Mathematics Education (BS) and Statistics (BS) (Double Major)

The double degree in Mathematics Education (BS) and Statistics (BS) is one of two double degree options in the Mathematics Education program in the Department of STEM Education.

This degree program prepares teacher-leaders to have a deep understanding of the mathematics and statistics they will teach and knowledge about different pedagogical strategies they can apply in the classroom. Students take five courses focused on mathematics education, beginning in their sophomore year. Our professional courses in the junior and senior year offer relevant pedagogical experiences, emphasize teaching mathematics with technology, and provide rich field experiences in math classrooms. Graduates are recommended for an initial North Carolina teaching license in mathematics grades 9-12. They will be able to seek employment opportunities in education and make a positive difference in their communities.

In addition, students earn a degree in Statistics. Upper level statistics electives help prepare students for a variety of statistics-related fields in addition to teaching at the secondary level and graduate study in statistics or related fields.

Students in this program also have the opportunity to participate in:

- Undergraduate research
- Kappa student chapter of the NC Council of Teachers of Mathematics, and other high impact experiences such as Passport to Success, SAY Village, and study abroad
- Tutoring in local schools

For more information about this program, visit our website (https://ced.ncsu.edu/programs/mathematics-education-middle-school-or-secondary-bachelor/).

Program Coordinator:
Dr. Cyndi Edgington
Email: cpedging@ncsu.edu
502J Poe Hall
919-515-1754

Plan Requirements
Mathematics Education (BS) and Statistics (BS) (Dual Degree): 129 Total Units

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENG 101</td>
<td>Academic Writing and Research</td>
<td>4</td>
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<tr>
<td>COM 112</td>
<td>Interpersonal Communication</td>
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</table>

Natural Sciences
Natural Sciences I & II (p. 2) 1
Natural Science Elective 1

GEP Courses
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/) 6
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/) 2

Mathematics Education (BS) and Statistics (BS) (Double Major) 1

To satisfy the science requirement, a sequence of two lab-based courses (BIO 181 and BIO 183, or CH 101/CH 102 and CH 201/CH 202, or PY 205 and PY 208, or PY 201 and PY 202, or PY 211 and PY 212) must be taken. The third science may be selected from the GEP list of approved science courses.

Mathematical Sciences
MA 141 Calculus I 2 4
MA 241 Calculus II 2 4
MA 242 Calculus III 2 4
MA 225 Foundations of Advanced Mathematics 2 3
MA 405 Introduction to Linear Algebra 2 3
MA 403 Introduction to Modern Algebra 2 3
MA 408 Foundations of Euclidean Geometry 2 3

Statistics Courses
ST 311 Introduction to Statistics 2 3
ST 312 Introduction to Statistics II 2 3
ST 307 Introduction to Statistical Programming- SAS 2 1
ST 308 Introduction to Statistical Programming - R 2 1
ST 421 Introduction to Mathematical Statistics I 2 3
ST 422 Introduction to Mathematical Statistics II 2 3
ST 430 Introduction to Regression Analysis 2 3
ST 431 Introduction to Experimental Design 2 3
ST 432 Introduction to Survey Sampling 2 3
ST 445 Introduction to Statistical Computing and Data Management 2 3

Advanced Statistics Elective (p. 2) 2 3

Professional Education
ED 100 Intro to Education 2 2
EDP 304 Educational Psychology 2 3
ELP 344 School and Society 2 3
ECI 416 Teaching Exceptional Students in the Mainstreamed Classroom 2 3
EMS 204 Introduction to Mathematics Education 2 3
ED 204 Introduction to Teaching in Today's Schools 2 2
ED 311 Classroom Assessment Principles and Practices 2 2
ED 312 Classroom Assessment Principles and Practices Professional Learning Lab 2 1
EMS 480 Teaching Mathematics with Technology 2 3
EMS 470 Methods and Materials for Teaching Mathematics 2 3
EMS 471 Student Teaching in Mathematics 2 10
EMS 472 Teaching Mathematics Topics in Senior High School 2 3
EMS 490 School Mathematics from an Advanced Perspective 2 3
EMS 495 Senior Seminar in Mathematics and Science Education 2 2
GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) (Humanities/Social Sciences/Visual and Performing Arts)

GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)

GEP U.S. Diversity (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/) (verify requirement)

GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)

Foreign Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/) (verify requirement)

Total Hours 129

1 A grade of C- or higher is required.
2 A grade of C or higher is required.
3 A grade of B- or higher is required.

Natural Sciences I & II

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CH 101</td>
<td>Chemistry - A Molecular Science</td>
<td>3</td>
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<tr>
<td>CH 102</td>
<td>General Chemistry Laboratory</td>
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<tr>
<td>CH 201</td>
<td>Chemistry - A Quantitative Science</td>
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</tr>
<tr>
<td>CH 202</td>
<td>Quantitative Chemistry Laboratory</td>
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</table>

Biology Sequence

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>BIO 181</td>
<td>Introductory Biology: Ecology, Evolution, and Biodiversity</td>
<td>4</td>
</tr>
<tr>
<td>BIO 183</td>
<td>Introductory Biology: Cellular and Molecular Biology</td>
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</table>

Physics Sequence A

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>PY 205</td>
<td>Physics for Engineers and Scientists I</td>
<td>3</td>
</tr>
<tr>
<td>PY 208</td>
<td>Physics for Engineers and Scientists II</td>
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Physics Sequence B

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>PY 201</td>
<td>University Physics I</td>
<td>4</td>
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<tr>
<td>PY 202</td>
<td>University Physics II</td>
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Physics Sequence C

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<thead>
<tr>
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<tr>
<td>PY 211</td>
<td>College Physics I</td>
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<tr>
<td>PY 212</td>
<td>College Physics II</td>
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Advanced Statistics Elective

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CSC 442</td>
<td>Introduction to Data Science</td>
<td>3</td>
</tr>
<tr>
<td>ECG 561</td>
<td>Applied Econometrics I</td>
<td>3</td>
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<tr>
<td>EMS 519</td>
<td>Teaching and Learning of Statistical Thinking</td>
<td>3</td>
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<tr>
<td>GPH 404</td>
<td>Epidemiology and Statistics in Global Public Health</td>
<td>3</td>
</tr>
<tr>
<td>MA 412</td>
<td>Long-Term Actuarial Models</td>
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</tr>
<tr>
<td>MA 413</td>
<td>Short-Term Actuarial Models</td>
<td>3</td>
</tr>
<tr>
<td>MA 546</td>
<td>Probability and Stochastic Processes I</td>
<td>3</td>
</tr>
<tr>
<td>ST 401</td>
<td>Experiences in Data Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ST 404</td>
<td>Epidemiology and Statistics in Global Public Health</td>
<td>3</td>
</tr>
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</table>

ST 405 | Applied Nonparametric Statistics                | 3     |
| ST 412 | Long-Term Actuarial Models                      | 3     |
| ST 413 | Short-Term Actuarial Models                     | 3     |
| ST 433 | Applied Spatial Statistics                      | 3     |
| ST 434 | Applied Time Series                             | 3     |
| ST 435 | Statistical Methods for Quality and Productivity Improvement | 3     |
| ST 437 | Applied Multivariate and Longitudinal Data Analysis | 3     |
| ST 440 | Applied Bayesian Analysis                       | 3     |
| ST 442 | Introduction to Data Science                    | 3     |
| ST 491 | Statistics in Practice                          | 3     |
| ST 495 | Special Topics in Statistics                    | 1-6   |
| ST 501 | Fundamentals of Statistical Inference I         | 3     |
| ST 502 | Fundamentals of Statistical Inference II        | 3     |
| ST 503 | Fundamentals of Linear Models and Regression   | 3     |
| ST 505 | Applied Nonparametric Statistics                | 3     |
| ST 506 | Sampling Animal Populations                     | 3     |
| ST 507 | Statistics For the Behavioral Sciences I        | 3     |
| ST 508 | Statistics For the Behavioral Sciences II       | 3     |
| ST 511 | Statistical Methods For Researchers I           | 3     |
| ST 512 | Statistical Methods For Researchers II          | 3     |
| ST 513 | Statistics for Management I                     | 3     |
| ST 514 | Statistics For Management and Social Sciences II| 3     |
| ST 515 | Experimental Statistics For Engineers I         | 3     |
| ST 516 | Experimental Statistics For Engineers II        | 3     |
| ST 517 | Applied Statistical Methods I                   | 3     |
| ST 519 | Teaching and Learning of Statistical Thinking   | 3     |
| ST 520 | Statistical Principles of Clinical Trials       | 3     |
| ST 524 | Statistics In Plant Science                     | 3     |
| ST 533 | Applied Spatial Statistics                      | 3     |
| ST 534 | Applied Time Series                             | 3     |
| ST 535 | Statistical Methods for Quality and Productivity Improvement | 3     |
| ST 537 | Applied Multivariate and Longitudinal Data Analysis | 3     |
| ST 540 | Applied Bayesian Analysis                       | 3     |
| ST 544 | Applied Categorical Data Analysis               | 3     |
| ST 546 | Probability and Stochastic Processes I          | 3     |
| ST 555 | Statistical Programming I                       | 3     |
| ST 556 | Statistical Programming II                      | 3     |
| ST 557 | Using Technology to Teach Statistics            | 3     |
| ST 561 | Applied Econometrics I                          | 3     |
| ST 562 | Data Mining with SAS Enterprise Miner           | 3     |
| ST 590 | Special Topics                                  | 1-6   |

Mathematics Education and Statistics Dual Major (13MTHEDMS-13MTHEDSD)

Major Field of Study Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td>Mathematical Sciences</td>
<td></td>
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<tr>
<td></td>
<td>Statistics:</td>
<td></td>
</tr>
</tbody>
</table>

Number of Hours: 129
ST 307  Introduction to Statistical Programming- SAS  1
ST 308  Introduction to Statistical Programming - R  1
ST 311  Introduction to Statistics  3
ST 312  Introduction to Statistics II  3
ST 421  Introduction to Mathematical Statistics I  3
ST 422  Introduction to Mathematical Statistics II  3
ST 430  Introduction to Regression Analysis  3
ST 431  Introduction to Experimental Design  3
ST 432  Introduction to Survey Sampling  3
ST 435  Statistical Methods for Quality and Productivity Improvement  3
(at most one grade below a C is permitted in required and elective math, statistics, and computer science courses; A C- or better is required in ST 421)

**Mathematics:**

MA 141  Calculus I  4
MA 241  Calculus II  4
MA 242  Calculus III  4
MA 225  Foundations of Advanced Mathematics  3
MA 403  Introduction to Modern Algebra  3
MA 405  Introduction to Linear Algebra  3
MA 408  Foundations of Euclidean Geometry  3
(at most one grade below a C is permitted in required and elective math, statistics, and computer science courses)

**Advanced Statistics Elective:**
Choose one ST-labeled 400 or 500 level course from:

ST 516  Experimental Statistics For Engineers II  3
ST 517  Applied Statistical Methods I  3
ST 519  Teaching and Learning of Statistical Thinking  3
ST 520  Statistical Principles of Clinical Trials  3
ST 524  Statistics In Plant Science  3
ST 533  Applied Spatial Statistics  3
ST 535  Statistical Methods for Quality and Productivity Improvement  3
ST 537  Applied Multivariate and Longitudinal Data Analysis  3
ST 540  Applied Bayesian Analysis  3
ST 544  Applied Categorical Data Analysis  3
ST 546  Probability and Stochastic Processes I  3
ST 555  Statistical Programming I  3
ST 556  Statistical Programming II  3
ST 557  Using Technology to Teach Statistics  3
ST 561  Applied Econometrics I  3
ST 562  Data Mining with SAS Enterprise Miner  3
ST 563  Introduction to Statistical Learning  3
ST 590  Special Topics  1-6

**Sciences:**

(To satisfy the science requirement, a sequence of two lab-based science courses must be taken. The third science may be selected from the GEP list of approved science courses)

Choose from:

CH 101  Chemistry - A Molecular Science  3
CH 102  General Chemistry Laboratory  1
CH 201  Chemistry - A Quantitative Science  3
CH 202  Quantitative Chemistry Laboratory  1
OR
BIO 181  Introductory Biology: Ecology, Evolution, and Biodiversity  4
BIO 183  Introductory Biology: Cellular and Molecular Biology  4
OR
PY 201  University Physics I  4
PY 202  University Physics II  4
OR
PY 211  College Physics I  4
PY 212  College Physics II  4

**Science elective:**

(At most one grade below a C- is permitted in the courses satisfying the science requirement)

**Communication:**

COM 112  Interpersonal Communication  3

**Professional Education**

EMS 204  Introduction to Mathematics Education  2
ED 204  Introduction to Teaching in Today's Schools  2
EDP 304  Educational Psychology  3
ELP 344  School and Society  3
EMS 480  Teaching Mathematics with Technology  3
ED 311  Classroom Assessment Principles and Practices  2
### Semester Sequence

This is a sample.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td><strong>First Year</strong></td>
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<tr>
<td><strong>Fall Semester</strong></td>
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<tr>
<td>MA 141</td>
<td>Calculus I A, 4</td>
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<tr>
<td>ENG 101</td>
<td>Academic Writing and Research H</td>
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<tr>
<td>ST 311</td>
<td>Introduction to Statistics 4</td>
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<tr>
<td>GEP Health and Exercise Studies (<a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a>) E</td>
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<td>ED 100</td>
<td>Intro to Education 2</td>
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<td><strong>Hours</strong></td>
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<td><strong>Spring Semester</strong></td>
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<td>MA 241</td>
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<tr>
<td>ST 312</td>
<td>Introduction to Statistics II 4</td>
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<tr>
<td>COM 112</td>
<td>Interpersonal Communication D</td>
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<tr>
<td>ST 307</td>
<td>Introduction to Statistical Programming - SAS 4</td>
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<tr>
<td><strong>Hours</strong></td>
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<tr>
<td>MA 242</td>
<td>Calculus III 4</td>
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<tr>
<td>MA 225</td>
<td>Foundations of Advanced Mathematics 4</td>
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<tr>
<td>Science 1, B, 3</td>
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<tr>
<td>ST 308</td>
<td>Introduction to Statistical Programming - R 4</td>
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<tr>
<td>EMS 204</td>
<td>Introduction to Mathematics Education 2</td>
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<tr>
<td>ED 204</td>
<td>Introduction to Teaching in Today's Schools 2</td>
<td>2</td>
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<tr>
<td>GEP Health and Exercise Studies (<a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a>) E</td>
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<td><strong>Hours</strong></td>
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<td><strong>Spring Semester</strong></td>
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<tr>
<td>ST 445</td>
<td>Introduction to Statistical Computing and Data Management 4</td>
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</tr>
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<td>MA 405</td>
<td>Introduction to Linear Algebra 4</td>
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<tr>
<td><strong>Hours</strong></td>
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<tr>
<td><strong>Total Hours</strong></td>
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</tbody>
</table>

**Third Year**

| Fall Semester                                                                                                      |       |
| ST 421   | Introduction to Mathematical Statistics I 4                           | 3     |
| MA 403   | Introduction to Modern Algebra 4                                       | 3     |
| ED 311   | Classroom Assessment Principles and Practices 2                       | 2     |
| ED 312   | Classroom Assessment Principles and Practices Professional Learning Lab 2                                           | 1     |
| EDP 304  | Educational Psychology D, 2                                            | 3     |
| ECI 416  | Teaching Exceptional Students in the Mainstreamed Classroom          | 3     |
| ST 430   | Introduction to Regression Analysis 4                                  | 3     |
| **Hours** |                                                                      | 18    |

| Spring Semester                                                                                                    |       |
| ST 422   | Introduction to Mathematical Statistics II 4                          | 3     |
| ST 432   | Introduction to Survey Sampling 4                                       | 3     |
| EMS 480  | Teaching Mathematics with Technology 2                                 | 3     |
| EMS 472  | Teaching Mathematics Topics in Senior High School 2                   | 3     |
| ELP 344  | School and Society 2                                                  | 3     |
| GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/) G | 3     |
| **Hours** |                                                                      | 18    |

| Fourth Year                                                                                                        |       |
| **Fall Semester**                                                                                                 |       |
| MA 408   | Foundations of Euclidean Geometry 4                                   | 3     |
| ST 431   | Introduction to Experimental Design 4                                 | 3     |
| EMS 470  | Methods and Materials for Teaching Mathematics 2                      | 3     |
| Advanced Statistics Elective 4, 5                                                                                  | 3     |
| GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) (Humanities/Social Sciences/Visual and Performing Arts) E | 3     |
| EMS 490  | School Mathematics from an Advanced Perspective 2                    | 3     |
| **Hours** |                                                                      | 18    |

| Spring Semester                                                                                                    |       |
| EMS 471  | Student Teaching in Mathematics 2                                     | 10    |
| EMS 495  | Senior Seminar in Mathematics and Science Education 2                 | 2     |
| **Hours** |                                                                      | 12    |

**Total Hours** 130
To satisfy the science requirement a sequence of two lab-based science courses (CH 101/CH 102 and CH 201/CH 202, or BIO 181 and BIO 183, or PY 205 and PY 208, or PY 201 and PY 202, or PY 211 and PY 212) must be taken. The third science may be selected from the GEP list of approved science courses.

A grade below a B- is not permitted in EMS 204. A grade below a C is not permitted in all other EMS, EDP, ECI, ELP, and ED courses.

At most one grade below a C- is permitted in the courses satisfying the science requirement.

At most one grade below a C is permitted in the mathematics, statistics, and computer science courses. A C- or better is required in ST 421.

Advanced Statistics Elective must be ST-labeled course at the 400 or 500 level.

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at [http://www.ncsu.edu/uap/academicstandards/gep/courselists/index.html](http://www.ncsu.edu/uap/academicstandards/gep/courselists/index.html).

A **Mathematical Sciences** (6 credit hours – one course with MA or ST prefix)
   Choose from the University approved GEP Mathematical Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement: MA 141, MA 241

B **Natural Sciences** (7 credit hours – include one laboratory course or course with a lab)
   Choose from the University approved GEP Natural Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement: CH 101/102 and CH 201/202; or BIO 181/183; or PY 201/202 or PY 205/208 or PY 211/212

C **Humanities** (6 credit hours selected from two different disciplines/course prefixes)
   Choose from the University approved GEP Humanities course list.

D **Social Sciences** (6 credit hours selected from two different disciplines/course prefixes)
   Choose from the University approved GEP Social Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement: ED 304, COM 112

E **Physical Education/Healthy Living** (2 credit hours – at least one 100-level Fitness and Wellness Course)
   Choose from the University approved GEP Physical Education/Healthy Living course list.

F **Additional Breadth** (3 credit hours to be selected from the following checked University approved GEP course lists)
   X Humanities/Social Sciences/Visual and Performing Arts or X Mathematical Sciences/Natural Sciences/Engineering

G **Interdisciplinary Perspectives** (5-6 credit hours)
   Major/College course requirements satisfies 3 credit hours of this requirement. Remaining hours must be chosen from the University Approved GEP course list for the category: ECI 305

H **Introduction to Writing** (4 credit hours satisfied by completing ENG 101 with a C- or better)
   The following Co-Requisites must be satisfied to complete the General Education Program requirements:

I **U.S. Diversity** (USD)
   Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

J **Global Knowledge** (GK)
   Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

K **Foreign Language proficiency** - Proficiency at the FL_102 level is required for graduation.