Biosystems engineering provides an essential link between the biological sciences and the engineering profession. This linkage is necessary for the development of production and processing systems involving biological materials that preserve our natural resource base. Students have the latitude to develop an area of specialization relating to environmental engineering, biotechnology, food processing, machine systems, or controlled environment engineering. The curriculum is also ideal preparation for those students wanting to pursue a graduate or professional degree in biomedical engineering or veterinary medicine through the pre-biomedical and pre-veterinary medicine options.

The curriculum in biosystems engineering is administered jointly by the College of Engineering and the College of Agriculture. Graduates earn the Bachelor of Science in Biosystems Engineering degree.

Admission to the degree program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

Degree Requirements

In addition to fulfilling UK Core and College of Engineering requirements, students must complete the biosystems engineering curriculum. The following curriculum meets the requirements for the B.S. degree.

### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td></td>
</tr>
<tr>
<td>EGR 101 Engineering Exploration I A §</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing</td>
<td>2</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 105§ or PHY 231 Gen Univ Phy PHYS 2115†§</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241 General University Physics Laboratory PHYS 2115† §</td>
<td>4</td>
</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication I WRC 2314</td>
<td>3</td>
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<tr>
<td>MA 113 Calculus I MATH 1304</td>
<td>4</td>
</tr>
<tr>
<td><strong>Second Semester</strong></td>
<td></td>
</tr>
<tr>
<td>EGR 103 Engineering Exploration II §</td>
<td>2</td>
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<tr>
<td>CIS/WRD 111 Composition and Communication II (no equivalency)</td>
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<td>MA 114 Calculus II MATH 1324</td>
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</tr>
<tr>
<td>PHY 231 Gen Univ Phy PHYS 2115§ or CHE 105 Gen Col Chem I CHEM 105§</td>
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<tr>
<td>UK Core (Social Sciences)</td>
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### Sophomore Year

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>First Semester</strong></td>
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<tr>
<td>BAE 201 Economic Analysis for Biosystems</td>
<td>2</td>
</tr>
<tr>
<td>BIO 148 Introductory Biology I BIO 1204</td>
<td>3</td>
</tr>
<tr>
<td>MA 213 Calculus III MATH 2144</td>
<td>4</td>
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<tr>
<td>CHE 107 Gen College Fundamentals II CHEM 1065</td>
<td>3</td>
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<tr>
<td>UK Core (Humanities)</td>
<td>3</td>
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<tr>
<td>CE 106 Computer Graphics and Communication</td>
<td>3</td>
</tr>
<tr>
<td><strong>Second Semester</strong></td>
<td></td>
</tr>
<tr>
<td>BAE 202 Statistical Inferences for Biosystems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MA 214 Calculus IV MATH 2084</td>
<td>3</td>
</tr>
<tr>
<td>ME 220 Engineering Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>EM 221 Statics</td>
<td>3</td>
</tr>
<tr>
<td>PHY 232 General University Physics PHYS 2125</td>
<td>4</td>
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<tr>
<td>PHY 242 General University Physics Laboratory PHYS 2125</td>
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### Junior Year

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>First Semester</strong></td>
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<tr>
<td>CE 341 Introduction to Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>EE 305 Electrical Circuits and Electronics</td>
<td>3</td>
</tr>
<tr>
<td>EM 313 Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>BIO 152 Principles of Biology II BIO 1206</td>
<td>3</td>
</tr>
<tr>
<td>WRD 204 Technical Writing §§</td>
<td>3</td>
</tr>
<tr>
<td><strong>Second Semester</strong></td>
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<tr>
<td>ME 325 Elements of Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>BAE 305 DC Circuits and Microelectronics</td>
<td>3</td>
</tr>
<tr>
<td>EM 302 Mechanics of Deformable Solids</td>
<td>3</td>
</tr>
<tr>
<td>Biological Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Biosystems Core Elective*</td>
<td>3</td>
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</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td><strong>First Semester</strong></td>
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<tr>
<td>BAE 402 Biosystems Engineering Design I</td>
<td>2</td>
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<tr>
<td>BAE 400 Senior Seminar</td>
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<tr>
<td>Biosystems Core* or Technical Electives*§</td>
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<tr>
<td>Biosystems Core* or Technical Electives*§</td>
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<tr>
<td><strong>Second Semester</strong></td>
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<tr>
<td>BAE 403 Biosystems Engineering Design II</td>
<td>2</td>
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<tr>
<td>ME 340 Introduction to Mechanical Systems</td>
<td>3</td>
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<tr>
<td>Biosystems Core* or Technical Electives*§</td>
<td>3</td>
</tr>
<tr>
<td>Supporting Elective§</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Global Dynamics)</td>
<td>3</td>
</tr>
</tbody>
</table>


** A minimum of 12 hours are to be taken in addition to the 9 core hours selected by the student. The technical electives allow the student an opportunity to concentrate or gain depth in one or more of the various specialty areas of biosystems engineering. The technical electives must be selected from the courses listed below and approved by the student’s academic advisor. Other courses may be considered, each on its individual merit.

***Graduation Composition and Communication Requirement (GCCCR) course.


‡§ Only if enrolled in PHY 231

Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.

University of Kentucky is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award associate, baccalaureate, masters, and doctorate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097, call 404-679-4500, or online at www.sacscoc.org for questions about the accreditation of University of Kentucky.
Chemical Engineering

A foundation in mathematics, chemistry, and physics is required for the study of chemical engineering. Fundamental principles related to the transformation of matter and energy are developed in subjects including thermodynamics, fluid flow, separations, heat and mass transfer, reactor design, and chemical process design. Undergraduate electives are available in biopharmaceutical engineering, energy and fuels, environmental engineering, and materials engineering and nanotechnology. A program is also available to fulfill pre-medical requirements simultaneously with requirements for the B.S. in chemical engineering.

Admission to the degree program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

Degree Requirements

In addition to fulfilling UK Core and College of Engineering requirements, students must complete the chemical engineering curriculum. The following curriculum meets the requirements for the B.S. degree.

Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I §</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing</td>
<td>2</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHY 231 Gen Univ Phy PHYS 2115</td>
<td>4</td>
</tr>
<tr>
<td>CHE 111 Laboratory to Accompany General Chemistry I CHEM 1055</td>
<td>1</td>
</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication WRC 2314I</td>
<td>3</td>
</tr>
<tr>
<td>MA 113 Calculus I MATH 1304</td>
<td>4</td>
</tr>
</tbody>
</table>

Second Semester

| EGR 103 Engineering Exploration II ∆ | 2 |
| CIS/WRD 111 Composition and Communication II (no equivalency) | 3 |
| MA 114 Calculus II MATH 1324 | 4 |
| PHY 231 Gen Univ Phy PHYS 2115 or CHE 105 Gen Col Chem I CHEM 1055 | 4 |
| UK Core (Social Sciences) | 3 |

Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME 200 Process Principles</td>
<td>3</td>
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<tr>
<td>MA 213 Calculus III MATH 2144</td>
<td>4</td>
</tr>
<tr>
<td>CHE 107 General College Chemistry II CHEM 1065</td>
<td>3</td>
</tr>
<tr>
<td>CHE 113 Laboratory to Accompany General Chemistry II CHEM 1065</td>
<td>2</td>
</tr>
<tr>
<td>MSE 201 Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Humanities)</td>
<td>3</td>
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</tbody>
</table>

Second Semester

| CME 320 Engineering Thermodynamics | 4 |
| CME 220 Computational Tools in Chemical Engineering | 3 |
| MA 214 Calculus IV MATH 2084 | 3 |
| PHY 232 General University Physics PHYS 2125 | 4 |
| STA 381 Engineering Statistics A Conceptual Approach | 3 |

Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME 415 Separation Processes</td>
<td>3</td>
</tr>
<tr>
<td>CHE 446G Physical Chemistry for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CME 330 Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>WRD 204 Technical Writing *</td>
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</tr>
<tr>
<td>CHE 230 Organic Chemistry I CHEM 2155</td>
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</tr>
<tr>
<td>CHE 231 Organic Chemistry Laboratory I CHEM 2155</td>
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</table>

Second Semester

| CME 006 The Engineering Profession (Junior and Senior) | 0 |
| CME 420 Process Modeling in Chemical Engineering | 3 |
| CME 425 Heat and Mass Transfer | 4 |
| CME 432 Chemical Engineering Laboratory I | 2 |
| CHE 232 Organic Chemistry II CHEM 2165 | 3 |
| Engineering/Science Elective† | 3 |

Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME 006 The Engineering Profession (Junior and Senior)</td>
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<tr>
<td>CME 470 Professionalism, Ethics and Safety</td>
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<tr>
<td>CME 433 Chemical Engineering Laboratory II</td>
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<tr>
<td>CME 455 Chemical Engineering Process Design I</td>
<td>3</td>
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<td>CME 550 Chemical Reactor Design</td>
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<tr>
<td>UK Core (Global Dynamics)</td>
<td>3</td>
</tr>
<tr>
<td>Engineering/Science Elective† MATH 2204</td>
<td>3</td>
</tr>
</tbody>
</table>

Second Semester

| CME 006 The Engineering Profession (Junior and Senior) | 0 |
| CME 456 Chemical Engineering Process Design II | 4 |
| CME 462 Process Control | 3 |
| Engineering/Science Elective† | 3 |
| Engineering/Science Elective† | 3 |
| Supportive Elective ** | 3 |

∆ Both classes must be taken to fulfill UK Core: Arts & Creativity requirement.

*Graduation Composition and Communication Requirement (GCCR) course.

** Supportive Elective (3 credits) can be any course that carries college credit and is not a more elementary version of a required course. The student completing 3 co-op tours (EGR 399) may count the co-op experience toward the supportive elective.

- Based on advisor consult

§ Transfer students who declare a major will take EGR 112 Engineering Exploration for Transfer Students in place of EGR 101.

Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.

†Engineering/Science Elective Structure. Students must select four courses as follows:

1. Chemical engineering elective (CME 395, 404G, 505, 513, 542, 554, 556, 580, 599) [CME 395 (3 credits) can be used to satisfy only one elective Requirement]

CONTINUED
2. Science/math elective (totaling three or more credit hours**) that is not a more elementary version of a required course. [Students may combine multiple qualifying courses that total 3 credits (e.g. pre-medical students may wish to combine PHY 241, 242 and CHE 233)]
   b. Chemistry (CHE 226, 250, 510 and above) Biology (BIO 148 and above)
   c. Physics (PHY 241 and above)
   d. Other courses by approval of Director of Undergraduate Studies

3. Engineering elective (level 300 and above) that does not significantly duplicate content in a core chemical engineering course (e.g. ME 330) OR a CME Elective (CME 395 and above).

4. Chemical engineering elective (CME 395 and above) OR one engineering elective (level 300 and above) OR one science/math elective as described above.
Civil Engineering

A civil engineering curriculum provides a strong foundation for entry into the profession or graduate school. Major areas include construction engineering and project management, environmental engineering, geotechnical engineering, materials engineering, structural engineering, transportation engineering, and water resources engineering.

Admission to the degree program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

Degree Requirements

The following curriculum meets the requirements for a B.S. in Civil Engineering, provided the student satisfies UK Core and College of Engineering requirements.

Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I A §</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing</td>
<td>1</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHY 231 Gen Univ Phy PHYS 2115 ●</td>
<td>2</td>
</tr>
<tr>
<td>PHY 241 General University Physics Laboratory PHYS 2115 ●</td>
<td>1</td>
</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication I WRC 2314</td>
<td>3</td>
</tr>
<tr>
<td>MA 113 Calculus I MATH 1304</td>
<td>4</td>
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Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 103 Engineering Exploration II A ●</td>
<td>2</td>
</tr>
<tr>
<td>CIS/WRD 111 Composition and Communication II (no equivalency)</td>
<td>3</td>
</tr>
<tr>
<td>MA 114 Calculus II MATH 1324</td>
<td>4</td>
</tr>
<tr>
<td>PHY 231 Gen Univ Phy PHYS 2115 or CHE 105 Gen Col Chem I CHEM 1055 ●</td>
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<tr>
<td>UK Core (Humanities)</td>
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Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 211 Surveying</td>
<td>4</td>
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<tr>
<td>CHE 107 General College Chemistry II CHEM 1065</td>
<td>3</td>
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<tr>
<td>EM 221 Statics</td>
<td>3</td>
</tr>
<tr>
<td>MA 213 Calculus III MATH 2144</td>
<td>4</td>
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<tr>
<td>CE 106 Computer Graphics and Communication</td>
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Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EM 302 Mechanics of Deformable Solids</td>
<td>3</td>
</tr>
<tr>
<td>MNG 303 Deformable Solids Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>MA 214 Calculus IV MATH 2084</td>
<td>2</td>
</tr>
<tr>
<td>PHY 232 General University Physics PHYS 2125</td>
<td>4</td>
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<tr>
<td>PHY 242 General University Physics Laboratory PHYS 2125</td>
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<tr>
<td>STA 381 Engineering Statistics A Conceptual Approach</td>
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</table>

Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.

Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>WRD 204 Technical Writing (GCGR)*</td>
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<tr>
<td>EES 220 Principles of Physical Geology</td>
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<tr>
<td>CE 303 Introduction to Construction Engineering</td>
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<tr>
<td>CE 341 Introduction to Fluid Mechanics</td>
<td>4</td>
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<tr>
<td>CE 381 Civil Engineering Materials I</td>
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Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CE 331 Transportation Engineering</td>
<td>3</td>
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<tr>
<td>CE 351 Introduction to Environmental Engineering</td>
<td>3</td>
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<tr>
<td>CE 382 Structural Analysis</td>
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<tr>
<td>Engineering Science Elective [1]</td>
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</tr>
<tr>
<td>Math Elective or Science Elective [2] MATH 2204</td>
<td>3</td>
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<tr>
<td>UK Core (Social Sciences)</td>
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Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 461G Water Resources Engineering</td>
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<tr>
<td>CE 471G Soil Mechanics</td>
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<tr>
<td>CE 48X Structures Elective [3]</td>
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<tr>
<td>CE Design Elective [4]</td>
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<td>UK Core (Citizenship – USA)</td>
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Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>CE 401 Seminar</td>
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<tr>
<td>CE 429 Civil Engineering Systems Design</td>
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<tr>
<td>CE Design Elective [4]</td>
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<tr>
<td>Supportive Elective [6]</td>
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</tr>
<tr>
<td>UK Core (Global Dynamics)</td>
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</tr>
</tbody>
</table>

[1] To be chosen from ME 220 or EM 313.
[3] To be selected from: CE 482 or CE 486G.
[4] Students are required to select two design electives from different areas. Choose from: CE 508, CE 531 or CE 533, CE 534, CE 549, CE 551, CE 579, CE 589. Design elective courses are typically taught once a year.
[5] Technical Elective is chosen from any of the courses at the 300-level or above that carry a CE prefix and in which a student is qualified to enroll, exclusive of required courses. Engineering elective courses are typically taught once a year.
[6] Supportive elective is to be chosen from any University course, excluding a more elementary version of a required course, such as precalculus mathematics or PHY211. However, each CE area has at least one recommendation for the supportive elective. Please review the Optional Concentration section in the Civil Engineering Undergraduate Handbook. The supportive elective can be taken pass-fail.

$\Delta$ Both classes must be taken to fulfill UK Core: Arts & Creativity requirement.
$\ddagger$ Only if enrolled in PHY 231
*Graduation Composition and Communication Requirement (GCGR) course.

§ Transfer students who declare a major will take EGR 112 Engineering Exploration for Transfer Students in place of EGR 101.
Computer Engineering

Computer Engineers shape the way people work, play, live and learn in the modern world and develop the infrastructure and devices people can't imagine living without. Computer Engineering is a dynamic and rewarding field that draws upon Electrical Engineering and Computer Science. Computer Engineers solve today's most challenging technology problems by applying their expertise in both hardware and software systems. Leveraging everything from the world's smallest micro-controllers to the largest server farms on the planet, Computer Engineers have revolutionized modern entertainment, medicine, telecommunications, transportation, and Information Technology. Computer Engineering graduates find employment in positions requiring Computer Science, Electrical Engineering or Computer Engineering expertise, are in high demand in virtually all industries, and are among the highest compensated specialties in engineering. Admission to the degree program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

Degree Requirements

In addition to fulfilling UK Core and College of Engineering requirements, students must complete the computer engineering curriculum. The following curriculum meets the requirements for the B.S. degree.

Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I △</td>
<td>1</td>
</tr>
<tr>
<td>PHY 231 Gen Univ Phy or PHYS 2115 CHE 105 Gen Col Chem CHEM 1055†</td>
<td>4</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHYS 2115</td>
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</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication I WRC 2314</td>
<td>3</td>
</tr>
<tr>
<td>MA 113 Calculus I MATH 1304</td>
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Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 103 Engineering Exploration II △</td>
<td>2</td>
</tr>
<tr>
<td>CIS/WRD 111 Composition and Communication II (no equivalency)</td>
<td>3</td>
</tr>
<tr>
<td>MA 114 Calculus II MATH 1324</td>
<td>4</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHYS 2115</td>
<td>4</td>
</tr>
<tr>
<td>CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques CS 2124</td>
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Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 213 Calculus III MATH 2144</td>
<td>4</td>
</tr>
<tr>
<td>PHY 232 General University Physics PHYS 2125</td>
<td>4</td>
</tr>
<tr>
<td>PHY 242 General University Physics Laboratory PHYS 2125</td>
<td>1</td>
</tr>
<tr>
<td>CS 216 Introduction to Software Engineering Techniques</td>
<td>3</td>
</tr>
<tr>
<td>CPE 282 Digital Logic Design</td>
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Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 214 Calculus IV MATH 2084</td>
<td>3</td>
</tr>
<tr>
<td>EE 211 Circuits I</td>
<td>4</td>
</tr>
<tr>
<td>CPE 287 Introduction to Embedded Systems</td>
<td>4</td>
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<tr>
<td>CS 270 Systems Programming</td>
<td>3</td>
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<tr>
<td>CS 275 Discrete Mathematics</td>
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Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EE 223 AC Circuits</td>
<td>4</td>
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<tr>
<td>CS 315 Algorithm Design and Analysis CS 2444</td>
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<tr>
<td>CPE 380 Microcomputer Organization</td>
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<tr>
<td>STA 381 Engineering Statistics A Conceptual Approach</td>
<td>3</td>
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<tr>
<td>UK Core (Humanities)</td>
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</table>

Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 421G Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>EE 461G Introduction to Electronics</td>
<td>3</td>
</tr>
<tr>
<td>CPE 480 Advanced Computer Architecture**</td>
<td>3</td>
</tr>
<tr>
<td>CPE Elective</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective†</td>
<td>3</td>
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<tr>
<td>UK Core (Social Sciences)</td>
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Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPE 490 ECE Capstone Design I** †, ***</td>
<td>3</td>
</tr>
<tr>
<td>CPE Elective†</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective† MATH 2204</td>
<td>3</td>
</tr>
<tr>
<td>Supportive Elective*</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Citizenship – USA)</td>
<td>3</td>
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Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPE 491 ECE Capstone Design II** †</td>
<td>3</td>
</tr>
<tr>
<td>Hardware Elective</td>
<td>3</td>
</tr>
<tr>
<td>Software Elective</td>
<td>3</td>
</tr>
<tr>
<td>CPE Elective†</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Global Dynamics)</td>
<td>3</td>
</tr>
</tbody>
</table>

*Technical elective may be selected from upper-division engineering, mathematics, statistics, computer science, physics, or other technologically-related fields excluding more elementary version of required courses. To be selected in consultation with academic advisor.

**CPE 480 is only taught in the spring semester. CPE 490 is only taught in the fall semester. CPE 491 is only taught in the spring semester.

***Graduation Composition and Communication Requirement (GCCR) course.

†400 level CS courses and 500 level CPE courses with emphasis in the computer engineering area and excluding EE 595. To be selected in consultation with academic advisor.

∆ Both classes must be taken to fulfill UK Core: Arts & Creativity requirement.

§ Hardware electives are senior level course in the CPE or EE disciplines and shall be selected from the following list and/or selected with consultation with academic advisor:

EE 582 Hardware Description Languages and Programmable Logic
CPE 584 Introduction to VLSI Design and Testing
CPE 585 Fault Tolerant Computing
CPE 586 Communication and Switching Networks

θ Software electives are senior level course in the CPE or CS disciplines and shall be selected from the following list and/or selected with academic advisor:

CS 441G Compilers for Algorithmic Languages
CS 471G Networking and Distributed Operating Systems
CS 570 Modern Operating Systems
CPE 588 Real-Time Digital Systems

φ Based on advisor consult

θ Transfer students who declare a major will take EGR 112 Engineering Exploration for Transfer Students in place of EGR 101.

† Only if enrolled in PHY 231

Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.

University of Kentucky is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award associate, baccalaureate, masters, and doctorate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097, call 404-679-4500, or online at www.sacscoc.org for questions about the accreditation of University of Kentucky.
The computer science program prepares students to identify computational problems in all areas of modern life, to design, implement, and analyze algorithmic solutions, and to build software for a variety of applications. Through required, elective and special topics courses students are exposed to the foundations and current practices of computing and algorithms, software engineering, programming languages, operating systems, graphics and multimedia, scientific computing and numerical analysis, databases, artificial intelligence and networks.

Admission to the degree program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

Degree Requirements

In addition to satisfying UK Core requirements, each student completes the following:

Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I A §</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing</td>
<td>2</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHY 231 Gen Univ Phy PHYS 2115‡</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241 General University Physics Laboratory PHYS 2115‡</td>
<td>1</td>
</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication I WRC 2314</td>
<td>3</td>
</tr>
<tr>
<td>MA 113 Calculus I MATH 1304</td>
<td>4</td>
</tr>
</tbody>
</table>

Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 103 Engineering Exploration II A</td>
<td>2</td>
</tr>
<tr>
<td>CIS/WRD 111 Composition and Communication II (no equivalence)</td>
<td>3</td>
</tr>
<tr>
<td>MA 114 Calculus II MATH 1324</td>
<td>4</td>
</tr>
<tr>
<td>PHY 231 Gen Univ Phy PHYS 2115 or CHE 105 Gen Col Chem I CHEM 1055‡</td>
<td>4</td>
</tr>
<tr>
<td>CS 215 Introduction to Program Design, Abstraction, and Problem Solving CS 2124</td>
<td>4</td>
</tr>
</tbody>
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Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 216 Introduction to Software Engineering Techniques</td>
<td>3</td>
</tr>
<tr>
<td>EE 280 Design of Logic Circuits</td>
<td>3</td>
</tr>
<tr>
<td>MA 213 Calculus III MATH 2144</td>
<td>4</td>
</tr>
<tr>
<td>CS 275 Discrete Mathematics</td>
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</tr>
<tr>
<td>UK Core (Social Sciences)</td>
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</table>

<table>
<thead>
<tr>
<th>Second Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 270 Systems Programming</td>
<td>3</td>
</tr>
<tr>
<td>CS 315 Algorithm Design and Analysis CS 2444</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective [T] MATH 2084</td>
<td>3</td>
</tr>
<tr>
<td>Science Elective [S]</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Humanities)</td>
<td>3</td>
</tr>
</tbody>
</table>

Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.
The Academic Minor

Many departments have designed academic minors for the convenience of undergraduate students.

A minor is a structured group of courses that leads to considerable knowledge and understanding of a subject, although with less depth than a major. Some employers consider minors desirable, and the corresponding major requirements at the University may stipulate a minor. Some students choose to complement their major program with a minor in a related field or even in an entirely different field of interest. Students interested in pursuing an academic minor should contact their college dean’s office and the department responsible for the minor program for guidance and advising.

Please note that undergraduate students can only complete a minor in addition to and as a complement to a major. The University does not award stand-alone minors.

Minor in Computer Science

The minor in computer science requires a minimum of 19-20 hours of course work in CS, to include the following:

EGR102 (2) or CS 115 (3), CS 215 (4), CS 216 (3), CS 275 (4), CS 315 (3), or equivalent, plus three additional hours of upper-division courses (300 or higher) in computer science. A GPA of at least 2.5 across these courses is required. At least 10 of the credit hours required to complete the minor must be earned at the University of Kentucky.
The electrical engineering degree program seeks to produce graduates who are trained in the theory and practice of electrical and computer engineering and are well prepared to handle the professional and leadership challenges of their careers. The program allows students to specialize in high performance and embedded computing, microelectronics and nanotechnology, power and energy, signal processing and communications, high frequency circuits and fields, and control systems, among others. Admission to the degree program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

**Degree Requirements**

The following curriculum meets the requirements for a B.S. in Electrical Engineering, provided the student satisfies UK Core requirements and graduation requirements of the College of Engineering.

### Freshman Year

**First Semester**

- EGR 101 Engineering Exploration I 
- EGR 102 Fundamentals of Engineering Computing
- PHY 231 Gen Univ Phy or CHE 105 Gen Col Chem I
- CIS/WRD 110 Composition and Communication I
- MA 113 Calculus I

**Hours**

- 1
- 2
- 3
- 3
- 3

**Second Semester**

- EGR 103 Engineering Exploration II
- CIS/WRD 111 Composition and Communication II
- CHE 105 Gen Col Chem I or PHY 231
- UK Core (Social Sciences)
- CS 215 Introduction to Program Design, Abstraction, and Problem Solving

**Hours**

- 2
- 2
- 4
- 3
- 3

### Sophomore Year

**First Semester**

- MA 213 Calculus III
- PHY 232 Gen General Physics
- EE 211 Circuits I
- EE/CPE 282 Digital Logic Design

**Hours**

- 4
- 4
- 3
- 4

**Second Semester**

- MA 214 Calculus IV
- EE/CPE 287 Intro to Embedded Systems
- CS 215 Introduction to Program Design, Abstraction, and Problem Solving
- Any upper-division (300-level or higher) math course at the 200-level or higher, other than an electrical engineering course and excluding MA 308 and MA 310
- UK Core (Humanities)

**Hours**

- 4
- 4
- 4
- 3
- 3

### Junior Year

**First Semester**

- EE 415G Electromechanics
- EE 417G Signals and Systems
- Elective EE Laboratory
- EE 461G Introduction to Electronics
- MA/STA 320 Introductory Probability or STA 381 Engineering Statistics: A Conceptual Approach
- Technical Elective

**Second Semester**

- EE 465G Introduction to Engineering Electromagnetics
- Elective EE Laboratory
- Engineering/Science Elective
- Technical Elective
- UK Core (Citizenship – USA)

### Senior Year

**First Semester**

- EE/CPE 490 ECE Capstone Design II
- EE Technical Electives
- EE Technical Electives
- Math/Statistics Elective
- UK Core (Global Dynamics)

**Hours**

- 3
- 4
- 4
- 3
- 3

**Second Semester**

- EE 491/CPE ECE Capstone Design III
- EE Technical Electives
- EE Technical Electives
- Supportive Elective
- Engineering/Science Elective
- UK Core (Statistical Inferential Reasoning)

**Hours**

- 3
- 4
- 4
- 3
- 3
- 3

*Supportiveelectives to be chosen from any University courses, excluding more elementary versions of required courses, such as precalculus mathematics or PHY 211.

**Graduation Composition and Communication Requirement (GCCR) course.

[M] Math/Statistics Elective: Any upper-division (300-level or higher) math or statistics course excluding MA 308 and MA 310 (3 credit hours total).

[F] Engineering/Science Elective: Any engineering, physics, computer science, or math course at the 200-level or higher, other than an electrical engineering course and excluding MA 308, MA 310, and more elementary versions of required courses (6 credit hours total). Cooperative education credit may not be used to satisfy this requirement.

[T] Technical elective may be selected from upper-division (300-level or higher), engineering, mathematics, statistics, computer science, physics, or other technologically-related fields excluding MA 308, MA 310, EE 305, and more elementary versions of required courses, to be selected in consultation with the academic advisor (3 credit hours total). Cooperative education credit may not be used to satisfy this requirement.


*EE/CPE 490 is only taught in the fall semester. EE/CPE 491 is only taught in the spring semester.

**EGR 112 Engineering Exploration for Transfer Students in place of EGR 101.

- Based on advisor consult

- Only if enrolled in PHY 231

- Students who take WRC 2314 and WRC 1034 can select CIS/WRD 111 or CIS 184 at UK.

**EE Technical Electives (must be 500-level courses). Courses recommended as electrical engineering technical electives are listed below (each course is 3 credit hours):**

- EE 511 Introduction to Communication Systems
- EE 512 Digital Communication Systems
- EE 513 Audio Signals and Systems
- EE 517 Advanced Electromechanics

CONTINUED
Electrical Engineering • 2

EE 518 Electric Drives
EE 521 Introduction to Wireless Communications  EE 522 Antenna Design
EE 523 Microwave Circuit Design
EE 525 Numerical Methods and Electromagnetics
EE 527 Electromagnetic Compatibility
EE 531 Alternative and Renewable Energy Systems
EE 532 Smartgrid: Automation and Control of Power Systems
EE 535 Power Systems: Generation, Operation and Control
EE 536 Power System Fault Analysis and Protection
EE 537 Electric Power Systems I
EE 538 Electric Power Systems II
EE 539 Power Distribution Systems
EE 546 Electric Power System Foundations
EE 560 Semiconductor Device Design
EE 561 Electric and Magnetic Properties of Materials
EE 562 Analog Electronic Circuits
EE 564 Digital Electronic Circuits
EE 565 Circuit Design With Analog Integrated Circuits
EE 567 Introduction to Lasers and Masers
EE 568 Fiber Optics
EE 569 Electronic Packaging Systems and Manufacturing Processes
EE 571 Feedback Control Design
EE 572 Digital Control of Dynamic Systems
EE 581 Advanced Logical Design
EE 582 Hardware Description Languages and Programmable Logic
EE 584 Introduction of VLSI Testing and Design
EE 585 Fault Tolerant Computing
EE 586 Communication and Switching Networks
EE 587 Microcomputer Systems Design
EE 589 Advanced VLSI
EE 599 Topics in Electrical Engineering (Subtitle required)
# Materials Engineering

The materials engineer is responsible for the selection, preparation and application of existing materials and for the development of new and improved materials. Materials engineers study the relationships between atomic and/or molecular constitution, microstructure and physical properties including mechanical, thermal, electrical, and optical behavior. Classes of materials include metals, ceramics, polymers, and electronic materials.

Admission to the degree program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

## Degree Requirements

The following curriculum meets the requirements for a B.S. in Materials Engineering, provided the student satisfies the graduation requirements of the College of Engineering.

### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing</td>
<td>2</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHY 231 GenUnivPhy PHYS 2115</td>
<td>4</td>
</tr>
<tr>
<td>CHE 111 General College Chemistry Labl CHEM 1055</td>
<td>1</td>
</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication I</td>
<td>3</td>
</tr>
<tr>
<td>MA 113 Calculus I MATH 1304</td>
<td>4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 103 Engineering Exploration II</td>
<td>2</td>
</tr>
<tr>
<td>CIS/WRD 111 Composition and Communication II (no equivalency)</td>
<td>3</td>
</tr>
<tr>
<td>MA 114 Calculus II MATH 1324</td>
<td>4</td>
</tr>
<tr>
<td>PHY 231 GenUnivPhy PHYS 2115 or CHE 105 Gen Col Chem I CHEM 1055</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241 General University Physics Laboratory PHYS 2115</td>
<td>1</td>
</tr>
<tr>
<td>UK Core (Social Sciences)</td>
<td>3</td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MSE 201 Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>CHE 107 General College Chemistry II CHEM 1065</td>
<td>3</td>
</tr>
<tr>
<td>CHE 113 General College Chemistry II CHEM 1065</td>
<td>2</td>
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<tr>
<td>MA 213 Calculus III MATH 2114</td>
<td>4</td>
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<tr>
<td>EM 221 Statics</td>
<td>3</td>
</tr>
<tr>
<td>MSE 202 Materials Science Laboratory</td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MSE 301 Materials Science II</td>
<td>3</td>
</tr>
<tr>
<td>MSE 351 Materials Thermodynamics</td>
<td>3</td>
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<tr>
<td>MA 214 Calculus IV MATH 2084</td>
<td>3</td>
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<tr>
<td>PHY 232 General University Physics PHYS 2125</td>
<td>4</td>
</tr>
<tr>
<td>CHE 236 Survey of Organic Chemistry</td>
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### Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MSE 401G Metal and Alloys</td>
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<tr>
<td>MSE404G Polymeric Materials</td>
<td>3</td>
</tr>
<tr>
<td>CME 200 Process Principles</td>
<td>3</td>
</tr>
<tr>
<td>EM 302 Mechanics of Deformable Solids</td>
<td>3</td>
</tr>
<tr>
<td>STA 381 Engineering Statistics: A Conceptual Approach</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Humanities)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 402G Electronic Materials and Processing</td>
<td>3</td>
</tr>
<tr>
<td>MSE 403G Ceramic Engineering and Processing</td>
<td>3</td>
</tr>
<tr>
<td>MSE 407 Materials Laboratory I **</td>
<td>3</td>
</tr>
<tr>
<td>MSE 535 Mechanical Properties of Materials</td>
<td>3</td>
</tr>
<tr>
<td>PHY 361 Principles of Modern Physics</td>
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### Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 408 Materials Laboratory II</td>
<td>3</td>
</tr>
<tr>
<td>MSE 436 Material Failure Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MSE 585 Materials Characterization Techniques</td>
<td>3</td>
</tr>
<tr>
<td>EE 305 Electrical Circuits and Electronics</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective** (MSE prefix)</td>
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</tr>
<tr>
<td>UK Core (Citizenship – USA)</td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 480 Materials Design</td>
<td>3</td>
</tr>
<tr>
<td>MSE 538 Metals Processing</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective ** MATH 2204</td>
<td>3</td>
</tr>
<tr>
<td>Supportive Elective*</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Global Dynamics)</td>
<td>3</td>
</tr>
</tbody>
</table>

*Supportive elective is any university course, excluding more elementary versions of required courses, such as precalculus mathematics or PHY 211.

**Technical Electives – Total of 6 credit hours must be chosen. Technical electives are to be selected from a technical discipline, with approval from the Director of Undergraduate Studies. At least 3 credit hours must come from a course with a MSE prefix. MSE 395 (Research) may count for one elective, but not both. Recommended technical electives include but are not limited to:

- MSE 395 Independent Work in Materials Engineering
- MSE 506 Mechanics of Composite Materials
- MSE 531 Powder Metallurgy
- MSE/CME 554 Chemical and Physical Processing of Polymer Systems
- MSE 556 Introduction to Composite Materials
- MSE 569 Electronic Packaging Systems and Manufacturing Processes
- MSE 599 Topics in Materials Science and Engineering (Subtitle required)
- CHE 580 Topics in Chemistry
- CME 542 Electric Power Generation Technologies
- MA 322 Matrix Algebra and Its Applications
- MA 422 Numerical Solutions of Equations
- MA 432G Methods of Applied Mathematics I
- ME/MFS 503 Lean Manufacturing Principles and Practices

Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.

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Mechanical Engineering

A mechanical engineering training is the broadest among the several fields of engineering. The mechanical engineer uses the techniques of mathematics combined with a specialized knowledge of the thermal and energy sciences, solid and fluid mechanics, and the properties of materials. This information is supplemented by an understanding of manufacturing processes, the design and control of systems, and the economics of the technological community.

Admission to the program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

Degree Requirements

The following curriculum meets the requirements for a Bachelor of Science in Mechanical Engineering, provided the student satisfies the graduation requirements of the College of Engineering.

Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing</td>
<td>2</td>
</tr>
<tr>
<td>PHY 231 GenUnivPhy PHYS 2115 or CHE 105 GenColChem I CHEM 1055†</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241 General University Physics Laboratory PHYS 2115‡</td>
<td>1</td>
</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication I WRC 2314</td>
<td>3</td>
</tr>
<tr>
<td>MA 113 Calculus I MATH 1304</td>
<td>4</td>
</tr>
</tbody>
</table>

Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 103 Engineering Exploration II</td>
<td>2</td>
</tr>
<tr>
<td>CIS/WRD 111 Composition and Communication II (no equivalency)</td>
<td>3</td>
</tr>
<tr>
<td>MA 114 Calculus II MATH 1324</td>
<td>4</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHY 231 GenUnivPhy PHYS 2115•</td>
<td>4</td>
</tr>
<tr>
<td>UK Core (Social Sciences)</td>
<td>3</td>
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</table>

Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 232 General University Physics PHYS 2125</td>
<td>4</td>
</tr>
<tr>
<td>PHY 242 General University Physics Laboratory PHYS 2125.</td>
<td>1</td>
</tr>
<tr>
<td>MA 213 Calculus III MATH 2144</td>
<td>1</td>
</tr>
<tr>
<td>CHE 107 General College Chemistry II CHEM 1065 or UK Core (Humanities)</td>
<td>3</td>
</tr>
<tr>
<td>ME 205 Computer Aided Engineering Graphics</td>
<td>3</td>
</tr>
<tr>
<td>EM 221 Statics</td>
<td>3</td>
</tr>
</tbody>
</table>

Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 220 Engineering Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>ME 251 Manufacturing Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MA 214 Calculus IV MATH 2084</td>
<td>3</td>
</tr>
<tr>
<td>EM 313 Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Humanities) or CHE 107 General College Chemistry II CHEM 1065–</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Statistical Inferential Reasoning)</td>
<td>3</td>
</tr>
</tbody>
</table>

Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.

Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM 302 Mechanics of Deformable Solids</td>
<td>3</td>
</tr>
<tr>
<td>EE 305 Electrical Circuits and Electronics</td>
<td>3</td>
</tr>
<tr>
<td>ME 330 Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 340 Introduction to Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>WRD 204 Technical Writing*</td>
<td>3</td>
</tr>
</tbody>
</table>

Second Semester

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 310 Engineering Experimentation I</td>
<td>3</td>
</tr>
<tr>
<td>ME 321 Engineering Thermodynamics II</td>
<td>3</td>
</tr>
<tr>
<td>ME 325 Elements of Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>ME 344 Mechanical Design</td>
<td>3</td>
</tr>
<tr>
<td>Math Elective** MATH 2204</td>
<td>3</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 411 ME Capstone Design I*</td>
<td>3</td>
</tr>
<tr>
<td>ME 311 Engineering Experimentation II</td>
<td>3</td>
</tr>
<tr>
<td>ME 440 Design of Control Systems</td>
<td>3</td>
</tr>
<tr>
<td>ME 501 Mechanical Design with Finite Element Methods</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective†</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 412 ME Capstone Design II</td>
<td>3</td>
</tr>
<tr>
<td>Technical Electives†</td>
<td>3</td>
</tr>
<tr>
<td>Supportive Elective ‡</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Global Dynamics)</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Citizenship USA)</td>
<td>3</td>
</tr>
</tbody>
</table>

Δ Both classes must be taken to fulfill UK Core: Arts & Creativity requirement.
● Based on advisor consult
‡ Only if enrolled in PHY 231
§ Transfer students who declare a major will take EGR 112 Engineering Exploration for Transfer Students in place of EGR 101.
*Graduation Composition and Communication Requirement (GCCR) course.
**Supportive elective is any university course, excluding more elementary versions of required courses, such as precalculus mathematics or PHY 2111.
†Technical Electives – Choose 9 hours from the following:
   ME 380 Topics in Mechanical Engineering (Variable Topics)
   ME 395 Independent Work in Mechanical Engineering
   ME/MFS 503 Lean Manufacturing Principles and Practices
   ME/MFS 505 Modeling of Manufacturing Processes and Machines
   ME/MSE 506 Mechanics of Composite Materials
   ME/MFS 507 Design for Manufacturing
   ME 510 Vibro-Acoustic Design in Mechanical Systems
   ME/MFS 512 Manufacturing Systems
   ME 513 Mechanical Vibrations
   ME 514 Computational Techniques in Mechanical System Analysis
   ME 515 Rotordynamics of Turbomachinery
   ME 516 Systems Engineering
   ME 527 Applied Mathematics in the Natural Sciences I
   ME 530 Gas Dynamics
   ME 531 Fluid Dynamics I
   ME 532 Advanced Strength of Materials

CONTINUED

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ME 548 Aerodynamics of Turbomachinery
ME 549 Power Generation
ME/MSE 556 Introduction to Composite Materials
ME 560 Engineering Optics
ME 563 Basic Combustion Phenomena
ME 565 Scale Modeling in Engineering
ME/BAE 580 Heating, Ventilating and Air-Conditioning
ME 599 Topics in Mechanical Engineering (Subtitle required)
MFS 599 Topics in Manufacturing Systems Engineering (Subtitle required)
EGR 599 Topics in Engineering
MSE 201 Materials Science
BAE 502 Modeling of Biological Systems
BME 501 Foundations of Biomedical Engineering
BME 530 Biomedical Instrumentation

*** Mathematics Elective
MA 320 Introductory Probability
MA 321 Introduction to Numerical Methods
MA 322 Matrix Algebra and Its Applications
MA 416G Introduction to Optimization
MA 432G Methods of Applied Mathematics I
MA 433G Introduction to Complex Variables
MA 481G Differential Equations
STA 381 Engineering Statistics- A Conceptual Approach
Mining Engineering

Mining engineering requires a broad knowledge of sciences and other fields of engineering in its practice after graduation. The curriculum below meets the requirements for a Bachelor of Science in Mining Engineering, provided the student satisfies the graduation requirements of the College of Engineering. Admission to the program is selective. Students should refer to the UK Bulletin for general information concerning admission and graduation requirements.

### Degree Requirements

#### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I A §</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing</td>
<td>2</td>
</tr>
<tr>
<td>CHE 105 Gen Col Chem I CHEM 1055 or PHY 231 GenUnivPhy PHYS 2115●</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241 Gen Univ Phy Lab PHYS 2115 or CHE 111 Gen Col Chem Lab I CHEM 1055∞</td>
<td>1</td>
</tr>
<tr>
<td>CIS/WRD 110 Composition and Communication I WRC 2314</td>
<td>3</td>
</tr>
<tr>
<td>MA 113 Calculus I MATH 1304</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 103 Engineering Exploration II A</td>
<td>2</td>
</tr>
<tr>
<td>CIS/WRD 111 Composition and Communication II (no equivalency)</td>
<td>3</td>
</tr>
<tr>
<td>MA 114 Calculus II MATH 1324</td>
<td>3</td>
</tr>
<tr>
<td>PHY 231 GenUnivPhy PHYS 2115 or CHE 105 Gen Col Chem I CHEM 1055●</td>
<td>4</td>
</tr>
<tr>
<td>UK Core (Social Sciences)</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 330 Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>MNG 211 Mine Surveying</td>
<td>2</td>
</tr>
<tr>
<td>MNG 301 Minerals Processing</td>
<td>3</td>
</tr>
<tr>
<td>MNG 302 Minerals Processing Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>MNG 335 Introduction to Mine Systems Analysis†</td>
<td>3</td>
</tr>
<tr>
<td>MNG 351 Underground Mine Design</td>
<td>3</td>
</tr>
<tr>
<td>UK Core (Humanities)</td>
<td>3</td>
</tr>
</tbody>
</table>

*Students who take WRC 2314 and WRC 1034 will take CIS/WRD 111 or CIS 184 at UK.*

#### Second Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNG 311 Electrical Circuits and Mining Machinery</td>
<td>3</td>
</tr>
<tr>
<td>MNG 332 Mine Safety &amp; Health Management and Processes</td>
<td>3</td>
</tr>
<tr>
<td>MNG 371 Professional Development of Mining Engineers***</td>
<td>3</td>
</tr>
<tr>
<td>MNG 435 Mine Systems Engineering and Economics</td>
<td>4</td>
</tr>
<tr>
<td>MNG 463 Surface Mine Design</td>
<td>3</td>
</tr>
<tr>
<td>Minerals Processing Technical Elective*</td>
<td>3</td>
</tr>
<tr>
<td>EGR 112 Engineering Exploration for Transfer Students in place of EGR 101.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Courses recommended as technical electives are listed below. These courses must be chosen with the approval of the student’s advisor to ensure that the curriculum includes sufficient engineering/design content.**

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM 313 Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MNG 332 Mine Plant Machinery</td>
<td>3</td>
</tr>
<tr>
<td>MNG 341 Mine Ventilation</td>
<td>3</td>
</tr>
<tr>
<td>MNG 551 Rock Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>MNG 564 Environmental Control System Design and Reclamation</td>
<td>3</td>
</tr>
<tr>
<td>MNG 591 Mine Design Project I</td>
<td>1</td>
</tr>
<tr>
<td>MNG 592 Mine Design Project II</td>
<td>3</td>
</tr>
<tr>
<td>MNG 599 Topic in Mining Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

*The Mineral Processing Technical Elective is to be chosen between MNG 575, Coal Preparation Design, and MNG 580, Mineral Processing Plant Design.**

#### Technical Electives: Students are required to select their technical elective from the departmental courses listed below:

- MNG 511 Mine Power System Design
- MNG 531 Advanced Blast Design and Technology
- MNG 541 Computer Design of Mine Ventilation Systems
- MNG 561 Mine Construction Engineering I
- MNG 575 Coal Preparation Design
- MNG 580 Mineral Processing Plant Design
- MNG 599 Topic in Mining Engineering

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2016-2017