# Mathematics: Applied Mathematics, BS

**Requirements for Students Matriculating in or before Academic Year 2017-2018.** Learn more about University Academic Regulation 3.1 (http://catalog.okstate.edu/university-academic-regulations/#matriculation).

Minimum Overall Grade Point Average: 2.00  
Total Hours: 120

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1113</td>
<td>Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1313</td>
<td>Critical Analysis and Writing I</td>
<td></td>
</tr>
<tr>
<td>ENGL 1213</td>
<td>Composition II</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1413</td>
<td>Critical Analysis and Writing II</td>
<td></td>
</tr>
<tr>
<td>ENGL 3323</td>
<td>Technical Writing</td>
<td></td>
</tr>
</tbody>
</table>

### American History & Government

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 1103</td>
<td>Survey of American History</td>
<td>3</td>
</tr>
<tr>
<td>POLS 1113</td>
<td>American Government</td>
<td>3</td>
</tr>
</tbody>
</table>

### Analytical & Quantitative Thought (A)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2144</td>
<td>Calculus I (A)</td>
<td>4</td>
</tr>
<tr>
<td>CS 1113</td>
<td>Computer Science I (A)</td>
<td>3</td>
</tr>
</tbody>
</table>

### Humanities (H)

Courses designated (H) 6

### Natural Sciences (N)

Must include one Laboratory Science (L) course  
PHYS 2014 General Physics (LN) 4

Course designated (N) 2

### Social & Behavioral Sciences (S)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 2103</td>
<td>Introduction to Microeconomics (S)</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 1113</td>
<td>Introduction to Agricultural Economics (S)</td>
<td></td>
</tr>
</tbody>
</table>

### Additional General Education

Courses designated (A), (H), (N), or (S) 7

### Hours Subtotal

41

### Diversity (D) & International Dimension (I)

May be completed in any part of the degree plan

Select at least one Diversity (D) course

Select at least one International Dimension (I) course

### College/Departmental Requirements

First Year Seminar  
A&S 1111 A&S First Year Seminar (transfer students with 15 hours exempt) 1

### Arts & Humanities

See note 2.a. 3

### Natural & Mathematical Sciences

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2153</td>
<td>Calculus II (A)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 2114</td>
<td>General Physics (LN)</td>
<td>4</td>
</tr>
</tbody>
</table>

Select 2 additional hours

### Foreign Language

See note 3 0

### Upper-Division General Education

Select 6 hours outside major department

See note 2.c.

### Hours Subtotal

13

### Major Requirements

Minimum GPA 2.00 with a minimum grade of “C” or “P” in each course in Major Requirements and each required MATH course

#### Mathematics Core

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2163</td>
<td>Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2233</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3013</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3613</td>
<td>Introduction to Abstract Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 4023</td>
<td>Introduction to Analysis</td>
<td></td>
</tr>
</tbody>
</table>

Select 2-3 hours of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2133</td>
<td>Computer Science II</td>
<td></td>
</tr>
<tr>
<td>CS 2433</td>
<td>C/C++ Programming</td>
<td></td>
</tr>
<tr>
<td>ENGR 1412</td>
<td>Introductory Engineering Computer Programming</td>
<td></td>
</tr>
</tbody>
</table>

Select 3 hours of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 4013</td>
<td>Statistical Methods I (A)</td>
<td>3</td>
</tr>
<tr>
<td>STAT 4033</td>
<td>Engineering Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 4053</td>
<td>Statistical Methods I for the Social Sciences (A)</td>
<td></td>
</tr>
<tr>
<td>MATH 3583</td>
<td>Introduction to Mathematical Modeling</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4513</td>
<td>Numerical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4263</td>
<td>Introduction to Partial Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 4553</td>
<td>Linear and Nonlinear Programming</td>
<td></td>
</tr>
</tbody>
</table>

Select 9 hours from the following, with at least 3 hours from each group and no more than 3 hours outside MATH:

#### Analysis:

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH 4013</td>
<td>Calculus of Several Variables</td>
<td></td>
</tr>
<tr>
<td>MATH 4023</td>
<td>Introduction to Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 4143</td>
<td>Advanced Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 4233</td>
<td>Intermediate Differential Equations</td>
<td></td>
</tr>
<tr>
<td>MATH 4263</td>
<td>Introduction to Partial Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4283</td>
<td>Complex Variables</td>
<td></td>
</tr>
<tr>
<td>MATH 4343</td>
<td>Introduction to Topology</td>
<td></td>
</tr>
<tr>
<td>MATH 4423</td>
<td>Geometry and Algorithms in Three-Dimensional Modeling</td>
<td></td>
</tr>
<tr>
<td>MATH 5213</td>
<td>Fourier Analysis and Wavelets</td>
<td></td>
</tr>
<tr>
<td>PHYS 3513</td>
<td>Mathematical Physics</td>
<td></td>
</tr>
<tr>
<td>STAT 4203</td>
<td>Mathematical Statistics I</td>
<td></td>
</tr>
</tbody>
</table>

#### Applied Algebra/Discrete Math:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 4063</td>
<td>Advanced Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 4453</td>
<td>Mathematical Interest Theory</td>
<td></td>
</tr>
<tr>
<td>MATH 4553</td>
<td>Linear and Nonlinear Programming</td>
<td></td>
</tr>
<tr>
<td>MATH 4663</td>
<td>Combinatorics</td>
<td></td>
</tr>
<tr>
<td>MATH 4713</td>
<td>Number Theory</td>
<td></td>
</tr>
</tbody>
</table>
MATH 4753  Introduction to Cryptography
MATH 4813  Groups and Representations
CS 3653  Discrete Mathematics for Computer Science

Select 3 hours of 4000-level courses in MATH or STAT or upper division CS

Areas of Application
Select 9 hours from one Area of Application (p. 2) 2

Capstone
Select 3 hours from a project or internship applying mathematical methods to a problem in the area of application:

MATH 4973  Senior Project (with approval of advisor and internship mentor)
MATH 4993  Senior Honors Thesis (with approval of advisor and internship mentor)
MATH 4590  Professional Practice in Mathematics (with approval of advisor and internship mentor)

Hours Subtotal  50

Electives
Select 16 hours

May need to include 6 hours of a foreign language (see note 3)
May need to include 6 hours upper-division general education outside major department (see note 2.c.) and 4 additional upper division hours

Hours Subtotal  16

Total Hours  120

1 College and Departmental Requirements that may be used to meet Gen Ed Requirements.
2 An alternative 9 hour plan with at least 6 upper division hours may be used with Departmental approval.

Area of Application
Agricultural Economics

Code  Title  Hours
AGEC 3213  Quantitative Methods in Agricultural Economics  3
AGEC 3333  Agricultural Marketing and Price Analysis  3
AGEC 4213  Advanced Quantitative Methods in Agricultural Economics  3
or AGEC 4333  Commodity Futures Markets

Bioinformatics

Code  Title  Hours
CHEM 1515  General Chemistry (LN)  5
MICR 3033  Cell and Molecular Biology  3
MICR 4203  Bioinformatics  3

Cognitive Sciences

Code  Title  Hours
CS 4793  Artificial Intelligence I  3
Select one of the following:  3

PHIL 4003  Mathematical Logic and Computability
PHIL 4313  Philosophy Of Mind (H)

PHIL 4543  Philosophy Of Language
PSYC 3173  Introduction to Cognitive Science (N)  3

Ecology

Code  Title  Hours
BIOL 1604  Animal Biology  4
BIOL 3034  General Ecology  4
Select 3 hours of upper division BIOL  3

Economics

Code  Title  Hours
ECON 2203  Introduction to Macroeconomics  3
ECON 3113  Intermediate Microeconomics  3
or ECON 3123  Intermediate Macroeconomics
Select 3 hours of upper division ECON  3

Finance

Code  Title  Hours
FIN 3113  Finance  3
Select 6 hours of the following:  6

FIN 4223  Investments
FIN 4333  Financial Management
FIN 4763  Financial Futures and Options Markets

GIS

Code  Title  Hours
GEOG 4203  Fundamentals of Geographic Information Systems  3
GEOG 4343  Geographic Information Systems: Resource Management Applications  3
or GEOG 4353  Geographic Information Systems: Socioeconomic Applications
Select 3 hours of the following:  3

GEOG 3333  Spatial Analysis (A)
GEOG 4333  Remote Sensing
GEOG 4383  Introduction to GIS Programming

Geophysical Analysis

Code  Title  Hours
ENSC 2113  Statics  3
ENSC 3233  Fluid Mechanics  3
GEOL 4103  Introduction to Geophysical Exploration  3

Network and Signal Analysis

Code  Title  Hours
ENSC 2613  Introduction to Electrical Science  3
ECEN 2011  Experimental Methods I  1
ECEN 3714  Network Analysis  4
ECEN 3513  Signal Analysis  3
or ECEN 3613  Electromagnetic Fields
Operations Research

<table>
<thead>
<tr>
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<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEM 4013</td>
<td>Introduction to Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>IEM 4713</td>
<td>Introduction to Systems Simulation Modeling</td>
<td>3</td>
</tr>
</tbody>
</table>

Select 3 hours of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEM 4103</td>
<td>Introduction to Quality Control</td>
<td></td>
</tr>
<tr>
<td>IEM 4113</td>
<td>Industrial Experimentation</td>
<td></td>
</tr>
<tr>
<td>IEM 4613</td>
<td>Production Planning and Control Systems</td>
<td></td>
</tr>
<tr>
<td>IEM 4623</td>
<td>Introduction to Supply Chain Management</td>
<td></td>
</tr>
</tbody>
</table>

Physics

Select 9 hours of upper division PHYS.

Other Requirements

- See the College of Arts and Sciences Requirements.
- **Upper-Division Credit:** Total hours must include at least 40 hours in courses numbered 3000 or above.
- **Hours in One Department:** Hours in one department in excess of 54 will be added to the minimum total of 120 required for graduation.

College of Arts and Sciences Requirements

1. **General Education Requirements**
   No more than two courses (or eight hours) from the major department may be used to meet General Education and College and Departmental Requirements. The General Education required English Composition, required U.S. History, required American Government, one required MATH or STAT course, and required foreign language for B.A. degrees do not count against the two-course maximum.

2. **A&S College/Departmental Requirements**
   a. Arts and Humanities are defined as any course carrying an (H) designation or courses from AMST, ART, DANC, ENGL (except ENGL 3323 Technical Writing) HIST, MUSI, PHIL (except PHIL 1313 Logic and Critical Thinking (A), PHIL 3003 Symbolic Logic (A) and PHIL 4003 Mathematical Logic and Computability), REL, TH, and foreign languages.
   b. Natural and Mathematical Sciences are defined as any course from the following prefixes: ASTR, BIOC, BIOL, BOT, CHEM, CS (except CS 4883 Social Issues in Computing), GEOL, MATH, MICR, PHYS, and STAT, or courses from other departments that carry an (A) or (N) general education designation.
   c. The required six hours of upper-division General Education may not include courses from the student’s major department. This requirement may be satisfied by courses also used to satisfy any part of a student’s degree program (i.e., in General Education, College Departmental Requirements, Major Requirements or Electives).
   d. Non-Western Studies Requirement for B.A. and B.F.A.; One 3-hour course in Non-Western Studies from:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMIS 2013</td>
<td>Introduction to American Indian Studies (D)</td>
<td>3</td>
</tr>
<tr>
<td>AMIS 4013</td>
<td>American Indian Sovereignty (D)</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 3443</td>
<td>Peoples of Mesoamerica (IS)</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 4223</td>
<td>The Aztec Empire (H)</td>
<td>3</td>
</tr>
</tbody>
</table>

ART 3693 Survey of Asian Art (H) 3
ART 3733 History of Latin American Art I 3
ART 4603 History of Ancient Egyptian Art 3
ART 4653 History of Indian Art 3
ART 4663 History of Chinese Art (H) 3
ART 4673 History of Japanese Art 3
ART 4683 Modern and Contemporary Art in Asia 3
ART 4703 Art East and West: Biases and Borrowings 3
ART 4713 The Visual Culture of the Islamic World (H) 3
ART 4763 Native American Art and Material Culture 3
CHIN 1813 Elementary Chinese II 3
ENGL 2963 Survey of Nonwestern Traditions (HI) 3
ENGL 3183 Native American Literature (DH) 3
ENGL 3190 Readings in Postcolonial and Multiethnic Literature (African Novel) 3
ENGL 4330 Studies in Native American Literature 3-6
FLL 1000 Special Studies in Foreign Languages and Literatures (Arabic 2 & Mvskoke2) 1-10
GEOG 3053 Introduction to Central Asian Studies (IS) 3
GEOG 3733 Russia and Its Neighbors (IS) 3
GEOG 3753 Asia (IS) 3
GEOG 3763 Africa (IS) 3
GEOG 3783 The Middle East (IS) 3
HIST 1713 Survey of Eastern Civilization (H) 3
HIST 3013 Ancient Egypt and Israel (H) 3
HIST 3043 Ancient Mesopotamia: Iraq, Iran & Syria from 4000-333 B.C. (H) 3
HIST 3053 Introduction to Central Asian Studies (IS) 3
HIST 3123 The History of Modern Africa (HI) 3
HIST 3133 African Diaspora History (H) 3
HIST 3153 Russia to 1861 (H) 3
HIST 3163 Russia Since 1861 (H) 3
HIST 3203 The Medieval World, 500-1500 (H) 3
HIST 3403 East Asia to 1800 (H) 3
HIST 3413 East Asia Since 1800 (HI) 3
HIST 3423 Modern Japan (HI) 3
HIST 3433 Modern China (HI) 3
HIST 3443 Gender Relations in Chinese History (H) 3
HIST 3503 Medieval Islamic History (H) 3
HIST 3513 Modern Middle East (HI) 3
HIST 3523 History of South Asia 1700 - Present (HI) 3
HIST 3543 Israel & Palestine in Modern Times (HI) 3
HIST 3553 Media and Popular Culture in the Arab Middle East (HI) 3
HIST 3583 Minorities and Diversity in the Middle East (H) 3
HIST 3793 Native American History (DH) 3
HONR 3033  Contemporary Cultures of the Non-Western World: Honors (IS)  3
JAPN 1813  Elementary Japanese II  3
JAPN 2813  Intermediate Japanese I  3
JAPN 3713  Intermediate Japanese II  3
MUSI 3583  Traditional World Music (HI)  3
PHIL 3943  Asian Philosophy (HI)  3
PHIL 4943  Indian Philosophy  3
PHIL 4953  East Asian Philosophy  3
POLS 3003  The Soviet Union: History, Society and Culture(IS)  3
POLS 3053  Introduction to Central Asian Studies (IS)  3
POLS 3123  Politics of Russia and Eurasia (I)  3
POLS 3163  Politics of Africa (I)  3
POLS 3223  Politics Of East Asia  3
POLS 3313  Politics Of The Middle East  3
REL 1103  Introduction to World Religions (HI)  3
REL 3573  The Religions of Native Americans (DH)  3
REL 4113  The World of Islam: Cultural Perspectives (HI)  3
REL 4213  Understanding Global Islam (HI)  3
REL 4223  Religions and Sects in the Middle East (HI)  3
RUSS 1813  Elementary Russian II  3
RUSS 3003  The Soviet Union: History, Society and Culture (IS)  3
RUSS 3053  Introduction to Central Asian Studies (IS)  3
RUSS 3123  Russian Culture and Civilization (H)  3
RUSS 4013  Survey of Russian Literature I  3
RUSS 4023  Survey of Russian Literature II  3
RUSS 4113  Russian Literature in Translation I (H)  3
RUSS 4123  Russian Literature in Translation II  3
SOC 4533  World Population Problems  3
SOC 4653  Gender and the Middle East (IS)  3

This requirement may be satisfied by courses also used to satisfy any part of a student's degree program (i.e., in General Education, College Departmental Requirements, Major Requirements or Electives).

e. The College of Arts & Sciences requires a minimum 2.0 GPA in all major requirements and a minimum 2.0 GPA in all major-prefix courses.

3. Foreign Language Proficiency
a. The foreign language requirement for the B.A. may be satisfied by 10 hours college credit in the same language, or equivalent proficiency (e.g., passing an advanced standing examination; completing a second-year or higher college-level course in the language, etc.).

b. The foreign language requirement for the B.S., B.M. and B.F.A. may be satisfied by presenting a high school transcript which demonstrates two years of study of a single foreign language (passing grades at second year level of study). It may also be satisfied by any of the options listed above for the B.A. utilizing elective hours.

c. In addition to a. and b., students pursuing teacher certification must meet novice-high foreign language proficiency by presenting a high school transcript which demonstrates two years of study of a single foreign language with no grade below B. Or, students may complete 5 hours college credit in the same language with no grade below C (or pass an advanced standing examination equivalent to 5 hours of college credit).

4. Exclusions
a. Courses used to satisfy the General Education English Composition, U.S. History, American Government, and Mathematics or Statistics requirements will not count toward the 54 hour maximum allowed from one department.

b. Courses with ATHL or LEIS prefixes and leisure activity courses may not be used for degree credit.

5. Teacher Certification
Students can satisfy the requirements for secondary schools teaching certification while earning a B.A. or B.S. in the College of Arts & Sciences. Those interested should see their Arts and Sciences adviser and the OSU Professional Education Unit in room 325 Willard.

Additional State/OSU Requirements
- At least: 60 hours at a four-year institution; 30 hours completed at OSU; 15 of the final 30 or 50% of the upper-division hours in the major field completed at OSU.

- Limit of: one-half of major course requirements as transfer work; one-fourth of hours earned by correspondence; 8 transfer correspondence hours.

- Students will be held responsible for degree requirements in effect at the time of matriculation and any changes that are made, so long as these changes do not result in semester credit hours being added or do not delay graduation.

- Degrees that follow this plan must be completed by the end of Summer 2023.