## BIOSYSTEMS ENGINEERING

### Freshman Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101[*]</td>
<td>Engineering Exploration</td>
<td>1</td>
<td>EGR 102[*]</td>
<td>Engineering Exploration II</td>
</tr>
<tr>
<td>EGR 102</td>
<td>Fund of Eng Comp</td>
<td>1</td>
<td>CIS/WRD 111[*]</td>
<td>Comp &amp; Comm II</td>
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<tr>
<td>CIS/WRD 110</td>
<td>Comp &amp; Comm I</td>
<td>2</td>
<td>MA 114[*]</td>
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</tr>
<tr>
<td>MA 113[*]</td>
<td>Calculus I</td>
<td>4</td>
<td>PHY 231[*]</td>
<td>Gen Univ Physics I</td>
</tr>
<tr>
<td>CHE 105[*]</td>
<td>General College Chemistry I</td>
<td>4</td>
<td>PHY 241</td>
<td>Gen Univ Physics Lab</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>UK Core</td>
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### Sophomore Year

<table>
<thead>
<tr>
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<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>BAE 200[*]</td>
<td>Principles of Biosystems Engr</td>
<td>3</td>
<td>MA 214</td>
<td>Calculus IV</td>
</tr>
<tr>
<td>BIO 148</td>
<td>Introductory Biology I</td>
<td>3</td>
<td>BAE 202</td>
<td>Statistical Inferences for Biosys Engr</td>
</tr>
<tr>
<td>MA 213[*]</td>
<td>Calculus III</td>
<td>4</td>
<td>EM 221</td>
<td>Statics</td>
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<td>PHY 233</td>
<td>Gen Univ Physics II</td>
<td>4</td>
<td>PHY 242</td>
<td>Gen Univ Physics II Lab</td>
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<td>PHY 242</td>
<td>General College Chemistry II</td>
<td>3</td>
<td>CHE 107</td>
<td>Statics</td>
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<tr>
<td>CE 106</td>
<td>Computer Graphics and Communic.</td>
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### Junior Year

<table>
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<tr>
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<th>Hours</th>
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<tbody>
<tr>
<td>BAE 301</td>
<td>Economic Analysis for Biosystems</td>
<td>2</td>
<td>BAE 305</td>
<td>DC Circuits and Microelectronics</td>
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<tr>
<td>ME 350</td>
<td>Fluid Mechanics</td>
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<td>EM 302</td>
<td>Mechanics of Deformable Solids</td>
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<tr>
<td>EE 305</td>
<td>Electrical Circuits and Electronics</td>
<td>3</td>
<td>BAE 310</td>
<td>Heat &amp; Mass Transf in Biosystems Engr</td>
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<tr>
<td>EM 313</td>
<td>Dynamics</td>
<td>3</td>
<td>Core Elective [*]</td>
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<tr>
<td>BIO 152</td>
<td>Principles of Biology II</td>
<td>3</td>
<td>UK Core</td>
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<tr>
<td>WRD 204[*]</td>
<td>Technical Writing</td>
<td>3</td>
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### Senior Year

<table>
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<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BAE 402</td>
<td>Biosystems Engineering Design I</td>
<td>2</td>
<td>BAE 403</td>
<td>Biosystems Engineering Design II</td>
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<tr>
<td>BAE 400</td>
<td>Senior Seminar</td>
<td>2</td>
<td>BAE 502</td>
<td>Modeling of Bio Systems</td>
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<tr>
<td>Core/Tech Elect [*]</td>
<td>CHEM 340</td>
<td>3</td>
<td>Core/Tech Elect [*]</td>
<td>BIO 441</td>
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<td>Core/Tech Elect[*]</td>
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<td>Core/Tech Elect[*]</td>
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<td>Bio Science Elect [*]</td>
<td>3</td>
<td>UK Core</td>
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</table>

[1] Courses required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CHE 105, CIS/WRD 110, MA 113, MA 114, MA 213, and PHY 231. Completion of BAE 200 with a grade of C or better. If a course is repeated the best grade will be used for calculation of GPA in the pre-major courses required for Engineering Standing.

[2] Transfer students who declare a major and meet the prerequisites will take EGR 215 "Introduction to the Practice of Engineering for Transfer Students" in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

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


A minimum of 9 hours are to be taken in addition to the 9 core hours selected by the student. The technical electives allow the student an opportunity 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.


[2] Biological Science electives:

- BIO 208 Principles of Microbiology
- PLS 366 Fundamentals of Soil Science
- CE 555 Microbial Aspects of Environmental Engineering
<table>
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<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>First Semester</th>
<th>Hours</th>
<th>Course Code</th>
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<th>Second Semester</th>
<th>Hours</th>
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<tr>
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<td>EGR 101</td>
<td>Engineering Exploration</td>
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<td>1</td>
<td>EGR 103</td>
<td>Engineering Exploration II</td>
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<td></td>
<td>EGR 102</td>
<td>Fund of Engg Comp</td>
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<td>CTS/WS 110</td>
<td>Comp &amp; Comm I</td>
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<tr>
<td></td>
<td>MA 113 T]</td>
<td>Calculus I</td>
<td>MAT 132</td>
<td>4</td>
<td>MA 114 T]</td>
<td>Calculus II</td>
<td>MAT 205</td>
<td>4</td>
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<td></td>
<td>CHE 105 T]</td>
<td>General College Chemistry I</td>
<td>CHM 131</td>
<td>4</td>
<td>PHY 231 T]</td>
<td>Gen Univ Physics I</td>
<td>PHY 221 or 315</td>
<td>4</td>
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<td></td>
<td>CHE 111 T]</td>
<td>General College Chemistry I Lab</td>
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<td>UK Core</td>
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<tr>
<td>Sophomore Year</td>
<td>CME 200</td>
<td>Process Principles</td>
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<td>3</td>
<td>CME 220</td>
<td>Computational Tools in Chem Engr</td>
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<td>MA 213 T]</td>
<td>Calculus III</td>
<td>MA 336</td>
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<td>CME 320</td>
<td>Engineering Thermodynamics</td>
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<td>CHM 311</td>
<td>3</td>
<td>MA 214</td>
<td>Calculus IV</td>
<td>MAT 337 or 437</td>
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<td>PHY 232</td>
<td>Gen Univ Physics II</td>
<td>PHY 221 or 315</td>
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<td>MSE 201</td>
<td>Materials Science</td>
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<td>STA 381</td>
<td>Engineering Statistics</td>
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<td>Junior Year</td>
<td>CME 330</td>
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<td></td>
<td>CME 415</td>
<td>Separation Processes</td>
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<td>CME 420</td>
<td>Process Modeling in Chemical Eng</td>
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<td>CHE 231 T]</td>
<td>Organic Chemistry I</td>
<td>CHM 221</td>
<td>3</td>
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<td>Heat and Mass Transfer</td>
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<td>CHE 231</td>
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<td>CHM 221</td>
<td>3</td>
<td>CME 432</td>
<td>Chemical Engineering Laboratory I</td>
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<td>CHE 446 G</td>
<td>Physical Chemistry for Engineers</td>
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<td>CHE 232</td>
<td>Organic Chemistry II</td>
<td>CHM 222</td>
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<td>WRD 204</td>
<td>Technical Writing</td>
<td></td>
<td>3</td>
<td>Engineering/Science Elective [1]</td>
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<td>Senior Year</td>
<td>CME 006</td>
<td>The Engineering Profession</td>
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<td>CME 006</td>
<td>The Engineering Profession</td>
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<td></td>
<td>CME 433</td>
<td>Chemical Engineering Laboratory II</td>
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<td>CME 436</td>
<td>Chemical Engr Process Design II</td>
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<td></td>
<td>CME 455</td>
<td>Chemical Engr Process Design I</td>
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<td>CME 462</td>
<td>Process Control</td>
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<td></td>
<td>CME 470</td>
<td>Professionalism, Ethics and Safety</td>
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<td>UK Core</td>
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</tbody>
</table>

[1] Courses required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CHE 105, CHE 107, CHE 111, CHE 113, CTS/WS 110, MA 113, MA 114, MA 213, and PHY 231. Completion of CME 200 with a grade of C or better. If a course is repeated the best grade will be used for calculation of GPA in the courses required for Engineering Standing.

[2] Students taking GSTR 110 and GSTR 210 should also take COM 203 or 206.

[3] Transfer students who declare a major and meet the prerequisites will take EGR 215 “Introduction to the Practice of Engineering for Transfer Students” in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

[∞] Graduation Composition and Communication Requirement (GCCCR) course.

[1] Engineering/Science Elective Structure. Students must select four courses as follows:
1. Chemical Engineering elective [CME 395, 404G, 505, 515, 542, 556, 580, 599] [CME 395 (3 credits) may be used to satisfy only one elective requirement]
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)
3. Other courses by approval of Director of Undergraduate Studies
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

## Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>EGR 101 [*]</td>
<td>1</td>
<td>EGR 103 [*][9]</td>
<td>2</td>
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<tr>
<td>EGR 102 Fund of Engng Comp</td>
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<td>CIS/WRD 111 (a)</td>
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<tr>
<td>CIS/WRD 110 [*] [a] Comp &amp; Comm I</td>
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<td>MA 114 [*]</td>
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<tr>
<td>MA 113 [*]</td>
<td>4</td>
<td>PHY 231 [*]</td>
<td>4</td>
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<td>MA 113 [*]</td>
<td>4</td>
<td>PHY 241 [*]</td>
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<td>CHE 105 [*]</td>
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<td>UK Core</td>
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</table>

[a] Transfer students who declare a major and meet the prerequisites will take EGR 215 “Introduction to the Practice of Engineering for Transfer Students” in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

[*] Courses required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CE 106, CE 211, CHE 105, CHE 107, CIS/WRD 110, EGR 103, EM 221, MA 113, MA 114, MA 213, PHY 231 and PHY 241 and a C or better in each course. If a course is repeated the best grade will be used for calculation of GPA in the courses required for Engineering Standing.

## Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 211 [*]</td>
<td>4</td>
<td>EM 302</td>
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<td>CHE 107 [*]</td>
<td>4</td>
<td>MNG 303</td>
<td>1</td>
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<tr>
<td>EM 221 [*]</td>
<td>4</td>
<td>MA 214</td>
<td>3</td>
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<tr>
<td>MA 213 [*]</td>
<td>4</td>
<td>PHY 232</td>
<td>4</td>
</tr>
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<td>CE 100 [*]</td>
<td>3</td>
<td>PHY 242</td>
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<td>STA 381 or 296</td>
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## Junior Year

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<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>WRD 204 [*]</td>
<td>3</td>
<td>CE 331</td>
<td>3</td>
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<td>EES 220</td>
<td>4</td>
<td>CE 361</td>
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<td>CE 303</td>
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<td>MA 429</td>
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<td>CE 381</td>
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<td>Math or Science Elective [2]</td>
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## Senior Year

<table>
<thead>
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<tbody>
<tr>
<td>CE 451G</td>
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<td>CE 471G</td>
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<td>CE 429</td>
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<td>UK Core</td>
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[*] To be chosen from ME 220 or EM 313.


[1] 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.

[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.
### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 [*]</td>
<td>Engineering Exploration</td>
<td>1</td>
<td>EGR 103 [*]</td>
</tr>
<tr>
<td>EGR 102</td>
<td>Fund of Engg Comp</td>
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<td>CIS/WRD 111 (a)</td>
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<tr>
<td>CIS/WRD 110 (a)</td>
<td>GSTR 110</td>
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<td>MA 114</td>
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<td>MA 113</td>
<td>Calculus I</td>
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<td>PHY 231 [*]</td>
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<td>CHE 105 [*]</td>
<td>General College Chemistry I</td>
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<td>PHY 241</td>
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### Second Semester

<table>
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<tbody>
<tr>
<td>CPE 215 [*]</td>
<td>Intro to Prog Desgn, Abstr &amp; Prob Solv</td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MA 213</td>
<td>Calculus III</td>
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<td>Gen Univ Physics II</td>
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<td>EE 211</td>
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<td>PHY 242</td>
<td>Gen Univ Physics II Lab</td>
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<td>CPE 287</td>
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<tr>
<td>CS 216 [*]</td>
<td>Intro to Software Engr Techniques</td>
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<td>CPE 200</td>
<td>Comp Engr Sophomore Seminar</td>
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<td>CPE 282 [*]</td>
<td>Digital Logic Design</td>
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### Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EE 223</td>
<td>AC Circuits</td>
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<td>EE 421G</td>
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<tr>
<td>CS 315</td>
<td>Algorithm Design and Analysis</td>
<td>3</td>
<td>EE 461G</td>
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<tr>
<td>CPE 380</td>
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### Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
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</table>

[*] Courses required for Engineering Standing. A cumulative UK GPA of at least a 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CHE 105, CIS/WRD 110, CS 215, CS 216, EE/CPE 282, and PHY 231. If a course is repeated, the best grade will be used for calculation of GPA in the courses required for Engineering Standing.

[a] Students taking GSTR 110 and GSTR 210 should also take COM 203 or 206.

[b] Transfer students who declare a major and meet the prerequisites will take EGR 215 “Introduction to the Practice of Engineering for Transfer Students” in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

[*1] Graduation Composition and Communication Requirement (GCCR) course.

[c] 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 Requirements (GCCR) course.

[d] Technical electives may be selected from upper-division engineering, mathematics, statistics, statistics, computer science, physics, or other technically-related fields excluding more elementary version of required courses. To be selected in consultation with academic advisor. If a student wishes to use CS 499 instead of CPE 490 and CPE 491 to fulfill the GCCR and senior design requirements, the student must receive approval from the DUS to select an additional technical elective that supports the proposed CS 499 project.

[e] 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.

[f] Hardware electives are senior level courses in the CPE or EE disciplines and shall be selected from the following list and/or selected in 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

[g] Software electives are senior level courses 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
<table>
<thead>
<tr>
<th>Year</th>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freshman Year</strong></td>
<td></td>
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<tr>
<td><strong>First Semester</strong></td>
<td>EGR 101 [1]</td>
<td>Engineering Exploration</td>
<td>1</td>
<td>EGR 103 [1]</td>
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<td></td>
<td>CS/WRD 110 [3]</td>
<td>Intro to Software Eng</td>
<td>3</td>
<td>MA 113</td>
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<td></td>
<td>MA 113</td>
<td>Calculus I</td>
<td>4</td>
<td>PHY 231 or</td>
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<td></td>
<td>GSTR 105</td>
<td>General College Chemistry</td>
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<td></td>
<td>MAT 131</td>
<td>Intro to Prog Desig, Abstr &amp; Prob Solv</td>
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<td>Comp &amp; Comm I</td>
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<td>PHY 231 or</td>
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<td></td>
<td>MA 113</td>
<td>Calculus I</td>
<td>4</td>
<td>PHY 241</td>
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<td>GSTR 105</td>
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<td>MA 113</td>
<td>Calculus II</td>
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**Sophomore Year**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MA 213</td>
<td>Calculus III</td>
</tr>
<tr>
<td>CS 216 [1]</td>
<td>Intro to Software Eng Techniques</td>
</tr>
<tr>
<td>EE 280</td>
<td>Design of Logic Circuits</td>
</tr>
<tr>
<td>CS 275 [1]</td>
<td>Discrete Mathematics</td>
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<tr>
<td><strong>Second Semester</strong></td>
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<tr>
<td>CS 270</td>
<td>Systems Programming</td>
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<tr>
<td>CS 217</td>
<td>Algorithm Design and Analysis</td>
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<td><strong>Junior Year</strong></td>
<td>Hours</td>
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<tr>
<td>CS Elective [2]</td>
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<tr>
<td>STA 381</td>
<td>Engr Statistics: A Conceptual Approach</td>
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<tr>
<td><strong>Second Semester</strong></td>
<td>Hours</td>
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<tr>
<td>CS Elective [2]</td>
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<tr>
<td>STA 381</td>
<td>Engr Statistics: A Conceptual Approach</td>
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<td><strong>Senior Year</strong></td>
<td>Hours</td>
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<tr>
<td>CS Elective [2]</td>
<td>3</td>
</tr>
<tr>
<td>STA 381</td>
<td>Engr Statistics: A Conceptual Approach</td>
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</tbody>
</table>

[1] Courses required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CS 215, CS 216, CS 275, and MA 114. If a course is repeated, the best grade will be used for calculation of GPA in the courses required for Engineering Standing.

[2] Students taking GSTR 110 and GSTR 210 should also take COM 203 or 206.

[3] These electives are in addition to the general education requirements of the University of Kentucky. At least one course must be an upper-level course (300 or higher) in the major.

[4] At least one course of technical electives must be 300 or higher.

[5] Science electives must be selected from either UK Core: Natural Science or Social Science approved list or by consent of academic advisor.
**ELECTRICAL ENGINEERING**

### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EGR 101 [#] Engineering Exploration</td>
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<tr>
<td>EGR 100 Elect [4] Fund of Eng &amp; Comp</td>
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<tr>
<td>CIS/WRD 110 [^] Comp &amp; Comm</td>
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<tr>
<td>MA 113 Calculus I</td>
<td>4</td>
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<tr>
<td>PHY 231[*] Gen Univ Physics I</td>
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<td>PHY 241 Gen Univ Physics I Lab</td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EGR 103 [#] Engineering Exploration II</td>
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<td>CIS/WRD 111 (a) Comp &amp; Comm II</td>
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<td>MA 114[*] Calculus II</td>
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<tr>
<td>MA 211 Calculus III</td>
<td>4</td>
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<tr>
<td>PHY 232 Phy 221 or 315</td>
<td>4</td>
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<tr>
<td>PHY 242 Phy 221 or 315</td>
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<tr>
<td>EE 211[*] Circuits I</td>
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<tr>
<td>EE/CPE 282[*] Digital Logic Design</td>
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### Sophomore Year

<table>
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<tr>
<th>First Semester</th>
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<tr>
<td>MA 213 Calculus III</td>
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<tr>
<td>PHY 232 Phy 222 or 316</td>
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<tr>
<td>PHY 242 Phy 222 or 316</td>
<td>4</td>
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<tr>
<td>EE 211[*] Circuits I</td>
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</tr>
<tr>
<td>EE/CPE 282[*] Digital Logic Design</td>
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<tbody>
<tr>
<td>MA 214 Calculus IV</td>
<td>3</td>
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<tr>
<td>PHY 232 Phy 222 or 316</td>
<td>4</td>
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<tr>
<td>EE/CPE 287 Introduction to Embedded Systems</td>
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<tr>
<td>UK Core</td>
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<td>UK Core</td>
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### Junior Year

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<tr>
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<tbody>
<tr>
<td>EE 415G Electromechanics</td>
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<tr>
<td>EE 421G Signals and Systems</td>
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<tr>
<td>EE Lab Elective</td>
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<tr>
<td>EE 461G Introduction to Electronics</td>
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<tr>
<td>MA 320/STA 381 Intro Probability/Engineering Stats</td>
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<tbody>
<tr>
<td>EE/CPE 491[∞] ECE Capstone Design I</td>
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<td>EE Tech Elect [4]</td>
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<tr>
<td>Math/Stat Elective [1]</td>
<td>3</td>
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<tr>
<td>UK Core</td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>EE/CPE 490[∞] ECE Capstone Design II</td>
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<td>EE Tech Elect [4]</td>
<td>3</td>
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<td>UK Core</td>
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</table>

[^] Courses required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least 2.5 GPA: CIS/WRD 110, CHE 105, CS 215, EE 211, EE/CPE 282, and PHY 231. If a course is repeated, the best grade will be used for calculation of GPA in the courses required for Engineering Standing.

[a] Students taking GSTR 110 and GSTR 210 should also take COM 203 or 206.

[b] Transfer students who declare a major and meet the prerequisites will take EGR 215 "Introduction to the Practice of Engineering for Transfer Students" in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

[∞] Graduation Composition and Communication Requirement (GCCCR) course.

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

[2] Engineering/Science Electives: 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.

[3] Technical elective may be selected from upper-division (300-level or higher) engineering, mathematics, statistics, computer science, physics, or other technically-related fields excluding MA 308, MA 310, 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.


[5] EE/CPE 490 is only taught in the fall semester. EE/CPE 491 is only taught in the spring semester.
## Pathway for Berea University Transfers - Fall 2019

### Materials Engineering

#### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 101 [#] Engineering Exploration</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Field of Eng Disc [CSC 305 or CSE 212]</td>
<td>2</td>
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<tr>
<td>CIS/WRD 110 [*] (4) Comp &amp; Comm I</td>
<td>3</td>
</tr>
<tr>
<td>MA 113[*] Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>CHE 105[*] General College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHE 111[*] General College Chemistry I Lab</td>
<td>1</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EGR 103 [#] Engineering Exploration II</td>
<td>2</td>
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<tr>
<td>CIS/WRD 111 (4) Comp &amp; Comm II</td>
<td>3</td>
</tr>
<tr>
<td>MA 114[*] Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>PHY 231[*] Gen Univ Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241[*] Gen Univ Physics I Lab</td>
<td>3</td>
</tr>
<tr>
<td>Core</td>
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</table>

**Note:** Transfer students who declare a major and meet the prerequisites will take EGR 215 "Introduction to the Practice of Engineering for Transfer Students" in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

#### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>MA 213[*] Calculus III</td>
<td>4</td>
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<tr>
<td>MSE 201 [*] Materials Science</td>
<td>3</td>
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<tr>
<td>MSE 202 Materials Science Laboratory</td>
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<tr>
<td>CHE 107[*] General College Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHE 113[*] General College Chemistry II Lab</td>
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<td>EM 261 Statics</td>
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<tbody>
<tr>
<td>MA 214 Calculus IV</td>
<td>3</td>
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<tr>
<td>MSE 301 Materials Science II</td>
<td>3</td>
</tr>
<tr>
<td>MSE 351 Materials Thermodynamics</td>
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</tr>
<tr>
<td>PHY 232 Gen Univ Physics II</td>
<td>4</td>
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<tr>
<td>CHE 236 Survey of Organic Chemistry</td>
<td>3</td>
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<td>Core</td>
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**Note:** Students taking GSTR 110 and GSTR 210 should also take COM 203 or 206.

#### Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MBE 401G Metal and Alloys</td>
<td>3</td>
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<tr>
<td>MBE 404G Polymeric Materials</td>
<td>3</td>
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<tr>
<td>CME 200 Process Principles</td>
<td>3</td>
</tr>
<tr>
<td>EM 302 Mechanics of Deformable Solids</td>
<td>3</td>
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<tr>
<td>STA 381 Engineering Statics A Concept App</td>
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<td>Core</td>
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<tbody>
<tr>
<td>MBE 402G Electronic Materials and Processing</td>
<td>3</td>
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<td>MBE 403G Ceramic Engineering and Processing</td>
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<td>MBE 407 [*] Materials Laboratory I</td>
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<tr>
<td>MSE 535 Mechanical Properties of Materials</td>
<td>3</td>
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<tr>
<td>PHY 361 Principles of Modern Physics</td>
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**Note:** Courses required for Engineering Standing. A cumulative UK GPA of least a 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CHE 105, CHE 107, CHE 111, CHE 113, CIS/WRD 110, MA 113, MA 114, MA 213, PHY 231, and PHY 241. Completion of MSE 201 with a grade of C or better. If a course is repeated, the best grade will be used for calculation of GPA in the courses required for Engineering Standing.

#### Senior Year

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<td>MBE 408 Materials Laboratory II</td>
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<td>MBE 436 Material Failure Analysis</td>
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<td>CME/ECE 470 Application of Math to Design Problems</td>
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<td>MBE 585 Materials Characterization Techniques</td>
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<td>EE 305</td>
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<td>MBE 480 Materials Design</td>
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<td>MBE 538 Metals Processing</td>
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<tr>
<td>MSE/CME 554 Chemical and Physical Processing of Polymer Systems</td>
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<td>PHY 274 Core</td>
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**Note:** Technical Electives - total of 6 credit hours and 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. MBE 395 (research) may count for one elective, but not both. Recommended technical electives include but are not limited to:

- MBE 395 Independent Work in Materials Engineering
- MBE 506 Mechanics of Composite Materials
- MBE 531 Powder Metallurgy
- MBE/CME 554 Chemical and Physical Processing of Polymer Systems
- MBE 556 Introduction to Composite Materials
- MBE 569 Electronic Packaging Systems and Manufacturing Processes
- MBE 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
- MEMS 503 Lean Manufacturing Principles and Practices

**Note:** Graduation Composition and Communication Requirement (GCCCR) course.
# Mechanical Engineering

## Freshman Year

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<th>First Semester</th>
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<tbody>
<tr>
<td>EGR 101 [*][#] Engineering Exploration</td>
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<tr>
<td>EGR 102 [*] Fund of Engng Comp</td>
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<tr>
<td>CIS/WRD 110 [*] Comp &amp; Comm I</td>
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<td>MA 113 [*] Calculus I</td>
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<tr>
<td>PHY 231 [*] Gen Univ Physics I</td>
<td>4</td>
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<td>PHY 241 [*] Gen Univ Physics I Lab</td>
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<th>Second Semester</th>
<th>Hours</th>
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<tbody>
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<td>EGR 103 [*][#] Engineering Exploration II</td>
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<td>MA 114 [*] Calculus II</td>
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<td>CHE 105 [*] General College Chemistry I</td>
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<td>UK Core</td>
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* [*] Courses required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CHE 105, CIS/WRD 111, EGR 101, EGR 102, GR 103, MA 221, MA 113, MA 114, MA 213, PHY 231, PHY 241, PHY 232, and PHY 242 and a C or better in each course. If a course is repeated, the best grade will be used for calculation of GPA in the courses required for Engineering Standing.

* [#] Transfer students who declare a major and meet the prerequisites will take EGR 215 “Introduction to the Practice of Engineering for Transfer Students” in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

* [∞] Graduation Composition and Communication Requirement (GCCCR) course.

<table>
<thead>
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<th>First Semester</th>
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<td>PHY 232 [*] Gen Univ Physics II</td>
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<td>PHY 242 [*] Gen Univ Physics II Lab</td>
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<td>EM 221 [*] Statics</td>
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<tr>
<td>ME 205 Computer Aided Engr Graphics</td>
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<tr>
<td>MA 214 Calculus IV</td>
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<tr>
<td>ME 220 Engineering Thermodynamics</td>
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<td>ME 251 Manufacturing Engineering</td>
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<td>CHE 107 General College Chemistry II</td>
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<td>EM 302 Mechanics of Deformable Solids</td>
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<tr>
<td>EE 305 Electrical Circuits and Electronics</td>
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<tr>
<td>ME 330 Fluid Mechanics</td>
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<tr>
<td>ME 340 Intro to Mechanical Systems</td>
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<tr>
<td>WRD 204 [*] Technical Writing</td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>ME 310 Engineering Experimentation I</td>
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<tr>
<td>ME 321 Engineering Thermodynamics II</td>
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<td>ME 325 Elements of Heat Transfer</td>
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<td>ME 344 Mechanical Design</td>
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<td>Math Elective [2]</td>
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<td>MAT 214</td>
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## Sophomore Year

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<tbody>
<tr>
<td>ME 301 Mechanical Design</td>
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<td>ME 311 Engineering Experimentation II</td>
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<tr>
<td>ME 440 Design of Control Systems</td>
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<tr>
<td>ME 501 Mech Dsgn w/ Finite Element Meth</td>
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<td>Technical Elect [1]</td>
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<tr>
<td>ME 412 ME Capstone Design II</td>
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<td>UK Core</td>
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## Junior Year

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<td>ME 311 Engineering Experimentation II</td>
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<tbody>
<tr>
<td>ME 412 ME Capstone Design II</td>
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<tr>
<td>Technical Elect [1]</td>
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<td>UK Core</td>
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## Senior Year

<table>
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<tr>
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<th>Hours</th>
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<tbody>
<tr>
<td>ME 411 ME Capstone Design</td>
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<tr>
<td>ME 311 Engineering Experimentation II</td>
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<tr>
<td>ME 501 Mech Dsgn w/ Finite Element Meth</td>
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<th>Second Semester</th>
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<tbody>
<tr>
<td>ME 412 ME Capstone Design II</td>
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<td>Technical Elect [1]</td>
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<tr>
<td>UK Core</td>
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### Technical Electives

- ME 385 Topics in Mechanical Engineering (variable topics)
- ME 389 Independent Work in Mechanical Engineering
- ME 435 Aerodynamics of Turbomachinery
- ME 454 Advanced Strength of Materials
- ME 455 Introduction to Composite Materials
- ME 456 Engineering Optics
- ME 458 Topics in Mechanical Engineering (subtle required)
- ME 459 Power Generation
- ME 460 Scale Modeling in Engineering
- ME 461 Topics in Manufacturing Systems (subtile required)
- ME 462 Manufacturing Engineering
- ME 463 Materials Science
- ME 464 Modeling of Biological Systems
- ME 465 Foundations of Biomedical Engineering
- ME 466 Biomedical Instrumentation
- ME 467 Topics in Mechanical Engineering (subtitle required)
- ME 468 Heat Transfer in Engineering
- ME 469 Materials Science
- ME 470 Introduction to Optimization

### Mathematics Elective

- MA 320 Introductory Probability
- MA 321 Introduction to Numerical Methods
- MA 322 Matrix Algebra and Its Applications
- MA 416G Introduction to Optimization

### General College Chemistry I

- CHE 105 General College Chemistry I

### General College Chemistry II

- CHE 107 General College Chemistry II

### Engineering Experimentation I

- EGR 101 Engineering Exploration

### Engineering Experimentation II

- EGR 102 Engineering Experimentation II

### General College Physics I

- PHY 221 or 315

### General College Physics II

- MAT 337 or 437

### Engineering Statistics - A Conceptual Approach

- STA 381 Engineering Statistics - A Conceptual Approach
## MINING ENGINEERING

### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EGR 101 [*] Engineering Exploration</td>
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<td>EGR 102 Fund of Eng Comp</td>
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<tr>
<td>CIS/WRD 110 [*] [a] Comp &amp; Coren I</td>
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<tr>
<td>MA 113 [*] Calculus I</td>
<td>4</td>
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<tr>
<td>CHE 105 [*] General College Chemistry I</td>
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<td>UK Core</td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>EGR 103 [*] Engineering Exploration II</td>
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<tr>
<td>CIS/WRD 111 [a] Comp &amp; Comm II</td>
<td>3</td>
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<tr>
<td>MA 114 [*] Calculus II</td>
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<tr>
<td>PHY 231 [*] Gen Univ Physics I</td>
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<tr>
<td>or CHE 111</td>
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</table>

[a] Transfer students who declare a major and meet the prerequisites will take EGR 215 "Introduction to the Practice of Engineering for Transfer Students" in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.

### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>EES 220 Principles of Physical Geology</td>
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<tr>
<td>EM 221 Statics</td>
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<tr>
<td>MA 213 [*] Calculus III</td>
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<tr>
<td>MNG 201 Mining Engineering Fundamentals</td>
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<tr>
<td>PHY 232 Gen Univ Physics II</td>
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<table>
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<tbody>
<tr>
<td>EES 230 Fundamentals for Geology I</td>
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<td>EM 302 Mechanics of Deformable Solids</td>
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<td>MA 214 Calculus IV</td>
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<td>MNG 291 Elements of Mine Design</td>
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<td>MNG 303 Deformable Solids Laboratory</td>
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<td>MNG 331 Explosives and Blasting</td>
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### Junior Year

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<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>CE 341 [*] Intro to Fluid Mechanics</td>
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<tr>
<td>MNG 211 Mine Surveying</td>
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<tr>
<td>MNG 301 Minerals Processing</td>
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<tr>
<td>MNG 351 Underground Mine Design</td>
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<table>
<thead>
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<th>Hours</th>
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<tbody>
<tr>
<td>MNG 311 Electrical Circuits &amp; Mining Machinery</td>
<td>3</td>
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<tr>
<td>MNG 322 Mine Safety &amp; Health Manage &amp; Process</td>
<td>2</td>
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<tr>
<td>MNG 371 [*+] Prof Development of Mining Engineers</td>
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<tr>
<td>MNG 435 Mine Systems Engr and Economics</td>
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<tr>
<td>MNG 463 Surface Mine Design</td>
<td>3</td>
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<tr>
<td>Min Pro Tech Elect 1</td>
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[*+] Graduation Composition and Communication Requirement (GCCR) course.

### Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>EM 313 Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MNG 332 Mine Plant Machinery</td>
<td>3</td>
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<tr>
<td>MNG 341 Mine Ventilation</td>
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<tr>
<td>MNG 551 Rock Mechanics</td>
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<tr>
<td>MNG 564 Environ Contl Syst Degn &amp; Reclama</td>
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<td>MNG 591 Mine Design Project I</td>
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<td>UK Core</td>
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<tr>
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</tbody>
</table>

### Notes:
- [*] Courses required for Engineering Standing. A cumulative UK GPA of at least a 2.5 and successful completion of all pre-major courses. Successful completion of the following pre-major courses with at least a 2.5 GPA: CIS/WRD 110, CHE 105, MA 113, MA 114, MA 213, and PHY 231. If a course is repeated, the best grade will be used for calculation of GPA in the pre-major courses.
- [a] Students taking GSTR 110 and GSTR 210 should also take COM 203 or 206.
- [b] Transfer students who declare a major and meet the prerequisites will take EGR 215 "Introduction to the Practice of Engineering for Transfer Students" in place of EGR 101 and EGR 103. EGR 215 will fulfill UK Core: Arts & Creativity requirement.
- [+] Graduation Composition and Communication Requirement (GCCR) course.
- [+] Offered only in the Spring semester for Mining students.
- [2] MNG 335 satisfies the Statistical Inferential Reasoning requirement in the UK Core.
- [3] Technical Electives: These courses must be chosen with the approval of the student's advisor to ensure that the curriculum includes sufficient engineering design content. Students are required to select their technical elective from the departmental courses listed below: