Secondary STEM Education

UK Core Requirements
See the UK Core section of the 2013-14 Undergraduate Bulletin for the complete UK Core requirements. The courses listed below are (a) recommended by the college, or (b) required courses that also fulfill UK Core areas. Students should work closely with their advisor to complete the UK Core requirements.

UK Core courses may overlap with content major requirements. May not overlap with content support courses.

I. Intellectual Inquiry in Arts and Creativity
Choose one course from approved list ................................................. 3

II. Intellectual Inquiry in the Humanities
Choose one course from approved list ................................................. 3

III. Intellectual Inquiry in the Social Sciences
PSY 100 Introduction to Psychology ................................................... 4

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences
Choose one course from approved list ................................................. 3

V. Composition and Communication I
CIS/WRD 110 Composition and Communication I ................................ 3

VI. Composition and Communication II
CIS/WRD 111 Composition and Communication II ................................ 3

VII. Quantitative Foundations
MA 113 Calculus I
or
MA 137 Calculus I with Life Science Applications .......................... 4

VIII. Statistical Inferential Reasoning
STA 210 Making Sense of Uncertainty: An Introduction to Statistical Reasoning ............................................. 3

IX. Community, Culture and Citizenship in the USA
Choose one course from approved list ................................................. 3

X. Global Dynamics
Choose one course from approved list ................................................. 3

UK Core hours ................................................................................. 32

Graduation Writing Requirement
EPE 301 Education in American Culture ................................. 3
or
MA 330 History of Mathematics .................................................. 3

Graduation Writing Requirement hours ........................................... 3

Required STEM Education Core

**SEM 110 Introduction to STEM Education ................................. 2
**EDP 202 Human Development and Learning ............................. 3
*EDS 516 Principles of Behavior Management and Instruction .......... 3

*SEM 421 STEM Methods I ............................................................... 3
*SEM 422 STEM Methods II ............................................................. 3
*SEM 423 Assessment in STEM Education .................................... 2
*SEM 435 STEM Student Teaching in the Secondary School ........... 10
**EPE 301 Education in American Culture .................................... 3
*Requires field experience hours.
*Required for TEP Application.

Required STEM Core hours .......................................................... 29

Specialization STEM Content Course Work
Choose your content area below. This will serve as your secondary major. All content courses require a C or better and at least a 2.75 GPA.

Chemistry Major

Premajor Requirements

Hours
††MA 113 Calculus I .......................................................................... 4
†MA 114 Calculus II ......................................................................... 4
†CHE 105 General College Chemistry I ........................................... 4
†CHE 111 Laboratory to Accompany General Chemistry I .............. 1
†CHE 107 General College Chemistry II .......................................... 3
†CHE 113 Laboratory to Accompany General Chemistry II .............. 2

Major Requirements

CHE 226 Analytical Chemistry ....................................................... 3
CHE 230 Organic Chemistry I .......................................................... 3
CHE 231 Organic Chemistry Laboratory I ........................................ 1
CHE 232 Organic Chemistry II ......................................................... 3
CHE 233 Organic Chemistry Laboratory II ...................................... 1
CHE 440G Introductory Physical Chemistry .................................. 4
CHE 441G Physical Chemistry Laboratory ..................................... 2
CHE 572 Communication in Chemistry (taken twice for 2 credit hours) ................................................. 2

Additional Major Requirements

PHY 211 General Physics .............................................................. 5
PHY 213 General Physics .............................................................. 5

Chemistry Electives

Minimum of 5 hours of upper-division electives .............................. 5

Outside Electives

Minimum of 10 hours of 300-500 level courses with a prefix of: ANA, BCH, BIO, CME, CS, EES, MA, MI, MSE, PAT, PGY, PHA, PHR, PHY, PM, RM, or STA. Credit will not be given for both BCH 401G and CHE 550 or CHE 552 .......................................................... 10

Chemistry Premajor and Major hours ............................................. 62

††Eligible to meet a UK Core requirement.
*Required for TEP Application.
### Computer Science Major

**Premajor Requirements**  
<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>†^MA 113 Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MA 114 Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>CS 100 The Computer Science Profession</td>
<td>1</td>
</tr>
<tr>
<td>CS 115 Introduction to Computer Programming</td>
<td>3</td>
</tr>
<tr>
<td>CS 215 Introduction to Program Design, Abstraction, and Problem Solving</td>
<td>4</td>
</tr>
<tr>
<td>CS 216 Introduction to Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CS 275 Discrete Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHY 231 General University Physics</td>
<td>1</td>
</tr>
<tr>
<td>PHY 241 General University Physics Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

**Additional course needed to gain certification in Mathematics (grades 8-12):**

- CS 405G Introduction to Database Systems

**Computer Science Electives**

Complete 15 hours of electives, with at least one course from each group below:

- at least one of the following courses (3 hours):
  - CS 316 Web Programming
  - CS 335 Graphics and Multimedia
  - CS 405G Introduction to Database Systems

- at least one of the following courses (3 hours):
  - CS 470G Introduction to Operating Systems
  - CS 471G Networking and Distributed Operating Systems
  - CS 441G Compilers for Algorithmic Languages
  - CS 450G Fundamentals of Programming Languages

- at least one of the following courses (3 hours):
  - CS 375 Logic and Theory of Computing
  - CS 321 Introduction to Numerical Methods
  - CS 463G Introduction to Artificial Intelligence

**Computer Science Endorsement hours**  
67-70

- †Eligible to meet a UK Core requirement.
- ^Required for TEP Application.

### Earth Science Major

**Earth Science Major hours**  
54

- †Eligible to meet a UK Core requirement.
- ^Required for TEP Application.

### Mathematics Major

**Mathematics Core Courses**

- CS 115 Introduction to Computer Programming
- †^MA 113 Calculus I
- MA 114 Calculus II
- MA 213 Calculus III
- ^MA 261 Introduction to Number Theory
- MA 322 Matrix Algebra and Its Applications

**Mathematics Major**

- CS 315 Algorithm Design and Analysis
- CS/EE 380 Microcomputer Organization

- CS 315 Algorithm Design and Analysis
- CS 335 Graphics and Multimedia
- CS 405G Introduction to Database Systems

- CS 470G Introduction to Operating Systems
- CS 471G Networking and Distributed Operating Systems
- CS 441G Compilers for Algorithmic Languages
- CS 450G Fundamentals of Programming Languages

- CS 375 Logic and Theory of Computing
- CS 463G Introduction to Artificial Intelligence

- CS 375 Logic and Theory of Computing
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Mathematics Sequence
Choose one. May substitute a different sequence with prior faculty approval (6 hours minimum):
- MA 351 Elementary Topology I 3
  and
- MA 352 Elementary Topology Algebra II 3
  OR
- MA 361 Elementary Modern Algebra I 3
  and
- MA 362 Elementary Modern Algebra II 3
  OR
- MA 471G Advanced Calculus I 3
  and
- MA 472G Advanced Calculus II 3

Required Mathematics Electives
Courses at the 300 level or above with exception of MA 241; 12 hours minimum:
- MA 310 Mathematical Problem Solving for Teachers 3
- MA/STA 320 Introductory Probability 3
- MA 330 History of Mathematics 3
- MA 341 Topics in Geometry 3

Optional Courses
- MA 214 Calculus IV (recommended for AP Calculus) 3
- MA 471G Advanced Calculus I (recommended for MA/MS in Mathematics) 3

Mathematics Major hours 39

Physics Major
- **CHE 105 General College Chemistry I** 4
- **CHE 107 General College Chemistry II** 3
- **PHY 231 General University Physics** 4
- PHY 232 General University Physics 4
- PHY 228 Optics, Relativity and Thermal Physics 3
- PHY 306 Theoretical Methods of Physics 3
- PHY 335 Data Analysis for Physicists 1
- PHY 361 Principles of Modern Physics 3
- PHY 401G Special Topics in Physics and Astronomy for Elementary, Middle School and High School Teachers 3
- PHY 460G Hands-On Physics for Middle School and High School Teachers (taken twice for a total of 4 hours) 4
- AST 310 Topics in Astronomy and Astrophysics (Subtitle required) 3
- **MA 113 Calculus I** 4
- **MA 114 Calculus II** 4
- MA 213 Calculus III 4

Physics Major hours 47

STEM Content Support Courses
Take up to 120 hours required for graduation. Select from each area of interest – you must choose at least 3 hours from Engineering unless you are a computer science major. You may not double count these courses with your major content course requirements or UK Core requirements. **This list is not inclusive.** All courses should be approved by advisor prior to taking. SEM 575 is required for mathematics and computer science majors. It is highly encouraged for other majors.

Mathematics/Statistics
- **FIN 350 Personal Investing and Financial Planning** 3
- STA 291 Statistical Methods 3
- STA 281 Probability and Statistics Using Interactive Computer Techniques 3
- OR/STA 524 Probability 3
- **MA 501/502 Seminar in Selected Topics** 3
- **OR/STA 505 Probability** 3
- EDC/EDP/EPE 522 Psychological and Educational Tests and Measurements 3
- SEM 575 See Blue Mathematics Clinic (required for Math Certification) 3

Engineering
- **ME 599 Topics in Mechanical Engineering (Subtitle required)** 3
- EGR 101 Introduction to Engineering 4
- **EGR 199 Topics in Engineering: Title to Be Assigned** 3
- **EGR 199 Topics in Engineering: Title to Be Assigned** 3

Technology
- **CS 115 Introduction to Computer Programming** 3
- MAS 201 Communication Technologies and Society 3
- INF 401G Informatics Fundamentals 3
- EDC 543 Digital Game Based Learning and Instruction 3
- EDC 544 Use and Integration of Instructional Media 3
- CS 215 Introduction to Program Design, Abstraction, and Problem Solving 4
- CS 221 First Course in Computer Science for Engineers 2
- CS 316 Web Programming 3

Science
- **CHE 105 General College Chemistry I** 4
- CHE 111 Laboratory to Accompany General Chemistry I 1
- BIO 150 Principles of Biology I 3
- BIO 151 Principles of Biology Laboratory I 2
- PHY 231 General University Physics 4
- PHY 241 General University Physics Laboratory 1
- EES 220 Principles of Physical Geology 4
- **The subtitle for this course must directly relate to STEM content. Check with your advisor for verification prior to taking the course.**

Minimum 120 credit hours required for graduation and Rank III certification.

TOTAL HOURS 120

Free Elective
Select 3 hours of your choice. You may not double count these courses with your major content course requirements or UK Core requirements or your STEM content support courses. All courses should be approved by advisor prior to taking.