

# Secondary STEM Education

College  
of Education

## UK Core Requirements

See the *UK Core* section of the *2020-2021 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 296 Statistical Methods and Motivations.....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 Composition and Communication Requirement (GCCR)

EPE 301 Education in American Culture.....3

## Graduation Composition and Communication Requirement hours (GCCR)

..... **3**

## Required STEM Education Core

	Hours
*^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
EDC 533 Teaching Literacy Across the Disciplines.....	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.

### Biology Major

Premajor Requirements	Hours
+^MA 137 Calculus I with Life Sciences Applications	
or	
+^MA 113 Calculus I.....	4
+^CHE 105 General College Chemistry I .....	4
+^CHE 111 General Chemistry I Laboratory .....	1
^CHE 107 General College Chemistry II .....	3
^CHE 113 General Chemistry II Laboratory.....	2
^BIO 148 Introductory Biology I.....	3
^BIO 152 Principles of Biology II.....	3
^BIO 155 Laboratory for Introductory Biology I.....	1

Major Requirements	Hours
BIO 303 Introduction to Evolution.....	4
BIO 304 Principles of Genetics .....	4
BIO 315 Introduction to Cell Biology .....	4
BIO 325 Ecology .....	4
BIO 350 Animal Physiology	
or	
BIO 430G Plant Physiology.....	4
BIO 425 Biology Seminar (Subtitle required)	
or	
BIO 499 Biology Research Seminar.....	1

### Additional Major Requirements

PHY 151 Introduction to Physics	
or	
PHY 211 General Physics.....	3 or 5
CHE 230 Organic Chemistry I	
or	
CHE 236 Survey of Organic Chemistry .....	3
CHE 231 Organic Chemistry Laboratory I.....	1

### Biology Electives (15 hours minimum)

Fifteen hours to be chosen from 300+ level BIO courses. A maximum of 6 credits of BIO 395 may be used as electives in this section. These could include BIO 300 (General Entomology), BIO 302 (Introduction to Neuroscience), BIO 308 (General Microbiology), BIO 351 (Plant Kingdom), BIO 375 (Behavioral Ecology and Sociobiology) with other options.

**Biology Premajor and Major hours** ..... **60**

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## Chemistry Major

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

Major Requirements	Hours
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 441 Physical Chemistry Laboratory.....	2
CHE 372 Communication in Chemistry I.....	1
CHE 472 Communication in Chemistry II.....	1

Additional Major Requirements	Hours
PHY 211 General Physics.....	5
PHY 213 General Physics.....	5

Chemistry Electives	Hours
Minimum of 5 hours of upper-division electives (300-599 level CHE courses).....	5

Outside Electives	Hours
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

Leads to Initial Rank III Mathematics (grades 8-12) and endorsement in Computer Science (grades 8-12):

Premajor Requirements	Hours
†^MA 113 Calculus I.....	4
^MA 114 Calculus II.....	4
^CS 100 The Computer Science Profession.....	1
^CS 115 Introduction to Computer Programming.....	3
^CS 215 Introduction to Program Design, Abstraction, and Problem Solving.....	4
CS 216 Introduction to Software Engineering Techniques.....	3
^CS 275 Discrete Mathematics.....	4
PHY 231 General University Physics.....	4
PHY 241 General University Physics Laboratory.....	1

Major Requirements	Hours
PHY 232 General University Physics.....	4
PHY 242 General University Physics Laboratory.....	1
MA 213 Calculus III.....	4
EE 280 Design of Logic Circuits.....	3
STA 281 Probability and Statistics Using Interactive Computer Techniques.....	3
CS 315 Algorithm Design and Analysis.....	3
CS/MA 321 Introduction to Numerical Methods.....	3
CS/EE 380 Computer Organization.....	3

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

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

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

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

Additional course needed to gain certification in in Mathematics (grades 8-12):	
MA 341 Topics in Geometry.....	3

**Computer Science Premajor and Major hours ..... 67-70**

†Eligible to meet a UK Core requirement.

^Required for TEP Application.

## Computer Science Endorsement Only

(add on to any content major)

Leads to endorsement in Computer Science (grades 8-12):	
†MA 113 Calculus I.....	4
MA 114 Calculus II.....	4
CS 100 The Computer Science Profession.....	1
CS 115 Introduction to Computer Programming.....	3
CS 215 Introduction to Program Design, Abstraction, and Problem Solving.....	4
CS 216 Introduction to Software Engineering Techniques.....	3
CS 275 Discrete Mathematics.....	4
EE 280 Design of Logic Circuits.....	3
CS 315 Algorithm Design and Analysis.....	3
CS/EE 380 Computer Organization.....	3

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

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

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

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

**Computer Science Endorsement hours ..... 46**

†Eligible to meet a UK Core requirement.

^Required for TEP Application.

## Earth Science Major

†^MA 113 Calculus I.....	4
^MA 114 Calculus II.....	4
MA 213 Calculus III.....	4
†^CHE 105 General College Chemistry I.....	4
†^CHE 111 General Chemistry I Laboratory.....	1
CHE 107 General College Chemistry II.....	3
CHE 113 General Chemistry II Laboratory.....	2
†^PHY 231 General University Physics.....	4
†^PHY 241 General University Physics Laboratory.....	1
PHY 232 General University Physics.....	4
PHY 242 General University Physics Laboratory.....	1
GEO 230 Severe Storms and Extreme Weather.....	3
AST 192 Stars, Galaxies and the Universe.....	3
†GEO 130 Earth's Physical Environment.....	3
EES 230 Fundamentals of Geology I.....	3
EES 235 Fundamentals of Geology II.....	3
EES 360 Mineralogy.....	4
EES 401G Invertebrate Paleobiology and Evolution.....	3

**Earth Science Major hours ..... 54**

†Eligible to meet a UK Core requirement.

^Required for TEP Application.

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## Mathematics Major

### Mathematics Core Courses

CS 115 Introduction to Computer Programming.....	3
†^MA 113 Calculus I.....	4
^MA 114 Calculus II.....	4
MA 213 Calculus III.....	4
^MA 261 Introduction to Number Theory.....	3
MA 322 Matrix Algebra and Its Applications.....	3

### Mathematics Sequence

Choose one. May substitute a different sequence with prior faculty approval (6 hours minimum):

MA 351 Elementary Topology I.....	3
<b>and</b>	
MA 352 Elementary Topology Algebra II.....	3
<b>OR</b>	
MA 361 Elementary Modern Algebra I.....	3
<b>and</b>	
MA 362 Elementary Modern Algebra II.....	3
<b>OR</b>	
MA 471G Advanced Calculus I.....	3
<b>and</b>	
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**

†Eligible to meet a UK Core requirement.

^Required for TEP Application.

## 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.....	2
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** ..... **48**

†Eligible to meet a UK Core requirement.

^Required for TEP Application.

### 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.

## 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
STA 292 Descriptive Statistics.....	1
MA 501/502 Seminar in Selected Topics.....	3
OR/STA 524 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 General Chemistry I Laboratory.....	1
BIO 150 Principles of Biology I.....	3
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**