APPLIED MATHEMATICS, ENGINEERING, AND PHYSICS, B.S. AMEP

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements section of the Guide.

General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF SCIENCE-APPLIED MATHEMATICS, ENGINEERING, AND PHYSICS (B.S.-AMEP)

Students pursuing a Bachelor of Science—Applied Mathematics, Engineering, and Physics degree in the College of Letters & Science must complete all of the requirements below. The B.S.—AMEP is a special degree program; it is not considered a major. The B.S.—AMEP degree is not available to students who intend to earn a degree outside the College of Letters & Science.

BACHELOR OF SCIENCE - AMEP DEGREE REQUIREMENTS

Mathematics

Complete the University General Education Requirements for Quantitative Reasoning A (QR-A) and Quantitative Reasoning B (QR-B) coursework.

Foreign Language

Complete the second unit of a foreign language.

Liberal Arts and Science Requirement

Complete a minimum of 20 credits in Liberal Arts and Science (LAS) coursework outside the physical and mathematical sciences, including:

- at least 12 credits of Humanities and/or Social Science, including at least 6 credits in Humanities and at least 3 credits of Social Science
- a maximum of 8 credits of Biological Science
- additional eligible coursework to reach 20 total credits.

Courses that carry the Physical Science breadth designation, or are listed (or cross-listed) in the MATH or COMP SCI subjects, are not eligible.

Total Credits

Complete at least 125 credits.

UW-Madison Experience

Complete both:

- 30 credits in residence, overall, and
- 30 credits in residence after the 90th credit.

Quality of Work

- 2.000 in all coursework at UW–Madison

REQUIREMENTS FOR THE PROGRAM

A total of at least 125 credits with a minimum GPA of 2.000 is required for this degree plan. Of these credits, at least 82 must be devoted to Mathematics, Physics, Engineering, and Chemistry requirements; 20 must be devoted to University General Education requirements; and the balance may be from electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td><strong>FOUNDATION: Mathematics</strong></td>
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<tr>
<td></td>
<td>Single Variable Calculus. Completed with credit for both the following courses:</td>
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<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>4</td>
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<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td>4</td>
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<tr>
<td></td>
<td>Multivariable calculus. Completed with credit for one of the following two options:</td>
<td>4</td>
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<tr>
<td>MATH 234</td>
<td>Calculus—Functions of Several Variables</td>
<td>4</td>
</tr>
<tr>
<td>MATH 375 &amp; MATH 376</td>
<td>Topics in Multi-Variable Calculus and Linear Algebra and Topics in Multi-Variable Calculus and Differential Equations 1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>FOUNDATION: Physics</strong></td>
<td>11-14</td>
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<tr>
<td></td>
<td>First Introductory course</td>
<td></td>
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<tr>
<td>PHYSICS 247</td>
<td>A Modern Introduction to Physics</td>
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<tr>
<td>or PHYSICS 207</td>
<td>General Physics</td>
<td>4</td>
</tr>
<tr>
<td>or PHYSICS 201</td>
<td>General Physics</td>
<td>4</td>
</tr>
<tr>
<td>or E M A 202</td>
<td>Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>or M E 240</td>
<td>Dynamics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Second Introductory course</td>
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</table>
PHYSICS 248  A Modern Introduction to Physics
or PHYSICS 206 General Physics
or PHYSICS 202 General Physics

Third Introductory course

PHYSICS 249  A Modern Introduction to Physics
or PHYSICS 241 Introduction to Modern Physics
or PHYSICS 206 Modern Physics for Engineers
or PHYSICS/ECE 235 Introduction to Solid State Electronics

CHEMISTRY. Completed with credit for one of the following options.

CHEM 109  Advanced General Chemistry
CHEM 103 & CHEM 104 General Chemistry I and General Chemistry II
CHEM 115  Chemical Principles I

MATHEMATICS. Completed with at least six courses for 18 credits.

Core: Linear Algebra

MATH 320  Linear Algebra and Differential Equations
or MATH 340  Elementary Matrix and Linear Algebra
or MATH 341  Linear Algebra
or MATH 375  Topics in Multi-Variable Calculus and Linear Algebra

Core: Differential Equations

MATH 320  Linear Algebra and Differential Equations
or MATH 319  Techniques in Ordinary Differential Equations
or MATH 376  Topics in Multi-Variable Calculus and Differential Equations

Core: Applied Analysis. Complete both courses.

MATH 321  Applied Mathematical Analysis
MATH 322  Applied Mathematical Analysis

MATH electives. 3

Completed with at least three courses for nine credits.

Select from:

MATH 415  Applied Dynamical Systems, Chaos and Modeling
MATH 421  The Theory of Single Variable Calculus
MATH/STAT 431  Introduction to the Theory of Probability
or MATH/STAT 309  Introduction to Probability and Mathematical Statistics I
MATH 443  Applied Linear Algebra
MATH/COMP SCI 513  Numerical Linear Algebra
MATH/COMP SCI 514  Numerical Analysis
MATH 519  Ordinary Differential Equations
MATH 521  Analysis I
MATH 522  Analysis II
MATH 531  Probability Theory
MATH 561  Differential Geometry

MATH 619  Analysis of Partial Differential Equations
MATH 623  Complex Analysis
MATH 627  Introduction to Fourier Analysis
MATH/ISY E/OTM/STAT 632  Introduction to Stochastic Processes

PHYSICS. Completed with at least 5 courses for 15 credits.

Core Physics. Complete both:

PHYSICS 311  Mechanics
PHYSICS 322  Electromagnetic Fields

Physics electives. 4

Remaining courses/credits from any PHYSICS course numbered 307 and above.

ENGINEERING

21 credits in Engineering courses with the following conditions. 5

Courses must be numbered 300 or above.
Courses must be distinct from any used to fulfill math and physics requirements above.

LABORATORY EXPERIENCE. Minimum of three credits selected from the options below. 6

The following course applies as three credits of lab:

E M A 522  Aerodynamics Lab

The following courses apply as two credits of lab each:

PHYSICS 307  Intermediate Laboratory-Mechanics and Modern Physics
PHYSICS 321  Electric Circuits and Electronics
PHYSICS 325  Optics
PHYSICS 407  Advanced Laboratory
PHYSICS 623  Electronic Aids to Measurement
PHYSICS 625  Applied Optics

The following courses apply as one credit of lab each:

E C E 270  Circuits Laboratory I
E M A/M E 307  Mechanics of Materials Lab

Computational Experience. 6

Select one:

COMP SCI 412  Introduction to Numerical Methods
E P/E M A 471  Intermediate Problem Solving for Engineers
MATH/COMP SCI 513  Numerical Linear Algebra
MATH/COMP SCI 514  Numerical Analysis

Bachelor of Science General Education Requirements 20

Electives to Reach 125 Credits 6-23

Total Credits 125

RESIDENCE AND QUALITY OF WORK

- Minimum 2.000 GPA in AMEP program courses. 7
- Minimum 2.000 GPA and 15 upper-level AMEP program credits, taken in residence. 7,8
• 15 credits in AMEP program courses, taken on the UW–Madison campus.7

HONORS IN THE MAJOR
Honors in the Major is not available in Applied Mathematics, Engineering, and Physics.

FOOTNOTES
1 MATH 375 may also be used to fulfill the Linear Algebra requirement below. MATH 376 may be used to fulfill the Differential Equations requirement below.
2 MATH 320 fulfills both the Linear Algebra and Differential Equations requirement. AMEP students are encouraged to consider the honors version of the course which is taught by AMEP faculty.
3 A default plan may include MATH 415, MATH/STAT 431, and MATH/COMP SCI 514.
4 A default plan might include courses selected from PHYSICS 307, PHYSICS 321, PHYSICS 325, PHYSICS 415, PHYSICS 448, and PHYSICS 449.
5 Work with an AMEP Engineering advisor to construct a progressive and cohesive sequence of courses. We recommend you begin enrolling in engineering courses at or near the completion of your MATH and PHYSICS core requirements.
6 Course used to fulfill this requirement need not be distinct from courses used to fulfill Mathematics, Physics, and Engineering requirements in AMEP.
7 This includes only those courses which may be used to fulfill Mathematics, Physics, Engineering, Chemistry, Laboratory, and Computational requirements described in the tables above.
8 A course numbered 300 or above is considered upper level in the program.

UNIVERSITY DEGREE REQUIREMENTS

| Total Degree | To receive a bachelor’s degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements. |
| Residency | Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. “In residence” means on the UW–Madison campus with an undergraduate degree classification. “In residence” credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs. |
| Quality of Work | Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation. |