

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

The double degree in Mathematics Education (BS) and Mathematics (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 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 Mathematics. Upper level mathematics electives help prepare students for a variety of math-related fields in addition to teaching at the secondary level and graduate study in mathematics 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:

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Plan Requirements

| Code | Title | Hours | Counts towards |
|------------------------------------------------------|----------------------------------------|-------|----------------|
| Computer Science ⁵ | | | |
| E 115 | Introduction to Computing Environments | 1 | |
| or COS 100 | Science of Change | | |
| Introduction to Computing (Choose one): ¹ | | 3 | |
| CSC 112 | Introduction to Computing-FORTRAN | | |

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|------------------------------------|------------------------------------------------------------------------------------------------|----------|--|
| CSC 116 | Introduction to Computing - Java | | |
| MA 116 | Introduction to Scientific Programming (Math) | | |
| Communications | | | |
| COM 112 | Interpersonal Communication | 3 | |
| Sciences ⁵ | | | |
| CH 101 & CH 102 | Chemistry - A Molecular Science and General Chemistry Laboratory ² | 4 | |
| PY 205 & PY 206 | Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory | 4 | |
| PY 208 & PY 209 | Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory | 4 | |
| Mathematics ⁵ | | | |
| MA 141 | Calculus I ¹ | 4 | |
| MA 241 | Calculus II ¹ | 4 | |
| MA 242 | Calculus III ¹ | 4 | |
| MA 225 | Foundations of Advanced Mathematics ¹ | 3 | |
| MA 341 | Applied Differential Equations I ¹ | 3 | |
| or MA 351 | Introduction to Discrete Mathematical Models | | |
| MA 405 | Introduction to Linear Algebra ¹ | 3 | |
| MA 407 | Introduction to Modern Algebra for Mathematics Majors ¹ | 3 | |
| MA 408 | Foundations of Euclidean Geometry ¹ | 3 | |
| MA 421 | Introduction to Probability ¹ | 3 | |
| MA 425 | Mathematical Analysis I ¹ | 3 | |
| Math Electives (p. 3) ¹ | | 12 | |
| Statistics ^{4,5} | | 3 | |

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|-------------------------------|--------------------------------------------------------------------------------------|----|
| ST 370 | Probability and Statistics for Engineers | |
| ST 372 | Introduction to Statistical Inference and Regression | |
| ST 421 | Introduction to Mathematical Statistics I | |
| ST 422 | Introduction to Mathematical Statistics II | |
| Professional Education | | |
| ECl 416 | Teaching Exceptional Students in the Mainstreamed Classroom ¹ | 3 |
| ED 100 | Intro to Education ¹ | 2 |
| ED 204 | Introduction to Teaching in Today's Schools ¹ | 2 |
| ED 311 | Classroom Assessment Principles and Practices ¹ | 2 |
| ED 312 | Classroom Assessment Principles and Practices Professional Learning Lab ¹ | 1 |
| EDP 304 | Educational Psychology ¹ | 3 |
| ELP 344 | School and Society ¹ | 3 |
| EMS 204 | Introduction to Mathematics Education ³ | 2 |
| EMS 480 | Teaching Mathematics with Technology ¹ | 3 |
| EMS 470 | Methods and Materials for Teaching Mathematics ¹ | 3 |
| EMS 471 | Student Teaching in Mathematics ¹ | 12 |
| EMS 472 | Teaching Mathematics Topics in Senior High School ¹ | 3 |

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|---------|------------------------------------------------------------------|---|
| EMS 490 | School Mathematics from an Advanced Perspective ¹ | 3 |
| EMS 495 | Senior Seminar in Mathematics and Science Education ¹ | 3 |

General Education Program (GEP) Courses

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|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| ENG 101 | Academic Writing and Research ² | 4 |
| 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 |
| GEP Interdisciplinary Perspectives | (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/) | 2 |
| GEP Global Knowledge | (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement) | |
| GEP US Diversity, Equity, and Inclusion | (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/) | 3 |
| 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.

⁴ The preferred statistics sequence is ST 370 with MA 421. Alternatives include ST 371 with ST 372, or ST 421 with ST 422. If ST 370 is taken, MA 421 will be an advanced mathematics elective. If ST 371/372 is taken, ST 371 will be a free elective. If ST 421/422 is taken, ST 421 will be a free elective.

⁵ At most one grade below a C is permitted in required and elective math, statistics, and computer science courses

Math Electives

Code Title Hours Counts towards

Math Electives <400

| | | | |
|------------|----------------------------------------------|---|--|
| MA 325 | Introduction to Applied Mathematics | 3 | |
| MA/LOG 335 | Symbolic Logic | 3 | |
| MA 341 | Applied Differential Equations I | 3 | |
| MA 351 | Introduction to Discrete Mathematical Models | 3 | |

Math Electives >400

| | | | |
|--------|-------------------------------------------------------|---|--|
| MA 401 | Applied Differential Equations II | 3 | |
| MA 402 | Mathematics of Scientific Computing | 3 | |
| MA 405 | Introduction to Linear Algebra | 3 | |
| MA 407 | Introduction to Modern Algebra for Mathematics Majors | 3 | |
| MA 408 | Foundations of Euclidean Geometry | 3 | |
| MA 410 | Theory of Numbers | 3 | |
| MA 412 | Long-Term Actuarial Models | 3 | |
| MA 413 | Short-Term Actuarial Models | 3 | |
| MA 416 | Introduction to Combinatorics | 3 | |
| MA 421 | Introduction to Probability | 3 | |
| MA 425 | Mathematical Analysis I | 3 | |
| MA 426 | Mathematical Analysis II | 3 | |
| MA 427 | Introduction to Numerical Analysis I | 3 | |
| MA 428 | Introduction to Numerical Analysis II | 3 | |
| MA 430 | Mathematical Models in the Physical Sciences | 3 | |
| MA 432 | Mathematical Models in Life Sciences | 3 | |

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|--------|------------------------------------------------------|-----|--|
| MA 437 | Applications of Algebra | 3 | |
| MA 440 | | 3 | |
| MA 444 | Problem Solving Strategies for Competitions | 1 | |
| MA 450 | Methods of Applied Mathematics I | 3 | |
| MA 451 | Methods of Applied Mathematics II | 3 | |
| MA 491 | Reading in Honors Mathematics | 1-6 | |
| MA 493 | Special Topics in Mathematics | 1-6 | |
| MA 494 | Major Paper in Math | 1 | |
| MA 499 | Independent Research in Mathematics | 1-6 | |
| MA 501 | Advanced Mathematics for Engineers and Scientists I | 3 | |
| MA 502 | Advanced Mathematics for Engineers and Scientists II | 3 | |
| MA 504 | Introduction to Mathematical Programming | 3 | |
| MA 505 | Linear Programming | 3 | |
| MA 512 | | 3 | |
| MA 513 | Introduction To Complex Variables | 3 | |
| MA 515 | Analysis I | 3 | |
| MA 518 | Geometry of Curves and Surfaces | 3 | |
| MA 520 | Linear Algebra | 3 | |
| MA 521 | Abstract Algebra I | 3 | |
| MA 522 | Computer Algebra | 3 | |
| MA 523 | Linear Transformations and Matrix Theory | 3 | |
| MA 524 | Combinatorics I | 3 | |
| MA 526 | Mathematical Analysis II | 3 | |

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|--------|---------------------------------------------------------------|---|
| MA 531 | Dynamic Systems and Multivariable Control I | 3 |
| MA 532 | Ordinary Differential Equations I | 3 |
| MA 534 | Introduction To Partial Differential Equations | 3 |
| MA 537 | Nonlinear Dynamics and Chaos | 3 |
| MA 540 | Uncertainty Quantification for Physical and Biological Models | 3 |
| MA 544 | Computer Experiments In Mathematical Probability | 3 |
| MA 546 | Probability and Stochastic Processes I | 3 |
| MA 547 | Stochastic Calculus for Finance | 3 |
| MA 548 | Monte Carlo Methods for Financial Math | 3 |
| MA 549 | Financial Risk Analysis | 3 |
| MA 551 | Introduction to Topology | 3 |
| MA 555 | Introduction to Manifold Theory | 3 |
| MA 561 | Set Theory and Foundations Of Mathematics | 3 |
| MA 565 | Graph Theory | 3 |
| MA 573 | Mathematical Modeling of Physical and Biological Processes I | 3 |
| MA 574 | Mathematical Modeling of Physical and Biological Processes II | 3 |
| MA 583 | Introduction to Parallel Computing | 3 |

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|--------|---------------------------------------------------------------------------------|-----|
| MA 584 | Numerical Solution of Partial Differential Equations--Finite Difference Methods | 3 |
| MA 587 | Numerical Solution of Partial Differential Equations--Finite Element Method | 3 |
| MA 591 | Special Topics | 1-6 |

Semester Sequence

This is a sample.

First Year

| Fall Semester | | Hours |
|------------------|-------------------------------------------------------------------------------|-----------|
| MA 141 | Calculus I ¹ | 4 |
| CH 101 & CH 102 | Chemistry - A Molecular Science and General Chemistry Laboratory ² | 4 |
| ENG 101 | Academic Writing and Research | 4 |
| E 115 or COS 100 | Introduction to Computing Environments or Science of Change | 1 |
| ED 100 | Intro to Education ⁴ | 2 |
| Hours | | 15 |

Spring Semester

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|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| MA 241 | Calculus II ¹ | 4 |
| PY 205 & PY 206 or PY 201 and PY 202 | Physics for Engineers and Scientists I ² or University Physics I and University Physics II | 4 |
| | Introduction to Programming (p. 1) ³ | 3 |
| | GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/) | 1 |
| COM 112 | Interpersonal Communication | 3 |
| Hours | | 15 |

Second Year

Fall Semester

| | | |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| MA 242 | Calculus III ¹ | 4 |
| MA 225 | Foundations of Advanced Mathematics ¹ | 3 |
| PY 208 & PY 209 | Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory ² | 4 |
| | GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/) | 2 |
| | GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/) | 3 |
| Hours | | 16 |

Spring Semester

| | | |
|------------------|-----------------------------------------------------------------------------------------------|---|
| MA 341 or MA 351 | Applied Differential Equations I ¹ or Introduction to Discrete Mathematical Models | 3 |
| MA 405 | Introduction to Linear Algebra ³ | 3 |

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/) | 1 |
| EMS 204 Introduction to Mathematics Education ⁴ | 2 |
| ED 204 Introduction to Teaching in Today's Schools ⁴ | 2 |
| GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/) | 3 |
| EDP 304 Educational Psychology ⁴ | 3 |
| Hours | 17 |

Third Year

Fall Semester

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|---------------------------------------------------------------------------------------------|-----------|
| MA 407 Introduction to Modern Algebra for Mathematics Majors ³ | 3 |
| MA 408 Foundations of Euclidean Geometry ³ | 3 |
| ELP 344 School and Society ⁴ | 3 |
| ED 311 Classroom Assessment Principles and Practices ⁴ | 2 |
| ED 312 Classroom Assessment Principles and Practices Professional Learning Lab ⁴ | 1 |
| ST Elective (p. 1) ⁸ | 2 |
| ECI 305 Equity and Education | 3 |
| Hours | 17 |

Spring Semester

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|------------------------------------------------------------------------|-----------|
| MA 425 Mathematical Analysis I ³ | 3 |
| Math Elective (p. 3) ^{1,3} | 3 |
| Math Elective (p. 3) ^{1,3} | 3 |
| EMS 472 Teaching Mathematics Topics in Senior High School ⁴ | 3 |
| EMS 480 Teaching Mathematics with Technology ⁴ | 3 |
| MA 421 Introduction to Probability ³ | 3 |
| Hours | 18 |

Fourth Year

Fall Semester

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| MA 426 Mathematical Analysis II (Or other MA elective) ^{1,3} or MA 512 | 3 |
| Math Elective (p. 3) ^{1,3} | 3 |
| EMS 490 School Mathematics from an Advanced Perspective ⁴ | 3 |
| ECI 416 Teaching Exceptional Students in the Mainstreamed Classroom ⁴ | 3 |
| EMS 470 Methods and Materials for Teaching Mathematics | 3 |
| GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/) | 3 |
| Hours | 18 |

Spring Semester

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|--------------------------------------------------------------------------|-----------|
| EMS 471 Student Teaching in Mathematics ⁴ | 10 |
| EMS 495 Senior Seminar in Mathematics and Science Education ⁴ | 2 |
| Hours | 12 |

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|--------------------|------------|
| Total Hours | 128 |
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Major/Program Footnotes:

- ¹ A grade below C is not permitted in MA 141, 241, 242, 225, 341 or 351.
- ² At most one grade below a C- is permitted in courses satisfying the science requirement.
- ³ At most one grade below a C is permitted in required mathematics courses >400, elective math courses, statistics, and computer science courses.
- ⁴ 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, ED courses.