MATHEMATICAL SCIENCES, B.S.

Begin Campus: Any Penn State Campus
End Campus: Harrisburg

Spring 2022 Curricular Update: The program description, entrance requirements, and program requirements detailed on this page are effective beginning Spring 2022. To learn more about what approved curricular changes take effect in Spring 2022, please visit the Changes to the UG Bulletin page (https://bulletins.psu.edu/undergraduate/general-information/using-this-bulletin/#changestotheugbulletintext). To view the requirements in effect for Fall 2021, please visit the 2021-22 Undergraduate Bulletin PDF (https://bulletins.psu.edu/pdf/2021-2022-undergraduate.pdf).

Degree Requirements
For the Bachelor of Science degree in Mathematical Sciences, a minimum of 120 credits is required; for the Bachelor of Science degree in Mathematical Sciences with the Secondary Education option, a minimum of 121 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>84-99</td>
</tr>
</tbody>
</table>

9-18 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 3 credits of GWS courses; 6 credits of GQ courses. In addition, the Secondary Education option includes 3 credits of GH courses and 6 credits of GS courses.

General Education
Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)
- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Knowledge Domains
- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)
- Inter-Domain or Approved Linked Courses: 6 credits

University Degree Requirements
First Year Engagement
All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement
6 credits are required and may satisfy other requirements
- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major
To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

Common Requirements for the Major (All Options)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 202C</td>
<td>Effective Writing: Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Calculus with Analytic Geometry II</td>
<td>4</td>
</tr>
</tbody>
</table>
Mathematical Sciences, B.S.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 311W</td>
<td>Concepts of Discrete Mathematics</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 401</td>
<td>Introduction to Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 430</td>
<td>Linear Algebra and Discrete Models I</td>
<td>3</td>
</tr>
</tbody>
</table>

**Requirements for the Option**

Select an option 64-78

**Requirements for the Option**

**General Mathematical Sciences Option (64-65 credits)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 230</td>
<td>Calculus and Vector Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Ordinary and Partial Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MATH/STAT 318</td>
<td>Elementary Probability</td>
<td>3</td>
</tr>
<tr>
<td>MATH 425</td>
<td>Introduction to Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>MATH 435</td>
<td>Basic Abstract Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 475Y</td>
<td>History of Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 401</td>
<td>Experimental Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

*Prescribed Courses: Require a grade of C or better*

CMPS 121 Introduction to Programming Techniques 3

MATH 220 Matrices 2-3

MATH 455 Introduction to Numerical Analysis I 3

**Supporting Courses and Related Areas**

Select 6 credits of 200 level or above courses 6

Select 18 credits of 300-400 level Mathematics courses in consultation with an academic adviser. Up to 6 of these credits may be replaced by any 300 or greater level CMPS courses (except CMPS 360), CMPS 221 or CMPS 122. 18

Select 9 credits of 300-400 level courses in consultation with an academic adviser and in support of the student's interests. 9

**Secondary Education in Mathematical Sciences Option (77-78 credits)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPS 239</td>
<td>Adolescent Development</td>
<td>3</td>
</tr>
</tbody>
</table>

*Prescribed Courses: Require a grade of C or better*

CMPS 121 Introduction to Programming Techniques 3

EDPS 14 Learning and Instruction 3

EDUC 313 Field Observation 2

EDUC 314 Learning Theory and Instructional Procedures 3

EDUC 315Y Social and Cultural Factors in Education 3

EDUC 400 Diversity and Cultural Awareness Practices in the K-12 Classroom 3

EDUC 417 Teaching Secondary Mathematics 3

EDUC 458 Behavior Management Strategies for Inclusive Classrooms 3

EDUC 459 Strategies for Effective Teaching in Inclusive Classrooms 3

EDUC 466N Foundations of Teaching English as a Second Language 3

EDUC 490 Student Teaching 12

MATH 220 Matrices 2-3

MATH 230 Calculus and Vector Analysis 4

MATH 250 Ordinary Differential Equations 3

MATH 425 Introduction to Operations Research 3

MATH 427 Foundations of Geometry 3

MATH 435 Basic Abstract Algebra 3

MATH 475Y History of Mathematics 3

STAT 401 Experimental Methods 3

**Supporting Courses and Related Areas**

Select 3 credits of 100-400 level courses 3

*Supporting Courses and Related Areas: Require a grade of C or better*

Select 3 credits of literature (GH) from department list 3

Select 3 credits of 300-400 level courses in Mathematics, Computer Science, Statistics, or Education 3