**MATHEMATICS: APPLIED MATHEMATICS, BS**

**Degree Requirements**

Requirements for Students Matriculating in or before Academic Year 2022-2023. 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

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<th>Hours</th>
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### General Education Requirements

**English Composition**
- See Academic Regulation 3.5 (http://catalog.okstate.edu/university-academic-regulations/#english-composition)
- ENGL 1113 Composition I 3
- or ENGL 1313 Critical Analysis and Writing I 3
- Select one of the following: 3
  - ENGL 1213 Composition II
  - ENGL 1413 Critical Analysis and Writing II
  - ENGL 3323 Technical Writing

**American History & Government**
- HIST 1103 Survey of American History 3
- or HIST 1483 American History to 1865 (H) 3
- or HIST 1493 American History Since 1865 (DH) 3
- POLS 1113 American Government 3

**Analytical & Quantitative Thought (A)**
- MATH 2144 Calculus I (A) 1 4
- CS 1113 Computer Science I (A) 1 3

**Humanities (H)**
- Courses designated (H) 6

**Natural Sciences (N)**
- Must include one Laboratory Science (L) course
- PHYS 2104 University Physics I (LN) 1 4
- Course designated (N) 2

**Social & Behavioral Sciences (S)**
- ECON 2103 Introduction to Microeconomics (S) 1 3
- or AGEC 1113 Introduction to Agricultural Economics (S) 3

### 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**
- (Transfer students with 15 hours exempt) 1
- Arts & Humanities
- See note 2.a.

**Natural & Mathematical Sciences**
- MATH 2153 Calculus II (A) 3
- PHYS 2114 University Physics II (LN) 4
- Select 2 additional hours. See note 2.b.

### Foreign Language

- See note 3
- 0-6 hours

**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.

**Mathematics Core**
- MATH 2163 Calculus III 3
- MATH 2233 Differential Equations 3
- MATH 3013 Linear Algebra (A) 3
- MATH 3613 Introduction to Abstract Algebra 3
- or MATH 4023 Introduction to Analysis 3
- Select 3 hours from the following: 3
  - CS 1103 Computer Programming (A)
  - CS 2133 Computer Science II
  - CS 2433 C/++ Programming
  - ENGR 1412 Introductory Engineering Computer Programming
  - STAT 4091 Sas Programming
  - STAT 4191 R Programming
  - STAT 4193 SAS and R Programming
- Select 3 hours from the following: 3
  - STAT 4013 Statistical Methods I (A)
  - STAT 4033 Engineering Statistics
  - STAT 4053 Statistical Methods I for the Social Sciences (A)
- MATH 3583 Introduction to Mathematical Modeling 3
- MATH 4513 Introduction to Numerical Analysis 3
- or MATH 4553 Introduction to Optimization 3
- MATH 4233 Intermediate Differential Equations 3
- or MATH 4263 Introduction to Partial Differential Equations 3
- Select 9 hours from the following, with at least 3 hours of MATH from each group: 9
  - MATH 4013 Calculus of Several Variables
  - MATH 4023 Introduction to Analysis
  - MATH 4083 Intermediate Analysis
  - MATH 4143 Advanced Calculus I
  - MATH 4263 Introduction to Partial Differential Equations
  - MATH 4283 Complex Variables
  - MATH 4343 Introduction to Topology
  - MATH 4423 Geometry and Algorithms in Three-Dimensional Modeling
- MATH 5213 Fourier Analysis and Wavelets

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*Note: 1 indicates core requirement; 2 indicates upper-division requirement; 3 indicates diversity requirement.*
**Mathematics: Applied Mathematics, BS**

**Applied Algebra/Discrete Math:**
- STAT 4203 Mathematical Statistics I
- MATH 4063 Advanced Linear Algebra
- MATH 4453 Mathematical Interest Theory
- MATH 4553 Introduction to Optimization
- MATH 4663 Combinatorics
- MATH 4713 Number Theory
- 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 Thesis
  - MATH 4993 Senior Honors Thesis
  - MATH 4590 Professional Practice in Mathematics (with approval of instructor and internship mentor)

**Hours Subtotal** 51

**Electives**
- Select 15 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 1 additional upper division hour
- MATH 1513 and MATH 1813 required for students who do not place directly into MATH 2144.

**Hours Subtotal** 15

**Total Hours** 120

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1. College and Departmental Requirements that may be used to meet General Education requirements.

2. An alternative 9 hour plan with at least 6 upper division hours may be used with Departmental approval.

3. If Bioinformatics is selected, additional required courses BIOL 1114, CHEM 1314, and MICR 2132 may be used to meet Additional General Education, Natural and Mathematical Sciences, or Elective requirements.

### Area of Application

#### Agricultural Economics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>AGEC 3213</td>
<td>Quantitative Methods in Agricultural Economics</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 3333</td>
<td>Agricultural Marketing and Price Analysis</td>
<td>3</td>
</tr>
<tr>
<td>or AGEC 4333</td>
<td>Commodity Futures Markets</td>
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### Bioinformatics

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>MICR 2123</td>
<td>Introduction to Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>MICR 3033</td>
<td>Cell and Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>MICR 4203</td>
<td>Bioinformatics</td>
<td>3</td>
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</tbody>
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### Cognitive Sciences

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<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>CS 4793</td>
<td>Artificial Intelligence I</td>
<td>3</td>
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</table>

Select one of the following:
- PHIL 4003 Mathematical Logic and Computability
- PHIL 4313 Philosophy of Mind (H)
- PHIL 4543 Philosophy of Language
- PSYC 3173 Introduction to Cognitive Science (N)

### Data Science

<table>
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<tr>
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<tbody>
<tr>
<td>MSIS 2103</td>
<td>Business Data Science Technologies</td>
<td>3</td>
</tr>
<tr>
<td>MSIS 3223</td>
<td>Principles of Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>MSIS 3103</td>
<td>End User Database Systems Design and Management</td>
<td>3</td>
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<tr>
<td>or MSIS 3333</td>
<td>Database Systems Development</td>
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### Economics

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>ECON 2203</td>
<td>Introduction to Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 3113</td>
<td>Intermediate Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 3123</td>
<td>Intermediate Macroeconomics</td>
<td>3</td>
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Select 3 hours of upper division ECON

### Energy Finance

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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ACCT 2003</td>
<td>Survey of Accounting</td>
<td>3</td>
</tr>
<tr>
<td>FIN 3113</td>
<td>Finance</td>
<td>3</td>
</tr>
</tbody>
</table>

Select 3 hours from the following:
- FIN 4003 Introduction to Energy Business
- FIN 4363 Energy Finance

### Finance

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<tr>
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<td>Finance</td>
<td>3</td>
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Select 3 hours from the following:
- FIN 4223 Investments
- FIN 4333 Financial Management
- FIN 4763 Financial Futures and Options Markets
- FIN 4843 Risk Management
Geographic Information Science

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<th>Hours</th>
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<tbody>
<tr>
<td>GEOG 4203</td>
<td>Fundamentals of Geographic Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 4343</td>
<td>Geographic Information Systems: Resource Management Applications</td>
<td>3</td>
</tr>
<tr>
<td>or GEOG 4353</td>
<td>Geographic Information Systems: Socioeconomic Applications</td>
<td>3</td>
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Select 3 hours of the following: 3

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<tbody>
<tr>
<td>GEOG 3333</td>
<td>Spatial Analysis (A)</td>
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<tr>
<td>GEOG 4333</td>
<td>Remote Sensing</td>
</tr>
<tr>
<td>GEOG 4383</td>
<td>Introduction to GIS Programming</td>
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Geophysical Analysis

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<th>Hours</th>
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<tbody>
<tr>
<td>ENSC 2113</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 3233</td>
<td>Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 4103</td>
<td>Introduction to Geophysical Exploration</td>
<td>3</td>
</tr>
</tbody>
</table>

Operations Research

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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>IEM 3103</td>
<td>Probability and Statistics for Engineers I</td>
<td>3</td>
</tr>
<tr>
<td>IEM 3703</td>
<td>Probability and Statistics for Engineers II</td>
<td>3</td>
</tr>
<tr>
<td>IEM 4013</td>
<td>Operations Research</td>
<td>3</td>
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Physics

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>PHYS 2203</td>
<td>University Physics III</td>
<td>3</td>
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Select 6 hours of upper-division PHYS

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<th>Hours</th>
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Other Requirements

- See the College of Arts and Sciences Requirements.
- Minimum grade of "C" or "P" in all required MATH courses.
- **Upper-Division Credit**: Total hours must include at least 40 hours in courses numbered 3000 or above.
- **Hours in One Department**: For B.A. and B.S. degrees, no more than 54 hours in one department may be applied to degree requirements.

College of Arts and Sciences

Requirements

1. **General Education Requirements**
   - No more than two courses (or eight hours) from the major department (http://catalog.okstate.edu/college-arts-sciences-major-departments/) 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, CHEM, CS (except CS 4883 Social Issues in Computing), GEOL, MATH, MICR, PBIO, 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 (N.W.). 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 applied to the degree.

3. **Foreign Language Proficiency**
   - a. The foreign language requirement for the B.A. may be satisfied by 9 hours college credit in the same language, which must include 3 hours at the 2000-level, or equivalent proficiency (e.g., passing an advanced standing examination; TOEFL exam; presenting a high school transcript which demonstrates the high school was primarily conducted in a language other than English; etc.). Computer Science courses may not be used to satisfy this requirement. Currently Arabic and Mvskoke are not offered at the 2000-level at OSU.
   - 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 6 hours college credit in the same language, which must include language courses (passing grades at second-year level of study). It may also be satisfied. It may also be satisfied by 6 hours college credit in the same language, which must include language courses 1713 and 1813, or equivalent proficiency (e.g., passing an advanced standing examination; TOEFL exam; presenting a high school transcript which demonstrates the high school was primarily conducted in a language other than English; etc.). Computer Science courses may not be used to satisfy this requirement.
   - 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 3 hours college credit in a single language with no grade below C (or pass an advanced standing examination, College Level Examination Program (CLEP) exam, or Oral Proficiency Interview developed by the American Council on the Teaching of Foreign Languages, equivalent to 3 hours of college credit.) Or, students may meet the requirement by transfer of documentation of meeting the foreign language competency from one of the teacher education programs in the State of Oklahoma approved by the Oklahoma State Regents for Higher Education.

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.

**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 2028.