented course of energy storage material and system. The course will be specifically touching on what are the advanced nanomaterials on energy storage application, how to design the material and how to fabricate its device through state-of-the-art equipment. Furthermore, the course will provide how to elucidate the failure mechanism using a nanoscale fundamental analysis.

*Prerequisite: None.*

*Credits: 3 (3-0)*

### **NANO 881 – Nano and Synthetic Biology**

Synthetic Biology is the use of biological tools and engineering rules to make things, reprogram pathways and components, and provide non-existing solutions. In this course we will use biological tools and engineering rules to understand and harness synthetic biology for nanotechnology and engineering applications. Aligned with the goals of SemiSynBio Roadmap (which is a national priority to merge nanotechnology, semiconductor industry, and synthetic biology), this course will increase the students' awareness of this emerging merger. Therefore, this course is in synergy with current national priorities.

*Prerequisite: NANO 781*

*Credits: 3 (3-0)*

### **NANO 882 – Advanced Biomedical Nanomaterials**

This graduate 800 level course focuses on nanoscale materials and their application in biomedicine and biomedical engineering, an interdisciplinary field that encompasses biology, chemistry, medicine and engineering to treat and heal damaged or diseased tissues, organs, and biological systems. Concepts related to the fundamentals of nanomaterials, their synthesis, characterization, biocompatibility and functionalization will be presented. Students will expand their current understanding of the application of nanomaterials on topics including: nanocarriers, nanomedical devices, nanobiosensors, tissue engineering, and nanomaterials in medical imaging. Case studies of specific nanomaterial applications in the fields of cancer, infectious diseases, and the human circulatory system will be discussed. Students will be required to participate in, and lead discussions on the course material and relevant journal articles.

*Prerequisite: NANO 782*

*Credits: 3 (3-0)*

### **NANO 885 - Special Topics Nanoengineering**

This course is designed to allow the introduction of potential new courses on a trial basis or special content courses on a once only basis at the doctoral level. The topic of the course and title are determined prior to registration.

*Prerequisite: Consent of the instructor.*

*Credits: 3 (3-0)*

### **NANO 994 - Doctoral Supervised Research**

This is supervised research under the mentorship of a member of the graduate faculty. It is not intended to serve as the dissertation topic of the doctoral student. The student receives a Pass/Fail and no letter grade is given upon completion.

*Prerequisite: Doctoral level standing.*

*Credits: 3 (3-0)*

### **NANO 997 - Doctoral Dissertation**

This represents the supervised research leading to the dissertation for the doctoral student. The student receives a Pass/Fail grade only after the completion of the final Ph.D. oral defense.

*Prerequisite: Passed NANO 995 and consent of the advisor..*

*Credits: 3 (3-0)*

### **NANO 999 - Continuation of Dissertation**

This course is for doctoral students who have completed all required dissertation credit hours. This can be repeated by the students as required. The student receives a Pass/Fail and no letter grade given upon completion.

*Prerequisite: Completion of all dissertation credits in nanoengineering.*

*Credits: 1 (1-0)*

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## **THE GRADUATE COLLEGE**

<https://www.ncat.edu/tgc/index.php>

Clay Gloster, Jr., Dean

Matthew B. A. McCullough, Associate Dean

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The Graduate College at North Carolina A&T State University offers 9 doctoral degree programs (12 concentrations), 29 master's degree programs (53 concentrations), one post-master's certificate program, and 8 post-baccalaureate certificate programs in collaboration with the following colleges: College of Agriculture and Environmental Sciences, College of Arts Humanities and Social Sciences, College of Business and Economics, College of Education, College of Engineering, College of Health and Human Sciences, College of Science and Technology, and the Joint School of Nanoscience and Nanoengineering. Currently, six graduate programs including one doctoral program, five master's programs and one post-baccalaureate certificate program have been approved for distance education. Details regarding all our programs of study are provided in this catalog. NC A&T also offers a variety of financial assistance options for graduate study.

### **POST-BACCALAUREATE CERTIFICATE PROGRAMS OFFERED**

- Cybersecurity
- Data Analytics

## Post-Baccalaureate Certificate - Cybersecurity

The Graduate College

**Program Coordinator:** Yolanda Stone

**Email:** ystone@ncat.edu

**Phone:** (336) 285-2380

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This certificate is available only as an online program.

### **Additional Admission Requirements**

- Earned bachelor's degree from an accredited university

### **Certificate Requirements**

Total credit hours: 12

- Core courses (6 credits)
- Technical Electives (6 credits)

### **Core courses**

Core Course 1 (Student must select either COMP 620 or CST 615)

COMP 620 Information Privacy and Security (3)

OR

CST 615 Advanced Security Applications (3)

Core Course 2 (Student must select either CST 750 or COMP 726)

CST 750 Computer System Security (3)

OR

COMP 726 Network Security (3)

### **Electives (choose two from the list below)**

COMP 621 Web Security (3)

COMP 725 Software Security Testing (3)

COMP 727 Secure Software Engineering (3)

COMP 878 Usable Security (3)

COMP 895/COMP 826 Special Topics: Security for Emerging Networks (3)

CST 605 Principles of Computer Networking (3)

CST 620 Telecommunications Management (3)

CST 625 Computer Database Management (3)

CST 685 Special Topics: Information Security (3)

## Post-Baccalaureate Certificate – Data Analytics

The Graduate College

**Program Coordinator:** Yolanda Stone

**Email:** ystone@ncat.edu

**Phone:** (336) 285-2380

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This certificate is available only as an online program.

### **Additional Admission Requirements**

- Earned bachelor's degree from an accredited university

### **Certificate Requirements**

Total credit hours: 12

- Core courses (6 credits)
- Technical Electives (6 credits)

### **Core courses**

#### Core Course 1 (Student must select either STAT 707 or CSE 704)

STAT 707 Introduction to Data Science (3)

OR

CSE 704 Data Processing and Visualization (3)

#### Core Course 2 (Student must select either CSE 708 or STAT 708)

CSE 708 Application of Data Analytics and Engineering (3)

OR

STAT 708 Linear Models for Data Science (3)

### **Electives (Student must select two courses from the list below)**

BUAN/MGMT 725 Business Analytics (3)

BUAN/MGMT 740 Data Analysis & Business Intelligence Application (3)

CSE 701 Applied Probability and Statistics (3)

CSE 801 Computational Statistics (3)

CSE 805 Machine Learning and Data Mining (3)

CSE 817 Fundamentals of Big Data Analysis (3)

ISEN 685/ISEN 662 Special Topics: Programming for Data Analysis (1)

ISEN 821 Multivariate Statistics for Engineers (3)

ISEN 885/ISEN 862 Special Topics: Data Preparation, Visualization and Analytics for Societal Impact (3)

ISEN 885/ISEN 863 Special Topics: Data Analytics Practicum (3)

MATH 690 Scientific Programming for Mathematical Science (3)

MATH 782 Statistical Data Analytics and Visualization (3)

STAT 710 Statistical and Deep Learning (3)

STAT 711 Statistical Computing and Algorithm Analysis (3)

STAT 823 Time Series and Business Analytics (3)

STAT 824 Biostatistics and Health Analytics (3)

**Computational Data Science and Engineering**

**CSE 701 - Appl Probability & Statistics**

This course addresses probability and statistics theory and techniques with common application in computational science and engineering. The course will include exploratory data analysis techniques, statistical standard distributions, one-and-two sample tests with continuous data, regression analysis, analysis of variance, analysis of tabular data, sample size calculations, hypothesis testing, linear regression, and design of experiments. Statistical languages such as R will be used to implement the concepts learned in the course. Prerequisites: None. (F;S)

3.000 Credit hours

**CSE 704 - Data Processing and Visualization**

This course deals with the process of data development through computational thinking and methodologies. Processing techniques such as generating, describing, cleaning, verifying and formatting data will be covered. Various approaches to visualization such as exploration, explanation, and spatio-temporal representations will also be covered. Prerequisites: None. (F;S);

3.000 Credit hours

**CSE 708 – Data Analytics and Engineering Applications**

This is a project-based course where the students will consider the challenges, issues, and approaches of solving various data analytics and engineering problems in a variety of applications in business, e-commerce, bioinformatics, social media, intelligent transportation, and image and video libraries. The course will also introduce and review concepts in data analytics and engineering such as the data ingestion cycle, the 5Vs of big data, data structures and formats, and hardware and software requirements. Prerequisites: None. (F;S);

3.000 Credit hours

**CSE 801 - Computational Statistics**

This course covers computational statistical concepts for analyzing large data sets including. Topics include: maximum likelihood, generating random variables, estimating distributions via simulation, expectation maximization, data partitioning including bootstrapping, jackknifing and cross-validation, multivariate, parametric and non-parametric regression, principle components, classification and regression trees, and multivariate analysis of variance (MANOVA). Statistical packages such as MATLAB will be utilized to implement the concepts learned in the course. Prerequisites: None. (F;S);

0.000 OR 3.000 Credit hours

**CSE 805 - Machine Learning and Data Mining**

This course covers machine-learning and data -mining concepts for analyzing very large, complex data sets Topics include data preprocessing, measuring data similarity, mining frequent patterns, association rule mining, classification/prediction, cluster analysis, neural-network, decision trees, discriminant analysis, rule-based decisions, nearest-neighbor and naive Bayes classifier, outlier detection and others. Machine learning tools like WEKA will be introduced to augment the course materials. Prerequisites:

Consent of the instructor. (F;S);

3.000 Credit hours

### **CSE 817 – Fundamentals of Big Data Analysis**

This course covers the concepts of big data analysis such as variety, velocity, veracity, and value. The course focuses on issues of storage, processing, analysis, visualization and application of big data. Technologies such as MapReduce and Hadoop are discussed, in addition to the newest trends.

Prerequisites: None. (F;S);

3.000 Credit hours

## **Computer Science**

### **COMP 620 - Information, Privacy & Security**

This course examines the security and privacy issues associated with information systems. There are cost/risk tradeoffs to be made. Topics discussed include technical, physical, and administrative methods of providing security, access control, identification, and authentication. Encryption is examined, including Data Encryption Standards (DES) and public key cryptosystems. Management considerations such as key protection and distribution, orange book requirements, and OSI data security standards are covered.

Privacy legislation is covered, as is current cryptographic research.

3.000 Credit hours

### **COMP 621 - Web Security**

This course focuses on the technologies that provide security services for the World Wide Web. It introduces a set of procedures, practices, and technologies for protecting web servers, web users, and their surrounding organizations. We discuss, understand and use various security technologies for the World Wide Web (WWW). How to use these technologies to secure WWW applications will be addressed.

3.000 Credit hours

### **COMP 725 - Software Security Testing**

This course focuses on software security testing techniques and tools. It covers security testing techniques such as code reviews and static analysis, creating test plans based on risk analysis, black-box, white-box and gray-box security testing and fault injection. Security testing tools will be introduced. Prerequisite: Graduate student standing.

3.000 Credit hours

### **COMP 726 - Network Security**

The course covers various aspects of securing data during their transmission. It includes the following topics: vulnerabilities in software and hardware systems; cyber attack methods and their defense mechanisms; symmetric ciphers; public key ciphers; hash functions; message authentication and digital signature; public key infrastructure and web of trust; email security; web security; IPSec; firewall; intrusion detection system. Prerequisite: Graduate student standing.

3.000 Credit hours

### **COMP 826 - Security for Emerging Networks**

This course discusses Software Defined Network (SDN)/Network Functions Virtualization (NFV), and other emerging network technologies. It covers advanced attacks to SDN/NFV and other emerging networking paradigms and defense techniques in the current research. Prerequisite: COMP726 or permission of the instructor.

3.000 Credit hours

## **Computer Systems Technology**

### **CST 605 - Prin of Computer Networking**

This course focuses on the concepts and principles of computer network protocols. The topics include the fundamentals of computer networks and Internet, application layer, transport layer, network layer, link layer (links, access networks, and LANS), wireless and mobile networks, packet switching, addressing, routing and flow/ congestion control, multimedia networking, security in computer networks, network management, and emphasis on internet working protocols. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 615 - Advanced Net Security Applica**

This course explores security terms, definitions, concepts, and issues that face industries today. This course also will examine how the concept of security, and being secure, integrates into the overall enterprise mission. The importance of user involvement, security training, ethics, trust, and informed management will be explored. Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **CST 620 - Telecommunications Management**

This course addresses fundamental principles of telecommunications management, which includes network management and administration, the telecommunications marketplace, and the planning and evaluation of systems. The Technology of modern telecommunications systems is also reviewed.

Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **CST 625 - Computer Database Management**

This course examines the fundamental concepts and theory of database management systems. Topics cover database system architectures, data models, query languages, conceptual database design, logical database design, normalization, and physical database design. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 685 - Special Topics**

This course involves the study of a topic not addressed by an existing course in the department. Typically, a topic is selected from within a new or evolving area in the field. Prerequisites: None. (F;S;SS)

3.000 Credit hours

### **CST 750 - Computer System Security**

This course focuses on the concepts and principles of computer security, cryptography, authentication, securing networks, threat environment, access control, firewalls, host hardening, application security, data protection, incident response, and a networking primer. A clear theoretical understanding supports a large practical component. Prerequisites: None. (F;S;SS)

3.000 Credit hours

## **Management**

### **BUAN 725 - Business Analytics**

This course will cover the basic descriptive, predictive, and prescriptive analytical techniques for decision making in all business functions. Topics covered will include constructing and analyzing data distributions, decision theory and analysis, statistical sampling and confidence estimation, business forecasting, linear and multiple regression models, linear and integer mathematical programming, and computer simulation. Students will utilize statistical and mathematical programming software throughout the course to solve complex managerial

problems and interpret results. Prerequisites: BUAN 605 or Permission of Instructor. (F;S;SS)  
3.000 Credit hours

### **BUAN 740 – Data Anlys & Busi Intel Appli**

In this course, the use of information systems applications and techniques for data analytics will be covered. Concepts from data warehouses, data mining, business intelligence, and data analytics will be used to model and solve problems with business processes. Data analytics and business intelligence techniques used to discover and report patterns of relationships among organizational processes hidden in databases will also be examined. A case based approach will be used to enable students many opportunities to extract, synthesize, analyze and interpret information from disparate sources to make business decisions. Prerequisites: MGMT 420, ACCT 763, FIN 750, MGMT 727, ECON 708, MGMT 725, MKTG 716, MGMT 750. (F;S;SS)  
3.000 Credit hours

## **Mathematics and Statistics**

### **MATH 690 - Scientific Pro for Math Scien**

This course covers the implementation of the computer in the Mathematical sciences. MATLAB will be used to apply algorithms and solve problems in areas such as differential equations and Linear algebra. Probability and statistical problems will be studied through the "R" language. Prerequisite: None. (F;S)  
3.000 Credit hours

### **MATH 782 – Stat Data Analytics and Visual**

This course explores statistical methods and computational programming skills for data analytics and visualization. Topics covered include linear regression, generalized linear regression, classification, text analysis, clustering and visualization. This course provides practical and prudent applications of data analytics methods to real world problems with contemporary programming tools  
3.000 Credit hours

### **STAT 707 - Introduction to Data Science**

This course covers the data science concepts and skills needed to collect, manipulate, compute with, and interpret data. The students will learn to write R, SAS and/or Python programs that manipulate and visualize data, and they will learn statistical inference, predictive modeling and machine learning techniques essential to analyzing and presenting data. Prerequisite: Graduate Standing. (F;S;SS) Graduate standing and permission of instructor.  
3.000 Credit hours

### **STAT 708 - Linear Models for Data Science**

The course introduces principles and methods of least squares regression and design of experiments that are used to solve data science problems. Least squares regression covers simple and multiple linear regression, including estimation, inference, model building and variable selection. Design of experiments introduces statistically designed experiments and related analytical methods. The course utilizes statistical programming language such as R, SAS, and/or Python. Prerequisite: STAT 707 or permission of instructor (F;S;SS)  
3.000 Credit hours

### **STAT 710 - Statistical and Deep Learning**

This course covers advanced topics in statistical and deep learning. The course provides a statistical approach to neural network algorithms and artificial intelligence complex high-dimensional problems in business and the social, natural, and life sciences Prerequisite: STAT 707. (F;S;SS)  
3.000 Credit hours

### **STAT 711 - Stat Comp and Algorithm Analy**

This course covers both theoretical and practical issues of statistical computing and algorithms required in modern data science. Students will learn how to develop algorithms for statistical methods and apply them to data science problems. Topics include resampling methods, EM algorithms, Markov chain Monte Carlo simulation, gradient-based optimization, and nonparametric curve fitting. Prerequisite: STAT 707. (F;S;SS)  
3.000 Credit hours

### **STAT 823 - Time Series Business Analytics**

This course covers advanced statistical methods and analytical techniques for business and financial decision making. Topics include univariate and multivariate time series modeling, nonstationarity and nonlinearity, frequency domain analysis, market research analysis, and management and operational data analysis. Students will learn both theoretical and practical approaches with advanced data analytics and visualization tools. Prerequisite: MATH 624 or STAT 708. (F;S;SS)  
3.000 Credit hours

### **STAT 824 - Biostatistics Health Analytics**

This course introduces statistical models and research designs to understand complex biomedical problems in public health, clinical trials, bioinformatics, and health care research fields. Topics include mixed effects model, regression analysis for time-to-event data and longitudinal data, and electronic health record data analysis. The emphasis is on leveraging advanced data analytics and visualization tools for methodological and practical applications. Prerequisite: MATH 624 or STAT 708 or permission of instructor. (F;S;SS)  
3.000 Credit hours

## **The Graduate College**

### **GRAD 799 - Continuation Residency**

Meets requirement for continuous enrollment during final term prior to graduation when all course credit requirements (including thesis or dissertation) have been completed. This course is non-graded, may receive a grade of S/U, and credit for this course does not count toward the degree. May be repeated twice. Prerequisites: None. (F;S;SS)  
1.000 TO 3.000 Credit hours

### **GRAD 999 - Continuation Residency**

Meets requirement for continuous enrollment during final term prior to graduation when all course credit requirements (including thesis or dissertation) have been completed. This course is non-graded, may receive a grade of S/U, and credit for this course does not count toward the degree. May be repeated twice. Prerequisites: None. (F;S;SS)  
1.000 TO 3.000 Credit hours

## **Instructional Technology**

### **INST 600 - Utilization Educational Media**

Applies basic concepts to problems in teaching and learning with school and adult audiences. Relates philosophical and psychological bases of communications to teaching. Discusses the role of communications in problem solving, attitude formation, and teaching, methods of selecting and using educational medial materials effectively in teaching. It provides experience in operating equipment, basic techniques in media preparation and practice in planning and presenting a session.

3.000 Credit hours

### **INST 605 - Computers in Education**

The student will be introduced to the various uses and functions of the computer in educational settings. The integration of the computer as a tool for instructor and student use; and its use as a tutor for student use in a variety of formats will be addressed. A basic introduction to the Internet and the World Wide Web will also be provided. Students will also explore different hardware and software configurations.

This is not a course for introducing computer usage.

3.000 Credit hours

### **INST 613 - Develop Media for Chldrn**

This course will entail a study of children's literature with emphasis on aids and criteria for selection of books and other materials for preschool through late childhood ages, story telling, and an investigation of reading interests.

3.000 Credit hours

### **INST 614 - Book Select Relat Mtrl Yng Peo**

A consideration of literature, reading interests, and non-book materials for young people.

3.000 Credit hours

### **INST 680 - Cataloging of Media Materials**

3.000 Credit hours

### **INST 700 - Instructional Design**

3.000 Credit hours

### **INST 701 - Found Instructional Technology**

This course provides an overview of the Instructional Technologoy field. Students will be introduced to some of the significant issues, areas, and practices in instructional technology. The history, current trends, and issues in instructional technology and their implications for education and training will be discussed during the course. This course also examines the instructional applications of microcomputers and telecommunications in classroom settings. Students will be informed of job opportunities, professional associations, and literature of the profession.

3.000 Credit hours

### **INST 702 - Gener Teaching And Assess Meth**

This course examines a variety of teaching and assessment methods that are appropriate for use with a variety of learners. Candidates will adjust methods to address the needs of K-adult learners and for a variety of environments (school, community, and business). Prerequisite: None. (F;S;SS)

3.000 Credit hours

### **INST 703 - Leadership and Management**

This course gives candidates the knowledge, skills, and dispositions to exercise management skills and provide leadership within their areas of expertise. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**INST 705 - Instruct Tech Serv Bus Indust**

This course introduces students to the impact of technology within business and industry and how learning in that environment warrants instruction that differs from that of traditional education. Students will have the opportunity to (a) investigate various learning and presentation needs of business and industry clients; and (b) apply different delivery methods and techniques, and technological applications to specific audiences in that environment.  
3.000 Credit hours

**INST 709 - Theory Mthds Ed Train Adult Le**

3.000 Credit hours

**INST 720 - Visual Media**

3.000 Credit hours

**INST 721 - Multimedia Develop and Evaluati**

3.000 Credit hours

**INST 722 - Adv Internet Use in Education**

3.000 Credit hours

**INST 723 - Media and Tech in the Schools**

This course prepares candidates to plan, implement, administer, and evaluate media and technology resources in schools. Issues in media and technology selection and use (including ethical use) are discussed. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**INST 725 - Tech Facilitation in Schools**

3.000 Credit hours

**INST 731 - Assistive Tech for Spec Needs**

This course focuses on assistive technologies (AT) and their application in learning contexts, with a special emphasis on English Language Learners and individuals with learning disabilities and behavioral challenges. AT for motor impairments, communication disorders, hearing impairments, and visual impairments will be introduced. Course participants will also understand the application of Universal Design principles in AT use. (F;S;SS)  
3.000 Credit hours

**INST 732 - Assistive Computer Technology**

This course includes an in-depth study of hardware and software solutions and services that classroom teachers can use to address learning disabilities and behavioral challenges. Assistive Computer Technologies that can address communication disorders, motor, hearing, and visual impairments will be included. Universal Design for Learning UDL principles will be applied in identifying AT that can result in multiple means of representation, expression, and engagement for the learner. (F;S;SS)  
3.000 Credit hours

**INST 733 - Integrat Assis Tech in K-12 CI**

This course prepares teachers to apply assistive technologies (AT) including low tech tools to a variety of learning disabilities and behavioral challenges in the inclusion classroom. Teaching strategies and technologies for English Language Learners will also be included. Universal Design principles will be applied in understanding learner needs and using AT to remove barriers to the curriculum. Specific strategies for parental education and involvement will be discussed. (F;S;SS)  
3.000 Credit hours

**INST 735 - Assistive Tech and Di Learners**

This course uses Universal Design as a foundation for learning and teaching. Course participants will learn strategies and techniques based on Universal Design principals to design instruction that makes curriculum accessible to ALL learners, including those with disabilities. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**INST 741 - Media Center Management**

3.000 Credit hours

**INST 750 - Distance Education**

3.000 Credit hours

**INST 751 - Educ Software Dsgn & Eval**

3.000 Credit hours

**INST 752 - Designing Courses Online Deliv**

3.000 Credit hours

**INST 753 - Program Evaluation**

3.000 Credit hours

**INST 755 - Programming in Basic**

3.000 Credit hours

**INST 756 - Programming in LOGO**

3.000 Credit hours

**INST 757 - Authoring Software**

3.000 Credit hours

**INST 758 - Emerg Tech Authoring Prob Solv**

3.000 Credit hours

**INST 760 - Social Found Instruct Tech**

3.000 Credit hours

**INST 765 - Super Man for Medi Tech Coord**

This course will provide students with models and guides for managing media and technology resources for K-12 educational settings and supervision of lab and media center schedules and assistants. Included within this course are the evaluation of policies and procedures and meeting the needs of the stakeholders. Prerequisite: None. (F;S;SS)  
3.000 Credit hours

**INST 768 - Comp Lab Supervision & Mgmt**

3.000 Credit hours

**INST 770 - Indep Study in Instruct Tech**

1.000 TO 3.000 Credit hours

**INST 771 - Spec Top Instructional Tech**

1.000 TO 3.000 Credit hours

**INST 785 - Internship in Instruc Tech**

This course is a professional laboratory designed to provide the student with on-the-job training and direct experiences relating to the professional track she/she has chosen within the program. Students have an opportunity to develop research in an area related to practical experience. Prerequisite: None. (F;S;SS)

3.000 Credit hours

**INST 788 - Comprehensive Examination**

This course is for candidates who need to take the core Comprehensive Examination. Prerequisites: Core Courses. (F;S;S)

0.000 Credit hours

**INST 791 - Thesis/Sp Proj Rsrch Develop**

3.000 Credit hours

**INST 792 - Spec Proj/Thesis Continuation**

1.000 Credit hours