The College of Engineering offers programs leading to undergraduate and graduate degrees in computer science and/or the following engineering disciplines—biomedical engineering, chemical, civil, computer, electrical, materials, mechanical, and mining. A minor and graduate training in biomedical engineering is also offered through the College of Engineering. The College also offers a highly multidisciplinary master of science in manufacturing systems engineering to address the growing need for enhancing manufacturing productivity and quality.

Creative accomplishment in the career of an engineer or computer scientist depends upon an education that stresses major ideas and fundamental concepts of engineering rather than specific technologies. The academic programs in engineering provide a sound background in the mathematical, physical and engineering sciences blended with the social sciences and humanities to ensure both a thorough education in engineering and a liberal education. Such an approach provides the best preparation for the engineer or computer scientist who must envisage and develop the technologies of the future and deal with scientific advances at present unknown.

The various curricula in the College of Engineering are broad, so that no student is limited to a narrow field of specialized knowledge but receives sufficient technical depth to provide a sound preparation for a professional career.

The College of Engineering produces over 600 graduates per year. Among the alumni of the College of Engineering are those who have distinguished themselves in the major fields of industry, government and education.

Concern for the individual is a most important feature of education in the College of Engineering. Close faculty-student relationships are a meaningful part of the educational process. The faculty, in addition to their duties related to instruction and research, serve as advisors to the student in the preparation of the academic program best matched to the student’s needs and intellectual capabilities. Students are also assigned a professional advisor who works with them on course selection and progress to degree.

**Accreditation and Program Assessment**

The undergraduate program in Computer Science is accredited by the Computing Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

The undergraduate programs in Biosystems Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Materials Engineering, Mechanical Engineering and Mining Engineering are accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

In addition, the University of Kentucky is accredited by the Southern Association of Colleges and Schools (SACS), and therefore all degree programs and certificates including those in the College of Engineering are governed by the rules associated with that accrediting body. All programs are assessed periodically based on achievement of their self-proclaimed student learning outcomes and the results are used in the improvement of those programs and certificates.

**Undergraduate Certificates in Engineering**

The University of Kentucky grants the following undergraduate certificates in the College of Engineering:

- Power and Energy
- Production Engineering

Information and requirements for the Power and Energy certificate are listed after the Bachelor of Science in Electrical Engineering. Information and requirements for the Production Engineering certificate are listed after the Bachelor of Science in Mechanical Engineering.

The following certificates are in the process of being approved:

- Aerospace Engineering
- Biopharmaceutical Engineering
- Cybersecurity
- Environmental Engineering

Student certification in Lean Systems is also available.

**Undergraduate Programs in Engineering**

The University of Kentucky grants the following degrees in the College of Engineering:

- Bachelor of Science in Biosystems Engineering
- Bachelor of Science in Chemical Engineering
- Bachelor of Science in Civil Engineering
- Bachelor of Science in Computer Engineering
- Bachelor of Science in Computer Science
- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Materials Engineering
- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Mining Engineering

While these are the official degrees granted at the bachelor’s level in the college, the prospective student is encouraged to study the wide variety of options available through technical electives, some of which are listed following the degree requirements of each department. Electives are included in each curriculum to allow the student to apply the fundamentals of a particular discipline to an area of special interest during the senior year.

Students in any department interested in biomedical engineering may make special arrangements to include a limited amount of such studies in the undergraduate program. In addition, students have the option to pursue a biomedical engineering minor as described on page 248. Biomedical engineering is primarily the application of engineering principles to the solution of medical problems.

Students in a number of our engineering programs have the option to complete pre-medical requirements while pursuing the engineering degree. Interested students should contact their academic advisor.

In response to industry requests, the College of Engineering and the Gatton College of Business and Economics have joined to offer a coordinated Bachelor of Science in Engineering and Masters of Business Administration. The MBA will be taken during a student’s fifth year of study beginning in the summer and finishing the following spring semester. In addition, students in the program will be required to complete a study abroad program designed specifically for the engineering/business student. This program will be conducted immediately upon completion of the MBA course requirements and the majority of costs will be paid by the program. Admission is highly competitive and is limited based upon the financial resources available.
For engineering students interested in manufacturing, the University offers a dual-degree program. This program allows students pursuing a B.S. in Electrical Engineering or Mechanical Engineering to concurrently enroll in the M.S. in Manufacturing Systems Engineering. The BSEE/MSMSE or BSME/MSMSE dual-degree programs can be completed in five years. Students in the program are strongly encouraged to be Co-op students or to do industry internships to supplement their course work with industry experience. During their junior year, students should apply to the Graduate School for admittance into the dual-degree program.

Graduate programs in the engineering fields of study are listed in The Graduate School section of this Bulletin.

ADMISSION POLICY

The minimum entry requirement for admission into the College of Engineering is:

- ACT math score of 23 or higher, or the SAT equivalent of 570 or higher.

Additionally, students must meet the minimum Kentucky statewide academic readiness requirements for Reading and Writing to be admitted to the College of Engineering:

- Reading: Students must have an ACT Reading subscore of 20 or above (or SAT subscore of 26 or above in Critical Reading);
- English/Writing: Students must have an ACT English subscore of 18 or above (or SAT of 25 or above in Writing).

Alternative admission routes include:

1. 3 or above on the Calculus AB portion of the Advanced Placement Exam.
2. Eligibility to enter MA 110 based on the UK Math Department Placement Exam (61 percent or higher).
3. Completion of the equivalent of MA 110 with a grade of C or higher.
4. Completion of the equivalent of MA 109 and MA 112 with a grade of C or higher.
5. Students who do not meet the reading/writing requirements will be required to take the ACCUPLACER exam and receive a score of 244 or better.
6. Students who do not meet the minimum score on the ACCUPLACER will be required to take APP courses (UK 120 for Reading and UK 130 for Writing) and can be considered for admission to the College of Engineering after successful completion of these courses.

International Students

Freshmen:

International freshman applicants must have both the minimum ACT/SAT scores, and must obtain a Test of English as a Foreign Language (TOEFL) score of 71 or above or an International English Language Testing System (IELTS) score of 6.0 or above.

Students who received a TOEFL score of 71 but less than 100 (IELTS score of 6.0 but less than 7.5) will be admitted to the College of Engineering but will be required to participate in English for Academic Purposes (EAP).

If students do not meet the IELTS/TOEFL (6.0 or 71) or ACT/SAT requirements, they will be admitted to the College of Engineering after meeting the following criteria: attend ESL, meet EAP requirements, and complete the appropriate math class. They must retake the TOEFL and earn a minimum score of 71 or the IELTS and earn a minimum score of 6.0. Then they would apply for a change of major to Engineering.

Transfer:

In addition to the alternative routes listed above, international transfer applicants must obtain a Test of English as a Foreign Language (TOEFL) score of 71 or above (527 paper-based); an International English Language Testing System (IELTS) score of 6.0 or above; or completion of the first and second English composition classes (e.g., ENG 101 and 102) from another US college, i.e., institution upon review. If students do not meet these requirements once they have completed UK’s ESL program, they must retake the TOEFL and earn a minimum score of 71 or the IELTS and earn a minimum score of 6.0.

First-Year Engineering Program

All newly admitted students will participate in the First-Year Engineering Program for their first two semesters. During this first year, they will have the opportunity to participate in hands-on engineering activities, explore all the engineering and computer science disciplines and learn about the Engineering Grand Challenges. Based on this experience, students will have the option to change their major or declare their major based on their interests.

Upon declaring their major, students will be designated as pre-major until they meet engineering standing requirements. Every student must be admitted to engineering standing in a specific program prior to taking engineering upper level courses that require engineering standing as a prerequisite.

Engineering Standing Admission

Admission to engineering standing in a degree program is necessary in order to continue in upper level courses and to be granted a baccalaureate degree in engineering or computer science. Specific departmental requirements for admission to engineering standing are noted below and engineering standing applies to a specific program. Hence, receiving engineering standing in one program does not grant engineering standing in another. Students can request admission to engineering standing after completing the required set of pre-major courses in the first three semesters of the published curriculum in their chosen program. In addition to the requirements described below, each program may specify specific procedures for applying for engineering standing, submitting appeals, etc. Students should refer to the departmental handbook or their undergraduate advisor in their program of choice to identify these specific procedures.

For Transfer Students: The same criteria are applied to transfer students with the equivalence of courses reviewed by the Director of Undergraduate Studies. It is important to note if a student receives acceptance of transfer credit for one or more of the below listed courses, the grades earned will be used in the calculation for engineering standing. Transfer students who have not completed all courses listed below may be considered for admission into courses that require engineering standing on a case-by-case basis.

Biosystems Engineering: 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 above listed courses.

Chemical Engineering: 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, CIS/WRD 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 above listed courses.

Civil Engineering: 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 above listed courses.

Computer Engineering: 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, 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 above listed courses.
**Computer Science:** 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 above listed courses.

**Electrical Engineering:** 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: 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 above listed courses.

**Materials Engineering:** 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, 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 above listed courses.

**Mechanical Engineering:** 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, EGR 103 (or EGR 215 in lieu of EGR 101 and EGR 103), EM 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 above listed courses.

**Mining Engineering:** 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: 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 above listed courses.

**Note:** According to Senate Rule 4.3.3, the chair of a department may refuse to allow a student to register in a course a third time. A withdrawal from the course shall not be counted as a registration for these purposes if a student can demonstrate that the withdrawal was for urgent non-academic reasons.

**Combined Degree Program**

The College of Engineering has transfer agreements with several institutions throughout the state. These programs enable students to enroll in a pre-engineering curriculum at their respective schools and then transfer to the College of Engineering. Upon completion, they can receive two degrees, one from the school at which they originally enrolled and the other a Bachelor of Science in the appropriate field of engineering from the University of Kentucky.

**Cooperative Education Program**

The nationally recognized engineering co-op program provides students the opportunity to gain practical work experience before graduation. By alternating semesters of academic study with semesters of paid, full-time career-related employment, participants can gain a full year of engineering work experience. Students who wish to participate in the Cooperative Education program in the College of Engineering should contact the Engineering Career Development Office or its co-op director.

To be eligible for this program, students should have a minimum grade-point average of 2.50. In addition, students should be making sufficient progress in their curriculum prior to the first work tour, which typically begins at the end of the sophomore year. Students will remain on a full-time, continuing student status while they are at work by registering for a one hour, pass/fail course. The grade, assigned by the co-op director, is based on a self-evaluation, a work report written by the student, and an evaluation completed by the immediate supervisor. In some states, co-op experience counts towards the practical experience requirement to sit for the Principles and Practice of Engineering (PE) exam.

The Cooperative Education program contributes significantly to the student’s academic motivation, career preparation, and success with job offers upon graduation. About a quarter of our graduates obtain co-op experience before graduation, and about 100 employers nationwide participate in the UK Engineering Co-op Program.

**Continuing Education and Extension**

The College of Engineering recognizes the rapid changes occurring in modern engineering technology. Students in engineering are made aware of the need to continue their studies after graduation. One of the ways to keep abreast of advances in engineering is for graduates and other engineering practitioners to participate in continuing education programs now available through the engineering colleges throughout the country.

The responsibilities of the Technology Exchange Program within the Kentucky Transportation Center, the Lean Manufacturing Program within the Institute of Research for Technology Development at the University of Kentucky and the staff of the former Office for Informational Services and Technical Liaison (OISTL), now administratively housed in the Department of Mining Engineering, are to:

1. create and manage appropriate intensive noncredit technical courses of interest to and needed by practicing engineers;
2. develop appropriate video-based courses and materials to be of interest to practicing engineers. Such activity includes taping, live satellite uplinking, and two-way video/audio of engineering-related courses and activities, Web-based instruction; and,
3. provide assistance in extension activities with other college and University units to be of assistance to engineers throughout the state.

**Scholarships**

The College of Engineering awards merit- and need-based scholarships to incoming freshmen and transfer students as well as to students already enrolled in the College. Freshman scholarship applications are due December 1; transfer scholarship applications are due June 15 for students incoming in the fall, and November 15 for students incoming in the spring; and continuing student applications are due April 15. Awards are made for the upcoming academic year; no new awards are made for the spring semester for freshmen and continuing students.

For further information, visit [https://www.engr.uky.edu/students/undergraduate/scholarships-and-financial-aid](https://www.engr.uky.edu/students/undergraduate/scholarships-and-financial-aid)

**Engineering Dean’s List**

Students enrolled in the College of Engineering can make the Engineering Dean’s List for a fall or spring semester by meeting the following requirements during the semester:

- 3.6 or better semester GPA;
- 12 or more credit hours (not including duplicate credit and/or pass/fail grades);
- no E, I or F grades;
- no grades out; and
- no more than 3 hours pass/fail.

**Minimum Requirements for Graduation**

In addition to the University graduation requirements listed in the Graduation Requirements section of this Bulletin, to be awarded a Bachelor of Science degree in any field of engineering or Computer Science, a student must:

1. complete the University and College requirements relating to writing and the UK Core;
2. complete the required number of hours, exclusive of those earned in freshman college algebra and freshman college trigonometry, with a cumulative standing of not less than 2.0 on a 4.0 scale;
3. be admitted to engineering standing in an engineering program for at least the final semester, and complete the requirements of that program;
4. complete a minimum of 24 credit hours of departmental courses at or above the 300 level.
Minor in Biomedical Engineering

This minor is intended for undergraduate engineering students seeking to supplement their education by applying skills learned in their respective disciplines to the field of biomedical engineering (BME). The emphasis on upper level BME courses builds upon the foundation taught in core undergraduate engineering courses. Beyond the one required course, students pursuing this minor will choose at least five elective courses in consultation with a Biomedical Engineering faculty advisor. Students and their Biomedical Engineering faculty advisor may select courses providing concentration in a particular subfield, or they may select courses providing breadth across the field of biomedical engineering.

The minor in Biomedical Engineering requires:

- a) at least 18 credit hours of course work; and
- b) a GPA of 2.5 or greater in these courses; and
- c) no grade lower than C in any BME course. At the discretion of the BME department chair (or designee), a limited number (maximum 6 credit hours) of equivalent course substitutions may be used. At least 12 credit hours must have the BME prefix.

Required Course

BME 301 Fundamentals of Biomedical Engineering ...... 3

Elective Courses

*Select five from among the following:

BME 395 Independent Research in Biomedical Engineering ........................................... 1-6
BME 405 Introduction to Biomedical Signal Processing .............................................. 3
BME 472 Human Biomechanics .................................................. 3
BME 485 Fundamentals of Biofluid Mechanics .............................. 3
BME 488 Introduction to Biomaterials ........................................... 3
BME 508 Cell Mechanics and Mechanobiology .............................. 3
BME 515 Modeling of Physiological Systems ........................................... 3
BME 530 Biomedical Instrumentation ........................................... 3
BME 540 Mechanical Modeling of Human Motion ....................... 3
BME 579 Neural Engineering .................................................. 3
Merging Engineering with Neuroscience ........................................... 3
BME 580 Introduction to Biomedical Imaging .............................. 3
BME 481G Topics in Biomedical Engineering .............................. 3
BME 599 Topics in Biomedical Engineering (Subtitle required) ........................................... 3

*Up to 6 credit hours of independent research (e.g., BME 395) or special topics courses (e.g., BME 481G or BME 599) may count as electives.

BACHELOR OF SCIENCE IN BIOSYSTEMS ENGINEERING

Biosystems engineering provides an essential link between the biological sciences and the engineering profession. This linkage is essential 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 bioenvironmental engineering, food and bioprocessing, 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 pre-biomedical engineering and pre-veterinary medicine options.

Engineers completing this program of study find employment in industries related to the production and processing of biological products. Opportunities include placement with manufacturers, consulting firms, or state and federal regulatory agencies. Biosystems engineers may work in the areas of biomedical/biotechnology engineering; environmental engineering; agricultural equipment; heating, ventilation and refrigeration equipment; food processing industries; livestock equipment and housing or greenhouse structures; and bioenergy.

The program educational objectives of the biosystems engineering program are based on the intellectual and professional development of our students. Graduates of the biosystems engineering program are expected within a few years of graduation to have:

- Established themselves as practicing professionals or engaged in advanced study in agricultural, biological, or environmental engineering or related area.
- Demonstrated their ability to work successfully as a responsible professional and function effectively on a professional team.

Degree Requirements

Each student must complete the following:

UK Core Requirements

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

I. Intellectual Inquiry in the Arts and Creativity

EGR 101 Engineering Exploration I § A ........................................... 1
EGR 103 Engineering Exploration II § A ........................................... 2

II. Intellectual Inquiry in the Humanities

Choose one course from approved list ........................................... 3

III. Intellectual Inquiry in the Social Sciences

Choose one course from approved list ........................................... 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences

PHY 231 General University Physics ........................................... 4
PHY 241 General University Physics Laboratory ........................................... 1

V. Composition and Communication I

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

VI. Composition and Communication II

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

VII. Quantitative Foundations

MA 113 Calculus I .......................................................... 4

VIII. Statistical Inferential Reasoning

BAE 202 Statistical Inferences

for Biosystems Engineering ........................................... 3

IX. Community, Culture and Citizenship in the USA

Choose one course from approved list ........................................... 3

UK Core hours .......................................................... 33
Graduation Composition and Communication Requirement (GCCR)

WRD 204 Technical Writing ............................................. 3

Graduation Composition and Communication Requirement hours (GCCR) ............................................. 3

Premajor Requirements Hours

BAE 200 Principles of Biosystems Engineering ............................. 3

BIO 148 Introductory Biology I ............................................. 3

CE 106 Computer Graphics and Communication ........................ 3

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

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

CHE 105 General College Chemistry I ..................................... 4

CHE 107 General College Chemistry II ...................................... 3

MA 113 Calculus I ............................................................ 3

MA 114 Calculus II ............................................................ 4

MA 213 Calculus III ............................................................ 3

PHY 231 General University Physics ......................................... 4

PHY 241 General University Physics Laboratory ................................ 1

UK Core ............................................................................. 3

Freshman Year

First Semester Hours

EGR 101 Engineering Exploration I § ∆ ..................................... 1

EGR 102 Fundamentals of Engineering Computing .......................... 2

CHE 105 General College Chemistry I ..................................... 4

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

MA 113 Calculus I ............................................................ 3

Second Semester Hours

EGR 103 Engineering Exploration II § ∆ ..................................... 2

MA 114 Calculus II ............................................................ 3

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

PHY 231 General University Physics ......................................... 4

PHY 241 General University Physics Laboratory ................................ 1

Subtotal: Premajor hours ................................................. 44

Major Requirements Hours

BAE 202 Statistical Inferences ................................................... 3

BAE 301 Economic Analysis for Biosystems .................................... 2

BAE 305 DC Circuits and Microelectronics ..................................... 3

BAE 310 Heat and Mass Transfer in Biosystems Engineering .................. 3

BAE 400 Senior Seminar .......................................................... 1

BAE 402 Biosystems Engineering Design I ...................................... 2

BAE 403 Biosystems Engineering Design II ..................................... 2

BIO 152 Principles of Biology II .................................................. 3

EE 305 Electrical Circuits and Electronics ....................................... 3

EM 221 Statics .................................................................. 3

EM 302 Mechanics of Deformable Solids ....................................... 3

EM 313 Dynamics ................................................................ 3

MA 214 Calculus IV .............................................................. 3

ME 220 Engineering Thermodynamics .......................................... 3

*ME 330 Fluid Mechanics ......................................................... 3

*ME 340 Introduction of Mechanical Systems ................................... 3

PHY 232 General University Physics ............................................. 4

PHY 242 General University Physics Laboratory ................................ 1

Subtotal: Major hours ..................................................... 48

Electives

Biological Science Elective ............................................................. 3

Core Electives (choose 3 of the following 4 courses) ................................... 3

BAE 417 Design of Machine Systems ............................................ 3

BAE 427 Structures and Environment Engineering .............................. 3

BAE 437 Land and Water Resources Engineering .................................. 3

BAE 447 Bioprocess Engineering Fundamentals .................................... 3

Technical Electives (chosen by the student and leading to a concentration in one area of study) ............................................................ 9

Subtotal: Electives ............................................................ 21

TOTAL HOURS ............................................................... 128

Curriculum

The following curriculum meets the requirements for a B.S. in biosystems engineering, provided the student satisfies the graduation requirements listed earlier.

Freshman Year

First Semester

EGR 101 Engineering Exploration I § ∆ ................................. 1

EGR 102 Fundamentals of Engineering Computing ............... 2

CHE 105 General College Chemistry I ................................. 4

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

MA 113 Calculus I ............................................................ 3

Second Semester

EGR 103 Engineering Exploration II § ∆ ................................. 2

MA 114 Calculus II ............................................................ 3

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

PHY 231 General University Physics ......................................... 4

PHY 241 General University Physics Laboratory ......................... 1

Subtotal: Premajor hours ................................................. 44

Major Requirements Hours

BAE 202 Statistical Inferences ................................................... 3

BAE 301 Economic Analysis for Biosystems .................................... 2

BAE 305 DC Circuits and Microelectronics ..................................... 3

BAE 310 Heat and Mass Transfer in Biosystems Engineering .................. 3

BAE 400 Senior Seminar .......................................................... 1

BAE 402 Biosystems Engineering Design I ...................................... 2

BAE 403 Biosystems Engineering Design II ..................................... 2

BIO 152 Principles of Biology II .................................................. 3

EE 305 Electrical Circuits and Electronics ....................................... 3

EM 221 Statics .................................................................. 3

EM 302 Mechanics of Deformable Solids ....................................... 3

EM 313 Dynamics ................................................................ 3

MA 214 Calculus IV .............................................................. 3

ME 220 Engineering Thermodynamics .......................................... 3

*ME 330 Fluid Mechanics ......................................................... 3

*ME 340 Introduction of Mechanical Systems ................................... 3

PHY 232 General University Physics ............................................. 4

PHY 242 General University Physics Laboratory ................................ 1

Subtotal: Major hours ..................................................... 48

Electives

Biological Science Elective ............................................................. 3

Core Electives (choose 3 of the following 4 courses) ................................... 3

BAE 417 Design of Machine Systems ............................................ 3

BAE 427 Structures and Environment Engineering .............................. 3

BAE 437 Land and Water Resources Engineering .................................. 3

BAE 447 Bioprocess Engineering Fundamentals .................................... 3

Technical Electives (chosen by the student and leading to a concentration in one area of study) ............................................................ 9

Subtotal: Electives ............................................................ 21

TOTAL HOURS ............................................................... 128

Curriculum

The following curriculum meets the requirements for a B.S. in biosystems engineering, provided the student satisfies the graduation requirements listed earlier.

Freshman Year

First Semester

EGR 101 Engineering Exploration I § ∆ ................................. 1

EGR 102 Fundamentals of Engineering Computing ............... 2

CHE 105 General College Chemistry I ................................. 4

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

MA 113 Calculus I ............................................................ 3

Second Semester

EGR 103 Engineering Exploration II § ∆ ................................. 2

MA 114 Calculus II ............................................................ 3

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

PHY 231 General University Physics ......................................... 4

PHY 241 General University Physics Laboratory ......................... 1

Subtotal: Premajor hours ................................................. 44

Major Requirements Hours

BAE 202 Statistical Inferences ................................................... 3

BAE 301 Economic Analysis for Biosystems .................................... 2

BAE 305 DC Circuits and Microelectronics ..................................... 3

BAE 310 Heat and Mass Transfer in Biosystems Engineering .................. 3

BAE 400 Senior Seminar .......................................................... 1

BAE 402 Biosystems Engineering Design I ...................................... 2

BAE 403 Biosystems Engineering Design II ..................................... 2

BIO 148 Introductory Biology I .................................................. 3

MA 213 Calculus III .............................................................. 4

PHY 232 General University Physics ............................................. 4

PHY 242 General University Physics Laboratory ......................... 1

CE 106 Computer Graphics and Communication ........................... 3

Second Semester

BAE 202 Statistical Inferences ................................................... 3

BAE 214 Calculus IV .............................................................. 3

ME 220 Engineering Thermodynamics .......................................... 3

EM 221 Statics .................................................................. 3

CHE 107 General College Chemistry II ....................................... 3

Junior Year

First Semester Hours

BAE 301 Economic Analysis for Biosystems .................................... 2

ME 330 Fluid Mechanics ......................................................... 3

EE 305 Electrical Circuits and Electronics ....................................... 3

EM 313 Dynamics ................................................................ 3

BIO 152 Principles of Biology II .................................................. 3

WRD 204 Technical Writing** .................................................. 3

Second Semester

BAE 305 DC Circuits and Microelectronics ..................................... 3

EM 302 Mechanics of Deformable Solids ....................................... 3

BAE 310 Heat and Mass Transfer in Biosystems Engineering ............. 3

Biosystems Core Elective* ...................................................... 3

UK Core ............................................................................. 2

Senior Year

First Semester Hours

BAE 402 Biosystems Engineering Design I ...................................... 2

BAE 400 Senior Seminar .......................................................... 1

Biosystems Core* or Technical Elective** ..................................... 3

Biosystems Core* or Technical Elective** ..................................... 3

Biological Science Elective ...................................................... 3

Second Semester

BAE 403 Biosystems Engineering Design II .................................... 2

ME 340 Introduction to Mechanical Systems ................................... 3

Biosystems Core* or Technical Elective** ..................................... 3

Biosystems Core* or Technical Elective** ..................................... 3

UK Core ............................................................................. 3

*Transfer students who declare a major will take EGR 215, Introduction to the Practice of Engineering for Transfer Students, in place of EGR 101 and EGR 103.

Δ Students must complete both EGR 101 and EGR 103 to fulfill the UK Core Arts and Creativity requirement. Transfer students may satisfy the UK Core Arts and Creativity requirement by taking EGR 215.

**Graduation Composition and Communication Requirement (GCCR) course.
College of Engineering

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

I. Intellectual Inquiry in Arts and Creativity
EGR 101 Engineering Exploration I §Δ ............................. 1
EGR 103 Engineering Exploration II §Δ ............................ 2

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

III. Intellectual Inquiry in the Social Sciences
Choose one course from approved list ............................. 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences
CHE 105 General College Chemistry I ............................. 4
CHE 111 General Chemistry I Laboratory ............................ 1

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

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

VII. Quantitative Foundations
MA 113 Calculus I ..................................................... 4

VIII. Statistical Inferential Reasoning
STA 381 Engineering Statistics – A Conceptual Approach .... 3

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

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

UK core hours .................................................................. 33

Graduation Composition and Communication Requirement (GCCR)
WRD 204 Technical Writing ............................................. 3

Graduation Composition and Communication Requirement hours (GCCR) ............................................. 3

Premajor Requirements Hours
CIS/WRD 110 Composition and Communication I .............. 3
CIS/WRD 111 Composition and Communication II ............. 3
CHE 105 General College Chemistry I ............................. 4
CHE 107 General College Chemistry II .............................. 4
CHE 111 General Chemistry I Laboratory ............................ 1
CHE 113 General Chemistry II Laboratory .......................... 2
CME 200 Process Principles ............................................. 3
MA 113 Calculus I ....................................................... 4
MA 114 Calculus II ....................................................... 4
MA 213 Calculus III ......................................................... 4
PHY 231 General University Physics ................................. 4
EGR 101 Engineering Exploration I §Δ ............................. 1
EGR 102 Fundamentals of Engineering Computing ............. 2
EGR 103 Engineering Exploration II §Δ ............................. 2
MSE 201 Materials Science ............................................ 3

Subtotal: Premajor Requirements: ................................. 43

Major Requirements Hours
CHE 230 Organic Chemistry I .......................................... 3
CHE 231 Organic Chemistry Laboratory I ........................... 1
CHE 232 Organic Chemistry II .......................................... 3
CHE 446G Physical Chemistry for Engineers .................... 3
MA 214 Calculus IV ....................................................... 3
PHY 232 General University Physics .................................. 4
CME 220 Computational Tools in Chemical Engineering .... 3
CME 320 Engineering Thermodynamics ............................ 3
CME 415 Separation Processes ........................................ 3
CME 006 The Engineering Profession (3 semesters) ............ 0
CME 330 Fluid Mechanics .............................................. 3
CME 470 Professionalism, Ethics and Safety ..................... 2
CME 420 Process Modelling in Chemical Engineering ......... 3
CME 425 Heat and Mass Transfer .................................... 4
CME 432 Chemical Engineering Laboratory I .................... 2
CME 433 Chemical Engineering Laboratory II ................... 3
CME 455 Chemical Engineering Process Design I .............. 3
CME 550 Chemical Reactor Design ................................ 3
CME 456 Chemical Engineering Process Design II ............ 3
CME 462 Process Control ................................................ 3
STA 381 Engineering Statistics – A Conceptual Approach .... 3

Subtotal: Major hours ................................................... 58

In addition to the premajor and major requirements, students must complete the following:

Engineering/Science Electives
Totaling three or more credit hours for each course.

Students must select four courses, as follows:
1. One chemical engineering elective: (CME 395*, 404G, 505, 515, 523, 542, 552, 554, 556, 570, 573, 580, 599)
2. One science/math elective (totaling 3 or more credit hours*) that is not a more elementary version of a required course.
   b. Chemistry (CHE 226, 250, 510 and above)
   c. Biology (BIO 148 and above)
   d. Physics (PHY 241 and above)
   e. Other courses by approval of Director of Undergraduate Studies

3. One 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. One chemical engineering elective (CME 395 and above) or one engineering elective (level 300 and above) or one science/math elective as described above.

*CME 395 (3 credits) can be used to satisfy only one elective requirement.

** 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).

Subtotal: Engineering/Science Electives ............................................. 12

TOTAL HOURS ................................................................... 128

Curriculum

Freshman Year
First Semester
CIS/WRD 110 Composition and Communication I ............................. 3
MA 113 Calculus I ....................................................... 4
EGR 101 Engineering Exploration I §Δ ................................... 1
EGR 102 Fundamentals of Engineering Computing ................... 2
CHE 105 General College Chemistry I ............................. 4
CHE 111 General Chemistry I Laboratory ............................ 1

Subtotal: First Semester ..................................................... 14

Second Semester
CIS/WRD 111 Composition and Communication II ..................... 3
MA 114 Calculus II ....................................................... 4
EGR 103 Engineering Exploration II §Δ ................................ 2
PHY 231 General University Physics .................................. 4
UK Core – Social Sciences ................................................ 3

Sophomore Year
First Semester
CME 200 Process Principles ............................................. 3
MA 213 Calculus III ......................................................... 4
CHE 107 General College Chemistry II ............................. 3
CHE 113 General Chemistry II Laboratory .......................... 2
MSE 201 Materials Science ............................................ 3
UK Core – Humanities ...................................................... 3

Second Semester
CME 220 Computational Tools in Chemical Engineering .......... 3
CME 320 Engineering Thermodynamics ................................ 3
MA 214 Calculus IV ......................................................... 3
PHY 232 General University Physics .................................. 4
STA 381 Engineering Statistics – A Conceptual Approach .... 3

Junior Year
First Semester
CME 330 Fluid Mechanics .............................................. 3
CME 415 Separation Processes ........................................ 3
CHE 230 Organic Chemistry I .......................................... 3
CHE 231 Organic Chemistry Laboratory I ........................... 1
CHE 446G Physical Chemistry for Engineers ..................... 3
WRD 204 Technical Writing* ........................................... 3

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 II ..................... 2
CHE 232 Organic Chemistry II ........................................ 3
Engineering/Science Elective .......................................... 3

Senior Year
First Semester
CME 006 The Engineering Profession (Junior and Senior) ........... 0
CME 433 Chemical Engineering Laboratory II ...................... 3
CME 455 Chemical Engineering Process Design I .................. 3
CME 470 Professionalism, Ethics and Safety ......................... 2
CME 550 Chemical Reactor Design ................................... 3
UK Core – Citizenship - USA ............................................ 3
Engineering/Science Elective .......................................... 3

Second Semester
CME 006 The Engineering Profession (Junior and Senior) ........... 0
CME 456 Chemical Engineering Process Design II ................ 3
CME 462 Process Control ................................................ 3
UK Core – Citizenship - Global Dynamics .......................... 3
Engineering/Science Elective .......................................... 3

§ Transfer students who declare a major will take EGR 215, Introduction to the Practice of Engineering for Transfer Students, in place of EGR 101 and EGR 103.

Δ Students must complete both EGR 101 and EGR 103 to fulfill the UK Core Arts and Creativity requirement. Transfer students may satisfy the UK Core Arts and Creativity requirement by taking EGR 215.

*Graduation Composition and Communication Requirement (GCCR) course.
BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING – PADUCAH

In addition to the program on the Lexington campus, students can pursue a B.S. degree in chemical engineering through the College’s Extended Campus Program in Paducah, Kentucky. The Paducah program uses the same curriculum as the main campus, but provides the opportunity for students to complete all B.S. degree requirements without having to relocate to Lexington.

Consistent with our Vision and Mission statements, the chemical engineering program at the University of Kentucky, including the Extended Campus in Paducah, strives to meet the following specific educational objectives:

- Produce graduates who are successful in chemical engineering practice, professional and/or academic pursuits.
- Produce graduates who function independently and in teams to carry out in-depth solution strategies to chemical engineering problems.
- Produce graduates who continue to advance in their careers and participate in professional development activities.

The Paducah chemical engineering program collaborates with West Kentucky Community and Technical College to provide the foundational math and science courses, as well as the general studies course requirements. On-site UK chemical engineering faculty members teach the engineering courses. Program admission, course registration, student advising and other student services all can be completed at the Paducah site.

Degree Requirements

The curriculum requirements for the B.S. degree in chemical engineering in Paducah are identical to those on the Lexington campus. Refer to those degree requirements for the Paducah degree program. Not all electives listed for the Lexington program will be available in Paducah. The student must satisfy the College graduation requirements listed earlier.

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

The student of civil engineering has a broad field of study to provide 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.

The program educational objectives for the civil engineering program reflect the mission of the Department of Civil Engineering. They are important for successful professional practice and the ability to pursue advanced degrees. Civil Engineering graduates from the University of Kentucky will:

1. Excel in Civil Engineering or a related career.
2. Create ethical and sustainable solutions.
3. Seek professional licensure.

Degree Requirements

The following curriculum meets the requirements for a B.S. in civil engineering, provided the student satisfies the graduation requirements listed earlier.

Each student must complete the following:

UK Core Requirements

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

I. Intellectual Inquiry in Arts and Creativity
   EGR 101 Engineering Exploration I § Δ............................. 1
   EGR 103 Engineering Exploration II § Δ........................... 2

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

III. Intellectual Inquiry in the Social Sciences
   Choose one course from approved list............................ 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences
   PHY 231 General University Physics.............................. 4
   PHY 241 General University Physics Laboratory................. 1

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

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

VII. Quantitative Foundations
   MA 113 Calculus I.................................................... 4

VIII. Statistical Inferential Reasoning
   STA 381 Engineering Statistics – A Conceptual Approach
   (or approved CE equivalent)........................................ 3

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

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

UK Core hours ............................................................ 33

Graduation Composition and Communication Requirement (GCCR)

WRD 204 Technical Writing............................................. 3

Graduation Composition and Communication Requirement hours (GCCR)........................... 33

Premajor Requirements

CIS/WRD 110 Composition and Communication I................ 1
CIS/WRD 111 Composition and Communication II............... 3
MA 113 Calculus I.................................................... 4
MA 114 Calculus II................................................... 4
MA 213 Calculus III.................................................... 4
CHE 105 General College Chemistry I........................... 4
CHE 107 General College Chemistry II.......................... 4
PHY 231 General University Physics.............................. 4
PHY 241 General University Physics Laboratory................. 1

EGR 101 Engineering Exploration I § Δ............................. 1
EGR 102 Fundamentals of Engineering Computing............. 2
EGR 103 Engineering Exploration II § Δ........................... 2
CE 106 Computer Graphics and Communication............... 3
CE 211 Surveying...................................................... 4
EM 221 Statics.......................................................... 3

Subtotal: Premajor hours............................................... 45

Major Requirements

EM 302 Mechanics of Deformable Solids........................ 3
MNG 303 Deformable Solids Laboratory.......................... 1
MA 214 Calculus IV.................................................... 3
PHY 232 General University Physics.............................. 4
PHY 242 General University Physics Laboratory................. 1
STA 381 Engineering Statistics – A Conceptual Approach
   (or approved CE equivalent)........................................ 3

EE 220 Principles of Physical Geology............................ 4
CE 303 Introduction to Construction Engineering............... 3
CE 331 Transportation Engineering.................................. 3
CE 341 Introduction to Fluid Mechanics.......................... 4
CE 351 Introduction to Environmental Engineering............ 3
CE 381 Civil Engineering Materials I............................. 3
CE 382 Structural Analysis............................................ 3
CE 401 Seminar......................................................... 1
CE 429 Civil Engineering Systems Design........................ 3
CE 461G Water Resources Engineering........................... 4
CE 471G Soil Mechanics............................................... 4

Subtotal: Major hours.................................................. 50

Electives

CE Technical Design Electives....................................... 6
Engineering Science Elective......................................... 3
Structures Elective...................................................... 3
CE Technical Elective.................................................. 3
Math or Science Elective................................................. 3

Subtotal: Electives....................................................... 18

TOTAL HOURS:.......................................................... 128

Curriculum

Freshman Year

First Semester
   Hours
   EGR 101 Engineering Exploration I § Δ............................. 1
   EGR 102 Fundamentals of Engineering Computing............. 2
   CIS/WRD 110 Composition and Communication I.............. 3
   MA 113 Calculus I.................................................... 4
   CHE 105 General College Chemistry I........................... 4

Second Semester
   Hours
   EGR 103 Engineering Exploration II § Δ........................... 2
   CIS/WRD 111 Composition and Communication II.............. 3
   MA 114 Calculus II.................................................... 4
   PHY 231 General University Physics.............................. 4
   PHY 241 General University Physics Laboratory................. 1
   UC Core – Social Sciences............................................ 3

Sophomore Year

First Semester
   Hours
   CE 211 Surveying...................................................... 4
   CHE 107 General College Chemistry II.......................... 3
   EM 221 Statics.......................................................... 3
   MA 213 Calculus III.................................................... 4
   CE 106 Computer Graphics and Communication............... 3

Second Semester
   Hours
   EM 302 Mechanics of Deformable Solids........................ 3
   MNG 303 Deformable Solids Laboratory.......................... 1
   MA 214 Calculus IV.................................................... 3
   PHY 232 General University Physics.............................. 4
   PHY 242 General University Physics Laboratory................. 1
   STA 381 Engineering Statistics – A Conceptual Approach
   (or approved CE equivalent)........................................ 3

University of Kentucky 2018-2019 Undergraduate Bulletin 251
Introduction to the Practice of Engineering for Transfer Students

The vision was expressed that "access to undergraduate engineering education will expand primarily through the creation of joint programs managed by multiple postsecondary institutions." In response, WKU and UK now jointly offer an ABET-accredited baccalaureate degree in civil engineering on the WKU campus in Bowling Green, Kentucky. By CPE definition, a joint-degree program is "a program that is mutually sponsored by two or more institutions leading to a single credential or degree, which is conferred by both or all participating institutions. All institutions share responsibility for all aspects of the program’s delivery and quality."

The joint civil engineering program is one of only three such joint-degree programs in Kentucky; the others include a joint-degree program between WKU and UK in mechanical engineering, between WKU and the University of Louisville (UL) in electrical engineering.

The WKU/UK joint programs emphasize a project-oriented educational approach. Courses are provided by both WKU and UK faculty. Students are required to complete a minimum of 15 credit hours of engineering course work taught by UK engineering faculty. At present, the UK contribution is provided primarily by distance delivery via interactive television. The curriculum of the joint civil engineering program is under the direction of a joint program faculty, with equal representation from each participating institution. The curriculum for enrolling students requires 137 credit hours, with the General Studies component based on the requirements of WKU. Students who complete the program will receive a B.S. degree conferred jointly by WKU and UK. Under the terms of the agreements between the degree-awarding institutions, WKU provides basic administrative support for students in the joint-degree program, including admission services, registration, and student financial aid. In addition, academic advising, laboratory and equipment support, and library and media resources are supplied by WKU.

The civil engineering curriculum approved within UK is listed below. The joint program faculty are responsible for on-going review of the curriculum requirements.

Degree Requirements

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<thead>
<tr>
<th>Freshman Year</th>
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<td>Fall Semester</td>
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<tr>
<td>ENGR 175 Univ Experiment – ENGR .............................. 1</td>
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<td>CE 176 CE Freshman Experience .................................. 1</td>
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<td>AMS 163 Architectural Drafting .................................. 3</td>
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<td>MATH 136 Calculus I .............................................. 4</td>
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<tr>
<td>GEOL 111/113 The Earth and Lab ................................ 3/1</td>
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<tr>
<td>Category I World Cultures Elective ............................ 3</td>
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<td>Total ................................................................. 19</td>
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<tr>
<td>Spring Semester</td>
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<tr>
<td>CE 160/161 Surveying I and Lab ................................ 3/1</td>
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<tr>
<td>MATH 137 Calculus II II ........................................... 4</td>
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<td>PHYS 255/256 Physics I and Lab ................................ 4/1</td>
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<td>ENGR 100 Freshman English ....................................... 3</td>
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<td>COMM 161 or 145 Public Speaking ............................... 3</td>
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<tr>
<td>Fall Semester</td>
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<tr>
<td>CE 303/304 Construction Mgt and Lab ........................ 3/1</td>
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<tr>
<td>EN 221 or 222 Statics ............................................ 3</td>
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<td>MATH 237 Multivariable Calculus ............................... 4</td>
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<tr>
<td>CHEM 120/121 College Chemistry I and Lab .......................... 3/2</td>
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<tr>
<td>Category F Health and Wellness Elect ........................ 1</td>
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<td>Spring Semester</td>
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<tr>
<td>EM 302 or 303 Mechanics of Deform Solids .................. 3</td>
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<tr>
<td>CE 310 Strength of Materials Lab ................................ 3</td>
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<td>MATH 331 Differential Equations ................................ 3</td>
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<tr>
<td>PHYS 265/266 Physics II and Lab ................................ 4/1</td>
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<tr>
<td>Category A-II Foreign Language (102) ......................... 3</td>
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<tr>
<td>ENG 200 Intro to Literature ...................................... 3</td>
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<td>Total ................................................................. 18</td>
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<th>Junior Year</th>
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<td>Fall Semester</td>
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<tr>
<td>CE 382 or 373 Structural Analysis ............................ 3</td>
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<td>CE 410/411 Soil Mechanics and Lab ............................ 3/1</td>
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<tr>
<td>CE 342 Fluid Thermal Science ................................... 4</td>
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<td>CE 370/371 Materials of Constr and Lab ........................ 2/1</td>
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<td>STAT 301 Probability and Statistics ........................... 3</td>
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<td>CE 316 Equipment and Methods ................................ 3</td>
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<td>CE 331 UK - Transportation Engineering ...................... 3</td>
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<td>ENGR 300 Junior English ........................................ 3</td>
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<td>CE 412 Foundation Engineering .................................. 3</td>
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<td>CE 384 Reinforced Concrete Design ............................. 1</td>
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<tr>
<td>CE Technical Elective ............................................ 2</td>
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<td>Total ................................................................. 16</td>
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<td>Senior Year</td>
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<td>Fall Semester</td>
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<td>CE 351 or 352 Intro Environmental Eng ........................ 3</td>
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<td>CE Technical Elective ............................................ 3</td>
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<td>CE 400 Senior Design Seminar ................................... 1</td>
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<td>ECOR 202 Economics (Micro) .................................... 3</td>
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<td>HIST 119 or 120 Western Civilization ........................... 3</td>
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<td>Category B-II Humanities Elective .............................. 3</td>
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[1] Instead of CE 384 Reinforced Concrete Design, students may take CE 402 Elementary Structural Design or CE 483 UK-Elementary Structural Design if offered.

[2] A two (2) course sequence in four different civil engineering areas is required. The curriculum already includes a two (2) course sequence in structures, geotechnical engineering, and construction. Therefore, each student must select one of their technical electives to cover an additional area such as surveying, materials, environmental engineering, hydrology, or transportation.

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Joint-Degree Program Offered by Western Kentucky University (WKU) and the University of Kentucky (UK)

As part of the “Strategy for Statewide Engineering Education in Kentucky,” adopted July 17, 2000 by all the chief executive officers of Kentucky universities and endorsed by the Kentucky Council on Postsecondary Education (CPE), the vision was expressed that “access to undergraduate engineering education will expand primarily through the creation of joint programs managed by multiple postsecondary institutions.” In response, WKU and UK now jointly offer an ABET-accredited baccalaureate degree in civil engineering on the WKU campus in Bowling Green, Kentucky. By CPE definition, a joint-degree program is “a program that is mutually sponsored by two or more institutions leading to a single credential or degree, which is conferred by both or all participating institutions. All institutions share responsibility for all aspects of the program’s delivery and quality.”

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<td>CE 382 or 373 Structural Analysis ............................ 3</td>
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<tr>
<td>CE 410/411 Soil Mechanics and Lab ............................ 3/1</td>
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<td>CE 342 Fluid Thermal Science ................................... 4</td>
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<tr>
<td>CE 370/371 Materials of Constr and Lab ........................ 2/1</td>
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<tr>
<td>STAT 301 Probability and Statistics ........................... 3</td>
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<tr>
<td>Category F Health and Wellness Elect ........................ 1</td>
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<td>Total ................................................................. 18</td>
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<td>Spring Semester</td>
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<td>CE 316 Equipment and Methods ................................ 3</td>
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<tr>
<td>CE 331 UK - Transportation Engineering ...................... 3</td>
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<td>ENGR 300 Junior English ........................................ 3</td>
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<td>CE 412 Foundation Engineering .................................. 3</td>
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<tr>
<td>CE 384 Reinforced Concrete Design ............................. 1</td>
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<td>CE Technical Elective ............................................ 2</td>
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<td>Senior Year</td>
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<td>Fall Semester</td>
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<td>CE 351 or 352 Intro Environmental Eng ........................ 3</td>
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<td>CE Technical Elective ............................................ 3</td>
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<td>CE 400 Senior Design Seminar ................................... 1</td>
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<td>ECOR 202 Economics (Micro) .................................... 3</td>
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<tr>
<td>HIST 119 or 120 Western Civilization ........................... 3</td>
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<td>Category B-II Humanities Elective .............................. 3</td>
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</table>

<table>
<thead>
<tr>
<th>TOTAL HOURS</th>
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</thead>
</table>

[1] Instead of CE 384 Reinforced Concrete Design, students may take CE 402 Elementary Structural Design or CE 483 UK-Elementary Structural Design if offered.

[2] A two (2) course sequence in four different civil engineering areas is required. The curriculum already includes a two (2) course sequence in structures, geotechnical engineering, and construction. Therefore, each student must select one of their technical electives to cover an additional area such as surveying, materials, environmental engineering, hydrology, or transportation.
BACHELOR OF SCIENCE IN
COMPUTER ENGINEERING

Program Educational Objectives

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.

The objective of the computer engineering degree program is to prepare students for success as practicing engineers engaged in life-long learning and serving in leadership roles in their chosen career path. Specifically, within five years of graduation, the computer engineering degree program will prepare graduates to:

• Establish themselves as practicing professionals meeting or exceeding the expectations of their employers.
• Continue their professional development or pursue formal education to earn advanced degrees and/or certifications.
• Demonstrate leadership in their professional endeavors and/or in their communities.

Degree Requirements

Each student must complete the following:

UK Core Requirements

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

I. Intellectual Inquiry in Arts and Creativity

EGR 101 Engineering Exploration I § Δ .......................... 1
EGR 103 Engineering Exploration II § Δ ........................ 2

II. Intellectual Inquiry in the Humanities

Choose one course from approved list ............................. 3

III. Intellectual Inquiry in the Social Sciences

Choose one course from approved list ............................. 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences

PHY 231 General University Physics .............................. 4
PHY 241 General University Physics Laboratory .............. 1

V. Composition and Communication I

CIS-WRD 110 Composition and Communication I .......... 3

VI. Composition and Communication II

CIS-WRD 111 Composition and Communication II .......... 3

VII. Quantitative Foundations

MA 113 Calculus I ....................................................... 4

VIII. Statistical Inferential Reasoning

STA 381 Engineering Statistics –
A Conceptual Approach .............................................. 3

IX. Community, Culture and Citizenship in the USA

Choose one course from approved list ............................. 3

X. Global Dynamics

Choose one course from approved list ............................. 3

UK Core hours .......................................................... 33

Graduation Composition and Communication Requirement (GCCR)

CPE 490 ECE Capstone Design I ..................................... 3
Graduation Composition and Communication Requirement hours (GCCR) ........................................ 3

Premajor Requirements

CIS-WRD 110 Composition and Communication I ........... 3
CIS-WRD 111 Composition and Communication II .......... 3
CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques .............................. 4
CS 216 Introduction to Software Engineering Techniques .................................................... 3
CPE 282 Digital Logic Design ........................................ 4
MA 113 Calculus I ....................................................... 4
MA 114 Calculus II ..................................................... 4
MA 213 Calculus III ................................................... 4
CHE 105 General College Chemistry I ............................ 4
PHY 231 General University Physics .............................. 4
PHY 241 General University Physics Laboratory .............. 1
EGR 101 Engineering Exploration I § Δ .......................... 1
EGR 102 Fundamentals of Engineering Computing .......... 2
EGR 103 Engineering Exploration II § Δ .......................... 2

Subtotal: Premajor hours ............................................. 48

Major Requirements

MA 214 Calculus IV .................................................... 3
CS 270 Systems Programming ....................................... 3
CS 275 Discrete Mathematics ....................................... 4
CS 315 Algorithm Design and Analysis ......................... 3
EE 211 Circuits I ....................................................... 4
EE 223 AC Circuits .................................................... 4
CPE 200 Computer Engineering Sophomore Seminar ....... 1
CPE 287 Introduction to Embedded Systems .................... 4
EE 461G Introduction to Electronics ............................. 3
CPE 380 Computer Organization ................................ 3
CPE 480 Advanced Computer Architecture ................... 3
STA 381 Engineering Statistics –
A Conceptual Approach .............................................. 3
CPE 490 ECE Capstone Design I ..................................... 3
CPE 491 ECE Capstone Design II ................................... 3

Subtotal: Major hours ................................................ 47

Electives

CPE Technical Electives†† ........................................... 9
Hardware/Software Electives ...................................... 6
Technical Electives†† ................................................... 6

Subtotal: Electives ..................................................... 21

TOTAL HOURS .......................................................... 128

Curriculum

Freshman Year

First Semester -------------------------------------------------- Hours
EGR 101 Engineering Exploration I § Δ .......................... 1
EGR 102 Fundamentals of Engineering Computing ........... 2
MA 113 Calculus I ..................................................... 4
CHE 105 General College Chemistry I ............................ 4
CIS-WRD 110 Composition and Communication I .......... 3

Second Semester ----------------------------------------------- Hours
EGR 103 Engineering Exploration II § Δ .......................... 2
MA 114 Calculus II ..................................................... 4
PHY 231 General University Physics .............................. 4
PHY 241 General University Physics Laboratory .............. 1
CIS-WRD 111 Composition and Communication II .......... 3
CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques .......................... 4

Sophomore Year ------------------------------------------------- Hours
First Semester -------------------------------------------------- Hours
MA 214 Calculus IV ..................................................... 3
EE 211 Circuits I ....................................................... 4
CPE 287 Introduction to Embedded Systems .................... 4
CS 270 Systems Programming ....................................... 3
CS 275 Discrete Mathematics ....................................... 4

Junior Year --------------------------------------------------------- Hours
First Semester -------------------------------------------------- Hours
EE 223 AC Circuits .................................................... 4
CS 315 Algorithm Design and Analysis ......................... 3
CPE 380 Computer Organization ................................ 3
STA 381 Engineering Statistics –
A Conceptual Approach .............................................. 3
UK Core – Humanities .................................................. 3

Second Semester -------------------------------------------------- Hours
EE 421G Signals and Systems ..................................... 3
EE 461G Introduction to Electronics ............................. 3
Technical Elective†† ................................................... 3
CPE 480 Advanced Computer Architecture ................... 3
UK Core – Social Sciences ............................................ 3

Senior Year -------------------------------------------------------- Hours
First Semester -------------------------------------------------- Hours
CPE 490 ECE Capstone Design I* ................................ 3
CPE Elective†† ......................................................... 3
CPE Elective†† ......................................................... 3
Technical Elective†† ................................................... 3
UK Core – Citizenship - USA ....................................... 3

Second Semester -------------------------------------------------- Hours
CPE 491 ECE Capstone Design II † ................................ 3
Hardware Elective € .................................................. 3
Software Elective ................................. 3
CPE Elective†† ......................................................... 3
UK Core – Global Dynamics ........................................... 3

§ Transfer students who declare a major will take EGR 215, Introduction to the Practice of Engineering for Transfer Students, in place of EGR 101 and EGR 103.
Δ Students must complete both EGR 101 and EGR 103 to fulfill the UK Core Arts and Creativity requirement. Transfer students may satisfy the UK Core Arts and Creativity requirement by taking EGR 215.

*Graduation Composition and Communication Requirement (GCCR) course.
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. The program’s educational objective is to equip graduates to succeed in their chosen career path. Specifically, within three to five years after graduation:

- Those employed in industry or entrepreneurial endeavors will demonstrate professional advancement through expanded leadership responsibility, significant technical accomplishment, or other recognition of their contributions.
- Those who continue their formal education will achieve an advanced degree or other technical certification.

In addition, graduates will appreciate the preparation received in the program as it relates to their chosen careers, to their role as educated citizens in a global society, and to continued learning.

For more information, please visit the department website at: [www.cs.uky.edu](http://www.cs.uky.edu)

**Degree Requirements**

Each student must complete the following:

**UK Core Requirements**

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

**I. Intellectual Inquiry in Arts and Creativity**

- EGR 101 Engineering Exploration I §Δ .......................... 1
- EGR 103 Engineering Exploration II §Δ .......................... 2

**II. Intellectual Inquiry in the Humanities**

Choose one course from approved list ............................ 3

**III. Intellectual Inquiry in the Social Sciences**

Choose one course from approved list ............................ 3

**IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences**

- PHY 231 General University Physics ........................................ 1
- PHY 241 General University Physics Laboratory .................... 1

**V. Composition and Communication I**

- STA 381 Engineering Statistics – A Conceptual Approach .......... 3

**VI. Composition and Communication II**

- CIS/WRD 110 Composition and Communication I ..................... 3
- CIS/WRD 111 Composition and Communication II ..................... 3

**VII. Quantitative Foundations**

- MA 113 Calculus I .......................................................... 4
- STA 381 Engineering Statistics – A Conceptual Approach .......... 3

**IX. Community, Culture and Citizenship in the USA**

Choose one course from approved list ............................ 3

**X. Global Dynamics**

Choose one course from approved list ............................ 3

**UK Core hours ............................................................ 33**

Graduation Composition and Communication Requirement (GCCR)

- CS 499 Senior Design Project .......................................... 3

Graduation Composition and Communication Requirement hours (GCCR) .......................................................... 3

**Premajor Requirements**

CIS/WRD 110 Composition and Communication I ..................... 3
CIS/WRD 111 Composition and Communication II ..................... 3
CHE 105 General College Chemistry I .................................. 4
MA 113 Calculus I .......................................................... 4
MA 114 Calculus II .......................................................... 4
PHY 231 General University Physics ...................................... 4
PHY 241 General University Physics Laboratory .................... 1
EGR 101 Engineering Exploration I §Δ ............................ 1
EGR 103 Engineering Exploration II §Δ ............................ 2
CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques .................................................. 4
CS 216 Introduction to Software Engineering Techniques ................. 3
CS 275 Discrete Mathematics .................................................. 4
MA 213 Calculus III ............................................................. 4
EE 280 Design of Logic Circuits ............................................. 3

Subtotal: Premajor hours .................................................. 46

**Major Requirements**

- CS 270 Systems Programming ............................................. 3
- STA 381 Engineering Statistics – A Conceptual Approach .......... 3

Choose 18 credit hours in CS courses at the 300-level or above

- CS 315 Algorithm Design and Analysis .................................. 3
- MA 321 Introduction to Numerical Methods or
- MA 322 Matrix Algebra and Its Applications .......................... 3
- CS 371 Introduction to Computer Networking .......................... 3
- CS 375 Logic and Theory of Computing .................................. 3
- CS 498 Software Engineering for Senior Project ..................... 3
- CS 499 Senior Design Project ............................................. 3

Subtotal: Major hours .................................................. 24

Computer Science Electives Hours

Choose 18 credit hours in CS courses at the 300-level or above with at least three courses from the following list:

- CS 335 Graphics and Multimedia .................................... 3
- CS 378 Introduction to Cryptology ................................... 3
- CS 405G Introduction to Database Systems ......................... 3
- CS 441G Compilers for Algorithmic Languages ................... 3
- CS 450G Fundamentals of Programming Languages ................ 3
- CS 460G Machine Learning ............................................. 3
- CS 463G Introduction to Artificial Intelligence ....................... 3

Subtotal: CS Electives [C] .................................................. 18

**Technical Electives**

Choose 12 credit hours from the following:

- MA 214 Calculus IV or any 300-level or higher classes selected from computer science, electrical engineering, mathematics, the College of Business and Economics, or by advisor’s approval.

Subtotal: Technical Electives [T] ........................................ 12

Electives

Choose 16 credit hours from the following:

- CS 515G Machine Learning ........................................... 3
- Natural Science Elective [N] ........................................... 3
- Free Electives [E] ....................................................... 10

At least 6 credit hours must be in areas other than computer science, science, engineering, or mathematics.

Subtotal: Electives ....................................................... 18

TOTAL HOURS .......................................................... 128

**Curriculum**

**Freshman Year**

**First Semester** Hours

- EGR 101 Engineering Exploration I §Δ ............................ 1
- EGR 102 Fundamentals of Engineering Computing .................... 2
- CHE 105 General College Chemistry I ................................ 4
- PHY 231 General University Physics ...................................... 4
- CIS/WRD 110 Composition and Communication I ..................... 3
- MA 113 Calculus I .......................................................... 4

Subtotal: 254

**Second Semester** Hours

- EGR 103 Engineering Exploration II §Δ ............................ 2
- CIS/WRD 111 Composition and Communication II ..................... 3
- MA 114 Calculus II .......................................................... 4
- PHY 241 General University Physics ...................................... 4
- CHE 105 General College Chemistry I ................................. 4
- PHY 241 General University Physics Laboratory §Δ .................. 1
- CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques .................................................. 4

Subtotal: 128

**Sophomore Year**

**First Semester** Hours

- CS 216 Introduction to Software Engineering Techniques ............... 3
- CS 275 Discrete Mathematics ............................................. 4
- EE 280 Design of Logic Circuits ............................................. 3
- MA 213 Calculus III .......................................................... 4
- UK Core – Social Sciences .................................................. 3

Subtotal: 84

**Second Semester** Hours

- CS 270 Systems Programming ............................................. 3
- CS 315 Algorithm Design and Analysis .................................. 3
- Technical Elective [T] ....................................................... 3
- UK Core – Humanities ..................................................... 3
- Science Elective [S] ....................................................... 3
## Minor in Computer Science

The minor in Computer Science requires a minimum of 19-20 hours of course work in CS, to include:

- CS 115 Introduction to Computer Programming
- EGR 102 Fundamentals of Engineering Computing ... 2-3
- CS 215 Introduction to Program Design, Abstraction, and Problem Solving .......... 4
- CS 216 Introduction to Software Engineering Techniques ............................... 3
- CS 275 Discrete Mathematics ........................................ 4
- CS 315 Algorithm Design and Analysis ........................................ 3
- or equivalent, plus 3 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.

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<thead>
<tr>
<th>Junior Year</th>
<th>Hours</th>
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<tr>
<td>First Semester</td>
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<tr>
<td>CS/MA 321 Introduction to Numerical Methods or MA 322 Matrix Algebra and Its Applications</td>
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<tr>
<td>CS 371 Introduction to Computer Networking</td>
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<td>Computer Science Elective [C]</td>
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<td>Computer Science Elective [C]</td>
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<tr>
<td>STA 381 Engineering Statistics – A Conceptual Approach</td>
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<td>Second Semester</td>
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<tr>
<td>CS 375 Logic and Theory of Computing</td>
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<tr>
<td>Technical Elective [T]</td>
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<tr>
<td>UK Core – Citizenship - US</td>
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<tr>
<td>Natural Science Elective [N]</td>
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<th>Senior Year</th>
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<tbody>
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<td>CS 498 Software Engineering for Senior Project</td>
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<td>Technical Elective [T]</td>
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<tr>
<td>UK Core – Global Dynamics</td>
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<tr>
<td>Free Elective [E]</td>
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<tr>
<td>Second Semester</td>
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<tr>
<td>CS 499 Senior Design Project*</td>
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<tr>
<td>Computer Science Elective [C]</td>
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<tr>
<td>Free Elective [E]</td>
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</table>

* Based on advisor consult.
** Only if enrolled in PHY 231.
[Δ] Technical Elective (12 credit hours) – include any 300-level and above courses in computer science, electrical engineering, mathematics and business and economics. MA 214 is also an acceptable technical elective. Cooperative education credit may be used to satisfy this requirement.
[S] Science Elective (3 credit hours) – must be selected from UK Core natural science or social science approved list or by consent of department.
[C] Computer Science Elective (18 credit hours) – include 300-level and above computer science courses with three to be selected from: CS 335, CS 378, CS 405G, CS 414G, CS 450G, CS 460G and CS 463G. Students are encouraged to take advantage of special topics courses, cooperative education, independent studies and undergraduate research.
[N] Natural Science (3 elective credit hours) – Any natural science course excluding more elementary versions of completed required courses.
[E] Free Elective (10 credit hours) – can be any course that earns college credit and is not a more elementary version of a required course. 6 credits are not to be in computer science, mathematics, science or engineering.

# BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

The electrical engineering undergraduate 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.

The objective of the electrical engineering degree program is to prepare students for success as practicing engineers engaged in life-long learning and serving in leadership roles in their chosen career path. Specifically, within five years of graduation, the electrical engineering degree program will prepare graduates to:

- Establish themselves as practicing professionals meeting or exceeding the expectations of their employers.
- Continue their professional development or pursue formal education to earn advanced degrees and/or certifications.
- Demonstrate leadership in their professional endeavors and/or in their communities.

The electrical engineering undergraduate program has identified curriculum tracks as recommended groups of courses for undergraduate students interested in a particular area of electrical engineering. Each track consists of a list of three recommended electives (typically EE Technical Electives) and possibly a recommended lab elective. A student will be considered to have completed a track if these course requirements have been satisfied with a grade of C or better. Students are not required to participate in a track. Tracks are intended for students as a guide of classes to take in a particular area. Student transcripts will not explicitly mention completion of a track. However, any student completing a track will receive an official recognition of this completion from the department.

The current set of tracks are:

### Electric Power and Energy
EE Technical Electives EE 537 and EE 538, and one of the following: EE 518, EE 531, or EE 539. Also, EE 416G as a Lab Elective.

### Signals and Systems
Any three of the following EE Technical Electives: EE 511, EE 512, EE 513, EE 571, EE 572, EE 586. Also, EE 422G as a Lab Elective.

### Digital Systems
EE Technical Electives EE 582 and EE 584, and one of the following: EE 585, EE 586, EE 587, EE 589. Also, EE 281 as a Lab Elective.

### High Frequency Circuits and Fields
EE Technical Electives EE 522 and EE 523, and one of the following additional: EE 523, EE 525, EE 527.

### Degree Requirements
Each student must complete the following:

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

1. **Intellectual Inquiry in Arts and Creativity**
   - EGR 101 Engineering Exploration I [Δ] 1
   - EGR 103 Engineering Exploration II [Δ] 2
2. **Intellectual Inquiry in the Humanities**
   - Choose one course from approved list 3
3. **Intellectual Inquiry in the Social Sciences**
   - Choose one course from approved list 3
4. **Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences**
   - PHY 231 General University Physics 4
   - PHY 241 General University Physics Laboratory 1
5. **Composition and Communication I**
   - CIS/WRD 110 Composition and Communication I 3
6. **Composition and Communication II**
   - CIS/WRD 111 Composition and Communication II 3
7. **Quantitative Foundations**
   - MA 113 Calculus I 4
8. **Statistical Inferential Reasoning**
   - STA 210 Making Sense of Uncertainty: An Introduction to Statistical Reasoning or STA 381 Engineering Statistics – A Conceptual Approach 3
9. **Community, Culture and Citizenship in the USA**
   - Choose one course from approved list 3
10. **Global Dynamics**
    - Choose one course from approved list 3

| UK Core hours | 33 |
College of Engineering

Graduation Composition and Communication Requirement (GCCR)

<table>
<thead>
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<th>Course</th>
<th>Hours</th>
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<tr>
<td>EE 490 ECE Capstone Design I ...........................................</td>
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</table>

Graduation Composition and Communication Requirement hours (GCCR) ....... 3

Premajor Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CIS/WRD 110 Composition and Communication I ................................</td>
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<tr>
<td>CIS/WRD 111 Composition and Communication II ................................</td>
<td>3</td>
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<tr>
<td>CHE 105 General College Chemistry I ......................................</td>
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<tr>
<td>CS 215 Introduction to Program Design, Abstraction, and Problem Solving</td>
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<tr>
<td>MA 113 Calculus I ...................................................................</td>
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<td>MA 114 Calculus II ..................................................................</td>
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<td>MA 213 Calculus III ..................................................................</td>
<td>4</td>
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<tr>
<td>PHY 231 General University Physics ..........................................</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241 General University Physics Laboratory ............................</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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Second Semester

<table>
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<tr>
<td>MA 214 Calculus IV ....................................................................</td>
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<td>EE 223 AC Circuits ....................................................................</td>
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<td>EE/CPE 287 Introduction to Embedded Systems ................................</td>
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<td>UK Core - Social Sciences .....................................................</td>
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Junior Year

<table>
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<tbody>
<tr>
<td>EE 415G Electromagnetism ................................................................</td>
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<td>EE 421G Signals and Systems ......................................................</td>
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<td>Elective EE Laboratory [L] ................................................................</td>
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<td>EE 461G Introduction to Electronics ..........................................</td>
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<td>MA 320 Introductory Probability ..............................................</td>
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<tr>
<td>STA 381 Engineering Statistics – A Conceptual Approach ...............</td>
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Technical Elective [T] ................................................................... 3

Second Semester

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<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>EE 468G Introduction to Engineering Electromagnetics .....................</td>
<td>4</td>
</tr>
<tr>
<td>Elective EE Laboratory [L] ................................................................</td>
<td>2</td>
</tr>
<tr>
<td>Engineering/Science Elective [E] ................................................</td>
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<tr>
<td>Technical Elective [T] ..................................................................</td>
<td>3</td>
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<tr>
<td>UK Core – Citizenship - USA .....................................................</td>
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Senior Year

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EE/CPE 490 ECE Capstone Design I .............................................</td>
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<tr>
<td>EE Technical Elective* ..................................................................</td>
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<tr>
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<td>3</td>
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<tr>
<td>Math/Statistics Elective [M] ......................................................</td>
<td>3</td>
</tr>
<tr>
<td>UK Core – Global Dynamics .......................................................</td>
<td>3</td>
</tr>
</tbody>
</table>

Second Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EE/CPE 491 ECE Capstone Design II ............................................</td>
<td>3</td>
</tr>
<tr>
<td>EE Technical Elective* ..................................................................</td>
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<tr>
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</tr>
<tr>
<td>Engineering/Science Elective [E] ................................................</td>
<td>3</td>
</tr>
<tr>
<td>UK Core – Statistical Inferential Reasoning ...................................</td>
<td>3</td>
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<td></td>
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<tr>
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<td></td>
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</tbody>
</table>

Total Hours: 128

Curriculum

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>EGR 101 Engineering Exploration I § Δ ......................................</td>
<td>1</td>
</tr>
<tr>
<td>EGR 102 Fundamentals of Engineering Computing ................................</td>
<td>2</td>
</tr>
<tr>
<td>PHY 241 General University Physics ..........................................</td>
<td>4</td>
</tr>
<tr>
<td>PHY 211 Circuits I ......................................................................</td>
<td>4</td>
</tr>
<tr>
<td>STA 381 Engineering Statistics – A Conceptual Approach ...............</td>
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<tr>
<td>STA 385 Principles of Engineering ............................................</td>
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Second Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EGR 103 Engineering Exploration II § Δ ....................................</td>
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<tr>
<td>CIS/WRD 111 Composition and Communication II ................................</td>
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<tr>
<td>MA 114 Calculus II ....................................................................</td>
<td>4</td>
</tr>
<tr>
<td>CHE 105 General College Chemistry I ........................................</td>
<td>4</td>
</tr>
<tr>
<td>CS 215 Introduction to Program Design, Abstraction, and Problem Solving</td>
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Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MA 213 Calculus III ....................................................................</td>
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<tr>
<td>PHY 232 General University Physics ..........................................</td>
<td>4</td>
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<tr>
<td>PHY 242 General University Physics Laboratory ............................</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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Second Semester

<table>
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<tbody>
<tr>
<td>MA 214 Calculus IV ....................................................................</td>
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<tr>
<td>EE 223 AC Circuits ....................................................................</td>
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<tr>
<td>EE/CPE 287 Introduction to Embedded Systems ................................</td>
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<tr>
<td>UK Core – Social Sciences .....................................................</td>
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<tr>
<td>UK Core – Humanities ..................................................................</td>
<td>3</td>
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Junior Year

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EE 415G Electromagnetism ................................................................</td>
<td>3</td>
</tr>
<tr>
<td>EE 421G Signals and Systems ......................................................</td>
<td>3</td>
</tr>
<tr>
<td>Elective EE Laboratory [L] ................................................................</td>
<td>2</td>
</tr>
<tr>
<td>EE 461G Introduction to Electronics ..........................................</td>
<td>3</td>
</tr>
<tr>
<td>MA 320 Introductory Probability ..............................................</td>
<td>3</td>
</tr>
<tr>
<td>STA 381 Engineering Statistics – A Conceptual Approach ...............</td>
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Technical Elective [T] ................................................................... 3

Second Semester

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</tr>
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</table>

Total Hours: 128

Undergraduate Certificate in Power and Energy

Requirements for the Undergraduate Certificate in Power and Energy

The purpose of the Power and Energy Undergraduate Certificate is to provide students with a formalized recognition of an emphasis in power and energy as part of their undergraduate degree program. The certificate consists of a series of foundational courses, supplemented with a broad array of elective courses related to power and energy. The elective courses cover a wide variety of areas, including fundamentals, conventional and emerging technologies, smart grid systems, distributed generation, power system protection, energy storage, solar power, biofuels, and others. This certificate is an important part of the Power and Energy Institute of Kentucky (PEIK), created through a grant from the US Department of Energy.

Structure

The Director of the Power and Energy Undergraduate Certificate is responsible for admitting students into the certificate, approving each
Entrance Requirements
To be accepted into the University of Kentucky Power and Energy Undergraduate Certificate, the student must be pursuing an undergraduate degree and have completed at least 24 credits with a UK cumulative GPA of at least 2.50. A transfer student can be accepted into the certificate if he/she has completed at least 24 credits with a weighted cumulative GPA from all other institutions of at least 2.50.

Exit Requirements
• The student must complete a minimum of 15 credits of course work in the certificate curriculum taken for a letter grade. Courses taken prior to admission into the certificate can be applied to the certificate.
• A minimum of 9 credits must be at, or above, the 300-level.
• The student must earn a grade of C or better in each course used to satisfy the certificate.
• The student must complete a 3-credit breadth component. The breadth component requires that a student take courses in at least two disciplines, with a minimum of 3 credits completed in the second discipline.
• The certificate will be awarded to students who complete the certificate curriculum and also complete an undergraduate degree.
• No more than 9 credits of the Power and Energy Undergraduate Certificate can be used as required courses in the student’s major, minor, or other certificate. Courses used to satisfy the certificate can be used as electives (including technical electives) in a student’s degree program.
• Courses applied to the Power and Energy Undergraduate Certificate cannot also be applied to the Power and Energy Graduate Certificate.
• The Power and Energy Undergraduate Certificate Director must approve the certificate curriculum for each student.

Power and Energy Undergraduate Certificate Curriculum
The structure of the certificate curriculum is shown below:

Required Course (3 credits)
EGR 240 Global Energy Issues 3

Core Elective (3 credits)
Choose one of the following courses:
EGR 540 Power Economics and Public Policy 3
EGR 542 Electric Power Generation Technologies 3
EGR 546 Electric Power System Fundamentals 3

Power and Energy Electives (9 credits)
Choose 9 credits from the approved list of Power and Energy Electives. The selected courses must be approved by the Director of the Power and Energy Undergraduate Certificate to ensure that the selections maintain a thematic consistency and fulfill the certificate breadth requirement. A partial list of approved power and energy courses is provided below. Additional courses will be added if they are approved for the power and energy certificate curriculum.

BAE 503 Fundamentals of Biorenewable Resource Engineering 3
BAE 504 Biofuels Production and Properties 3
BAE 505 Thermochemical Processing of Biomass 3
BAE/EE/EGR 543 Solar Cell Devices and Systems for Electrical Energy 3
BAE/ME 580 Heating, Ventilating and Air Conditioning 3
CE 351 Introduction to Environmental Engineering 3
CE 433 Railway Operations and Multi-Modal Transportation 3
CE 533 Railroad Facilities Design and Analysis 3
CE/EGR/553 Environmental Consequences of Energy Production 3
CHE 565 Environmental Chemistry 3
CME 425 Heat and Mass Transfer 3
CME 515 Air Pollution Control 3
CME/EGR/MFS 523 Concepts, Assessment Tools and Methods in Sustainable Power and Energy 3
CME 580 Design of Rate and Equilibrium Processes for Water Pollution Control 3
EE 415G Electromechanics 3
EE 416G Energy Conversion Laboratory 2
EE 503 Power Electronics 3
EE 517 Advanced Electromechanics 3
EE 518 Electric Drives 3
EE 531 Alternative and Renewable Energy Systems 3
EE 532 Smart Grid: Automation and Control of Power Systems 3
EE 533 Advanced Power System Protection 3
EE 535 Power Systems: Generation, Operation and Control 3
EE 536 Power System Fault Analysis and Protection 3
EE 537 Electric Power Systems I 3
EE 538 Electric Power Systems II 3
EE 539 Power Distribution Systems 3
EGR 540 Power Economics and Public Policy 3
EGR/CME 542 Electric Power Generation Technologies 3
EGR/CME 543 Solar Cell Devices and Systems for Electrical Energy Generation 3
EGR/EE 546 Electric Power System Fundamentals 3
ME 321 Engineering Thermodynamics II 3
ME 325 Elements of Heat Transfer 3
ME 515 Rotordynamics of Turbomachinery 3
ME 530 Gas Dynamics 3
ME 548 Aerodynamic of Turbomachinery 3
ME 549 Power Generation 3
ME 563 Basic Combustion Phenomena 3
MNG 511 Mine Power System Design 3
MNG 575 Coal Preparation Design 3

Additional courses will be added as they are approved for the power and energy certificate curriculum.

Degree Requirements
The following curriculum meets requirements for the B.S. in materials engineering, provided the student satisfies the graduation requirements listed earlier. Each student must complete the following:

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

I. Intellectual Inquiry in Arts and Creativity
EGR 101 Engineering Exploration I § Δ 3
EGR 103 Engineering Exploration II § Δ 2

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

III. Intellectual Inquiry in the Social Sciences
Choose one course from approved list 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences
CHE 105 General College Chemistry I 4
CHE 111 General Chemistry I Laboratory 1

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

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

VII. Quantitative Foundations
MA 113 Calculus I 3

VIII. Statistical Inferential Reasoning
STA 381 Engineering Statistics – A Conceptual Approach 3

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

BACHELOR OF SCIENCE IN 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.

The educational objectives of the materials engineering program state that graduates will:
• Excel in their chosen career pathways, as practicing materials engineers or through the pursuit of advanced technical or professional degrees.
• Impact their profession through effective leadership, communication, teamwork, and through creative solution strategies to address global and societal issues.
• Apply their engineering training to contribute to the health, safety, environmental and economic well-being of their communities.
• Seek out continuing education, professional development and career advancement opportunities.

The following curriculum meets requirements for the B.S. in materials engineering, provided the student satisfies the graduation requirements listed earlier. Each student must complete the following:

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

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

III. Intellectual Inquiry in the Social Sciences
Choose one course from approved list 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences
CHE 105 General College Chemistry I 4
CHE 111 General Chemistry I Laboratory 1

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

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

VII. Quantitative Foundations
MA 113 Calculus I 3

VIII. Statistical Inferential Reasoning
STA 381 Engineering Statistics – A Conceptual Approach 3

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

UK Core hours ................................................................. 33

Graduation Composition and Communication Requirement (GCCR)
MSE 407 Materials Laboratory I .................................................. 3

Graduation Composition and Communication Requirement hours (GCCR) ........................................... 3

Premajor Requirements
CIS/WRD 110 Composition and Communication I .................................. 3
CIS/WRD 111 Composition and Communication II .................................. 3
CHE 105 General College Chemistry I ................................................. 4
CHE 107 General College Chemistry II ................................................. 4
CHE 111 General Chemistry I Laboratory .............................................. 1
CHE 113 General Chemistry II Laboratory .............................................. 2
MA 113 Calculus I ........................................................................... 4
MA 114 Calculus II ........................................................................... 4
MA 213 Calculus III .......................................................................... 4
PHY 231 General University Physics ..................................................... 4
PHY 241 General University Physics Laboratory .................................... 1
MSE 201 Materials Science ............................................................... 3
MSE 202 Materials Science Laboratory ................................................. 1
EGR 101 Engineering Exploration I § .................................................. 1
EGR 102 Fundamentals of Engineering Computing ................................ 2
EGR 103 Engineering Exploration II § ............................................... 2

Subtotal: Premajor hours .................................................................. 42

Major Requirements
CHE 236 Survey of Organic Chemistry ................................................. 3
CME 200 Process Principles ............................................................. 3
EM 221 Statics .................................................................................. 4
MA 214 Calculus IV ........................................................................... 4
PHY 232 General University Physics ..................................................... 4
MSE 301 Materials Science II .......................................................... 3
MSE 351 Materials Thermodynamics ................................................... 3
EM 302 Mechanics of Deformable Solids ............................................ 3
EE 305 Electrical Circuits and Electronics ........................................... 3
PHY 361 Principles of Modern Physics ............................................... 3
MSE 401G Metal and Alloys ............................................................. 3
MSE 402G Electronic Materials and Processing .................................... 3
MSE 403G Ceramic Engineering and Processing .................................. 3
MSE 404G Polymeric Materials ........................................................ 3
MSE 407 Materials Laboratory I ......................................................... 3
MSE 408 Materials Laboratory II ......................................................... 3
MSE 436 Material Failure Analysis ..................................................... 3
MSE 470 Application of Materials Engineering to Design Problems .......... 1
MSE 480 Materials Design ............................................................. 3
MSE 535 Mechanical Properties of Materials .................................... 3
MSE 538 Metals Processing ............................................................ 3
MSE 585 Materials Characterization Techniques ..................................... 3
STA 381 Engineering Statistics – A Conceptual Approach .................... 3

Subtotal: Major hours ..................................................................... 68

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 an 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 .......................... 3
MSE 506 Mechanics of Composite Materials ..................................... 3
MSE 531 Powder Metallurgy ............................................................ 3
MSE 552 Automotive Plastics .......................................................... 3
MSE 554 Chemical and Physical Processing of Polymer Systems .......... 3
MSE 556 Introduction to Composite Materials .................................... 3
MSE 569 Electronic Packaging Systems and Manufacturing Processes .... 3
MSE 599 Topics in Materials Science and Engineering (Subtitle required) .... 3
BME 488 Introduction to Biomaterials ............................................... 3
CHE 580 Topics in Chemistry .......................................................... 3
CME 542 Electric Power Generation Technologies ................................ 3
CME 599 Topics in Chemical Engineering .......................................... 3
MA 322 Matrix Algebra and Its Applications ...................................... 3
MA 422 Numerical Solutions of Equations ......................................... 3
MA 432G Methods of Applied Mathematics ....................................... 3
ME/MPS 503 Lean Manufacturing Principles and Practices ............... 3

Subtotal: Technical Electives .......................................................... 6

TOTAL HOURS: ......................................................................... 128

Curriculum

Freshman Year
First Semester
EGR 101 Engineering Exploration I § .................................................. 1
EGR 102 Fundamentals of Engineering Computing ................................ 2
CHE 105 General College Chemistry I ................................................. 4
CHE 111 General Chemistry I Laboratory .............................................. 1
CIS/WRD 110 Composition and Communication I .................................. 3
MA 113 Calculus I ........................................................................... 4

Second Semester
EGR 103 Engineering Exploration II § ............................................... 2
CIS/WRD 111 Composition and Communication II ................................ 2
MA 114 Calculus II .......................................................................... 4
PHY 231 General University Physics ..................................................... 4
PHY 241 General University Physics Laboratory .................................... 1
UK Core – Social Sciences ............................................................... 3

Sophomore Year
First Semester
MSE 201 Materials Science ............................................................. 3
MSE 202 Materials Science Laboratory ................................................. 1
MA 213 Calculus III .......................................................................... 4
CHE 107 General College Chemistry II ................................................. 3
CHE 113 General Chemistry II Laboratory .............................................. 2
EM 221 Statics .................................................................................. 3

Second Semester
MSE 301 Materials Science II .......................................................... 3
MSE 351 Materials Thermodynamics ................................................... 3
MA 214 Calculus IV .......................................................................... 4
PHY 232 General University Physics ..................................................... 4
CHE 236 Survey of Organic Chemistry ............................................... 3

Junior Year
First Semester
MSE 401G Metal and Alloys ............................................................. 3
MSE 404G Polymeric Materials ........................................................ 3
CME 200 Process Principles ............................................................. 3
EM 302 Mechanics of Deformable Solids ............................................ 3
STA 381 Engineering Statistics – A Conceptual Approach .................... 3
UK Core – Humanities .................................................................. 3

Second Semester
MSE 402G Electronic Materials and Processing .................................... 3
MSE 403G Ceramic Engineering and Processing .................................. 3
MSE 407 Materials Laboratory I ......................................................... 3
MSE 535 Mechanical Properties of Materials .................................... 3
PHY 361 Principles of Modern Physics ............................................... 3

Senior Year
First Semester
MSE 408 Materials Laboratory II ......................................................... 3
MSE 436 Material Failure Analysis ..................................................... 3
MSE 470 Application of Materials Engineering to Design Problems .......... 1
MSE 585 Materials Characterization Techniques ..................................... 3
EE 305 Electrical Circuits and Electronics ........................................... 3
Technical Elective* (MSE prefix) ....................................................... 3

Second Semester
MSE 480 Materials Design ............................................................. 3
MSE 538 Metals Processing ............................................................ 3
Technical Elective* .......................................................... 3
UK Core – Citizenship - USA ......................................................... 3
UK Core – Global Dynamics ........................................................... 3

§ Transfer students who declare a major will take EGR 215, Introduction to the Practice of Engineering for Transfer Students, in place of EGR 101 and EGR 103.

Δ Students must complete both EGR 101 and EGR 103 to fulfill the UK Core Arts and Creativity requirement. Transfer students may satisfy the UK Core Arts and Creativity requirement by taking EGR 215.

*Choose from the list of Technical Electives.

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

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

The training of the mechanical engineer 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.

Our graduates will be able to apply knowledge of mathematics and engineering to the solution of problems, particularly in the areas of thermodynamics and energy systems; heat transfer; fluid mechanics; mechanical systems and controls; mechanical design; finite element methods and computer-aided graphics; manufacturing; instrumentation; and experimental method.

Consistent with the Vision and Mission statements of the University of Kentucky and the College of Engineering, the undergraduate program in mechanical engineering will prepare our graduates for successful practice or academic pursuits in mechanical engineering. We expect our graduates to attain the following Program Educational Objectives within a few years of graduation:

1. Our graduates will be employed in mechanical engineering or a variety of related fields as professionals, or attend graduate and professional schools in their career paths.
2. Our graduates will continue their education and professional growth by supporting or participating in professional societies, licensure programs, short courses, or other professional development activities.

Degree Requirements
Each student must complete the following:
UK Core Requirements
See the UK Core section of this Bulletin for the complete UK Core requirements. The courses listed below are (a) recommended by the college, or (b) required courses that also fulfill UK Core areas. Students should work closely with their advisor to complete the UK Core requirements.

I. Intellectual Inquiry in Arts and Creativity
EGR 101 Engineering Exploration I $\Delta$
and EGR 103 Engineering Exploration II $\Delta$
or ME 411 ME Capstone Design I ...................... 3

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

III. Intellectual Inquiry in the Social Sciences
Choose one course from approved list .................. 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences
PHY 231 General University Physics .......... 4
PHY 241 General University Physics Laboratory .... 1

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

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

VII. Quantitative Foundations
MA 113 Calculus I ............................................ 4

VIII. Statistical Inferential Reasoning
Choose one course from approved list. Recommended:
STA 210 Making Sense of Uncertainty:
An Introduction to Statistical Reasoning or
STA 381 Engineering Statistics – A Conceptual Approach .......... 3

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

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

UK Core hours .......................................................... 33

Graduation Composition and Communication Requirement (GCCR)
WRD 204 Technical Writing ................... 3

Graduation Composition and Communication Requirement hours (GCCR) .................. 3

Premajor Requirements Hours
CIS/WRD 110 Composition and Communication I ...... 3
CIS/WRD 111 Composition and Communication II .... 3
CHE 105 General College Chemistry I .......... 4
CHE 107 General College Chemistry II .......... 3
MA 113 Calculus I ............................................ 4
MA 114 Calculus II ............................................ 4
MA 213 Calculus III ........................................... 4
PHY 231 General University Physics .......... 4
PHY 241 General University Physics Laboratory .... 1
PHY 242 General University Physics Laboratory .... 1
EGR 101 Engineering Exploration I $\Delta$
and EGR 103 Engineering Exploration II $\Delta$
ME 205 Computer Aided Engineering Graphics .... 3
EM 221 Statics .................................................. 3

Subtotal: Premajor hours: ........................................ 46

Major Requirements Hours
MA 214 Calculus IV ........................................... 3
ME 220 Engineering Thermodynamics I .......... 3
ME 251 Introduction to Materials and Manufacturing Processes .... 3
EM 302 Mechanics of Deformable Solids .......... 3
EM 313 Dynamics ............................................ 3
EE 305 Electrical Circuits and Electronics ........ 3
ME 310 Engineering Experimentation I .......... 3
ME 311 Engineering Experimentation II .......... 3
ME 321 Engineering Thermodynamics II .......... 3
ME 325 Elements of Heat Transfer .................. 3
ME 330 Fluid Mechanics .................................... 3
ME 340 Introduction to Mechanical Systems .... 3
ME 344 Mechanical Design .................................. 3
ME 411 ME Capstone Design I ...................... 3
ME 412 ME Capstone Design II ..................... 3
ME 440 Design of Control Systems ............... 3
ME 501 Mechanical Design with Finite Element Methods .......... 3
Subtotal: Major hours ........................................... 51

Electives Hours
Math Elective$^*$ ................................................. 3
Technical Electives? ............................................ 9

Subtotal: Elective hours ........................................... 2

TOTAL HOURS: ........................................... 127

Curriculum
Freshman Year
First Semester
EGR 101 Engineering Exploration I $\Delta$ .......... 1
EGR 102 Fundamentals of Engineering Computing .... 2
CIS/WRD 110 Composition and Communication I ...... 3
MA 113 Calculus I ............................................ 4
PHY 231 General University Physics .......... 4
PHY 241 General University Physics Laboratory .... 1

Second Semester
EGR 103 Engineering Exploration II $\Delta$ .......... 2
MA 114 Calculus II ............................................ 4
CIS/WRD 111 Composition and Communication II .... 3
CHE 105 General College Chemistry I .......... 4
UK Core$^*$ – Social Sciences ...................... 3

Sophomore Year
First Semester
MA 213 Calculus III ........................................... 4
PHY 232 General University Physics .......... 4
PHY 242 General University Physics Laboratory .... 1
EM 221 Statics .................................................. 3
ME 205 Computer Aided Engineering Graphics .... 3
CHE 107 General College Chemistry II
or
UK Core$^*$ – Humanities ...................................... 3

Second Semester
ME 220 Engineering Thermodynamics I .......... 3
ME 251 Introduction to Materials and Manufacturing Processes .... 3
MA 214 Calculus IV ........................................... 3
EM 313 Dynamics ............................................ 3
UK Core$^*$ – Humanities or
CHE 107 General College Chemistry II ............. 3
UK Core$^*$ – Statistical Inferential Reasoning. Recommended: STA 210 Making Sense of Uncertainty:
An Introduction to Statistical Reasoning or
STA 381 Engineering Statistics – A Conceptual Approach .......... 3

Junior Year
First Semester
Hours
EM 302 Mechanics of Deformable Solids .......... 3
EE 305 Electrical Circuits and Electronics ........ 3
ME 330 Fluid Mechanics .................................... 3
ME 340 Introduction to Mechanical Systems .... 3
WRD 204 Technical Writing$^*$ ........................ 3

Second Semester
ME 310 Engineering Experimentation I .......... 3
ME 321 Engineering Thermodynamics II .......... 3
ME 325 Elements of Heat Transfer .................. 3
ME 344 Mechanical Design ............................... 3
Mathematics Elective$^*$ ................................. 3

Senior Year
First Semester
ME 411 ME Capstone Design I ...................... 3
ME 311 Engineering Experimentation II .......... 3
ME 440 Design of Control Systems ............... 3
ME 501 Mechanical Design with Finite Element Methods .......... 3
Technical Elective? ............................................ 3

Second Semester
ME 412 ME Capstone Design II .................... 3
Technical Elective? ............................................ 3
UK Core$^*$ – Citizenship - US .......................... 3
UK Core$^*$ – Global Dynamics ....................... 3

*Students must complete both EGR 101 and EGR 103 to fulfill the UK Core Arts and Creativity requirement. Transfer students may satisfy the UK Core Arts and Creativity requirement by taking EGR 215.

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

Mathematics Elective – choose one course from approved list.

Mathematics Elective – choose 9 hours from approved list.

Technical Electives
Choose 9 hours from the following:
BAE 502 Modeling of Biological Systems .......... 3
BME 330 Biomedical Instrumentation ............... 3
EGR 599 Topics in Engineering ..................... 3
ME 380 Topics in Mechanical Engineering (Variable Topics) .......... 3
ME 395 Independent Work in Mechanical Engineering .......... 1-3
ME 416 Automotive Painting Technology .......... 3
ME/MFS 503 Lean Manufacturing Principles and Practices .......... 3
ME/MFS 505 Modeling of Manufacturing Processes and Machines .......... 3
ME/MSE 506 Mechanics of Composite Materials .......... 3
ME/MFS 507 Design for Manufacturing .......... 3
College of Engineering

ME 510 Vibro-Acoustic Design in Mechanical Systems ........................................... 3
ME/MFS 512 Manufacturing Systems ................................................................. 3
ME 513 Mechanical Vibrations ........................................................................... 3
ME 514 Computational Techniques in Mechanical System Analysis .................. 3
ME 515 Rotordynamics of Turbomachinery ...................................................... 3
ME 516 Systems Engineering ............................................................................. 3
ME/EE/MFS 526 Lean Operations Management ................................................ 3
ME 527 Applied Mathematics in the Natural Sciences I ..................................... 3
ME 530 Gas Dynamics ......................................................................................... 3
ME 531 Fluid Dynamics I .................................................................................... 3
ME 532 Advanced Strength of Materials ............................................................ 3
ME 548 Aerodynamics of Turbomachinery ....................................................... 3
ME 549 Power Generation .................................................................................. 3
ME/MFS/CME/MSE 554 Chemical and Physical Processing of Polymer Systems ................................................................. 3
ME 555 Introduction to Micro-/Nano-Electromechanical Systems ...................... 3
ME/MSE 556 Introduction to Composite Materials .............................................. 3
ME 560 Engineering Optics ................................................................................. 3
ME 563 Basic Combustion Phenomena ............................................................... 3
ME 565 Scale Modeling in Engineering .............................................................. 3
ME/EE/MSE 570 Fundamentals of Nanoelectric Devices and Materials .............. 3
ME/BAE 580 Heating, Ventilating and Air-Conditioning .................................... 3
ME 599 Topics in Mechanical Engineering (Subtitle required) ......................... 3
MFS 599 Topics in Manufacturing Systems (Subtitle required) ......................... 3
MSE 201 Materials Science ................................................................................ 3
A minimum of 6 credit hours (two courses) must have an ME prefix or be cross-listed as an ME course. A maximum of 3 credit hours (one course) may be chosen from technical electives with prefixes other than ME, but only with the approval of the Director of Undergraduate Studies.

Subtotal: Technical Electives: ................................................................. 9

Undergraduate Certificate in Production Engineering

The Production Engineering Certificate (PEC) encompasses development of students’ experiences and knowledge, and the application of engineering and scientific principles, in automotive manufacturing. It enhances capstone senior design projects, promotes students understanding of key automotive production processes, and involves students in capstone projects that develop knowledge of problems in and potential solutions for automotive production process design. Design projects within the Core Courses are developed through proposals from industry or an engineering organization.

The program requires 12 credit hours minimum to be awarded the certificate, which includes 6 credit hours of capstone design and 6 credit hours of elective courses. However, students from departments or disciplines that do not have two semesters (6 credit hours) of capstone design courses can substitute ME 526 Lean Operations Management (a required prerequisite for the certificate) as an acceptable core course to meet the 6 credit hours requirements. For example, CME/MSE students whose capstone design course is only one semester (3 credit hours), ME 526 Lean Operations Management, can count for one of the core courses or they will be required to take three elective courses (9 credit hours) to satisfy the total of 12 credit hours required. Students from departments or disciplines that may be interested in the certificate but do not have capstone design as part of their degree requirements, their core course requirement will be assessed by the director on a case by case basis.

Admission Requirements

Students accepted for the PEC Program must be pursuing or have pursued an accredited university degree. For UK students, 24 credits completed and a minimum cumulative GPA of 2.5 are required; in the case of transfer students into UK, 24 credits completed and a minimum cumulative GPA of 2.5 are required from all other institutions.

Core Courses

ME 411 ME Capstone Design I or EE 490 ECE Capstone Design I .................. 3
ME 412 ME Capstone Design II or EE 491 ECE Capstone Design II ................ 3
MSE 480 Materials Design ................................................................................. 3

Electives

ME 416 Automotive Painting Technology ......................................................... 3
EE 528 Automotive Body Welding .................................................................... 3
MSE/MSE 552 Automotive Plastics ................................................................ 3
ME 418 Automotive Assembly and Quality Control .................................... 3

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING – PADUCAH

In addition to the program on the Lexington campus, students can pursue a B.S. degree in mechanical engineering through the College’s Extended Campus Program in Paducah, Kentucky. The Paducah program uses the same curriculum as the main campus, but provides the opportunity for students to complete all B.S. degree requirements without having to relocate to Lexington.

Consistent with the Vision and Mission statements of the University of Kentucky, the mechanical engineering program at the UK Extended Campus in Paducah strives to meet the following educational objectives:

1. Our graduates will practice mechanical engineering in a variety of fields as professionals and/or be recruited to graduate and professional schools in their career paths.
2. Our graduates will communicate effectively, work in diverse teams, address the challenges of a global society, and exhibit leadership, ethics, and creativity in their work places.

3. Our graduates will value continuing education and professional growth by supporting or participating in professional societies, licensure programs, short courses, or other professional development activities.

The Paducah mechanical engineering program collaborates with West Kentucky Community and Technical College to provide the basic math and science courses, as well as the general studies course requirements. On-site UK mechanical engineering faculty members teach the engineering courses. Program admission, course registration, student advising and other student services all can be completed at the Paducah site.

Degree Requirements

The curriculum requirements for the B.S. degree in mechanical engineering in Paducah are identical to those on the Lexington campus. Refer to those degree requirements for the Paducah degree program. Not all the technical electives listed for the Lexington program will be available in Paducah. The student must satisfy the College graduation requirements listed earlier.

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Joint-Degree Program Offered by Western Kentucky University (WKU) and the University of Kentucky (UK)

As part of the “Strategy for Statewide Engineering Education in Kentucky,” adopted July 17, 2000 by all the chief executive officers of Kentucky universities and endorsed by the Kentucky Council on Postsecondary Education (CPE), the vision was expressed that “access to undergraduate engineering education will expand primarily through the creation of joint programs managed by multiple postsecondary institutions.” In response, WKU and UK now jointly offer an ABET-accredited baccalaureate degree in mechanical engineering on the WKU campus in Bowling Green, Kentucky. By CPE definition, a joint-degree program is “a program that is mutually sponsored by two or more institutions leading to a single credential or degree, which is conferred by both or all participating institutions. All institutions share responsibility for all aspects of the program’s delivery and quality.”

The joint mechanical engineering program is one of only four such joint-degree programs in Kentucky; the others include a joint-degree program between WKU and UK in civil engineering, between WKU and the University of Louisville (UL) in electrical engineering, and between Murray State University and UL in electrical and telecommunications engineering.

The WKU/UK joint programs emphasize a project-oriented educational approach. Courses are provided by both WKU and UK faculty. Students are required to complete a minimum of 16 credit hours of engineering course work taught
by UK engineering faculty. At present, the UK contribution is provided primarily by distance delivery via interactive television. The curriculum of the joint mechanical engineering program is under the direction of a joint program faculty, with equal representation from each participating institution. The curriculum for entering students requires 127.5 credit hours, with the General Studies component based on the requirements of WKU. Students who complete the program will receive a B.S. degree conferred jointly by WKU and UK. Under the terms of the agreements between the degree-awarding institutions, WKU provides basic administrative support for students in the joint-degree program, including admission services, registration, and student financial aid. In addition, academic advising, laboratory and equipment support, and library and media resources are supplied by WKU.

The mechanical engineering curriculum of the joint program is listed below. The joint program faculty are responsible for on-going review of the curricular requirements.

### Curriculum

#### Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 176 Freshman Design</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 116/116 Intro Coll. Chem/LAB</td>
<td>4</td>
</tr>
<tr>
<td>MATH 136 Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>ENG 100 Freshman English</td>
<td>3</td>
</tr>
<tr>
<td>COMM 161 Business Speaking</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

| Spring Semester | ME 180 Freshman Design II | 3 |
| MATH 137 Calculus II | 4 |
| PHYS 255/256 Intro. Mech. & LAB (4, 1) | 5 |
| EM 221 UK Statics | 3 |
| Category F Elective | 2 |
| Total | 16 |

#### Sophomore Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 331 Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>ME 240/241 Mats./Meth. &amp; LAB (3, 1)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 265/266 Intro E&amp;M &amp; LAB (4, 1)</td>
<td>5</td>
</tr>
<tr>
<td>Category F Elective 2 of 2</td>
<td>1</td>
</tr>
<tr>
<td>ENG 200 Introduction to Literature</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
</tr>
</tbody>
</table>

| Spring Semester | MATH 237 Multivariable Calculus | 4 |
| EM 313 UK Dynamics | 3 |
| HIST 119/120 Western Civilization | 3 |
| ME 200 Sophomore Design | 3 |
| ME 347 Mechanics LAB | 1 |
| Total | 17 |

#### Junior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 220 Eng. Thermo I</td>
<td>3</td>
</tr>
<tr>
<td>ME 310 Eng. Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>ME 344 UK Mechanical Design</td>
<td>3</td>
</tr>
<tr>
<td>MATH/SCIENCE ELECTIVE</td>
<td>3</td>
</tr>
<tr>
<td>Category B Elective 1 of 2</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

| Spring Semester | ME 300 Junior Design | 2 |
| ME 330/332 Fluid Mechanics/LAB | 3, 1 |
| EE 210 Circuits/Networks | 3.5 |
| Category C Elective 1 of 2 | 3 |
| Foreign Lang. Modern Language | 3 |
| Total | 15.5 |

#### Senior Year

| Fall Semester | ME 325/333 Heat Transfer/LAB | 3, 1 |
| ME 400 Mech. Engr. Design | 2 |
| ME — ME Tech Elective 1 of 4 | 1 |
| ME — ME Tech Elective 2 of 4 | 3 |
| ENG 300 Junior English | 3 |
| Category E Elective 1 of 1 | 3 |
| Total | 15 |

| Spring Semester | ME 412 ME Senior Project | 3 |
| ME — ME Tech Elective 3 of 4 | 3 |
| ME — ME Tech Elective 4 of 4 | 3 |
| Category B Elective 2 of 2 | 3 |
| Category C Elective 2 of 2 | 3 |
| Total | 18 |

| TOTAL HOURS | 127.5 |

This curriculum applies to students entering in fall 2013 or later. Currently enrolled students may complete a “Request to Change or Extend Catalog Term/Year” form found on the ICAP main page.

Students are admitted as a Pre-Major in Mechanical Engineering. In order to transition from Pre-Major to Major and to graduate with a degree in Mechanical Engineering, students must satisfy the requirements below. All courses listed below must have a grade of C or better.

### Written and Oral Communication

ENG 100 or equivalent credit | 3 |
COMM 145 or 161 or equivalent credit | 3 |

### Mathematics and Science

MATH 136 Calculus I or equivalent credit | 4 |
MATH 137 Calculus II or equivalent credit | 4 |
MATH 237 Multivariable Calculus | 4 |
PHYS 255/256 University Physics I/LAB | 5 |
PHYS 265/266 University Physics II/LAB | 5 |
CHEM 116/116 or CHEM 120/121 | 4 or 5 |

### Engineering Science

ME 240/241 Materials and Methods of Mfg | 3/1 |
EM 221 or EM 222 Statics | 3 |

| TOTAL HOURS | 43-44 |

These Pre-Major eligibility requirements MUST be completed before enrolling ME 300 Junior Design. Check ICAP for progress towards meeting these requirements.

After satisfying the requirements to transition from Pre-Major to Major in Mechanical Engineering, the student must also earn a grade of C or better in the following courses required of the major: EM 303, ME 200, 220, 310, 330, 347, and MATH 331.

Each Mechanical Engineering student’s transcript must include at least 16 hours of credit in the major taught by UK faculty members.

UK faculty are scheduled to deliver the following courses to the ME Joint Program: EM 221, EM 313, ME 321, ME 344, ME 416, and a range of technical electives. ME 489 (fall) or 499 (spring)

Each Mechanical Engineering student must also take at least one mathematics/science elective, for a total of a minimum of 32 hours of mathematics and science beginning at MATH 136. This elective must be chosen from the following list:

| ME Program Mathematics and Science Electives |
| PH 280 Introduction to Environmental Science (Equivalent to AGRI 280, CHEM 280, ENV 280, and GEOG 280) |
| ASTR 214 General Astronomy |
| BIOL 120/121 Biological Concepts: Cells Metabolism and Genetics |
| BIOL 122/123 Biological Concepts: Evolution, Diversity, and Ecology |
| BIOL 207/207C General Microbiology |
| CHEM 222/223 College Chemistry II |
| GEOG 121 Meteorology |
| GEO 111 The Earth |
| GEOL 112 Earth History |
| PHYS 316 Computational Physics |
| PHYS 318 Data Acquisition Using Labview |
| PHYS 320 Introductory Modern Physics I |
| MATH 305 Introduction to Mathematical Modeling |
| MATH 307 Introduction to Linear Algebra |
| MATH 310 Introduction to Discrete Mathematics |
| MATH 370 Applied Techniques in Mathematics |
| STAT 301 Introductory Probability and Applied Statistics |

Consult the WKU Undergraduate Catalog and ICAP for the WKU Undergraduate Catalog for current policies concerning the foreign language course.

### BACHELOR OF SCIENCE IN MINING ENGINEERING

Mining engineering requires the broadest knowledge of sciences and other fields of engineering in its practice after graduation. The curriculum below prepares the student for a career in the field of mining.

The program educational objectives of the undergraduate program in mining engineering take into consideration the university mission and the constituents’ needs by producing graduates who, in their first few years after graduation, will be able to:

- Advance in their careers, adapting to new situations and emerging problems, through the application of general purpose engineering skills and the core technical disciplines, analytical procedures, and design practices of the mining engineering profession.
- Function ethically in a variety of professional roles such as mine planner, designer, production manager, mineral processing engineer, consultant, technical support representative and regulatory specialist.
- Pursue advanced degrees in mineral-related fields and also those fields that support the mineral industries such as business and law.
- Utilize professional skills such as effective communication, teamwork, and leadership.
- Demonstrate an understanding of the critical role mining engineers play in society with respect to health, safety, and the envi-
Degree Requirements

Each student must complete the following:

UK Core Requirements

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

I. Intellectual Inquiry in Arts and Creativity
   EGR 101 Engineering Exploration I § Δ .................................. 1
   EGR 103 Engineering Exploration II § Δ .................................. 2
   or
   MNG 592 Mine Design Project II ........................................... 3

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

III. Intellectual Inquiry in the Social Sciences
   Choose one course from approved list .................................... 3

IV. Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences
   PHY 231 General University Physics ..................................... 4
   and
   PHY 241 General University Physics Laboratory ..................... 5
   or
   CHE 105 General College Chemistry I
   and
   CHE 111 General Chemistry I Laboratory ............................ 5

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

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

VII. Quantitative Foundations
   MA 113 Calculus I .......................................................... 4

VIII. Statistical Inferential Reasoning
   MNG 335 Introduction to Mine Systems Analysis ..................... 3

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

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

UK Core hours ................................................................. 33

Graduation Composition and Communication Requirement (GCCR)

MNG 371 Professional Development of Mining Engineers .......... 3

Graduation Composition and Communication Requirement hours (GCCR) ........................................... 3

Premajor Requirements

   CHE 105 General College Chemistry I .................................. 4
   CIS/WRD 110 Composition and Communication I ..................... 3
   CIS/WRD 111 Composition and Communication II ..................... 3
   MA 113 Calculus I .......................................................... 4
   MA 114 Calculus II .......................................................... 4
   MA 213 Calculus III .......................................................... 4
   MNG 201 Mining Engineering Fundamentals ......................... 3
   PHY 231 General University Physics ..................................... 4
   PHY 241 General University Physics Laboratory
   or
   CHE 111 General Chemistry I Laboratory † ............................ 5

PHYS 232 General University Physics ..................................... 4
   EES 220 Principles of Physical Geology ................................. 4
   EGR 101 Engineering Exploration I § Δ .................................. 1
   EGR 102 Fundamentals of Engineering Computing .................. 2
   EGR 103 Engineering Exploration II § Δ .................................. 2

   Subtotal: Premajor hours ................................................. 43

   Major Requirements

   MA 214 Calculus IV .......................................................... 3
   EES 230 Fundamentals of Geology I ..................................... 3
   EGR 221 Statics .............................................................. 4
   EM 302 Mechanics of Deformable Solids ............................... 3
   EM 313 Dynamics ............................................................ 4
   CE 341 Introduction to Fluid Mechanics ............................... 4
   MNG 211 Mine Surveying .................................................. 2
   MNG 291 Elements of Mine Design ..................................... 3
   MNG 301 Minerals Processing ............................................. 3
   MNG 303 Deformable Solids Laboratory ................................ 1
   MNG 311 Electrical Circuits and Mining Machinery .............. 3
   MNG 322 Mine Safety and Health Management and Processes ... 2
   MNG 331 Explosives and Blasting ...................................... 2
   MNG 332 Mine Plant Machinery ......................................... 2
   MNG 335 Introduction to Mine Systems Analysis ................. 3
   MNG 341 Mine Ventilation .............................................. 3
   MNG 351 Underground Mine Design ................................... 3
   MNG 371 Professional Development of Mining Engineers .......... 3
   MNG 435 Mine Systems Engineering and Economics .............. 3
   MNG 463 Surface Mine Design .......................................... 3
   BAE 355/MNG 564 Environmental Control System Design and Reclamation .................................................. 3
   MNG 551 Rock Mechanics .................................................. 4
   MNG 591 Mine Design Project I ......................................... 1
   MNG 592 Mine Design Project II ....................................... 3

   Subtotal: Major hours ...................................................... 67

   Electives

   Total Hours: ................................................................. 128

Curriculum

Freshman Year

First Semester

   CHE 105 General College Chemistry I .................................. 4
   CIS/WRD 110 Composition and Communication I ..................... 3
   EGR 101 Engineering Exploration I § Δ .................................. 1
   EGR 102 Fundamentals of Engineering Computing .................. 2
   MA 113 Calculus I .......................................................... 4

Second Semester

   CIS/WRD 111 Composition and Communication II ................... 3
   EGR 103 Engineering Exploration II § Δ .................................. 2
   MA 114 Calculus II .......................................................... 4
   PHY 231 General University Physics ..................................... 4
   PHY 241 General University Physics Laboratory
   or
   CHE 111 General Chemistry I Laboratory † ............................ 5

   UK Core – Social Sciences .................................................. 3

Sophomore Year

   EES 220 Principles of Physical Geology ................................. 4
   EM 221 Statics .............................................................. 4
   MA 213 Calculus III .......................................................... 4
   MNG 201 Mining Engineering Fundamentals ......................... 3
   PHY 232 General University Physics ..................................... 4

Second Semester

   EES 230 Fundamentals of Geology I ..................................... 3
   EM 302 Mechanics of Deformable Solids ............................... 3
   MA 214 Calculus IV .......................................................... 3
   MNG 291 Elements of Mine Design ..................................... 3
   MNG 303 Deformable Solids Laboratory ................................ 1
   MNG 322 Mine Safety and Health Management and Processes ... 2
   MNG 331 Explosives and Blasting ...................................... 2

Junior Year

First Semester

   EES 313 Dynamics ............................................................ 3
   MNG 211 Mine Surveying .................................................. 2
   MNG 301 Minerals Processing ............................................. 3
   MNG 335 Introduction to Mine Systems Analysis† ................ 3
   MNG 463 Surface Mine Design .......................................... 3
   UK Core – Humanities ...................................................... 3

Second Semester

   CE 341 Introduction to Fluid Mechanics ............................... 4
   MNG 311 Electrical Circuits and Mining Machinery .............. 3
   MNG 371 Professional Development of Mining Engineers*** .... 3
   MNG 435 Mine Systems Engineering and Economics .............. 3
   MNG 551 Rock Mechanics .................................................. 4

Senior Year

First Semester

   MNG 332 Mine Plant Machinery .......................................... 3
   MNG 341 Mine Ventilation .................................................. 3
   MNG 351 Underground Mine Design ................................... 3
   MNG 591 Mine Design Project I ......................................... 1
   UK Core – Citizenship · USA .............................................. 3

Second Semester

   BAE 355/MNG 564 Environmental Control System Design and Reclamation ............................................. 3
   MNG 592 Mine Design Project II (UK Core – Arts and Creativity) .................................................. 3
   Minerals Processing Technical Elective* ................................ 3
   Technical Elective** .......................................................... 3
   UK Core – Global Dynamics ................................................ 3

* Transfer students who declare a major will take EGR 215, Introduction to the Practice of Engineering for Transfer Students, in place of EGR 101 and EGR 103.

Δ Students must complete both EGR 101 and EGR 103 to fulfill the UK Core Arts and Creativity requirement. Transfer students may satisfy the UK Core Arts and Creativity requirement by taking EGR 215.

§ Students only required to take one lab. Consult with advisor.

*The Minerals Processing Technical Elective is to be chosen between MNG 357, Coal Preparation Design, and MNG 580, Mineral Processing Plant Design.

**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.

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

MNG 335 satisfies the Statistical Inferential Reasoning requirement in the UK Core.

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

   MNG 511 Mine Power System Design ................................ 3
   MNG 531 Advanced Blast Design and Technology ................ 3
   MNG 541 Computer Design of Mine Ventilation Systems ........ 3
   MNG 552 Ground Control Software and Analysis .................. 3
   MNG 561 Mine Construction Engineering I ......................... 3
   MNG 575 Coal Preparation Design ...................................... 3
   MNG 580 Mineral Processing Plant Design ......................... 3
   MNG 599 Topic in Mining Engineering ................................. 3