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## DEPARTMENT OF MECHANICAL ENGINEERING

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### 2021-2022 UNDERGRADUATE STUDENT HANDBOOK

08/24/2022

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## Welcome to the UK Department of Mechanical Engineering!

This handbook has been prepared to assist mechanical engineering undergraduate students plan a course of study and to keep track of their progress. It is intended to be used only as a supplement to the *University of Kentucky Bulletin*. The *UK Bulletin*, among other important information, contains statements of official academic policy regarding current courses, elective requirements, as well as pre-engineering and engineering standing requirements. The *UK Bulletin* is the authoritative source of information for all undergraduate students.

This handbook should be retained throughout the student's stay in the department, and it should be used in conjunction with priority registration conferences with the student's academic advisor each semester, as well as an aid in planning courses to be taken in upcoming semester(s).

Most of the courses in the mechanical engineering curriculum are required of all mechanical engineering students. However, there is a certain degree of flexibility provided by elective courses. The courses that offer the student a choice within certain limits are: (1) the UK Core curriculum, (2) the mathematics elective, (3) the supportive elective and (4) the mechanical engineering technical electives. Each area is discussed later in this handbook.

Please keep in mind that while intended to be a helpful resource to students, this handbook is not a substitute for meeting with an academic advisor in ME, nor a replacement for the information found in the *UK Bulletin*. The most updated

version of this handbook is available on the ME website. Students are encouraged to contact their ME advisor whenever they have a question about the program, the college, or the university.

In addition to making steady progress through the ME curriculum, students are encouraged to take advantage of opportunities for student involvement in pre-professional and engineering-related activities offered at the department, college, and university levels. Students should consider participating in those activities to further enrich their academic experience at UK.

The faculty and staff of the Department of Mechanical Engineering look forward to working with you while you pursue your goal of becoming a graduate of UK in mechanical engineering.

### **ADVISING INFORMATION FOR MECHANICAL ENGINEERING STUDENTS**

After ME students have completed their freshman year, academic advising becomes the responsibility of the mechanical engineering department. Each student is assigned to both an academic advisor and a faculty mentor, the names and email addresses of which are posted on a student's myUK account.

As ME majors, all students are welcome and encouraged to meet with departmental advisors and faculty mentors with questions/concerns regarding the program, the program requirements, opportunities for scholarships, research, and employment.

The *academic advisors* (located within the ME department office suite, 1<sup>st</sup> floor, RGAN) maintain the departmental

records for students, and monitor their progress through the program. They are available to discuss the choices and decisions students may face as they work toward the successful completion of the ME degree. Advisors provide guidance and referral to other resources and services within the department, college, and university. Departmental advisors also provide accurate and timely information regarding academic policies, procedures, and requirements.

*Faculty mentors* provide additional value and insight to the advising process for ME students. In addition to their academic expertise, the ME faculty is aware of current issues and trends in ME that can be helpful to students' career development. Students may meet with their faculty advisor to discuss particular classes, research opportunities, certifications, career planning, and graduate studies.

## Communication

In addition to meetings with an advisor, students can receive relevant information about academic and non-academic topics through the *ME undergraduate listserv*. These periodic emails are meant to contain meaningful and timely information for the benefit of ME students.

Likewise, advisors welcome emails from students who have a quick question or need clarification on an issue. In some cases, advisors may invite the student for an in-person meeting in order to have a full discussion regarding a particular issue. It is the responsibility of ME students to read **all** ME emails and to stay current with department information.

*[Note: The university requires all students use their official UK email account when contacting faculty and staff.]*

## Priority Registration Advising

During the fall semester, advising for priority registration for the upcoming spring term begins in late September or early October. During the spring semester, advising for the summer / fall terms begins prior to spring break (usually in late February or early March). Timely emails are sent to the ME undergraduate listserv announcing the approaching registration period and the procedures that are to be followed.

All students are required to meet with their departmental advisor prior to being eligible to register for the next semester. Any instructions for making advising appointments during this time will be provided to students prior to the start of priority registration appointments

To prepare for priority registration advising, students are required to use the Course Planner feature of their myUK/myGPS account to plan the next semester of courses. It is recommended that courses be planned in conjunction with the Degree Audit feature (myGPS) of myUK. Prerequisites can be verified either via course descriptions in the *UK Bulletin* or in the Course Catalog.

After the advising meeting and formulating an agreed upon plan for the upcoming semester's courses, the advisor will remove the "advising hold," and the student will register via myUK during a university-determined registration window. Except for extenuating circumstances, students must meet in-person with their academic advisor before the advising hold will be lifted.

*[Note: While registration advising occurs once each term, students are encouraged to visit / contact their advisor at any time during the semester.]*

## THE UK CORE CURRICULUM

The UK Core curriculum is separated into ten areas of study (see below). Mechanical engineering students satisfy some of the UK Core curriculum requirements in conjunction with their major requirements. Typically, a student may satisfy the remaining UK Core requirements with the completion of eight courses outside the mechanical engineering curriculum. (This is the case only if the student completed two years of the same foreign language in a secondary school. See below.)

For mechanical engineering students, the UK Core requirements are to be completed in the following manner:

**Intellectual Inquiry** – One course in each of the following areas:

- *Arts & Creativity* – Fulfilled by program requirement of EGR 101, EGR 102, and EGR 103. (Transfer students will use EGR 215 in lieu of EGR 101 and EGR 103.)
- *Humanities* – Fulfilled by taking one course from UK Core offerings.
- *Social Sciences* – Fulfilled by taking one course from UK Core offerings.
- *Physical and Mathematical Sciences* – Fulfilled by program requirement of PHY 231 and 241

**Composition & Communication I and II Sequence –**

- WRD/CIS 110 and WRD/CIS 111 or
- WRD/CIS 112

**Quantitative Reasoning** – One course in each of the following areas:

- *Quantitative Foundations* – Fulfilled by program requirement of MA 113/193

- *Statistical Inferential Reasoning* – Fulfilled by taking STA 210, STA 296 or STA 381

**Community, Culture and Citizenship in the USA** – Fulfilled by taking one course from UK Core offerings.

**Global Dynamics** – Fulfilled by taking one course from UK Core offerings.

**Foreign Language** – Fulfilled by two college semesters of the same foreign language **or** two years of the same foreign language in a secondary school. (Submit a high school transcript to UK Admissions if one is not on file already.)

In addition to the UK Core, students must fulfill the university's **Graduation Composition & Communication Requirement (GCCR)**. ME majors accomplish this by taking WRD 204 (Technical Writing).

## MECHANICAL ENGINEERING MAJOR PRE-REQUISITES

The mechanical engineering curriculum (see page 12) is organized by courses recommended taken in a particular semester. Many courses are pre or co-requisites for other courses, and it is important that these courses be taken during the proper semester of study. **A delay in taking or passing a pre or co-requisite course may result in a delay of the student's graduation.**

Students who are "off-schedule" may find that the number of semesters required to complete this program will be determined not by the number of courses needed, but the sequence in which the

courses must be taken. Be sure to ask your advisor before dropping any courses, as well, since that may also affect the student's eligibility to take upcoming courses.

Students are allowed to take EM and ME classes three times, including withdrawals. Students wishing to take an EM or ME class for a fourth time must obtain written permission from the Director of Undergraduate Studies.

*[Note: Pre and co-requisites are enforced rigidly, regardless of the student's major.]*

## **REQUIREMENTS FOR ENGINEERING STANDING**

To earn engineering standing and be eligible to take upper-division classes, mechanical engineering students must have completed at least 35 semester credit hours applicable to the degree program with a minimum cumulative UK GPA of 2.50. In addition, completion of EGR 101, EGR 102, and EGR 103 (or EGR 215 instead of EGR 101 and EGR 103 if a transfer student), WRD/CIS 111 or WRD/CIS 112 (or ENG 102) CHE 105, MA 113, MA 114, MA 213, PHY 231/241, PHY 232/242, and EM 221 with a minimum GPA of 2.50 in these courses averaged, as well as a C or better earned for each of these courses.

Students can retake the classes used for the *pre-ME GPA* of the courses listed above up to three times, and the highest of those three attempts will be used to calculate the *pre-ME GPA*. Any request for exceptions to these requirements should be submitted to the ME Director of Undergraduate Studies.

To improve their *cumulative GPA*, students may retake up to three classes and exercise an official University of Kentucky repeat option, in which the first grade is replaced by the second.

## **Note to Transfer Students:**

Additionally, it is important to note if you receive acceptance of transfer credit for one or more of the above listed courses, the grades earned will be used in the calculation of the pre-ME GPA necessary for engineering standing.

## **GUIDED ELECTIVE**

Students can choose from a variety of courses to fulfill the guided elective, including

CHE 107 – General College Chemistry II  
CS 115 – Intro to Computer Programming  
CS 215 – Intro to Program Design Abstraction/Problem Solving  
ME 501 – Mechanical Design with Finite Element Methods  
ME 590 – Applied CFD and Numerical Heat Transfer

Note: If a class is being used to fulfill the guided elective, it cannot also be used to complete another program requirement. Consult your academic advisor for more information.

## **MATHEMATICS ELECTIVE**

The mathematics elective is selected from the following options:

STA 381 – Intro to Engineering Stats  
MA/STA 320 – Intro Probability  
MA/CS 321 – Intro to Numerical Methods  
MA 322 – Matrix Algebra

\*MA 416G – Principles of Operations Research I  
\*MA 432G – Methods of Applied Mathematics I  
\*MA 481G – Differential Equations I  
EGR 537 – Numerical Analysis  
ME 585 – Fourier Series & Boundary Value Problems

\*These courses are particularly appropriate for students considering graduate study.

### **TECHNICAL ELECTIVE REQUIREMENTS**

Students must take nine credit hours (3 courses) from the approved list to complete the technical elective requirement. A minimum of six credit hours (two courses) must have an ME prefix or be cross-listed as an ME course. A maximum of three credit hours (one course) may be chosen from the courses listed from another UK engineering department.

*[Note: A list of approved ME and non-ME technical electives is provided as an attachment at the end of this document.]*

For a student to receive permission to take a course not on the either of the approved lists, the student will submit a petition -- with justification included -- to the DUS for an exception, which will then be reviewed on a case-by-case basis.

Technical electives are generally taught during a fall-only or spring-only basis and may not be offered every year. Insufficient student enrollment also may result in a course not being offered.

### **GRADUATION REQUIREMENTS**

To be eligible for the award of any degree, a student must have completed all requirements as approved by the University Senate. **Curriculum requirements must include, in addition to specified credits, specified grade-point averages – cumulative, pre-major/major, and engineering major – which may in no case be less than a 2.0 GPA.** (See the *UK Bulletin* for specific classes used for the major GPA.)

The graduating student must file an application for graduation, via a link on myUK or otherwise directed, by the published deadline. The last day to submit the Application for Degree is provided in the official University of Kentucky Calendar.

### **REPEATED REGISTRATION IN A COURSE**

ME policy allows students to take ME and EM classes at UK a maximum of three times, including times when a student receives a "W" for withdrawing from the class. However, unless an official university repeat option is filed, only the first attempt will count toward a student's cumulative GPA. (The University allows students a maximum of three repeat options for their undergraduate career.)

Please keep in mind that repeated attempts yielding low grades will negatively affect a student's GPA and may create problems with earning engineering standing, maintaining scholarships, avoiding probation/suspension, etc.

Be sure to talk to your advisor about any need or plans to repeat a course. Also, when considering whether or not to repeat a course, be sure to review both

the University's and the college's policies on filing repeat options.

### **ACADEMIC BANKRUPTCY** **(Readmission after Two or More Years away from UK)**

The dean of the student's college may permit a readmitted student who has elected not to count past work to receive credit for selected courses without including those grades in the computation of the student's cumulative GPA. This is called academic bankruptcy. Part-time, as well as full-time students can take advantage of the academic bankruptcy rule. Students need not have been originally suspended from the University to qualify for this option. Check with your academic advisor about the qualifications for applying for academic bankruptcy.

#### **How Academic Bankruptcy is applied to ME:**

For ME engineering standing, previous grades earned for any of the ME engineering standing courses that have been bankrupted will be used towards the calculation of standing. When courses have been repeated, the best earned grade will be used to calculate the GPA for standing, even if they have been removed from the student's cumulative GPA.

### **PLAGIARISM**

Be sure you understand the expectations of the university regarding cheating and plagiarism. Do not assume that a team effort is allowed unless it is clearly indicated in the assignment. A team effort should be indicated clearly in

the work submitted, as well. For a discussion of the overall issue and guidelines, refer to the website for the Ombud of the University of Kentucky. Uploading any assignments from Chegg, copying from Chegg, or accessing information from Chegg (or any similar online answer source) is considered cheating and plagiarism and may result in at least a one letter grade drop or an E grade for the class.

### **SPECIAL EXAMINATIONS and BYPASS EXAMS**

The chair of the mechanical engineering department approves / denies requests by students to take special examinations or bypass exams.

No special or bypass exam will be approved for courses with laboratory content, group projects, presentations, or design content offered through the mechanical engineering department.

To request a special or bypass exam, begin by checking with the appropriate department or faculty member to determine if a special exam is available, then go to the Registrar's Office (Room 10 Funkhouser Building) and request an "Application for Special Examination" form. Complete the top portion of the form and take the form to your academic advisor for further instructions.

### **PERMISSION TO RECEIVE CREDIT FROM ANOTHER INSTITUTION** **(Transfer credit)**

Transferring engineering courses to UK is possible, but certain restrictions apply. Engineering courses must be taken from an ABET-accredited program and with the approval of the Director of Undergraduate Studies or from the UK

Transfer Equivalency Office.

*Permission to receive credit from another institution must be requested and approved prior to taking the intended course. Ask your advisor for the proper form and additional information.*

Depending on the course and the institution, approval or conditional approval will be granted for either a course equivalency or bypass examination eligibility (see earlier section). It is advised that students collect and save the course syllabus, graded homework and papers, and copies of exams for possible review / evaluation.

Credit hours earned will transfer to UK, although the grade will only be used for calculating engineering standing eligibility. Grades will not be used in calculating the UK cumulative GPA, the pre-major/major, or the engineering major GPAs for graduation purposes.

Once the course is completed, you must have that institution send an official transcript to UK so the credit may be applied to your UK record. This should be done as soon as the final grade is posted by the transfer school.

Transferred courses must be completed, and credit transferred to UK prior to beginning any classes for which the transferred course is a pre- or co-requisite. Be sure to check with your academic advisor to determine if the course you plan on taking fits these criteria. Send the official transcript or course information to the UK Office of Undergraduate Admission.

## **PROFESSIONAL ENGINEER FUNDAMENTALS EXAM (FE EXAM)**

Students often inquire about why they should take the FE exam, since it is not required for graduation. Students may find that many employers place a premium on licensure and reward it with higher pay; others may require it for more senior-level positions. Some types of engineering work require a Professional Engineers License which can only be obtained after successfully completing the FE exam and four years of engineering work experience beyond a bachelor's from an (EAC/ABET) accredited institution.

Students will register for the FE exam on the National Council of Examiners for Engineering and Surveying website (<http://ncees.org>). For more information, go to the Kentucky State Board of Licensure for Professional Engineers and Land Surveyors at: <http://kyboels.ky.gov/>. The website provides information on the application process for the FE exam.

Students will also take the FE at the Pearson VUE Testing Center in Lexington, as well as at Pearson VUE testing centers in other cities in Kentucky. Students may register for the tests at any time throughout the year through the NCEES website.

## **COOPERATIVE EDUCATION**

Through co-operative education, students obtain transferable skills, such as communication, leadership, presentation, teamwork, and social skills. Students get a glimpse of "real life" as an engineer and have the opportunity to be mentored and be introduced to a professional engineering, business or research environment.

Most co-op employers request students to work for a total of three, full-time rotations (semesters and summers), alternating with regular semesters of study on campus. Many of UK's co-op graduates receive job offers even before receiving their diplomas.

Employers inside and outside of Kentucky participate in this program, and routinely recruit co-op students from UK.

Check with the Director of Engineering Cooperative Education for details.

### **EDUCATION ABROAD**

The ME department collaborates with the Education Abroad office in order to confirm *pre-departure approval of course equivalencies and course bypass examination eligibility*. Meet with your advisor early in the planning process in order to discuss the proper procedure.

*[Note: Arranging a study abroad experience is a lengthy process, so be sure to allow several months prior to the student's planned departure for this process to be completed.*

### **THE UNIVERSITY SCHOLAR'S PROGRAM -- COMBINED MASTER'S / BACHELOR'S DEGREE PROGRAM**

The University Scholar's Program offers highly motivated undergraduates the opportunity and the challenge of integrating their undergraduate and graduate courses in a single continuous program culminating in both a baccalaureate and master's degree in mechanical engineering.

The University Scholar's Program provides students the opportunity to begin preliminary course and research work for the graduate degree under the direction of a faculty advisor during their senior year.

Other opportunities for similar combined degrees are available in Biomedical Engineering and Manufacturing Systems. For further information on these programs, check with your advisor.

### **AEROSPACE CERTIFICATE**

The aerospace option in engineering certificate program provides students with a formalized recognition of an emphasis in aerospace subjects as part of their undergraduate degree program.

At UK, as at most universities, the fundamental and applied courses necessary for a career in aerospace engineering are taught in various departments. The UK Aerospace Certificate option will provide students with multidisciplinary experience in aerospace systems and in aerospace specializations, preparing them to join the aerospace workforce.

### **POWER AND ENERGY INSTITUTE OF KENTUCKY (PEIK) CERTIFICATE**

The certification program at the PEIK is built on a series of foundational courses at the undergraduate level, supplemented with a broad array of more advanced elective courses related to power and energy.

These advanced courses will cover both conventional and emerging areas, including smart grid systems, distributed generation, system protection, energy

storage, solar power systems, biofuels, and others.

The undergraduate certificate program will mesh with the requirements for the various engineering majors, taking advantage of the fact that each major already has elective courses within their existing curriculum relevant to power and energy.

The structure of the certificate program will allow certification through electives requirements, with few if any additional courses beyond those required for the degree.

### **STUDENT LEAN CERTIFICATION COURSE**

The College of Engineering Lean Systems Program offers a unique, week- long non-academic certification course for UK undergraduate students. It accommodates student academic schedules by being offered during semester breaks, typically in the summer. Students do not receive any credit towards their degree but will receive a Lean Certification.

This fee-based course is designed to build students' basic knowledge of true lean principles and practices, plus the most important lean tools.

The program is an intensive five full days of hands-on instructional strategy, focused on the specially designed lean cylinder factory laboratory where regular, basic lean tools, standardization, collaborative problem solving, and continuous improvement are taught.

### **AUTOMOTIVE PRODUCTION ENGINEERING CERTIFICATE**

The Automotive Production Engineering Certificate (PEC) introduces students to automotive manufacturing core processes. Using a project-based learning approach, the program has a capstone design at its heart. Students attend lectures and are assigned work on the major topics of design. The project itself is the result of a proposal from industry, and engineering organization, or an extra-curricular student organization.

Through collaboration with major automotive OEMs, the course instructors will identify current engineering problems that best fit the scope of the PEC Program. Students are required to take two core courses plus two electives for a total of fifteen hours, as well as completing a senior project to earn the certificate.

### **UNDERGRADUATE PROGRAM EDUCATIONAL OBJECTIVES**

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:

- 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.

inclusive environment, establish goals, plan tasks, and meet objectives

6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

## **STUDENT OUTCOMES**

Our undergraduate students will attain:

- 1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- 2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- 3) an ability to communicate effectively with a range of audiences
- 4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- 5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and

7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The University of Kentucky Mechanical Engineering undergraduate program is accredited by the Engineering Accreditation Commission of ABET. For more information on ABET visit [www.abet.org](http://www.abet.org).

Name: \_\_\_\_\_  
(Last, First, Middle)

UK ID #: \_\_\_\_\_  
Degree #1: **BS** Major(s): **ME** Bulletin: **2022-23**  
Advisor: \_\_\_\_\_  
Degree #2: \_\_\_\_\_ Major(s): \_\_\_\_\_  
Faculty Mentor: \_\_\_\_\_ Degree #3: \_\_\_\_\_ Major(s): \_\_\_\_\_  
Dept. Entry Date: \_\_\_\_\_ Sheet Last Updated: \_\_\_\_\_

Course	CR	Term(s)	Grade(s)					Notes
			1	2	3	Best	RO?	

#### UK CORE - GENERAL EDUCATION

Foreign Language (Two Semesters or High School)									
Intellectual Inquiry - Arts and Creativity									
EGR 101		1							
EGR 215~		3							
EGR 103		2							
ME 411		3							
Intellectual Inquiry - Humanities									
		3							
Intellectual Inquiry - Social Sciences									
		3							
Statistical Inferential Reasoning									
		3							
Citizenship - USA									
		3							
Citizenship - Global Dynamics									
		3							
GCCR									
WRD 204		3							
Additional Courses									

Course	CR	Term(s)	Grade(s)					Notes
			1	2	3	Best	RO?	

#### FRESHMAN YEAR

First Semester										Second Semester									
MA 113*			4							CHE 105*			4						
PHY 231*			4							MA 114*			4						
PHY 241*			1							CIS/WRD 111*			3						
EGR 101*			1							EGR 103*			2						
EGR 215~			3																
EGR 102*			2																
CIS/WRD 110			3																

#### SOPHOMORE YEAR

First Semester										Second Semester									
MA 213*			4							ME 220			3						
PHY 232*			4							ME 251			3						
PHY 242*			1							EM 313			3						
EM 221*			3							MA 214			3						
ME 205			3							GUIDED EL:			3						

#### JUNIOR YEAR

First Semester										Second Semester									
EM 302			3							ME 310			3						
ME 330			3							ME 321			3						
ME 340			3							ME 325			3						
EE 305			3							ME 344			3						
WRD 204			3							MATH EL:			3						

#### SENIOR YEAR

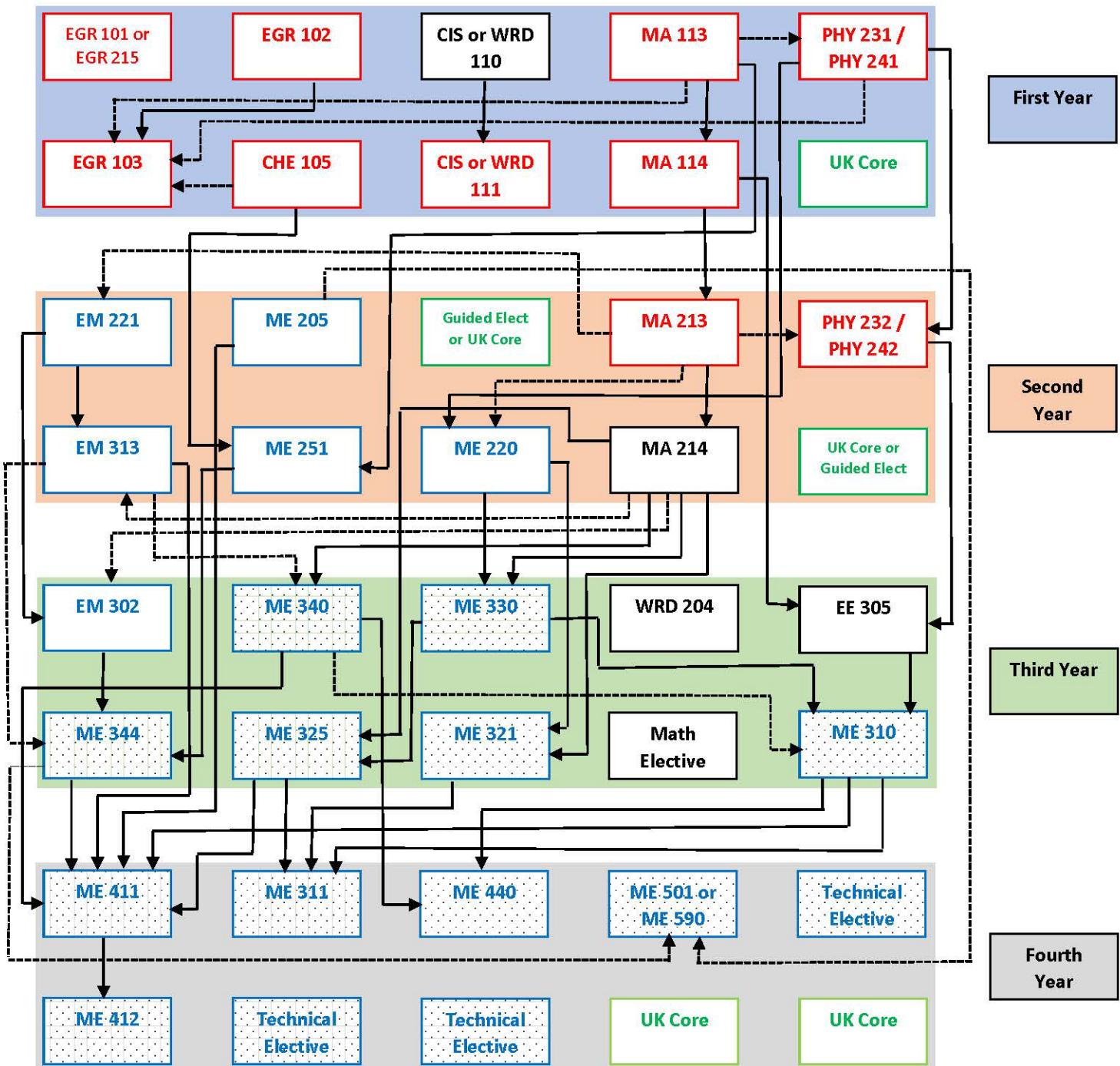
First Semester										Second Semester									
ME 411			3							ME 412			3						
ME 311			3							TECH EL:			3						
ME 440			3							TECH EL:			3						
ME 501/ME 590			3																
TECH EL:			3																

Additional Notes									

Department Notes/Considerations									

Engineering Standing Date: \_\_\_\_\_  
Engineering Standing GPA: \_\_\_\_\_  
Cumulative GPA at ES Date: \_\_\_\_\_  
Cumulative Hours: 0  
Graduation Date: \_\_\_\_\_  
Graduation GPA: \_\_\_\_\_  
Graduation Honors: \_\_\_\_\_

Key: \* - Course Must Be Completed with a C or Better Grade; ~ - Course for Transfer Students Only; AP - AP Credit; CLEP - CLEP Exam; ES - Engineering Standing; GETA - KY General Education Transfer Agreement; IP - Course in Progress; RO - Repeat Option; T - Transfer Credit; USP - University Scholars Program



Mechanical Engineering Program Flow Chart

**List of Approved ME Technical Electives**  
(Offered by ME Department or cross-listed as ME classes)

A minimum of six credit hours (two courses) must have an ME prefix or be cross-listed as an ME course.

ME 380 Topics in ME  
ME 395 Independent Work in ME  
ME 416 Automotive Painting Technology  
ME 417 Sheet Metal Forming  
ME 418 Automotive Assembly and Quality Control  
ME 501 Mechanical Design with Finite Elements Methods  
ME/MFS 503 Lean Manufacturing  
ME/MFS 505 Modeling of Manufacturing  
ME/MSE 506 Mechanics of Comp. Materials  
ME/MFS 507 Design for Manufacturing  
ME 510 Vibro-Acoustic Design  
ME/MFS 511 Machining of Materials and Applications  
ME/MFS 512 Manufacturing Systems  
ME/MFS 513 Mechanical Vibrations  
ME 514 Comp Tech in Systems  
ME/MFS 515 Rotordynamics of Turbomachinery  
ME 516 Systems Engineering  
ME/MFS/EE 526 Lean Operations Management  
ME/MA 527 Applied Math in Natural Sciences I  
ME 530 Gas Dynamics  
ME 531 Fluid Dynamics I  
ME 532 Adv. Strength of Materials  
ME 542 Kinematic Synthesis of Mechanisms  
ME 548 Aerodynamics of Turbomachinery  
ME 549 Power Generation  
ME/MFS/CME/MSE 554 Chemical and Physical Processing of Polymer Systems  
ME/EE/MSE 555 Intro to Micro/Nano Elect Systems  
ME/MFS/CME/MSE 556 Intro. to Composite Materials  
ME 560 Engineering Optics (same as EE 566)  
ME 563 Basic Combustion Phenomena  
ME 565 Scale Modeling in Engineering  
ME/EE/MSE 570 Fundamentals of Nanoelectronic Devices and Materials  
ME/BAE 580 Heating, Ventilating & Air Conditioning  
ME/EE/BAE/EGR/MFS 583 Industrial Energy Utilization and Assessment  
ME 585 Fourier Series & Boundary Value Problems  
ME 590 Applied CFD and Numerical Heat Transfer  
ME 599 Topics in ME

(List of approved non-ME technical electives continued next page.)

## **List of Approved Non-ME Technical Electives**

(From other College Departments)

A maximum of three credit hours (one course) may be chosen from the courses listed below:

BAE 502 Modeling of Bio Systems

BAE 515 Fluid Power Systems

BAE 516 Control of Off-Road Vehicles

BME 440 Introduction to Biomedical Signal Processing

BME 472 Human Biomechanics

BME 473 Fundamentals of Biofluid Mechanics

BME 488 Introduction to Biomaterials

BME 532 Modeling of Physiological Systems

BME 540 Biomedical Instrumentation

BME 550 Introduction to Biomedical Imaging

BME 571 Mechanical Modeling of Human Motion

BME 573 Cell Mechanics and Mechanobiology

BME 579 Neural Engineering: Merging Engineering with Neuroscience

EGR 523 Concepts, Assessment Tools and Methods in Sustainable Power and Energy

EGR 537 Numerical Analysis

EGR 540 Power Economics and Public Policy

EGR 542 Electric Power Generation Technologies

EGR 546 Electric Power System Fundamentals

EGR/CME/MFS 523 Concepts, Tools, Methods

EGR 553 Environmental Consequences of Energy Production

MFS 509 Leadership for a Lean Enterprise

MFS/MNG 520 Industrial Automation and Control

MFS 525 Organizational Learning for Lean Manufacturing

MFS 581 Quality Control

MFS 599 Topics in Manufacturing Systems Engineering

MSE 201 Material Science

MSE/CME 552 Automotive Plastics

**NOTE:** For any courses not on the either of the approved lists, a student will submit a petition -- including justification -- to the DUS for an exception, which will be reviewed on a case-by-case basis.