# Middle Grades Education (BS): Mathematics and Sciences Concentration

To see more about what you will learn in this program, visit the Learning Outcomes website (https://apps.oirp.ncsu.edu/pgas/)!

## Plan Requirements

**Middle Grades Education (BS): Mathematics and Sciences Concentration: 121 Total Units**

| Code | Title | Hours | Counts towards |
|---|---|---|---|
| **Communication and English** | | | |
| COM 112 | Interpersonal Communication | 3 | |
| ENG 101 | Academic Writing and Research [1] | 4 | |
| **History & Philosophy of Science** | | | |
| Select one of the following: | | 3 | |
| HI 321 | Scientific Revolution and European Society, 1500-1800 | | |
| HI 322 | Rise of Modern Science | | |
| HI 341 | Technology in History | | |
| PHI 340 | Philosophy of Science | | |
| STS 301 | Science and Civilization | | |
| **Mathematics** | | | |
| MA 141 | Calculus I | 4 | |
| MA 241 | Calculus II | 4 | |
| MA 114 | Introduction to Finite Mathematics with Applications | 3 | |
| MA 225 | Foundations of Advanced Mathematics | 3 | |
| MA 408 | Foundations of Euclidean Geometry | 3 | |
| Select one of the following: | | 3 | |
| CSC 110 | Computer Science Principles - The Beauty and Joy of Computing | | |
| CSC 112 | Introduction to Computing-FORTRAN | | |
| CSC 200 | | | |
| Select one of the following: | | 3 | |
| ST 101 | Statistics by Example | | |
| ST 311 | Introduction to Statistics | | |
| ST 371 | Introduction to Probability and Distribution Theory | | |
| Mathematics Elective (p. 2) | | 3 | |
| **Sciences** | | | |
| BIO 181 | Introductory Biology: Ecology, Evolution, and Biodiversity | 4 | |
| BIO 183 | Introductory Biology: Cellular and Molecular Biology | 4 | |
| 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 | |
| PY 131 | Conceptual Physics | 4 | |
| MEA 101 | Geology I: Physical | 3 | |
| MEA 110 | Geology I Laboratory | 1 | |
| MEA 130 | Introduction to Weather and Climate | 3 | |
| MEA 135 | Introduction to Weather and Climate Laboratory | 1 | |
| **Professional Education** | | | |
| EMS 375 | Methods of Teaching Science I | 3 | |
| EMS 476 | Student Teaching in Science | 4 | |
| ECI 305 | Equity and Education | 3 | |

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|---|---|---|
| ECI 416 | Teaching Exceptional Students in the Mainstreamed Classroom | 3 |
| ELP 344 | School and Society | 3 |
| EMS 476 | Student Teaching in Science | 4 |
| EMS 470 | Methods and Materials for Teaching Mathematics | 3 |
| EMS 471 | Student Teaching in Mathematics | 4 |
| EMS 474 | Teaching Mathematics Topics in the Middle Grades | 3 |
| ECI 309 | Teaching in the Middle Years | 3 |
| ECI 306 | Middle Years Reading | 3 |
| EMS 373 | Instructional Materials in Science | 3 |
| or EMS 480 | Teaching Mathematics with Technology | |
| HESM 280 | Responding to Emergencies | 2 |
| EDP 304 | Educational Psychology | 3 |
| **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 |
| GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) (Humanities/Social Sciences/Visual and Performing Arts) | | 3 |
| GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/) | | 2 |
| 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) | | |
| **Free Elective** | | **2** |
| **Total Hours** | | **123** |

1 A grade of C- or higher is required.

2 Students should consult their academic advisors to determine which courses fill this requirement.

## Mathematics Electives

| Code | Title | Hours | Counts towards |
|---|---|---|---|
| BMA 573 | Mathematical Modeling of Physical and Biological Processes I | 3 | |
| BMA 574 | Mathematical Modeling of Physical and Biological Processes II | 3 | |
| CSC 416 | Introduction to Combinatorics | 3 | |
| CSC 427 | Introduction to Numerical Analysis I | 3 | |
| CSC 428 | Introduction to Numerical Analysis II | 3 | |
| CSC 565 | Graph Theory | 3 | |
| CSC 580 | Numerical Analysis I | 3 | |
| CSC 583 | Introduction to Parallel Computing | 3 | |
| E 531 | Dynamic Systems and Multivariable Control I | 3 | |
| ECG 528 | Options and Derivatives Pricing | 3 | |
| FIM 528 | | 3 | |
| FIM 548 | Monte Carlo Methods for Financial Math | 3 | |
| FIM 549 | Financial Risk Analysis | 3 | |
| ISE 505 | Linear Programming | 3 | |

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| LOG 335 | Symbolic Logic | 3 |
| MA 103 | Topics in Contemporary Mathematics | 3 |
| MA 103A | Topics in Contemporary Mathematics | 3 |
| MA 105 | Mathematics of Finance | 3 |
| MA 114 | Introduction to Finite Mathematics with Applications | 3 |
| MA 116 | Introduction to Scientific Programming (Math) | 3 |
| MA 132 | Computational Mathematics for Life and Management Sciences | 1 |
| MA 151 | Calculus for Elementary Education I | 3 |
| MA 152 | Calculus for Elementary Education II | 3 |
| MA 205 | Elements of Matrix Computations | 3 |
| MA 225 | Foundations of Advanced Mathematics | 3 |
| MA 242 | Calculus III | 4 |
| MA 302 | Numerical Applications to Differential Equations | 1 |
| MA 303 | Linear Analysis | 3 |
| MA 305 | Introductory Linear Algebra and Matrices | 3 |
| MA 315 | Mathematics Methods in Atmospheric Sciences | 4 |
| MA 325 | Introduction to Applied Mathematics | 3 |
| MA 331 | Differential Equations for the Life Sciences | 3 |
| MA 335 | Symbolic Logic | 3 |
| MA 341 | Applied Differential Equations I | 3 |
| MA 351 | Introduction to Discrete Mathematical Models | 3 |
| MA 401 | Applied Differential Equations II | 3 |
| MA 402 | Mathematics of Scientific Computing | 3 |
| MA 403 | Introduction to Modern Algebra | 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 |
| MA 437 | Applications of Algebra | 3 |
| MA 440 | Game Theory | 3 |
| MA 444 | Problem Solving Strategies for Competitions | 1 |
| MA 450 | Methods of Applied Mathematics I | 3 |

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| 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 507 | Survey of Real Analysis | 3 |
| MA 508 | Survey of Geometry | 3 |
| MA 509 | Survey of Abstract Algebra | 3 |
| MA 510 | Selected Topics In Mathematics For Secondary Teachers | 1-6 |
| MA 511 | Introduction to Advanced Calculus | 3 |
| MA 512 | Advanced Calculus | 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 |
| MA 528 | | 3 |
| 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 580 | | 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 |
| MBA 528 | | 3 |
| MEA 315 | Mathematics Methods in Atmospheric Sciences | 4 |
| OR 504 | Introduction to Mathematical Programming | 3 |
| OR 505 | Linear Programming | 3 |
| OR 531 | Dynamic Systems and Multivariable Control I | 3 |
| OR 565 | Graph Theory | 3 |
| ST 412 | Long-Term Actuarial Models | 3 |
| ST 413 | Short-Term Actuarial Models | 3 |
| ST 546 | Probability and Stochastic Processes I | 3 |

**Middle Grades Education (BS): Mathematics and Sciences (13MIDEDBS-13MIDEDMSD)**

## Semester Sequence

This is a sample.

| | | |
|---|---|---|
| **First Year** | | |
| **Fall Semester** | | **Hours** |
| CH 101 | Chemistry - A Molecular Science | 3 |
| CH 102 | General Chemistry Laboratory | 1 |
| MA 141 | Calculus I | 4 |
| ENG 101 | Academic Writing and Research | 4 |
| COM 112 | Interpersonal Communication | 3 |
| | **Hours** | **15** |
| **Spring Semester** | | |
| MEA 101 | Geology I: Physical | 3 |
| MEA 110 | Geology I Laboratory | 1 |
| CH 201 | Chemistry - A Quantitative Science | 3 |
| CH 202 | Quantitative Chemistry Laboratory | 1 |
| MA 241 | Calculus II | 4 |
| GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/) | | 1 |
| | **Hours** | **13** |
| **Second Year** | | |
| **Fall Semester** | | |
| BIO 181 | Introductory Biology: Ecology, Evolution, and Biodiversity | 4 |
| CSC 200 | | 3 |
| MEA 130 | Introduction to Weather and Climate | 3 |
| MEA 135 | Introduction to Weather and Climate Laboratory | 1 |
| GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) | | 3 |
| MA 114 | Introduction to Finite Mathematics with Applications | 3 |
| | **Hours** | **17** |
| **Spring Semester** | | |
| BIO 183 | Introductory Biology: Cellular and Molecular Biology | 4 |
| PY 131 | Conceptual Physics | 4 |
| EDP 304 | Educational Psychology | 3 |
| Select one of the following: | | 3 |
| ST 101 | Statistics by Example | |
| ST 311 | Introduction to Statistics | |
| ST 371 | Introduction to Probability and Distribution Theory | |
| | **Hours** | **14** |
| **Third Year** | | |
| **Fall Semester** | | |
| ECI 309 | Teaching in the Middle Years | 3 |
| ELP 344 | School and Society | 3 |
| EMS 373 or EMS 480 | Instructional Materials in Science or Teaching Mathematics with Technology | 3 |
| ECI 305 | Equity and Education | 3 |
| MA 225 | Foundations of Advanced Mathematics | 3 |
| HESM 280 | Responding to Emergencies | 2 |
| | **Hours** | **17** |
| **Spring Semester** | | |
| PSY 476 | Psychology of Adolescent Development | 3 |
| EMS 375 | Methods of Teaching Science I | 3 |
| ECI 416 | Teaching Exceptional Students in the Mainstreamed Classroom | 3 |
| Mathematics Elective | | 3 |
| GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/) | | 1 |
| Free Elective | | 2 |
| | **Hours** | **15** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| EMS 470 | Methods and Materials for Teaching Mathematics | 3 |

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|---|---|---|
| EMS 471 | Student Teaching in Mathematics | 4 |
| EMS 474 | Teaching Mathematics Topics in the Middle Grades | 3 |
| EMS 476 | Student Teaching in Science | 4 |
| | **Hours** | **14** |
| **Spring Semester** | | |
| ECI 306 | Middle Years Reading | 3 |
| Select one of the following: | | 3 |
| HI 321 | Scientific Revolution and European Society, 1500-1800 | |
| HI 322 | Rise of Modern Science | |
| HI 341 | Technology in History | |
| PHI 340 | Philosophy of Science | |
| STS 301 | Science and Civilization | |
| GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/) | | 6 |
| GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/) | | 2-3 |
| | **Hours** | **14-15** |
| | **Total Hours** | **119-120** |