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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 the priority registration conference with the student’s academic and/or faculty advisor each semester, as well as an aide in planning courses to be taken in the 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 supportive elective, (3) the mathematics 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 advisors 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.
ACADEMIC ADVISING

Why have an Academic Advisor?

Professional academic advisors:
- Assist students in taking responsibility for developing meaningful education plans compatible with their potential and their career and life goals
- Help students formulate important questions about the nature and direction of their education and to assist them in finding answers to those questions
- Assist students in acquiring accurate and timely information regarding academic policies, procedures, and requirements
- Facilitate the successful transition of prospective, continuing, and nontraditional students to the academic and campus environment.

Mechanical Engineering Academic Advising Mission Statement

Consistent with the mission of the University of Kentucky, academic advising in the Department of Mechanical Engineering is committed to engaging students in intentional, collaborative, supportive, and meaningful partnerships. Grounded in teaching and learning, academic advising will assist students in achieving their personal, educational, and career goals, in addition to becoming self-directed, life-long learners.

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 advisor, the names and email addresses of which are posted on the student’s myUK account.

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

The academic advisors (located within the ME department office, 1st floor, RGAN) maintain the departmental records for each student and monitor their progress, as well as being available to discuss all the choices and decisions students may face as they work toward the successful completion of the ME degree. Advisors also provide guidance and referral to other resources and services within the department, college, and university.

Faculty advisors 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 a particular class, research opportunities, certifications, career planning, and graduate studies.
In addition to meetings with an advisor, advising and academic related announcements are made available through the ME Undergraduate list serve. 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 office 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.

Each Semester, Priority Registration Advising

[Note: While the primary emphasis on advising is during the Priority Registration period, students are encouraged and welcome to visit their advisor at any time during the semester.]

During the fall semester, advising for Priority Registration for the upcoming Spring term begins around October 1st. During the spring semester, advising for the following Fall term begins prior to Spring Break (usually in mid-March). Timely emails are sent to the ME Undergraduate list serve announcing the approaching registration period and the procedures that are to be followed.

All students are required to meet with their advisor prior to being eligible to register for the next semester. Advising appointments can be scheduled via “myappointments” available on myUK, unless otherwise directed.

To prepare for Priority Registration advising, students will complete an advising worksheet (sent to students via email) prior to meeting with their assigned academic advisor. Students may use other scheduling-related resources available on their myUK account to prepare for advising. Course prerequisites can be verified either via course descriptions in the UK Bulletin or the Course Catalog.

After the advising meeting and 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 their pre-determined registration window. Except for extenuating circumstances, students must meet in-person with their academic advisor before the advising hold will be lifted.
For new students beginning Fall 2014 and afterward

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

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* Indicates course also counts as a UK Core course

** Indicates course to be selected from appropriate list

° Indicates core course counting toward Engineering Standing
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.)

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 ME 411
- 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 & 241

Composition and Communication I and II Sequence –
- WRD/CIS 110
- WRD/CIS 111

Quantitative Reasoning – One course in each of the following areas:
- Quantitative Foundations – Fulfilled by program requirement of MA 113
- Statistical Inferential Reasoning – Fulfilled by taking either STA 210 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 – two semesters of the same foreign language or two years of the same foreign language in a secondary school. Submit high school transcript to UK Admissions if it does not have one on file already.

MECHANICAL ENGINEERING MAJOR PRE-REQUISITES

The mechanical engineering curriculum is organized by semester course load in the recommended semester. Certain courses are pre-requisites for other courses. Please note: It is extremely important that the pre-requisite course(s) be taken during the proper semester of study. A delay in taking a pre-requisite course may result in a delay of the student’s graduation.

The student who takes the courses in the order listed on the attached curriculum sheet is more likely to complete the program in an efficient and timely manner. The student who is “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. Note: Pre-requisites will be enforced rigidly, regardless of the student’s major.

REQUIREMENTS FOR ENGINEERING STANDING

To earn engineering standing, mechanical engineering students must
have completed at least 35 semester credit hours applicable to the degree program with a minimum cumulative GPA of 2.50. In addition, completion of ME 101, WRD/CIS 110, WRD/CIS 111 (or ENG 101 and ENG 102, or ENG 104), CHE 105, MA 113, MA 114, MA 213, PHY 231, PHY 241 with a minimum GPA of 2.50 in these courses.

While a student may exercise up to three official University of Kentucky Repeat Options to improve his/her cumulative grade point average, only one can be used for the subset of classes listed above for the purpose of calculating engineering standing. Written request for exception to the allowed number of repeats should be submitted to the ME Director of Undergraduate Studies.

**Note to Transfer Students:** Transfer students who have received more than 35 hours transfer credit in the degree program will be considered without the inclusion of ME 101. (In place of ME 101, transfer students will take a fourth technical elective.) Additionally, it is important to note if you receive acceptance of transfer credit for one of the above listed courses, the grades will be used in the calculation of the requisite GPAs necessary for engineering.

**In no case** will an exception be made to the minimum acceptable grade point averages listed above.

UK’s GPA calculator: www.uky.edu/Registrar/GPACalc.htm

**SUPPORTIVE ELECTIVE**

The supportive elective course can be any course that carries college credit and is not a more elementary version of a required course. For example, College Algebra would not be acceptable as it is more elementary than the required Calculus courses. However, a course in the Human Environmental Sciences would be satisfactory because there HES courses are required for ME. It is important to note that this is the only course in the Mechanical Engineering curriculum that may be taken on a pass/fail grade option.

**MATHEMATICS ELECTIVE**

The mathematics elective, scheduled for the second semester of the junior year, must meet two criteria:

1. It must be a course offered by the Department of Mathematics or by the Department of Statistics, and
2. It must not be a course that repeats subject matter already taken in a required course, and it must be of a general level equal to or higher than that for the ME required courses in Mathematics.

[NOTE: Courses such as ECO 391 (Economic and Business Statistics) and STA 291 (Statistical Methods) are NOT acceptable as they are remedial in comparison to the required mathematics courses.]

Courses frequently taken to complete the mathematics elective include:

- STA 381 – Intro to Engr Stats
- MA/STA 320 – Intro Probability
- MA 321 – Intro to Numerical Methods
- MA 322 – Matrix Algebra (required for a minor in mathematics)
- *MA 432G – Methods of Applied Mathematics I
- *MA 481G – Differential Equations I

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

**APPROVED ME TECHNICAL ELECTIVES**

The following is a list of approved technical electives. TEs are taught on a fall/spring-only basis and may not be offered every year. Insufficient student enrollment may result in a course not being offered.

ME 380  Topics in ME
ME 395  Independent Work in ME
ME 503  Lean Manufacturing
ME 505  Modeling of Manufacturing
ME 506  Mechanics of Comp. Mat.
ME 507  Design for Manufacturing
ME 510  Vibro-Acoustic Des
ME 512  Manufacturing Systems
ME 513  Mechanical Vibrations
ME 527  Applied Math in Nat Sci I
ME 530  Gas Dynamics
ME 531  Fluid Dynamics I
ME 532  Adv. Strength of Materials
ME 548  Aerodyn of Turbomachinery
ME 549  Power Generation
ME 556  Intro. to Composite Mat.
ME 560  Engineering Optics
ME 563  Basic Combustion Phenom
ME 565  Scale Modeling in Engr.
ME 580  Heating, Ventilating & AC
ME 599  Topics in ME
MFS 599  Topics in Manufacturing
EGR 599  Topics in Engineering
MSE 201  Material Science
BAE 502  Modeling of Bio Systems
BME 501  Foundations of BME BME
530  Biomed Instrumentation

In addition to the above list, students may choose to take one course offered by the College of Engineering which is 500-level or above to satisfy one of the three required technical electives.

**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, a specified grade-point average, both overall and in the student’s major (all ME and EM classes), which may in no case be less than a 2.0 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 and in the Schedule of Classes.

**REPEATED REGISTRATION IN A COURSE**

Previously, students were allowed to take ME and EM classes for a grade only twice, after which any further attempts to pass the class would have to be made at another institution. However, beginning in Spring 2013, ME policy has changed, and students may now take ME and EM classes at UK more than two times for a grade. (“W”s do not count toward attempts.)

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

Be sure to talk to your advisor about any need and/or plans to repeat a course. Also, when considering whether or not to repeat a course, be sure to consider both
the University’s and the department’s policies on filing repeat options.

**ACADEMIC BANKRUPTCY**

**Readmission after Two or More Years** *(from the UK Bulletin)*

Undergraduate students who have been readmitted through the usual channels after an interruption of two or more continuous years, and who have completed at least one semester or 12 hours with a GPA of 2.0 or better, beginning with the semester of readmission, may choose to have none of their previous University course work counted toward graduation and in the computation of their GPAs. Enrollment for a semester, when terminated by a withdrawal before completion of the semester (grades all Ws), in the two years preceding readmission is not an interruption. Under this circumstance, a student cannot invoke the academic bankruptcy rule.

In addition, the dean of the student’s college may permit such 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 GPA (cumulate or otherwise). 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.

If a student has completed a degree and re-enrolls, he/she may not apply the academic bankruptcy rule to courses taken for the degree already completed. *The Academic Bankruptcy option may be used only once.*

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

For ME Engineering Standing, previous grades earned for any of the ME standing courses that have been bankrupted will be used towards the calculation of standing. In the case of the course being repeated, the average of all attempts will be used to calculate the GPA for standing.

**PLAGIARISM**

A note to all students -- be sure you understand the expectations of the university in regard to 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 submission. For a discussion of the overall issue and guidelines, refer to the document on the website of the Ombud of the University of Kentucky *(http://www.uky.edu/Ombud/Plagiarism.pdf)*. The Ombud’s web site also includes a link to a Prentice Hall Companion web article, “Understanding Plagiarism.”

**SPECIAL EXAMS**

Any full-time or part-time student enrolled in the University, and in good academic standing, may request a special examination for credit in any course offered in the university system, regardless of whether the student has
audited the course, is currently enrolled in it, or has studied for it independently.

Approval of requests from undergraduate students rests with the department chair. The chair of the mechanical engineering department approves/denies request for Credit by Special Examinations as per the University Senate Rule 5.2.1.2.

It is the policy of the chair of mechanical engineering to approve/deny request based on the following:

- All special exams must be scheduled and taken prior to the “last day to drop a course without it appearing on the student’s transcript.” (This date appears in the official University Calendar.)
- No special exam will be approved for courses with laboratory content offered through the Mechanical Engineering Department (ME 310, ME 311, ME 411 and ME 412).
- No special exam will be approved in accordance with the department policy to enforce the University Senate Rule 4.3.3.

To request a special exam, begin by checking with the offering department and faculty that a special exam is available, then go to the Registrar’s Office (Room 10 Funkhouser Building) and request an “Application for Special Exam” 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)

[NOTE: Before enrolling at another institution, meet with your ME advisor to insure that the course will transfer and fulfill the intended UK degree requirement, for further details, procedures, and approval.]

Transferring engineering courses to UK is possible but certain restrictions apply. Due to ABET accreditation, all ME transfer credits (with the possible exception of EM 221, ME 220, EM 313 and EM 302) must be taken at an ABET-accredited institution. 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 granted for either a course equivalency or bypass examination (see page 8, “Special Exams”) eligibility. It is advised that students collect and save the course syllabus, graded homework and papers, and copies of exams for possible review/evaluation.

[Note on CS 221: Transfer students may transfer any structured programming language to fulfill the department’s programming requirement. Students already at UK must take CS 221 to fulfill the ME programming requirement.] Credit hours earned will transfer to UK, although the grade will only be used for calculating engineering standing and exit status. Grades will not be used in calculating University cumulative GPA.

Once you have completed the course, you must have that institution send an official transcript to UK (see address below) so that the credit may be applied to your UK record.

Send the official transcript or course information to:
PROFESSIONAL ENGINEER FUNDAMENTALS EXAM (FE EXAM)

Students often inquire about why they should take the FE exam if it is not required. 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.

Beginning January 2014, 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.

Also, beginning January 2014, 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. (Note: Another change in the FE exam process is that the KYBOELS no longer reimburses the exam fee for students who pass the FE on their first attempt.)

COOPERATIVE EDUCATION

One of the most common ways to fulfill the supportive elective, while gaining valuable work experience, is by participating in the Co-Op Program. For more information, contact Marsha Phillips, Engineering Cooperative Education Advisor (marsha.phillips@uky.edu).

EDUCATION ABROAD

The ME department collaborates with the Education Abroad office in order to assure 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.

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.

There are also opportunities for similar combined degrees in Biomedical Engineering and Manufacturing Systems.

For further information on these programs, check with your advisor.
SCHOLARS in ENGINEERING AND MANAGEMENT (SEAM) PROGRAM

SEAM is an Honors Program that integrates business fundamentals with the engineering curriculum. The program is designed to complement a student’s chosen engineering major, as well as provide an exceptional pool of unique talent to the college’s corporate partners.

Graduates of SEAM are more marketable to industries, as they enjoy exposure to best business practices, as well as visiting and hearing from successful industry representatives. Entrepreneurialism is a strong theme in the SEAM offerings.

SEAM graduates obtain a business background without an MBA. However, SEAM is a feeder program for the University of Kentucky BS/MBA. SEAM freshman have the opportunity to live in the Engineering Living and Learning Community.

POWER AND ENERGY INSTITUTE OF KENTUCKY (PEIK) CERTIFICATE

The certification program at the PEIK are 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: Once between the fall and spring semesters, and twice between the spring and fall semesters. 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.

It will be 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.

UNDERGRADUATE PROGRAM EDUCATIONAL OBJECTIVES

Present Educational Objectives -- Effective Fall 2010 (Approved by Faculty, April 21, 2010)

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. Our educational objectives are:

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.

**UNDERGRADUATE PROGRAM LEARNING OUTCOMES**

The Program Outcomes for Mechanical Engineering are given below along with a set of more specific program goals. These program outcomes are aligned with the ABET program outcomes a) through k).

**Outcome (a):** Our students will have the ability to apply knowledge of mathematics, physical science, and mechanical engineering.

**Goals:** Students will be able to understand and apply material concerning

1. Thermodynamic & Energy Systems
2. Heat Transfer
3. Fluid Mechanics
4. Engineering Statics
5. Engineering Solid Mechanics
6. Engineering Dynamics
7. Mechanical Systems and Controls
8. Design Representation
9. Mechanical Design
10. Finite Element Methods
11. Manufacturing
12. Statistics
13. Linear Algebra

**Outcome (b):** Our students will have the ability to design and conduct experiments, as well as to analyze and interpret data.

**Goals:** Students will be able to

1. Design and conduct experiments and analyze the results
2. Graphically depict relationships in experimental data
3. Apply appropriate statistical methods in data analysis.

**Outcome (c):** Our students will have the ability to design a system, component, or process to meet desired needs within realistic constraints, including economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

**Goals:** Students will be able to

1. Design components, systems and processes in Mechanical Engineering with mechanical components
2. Design components, systems and processes in Mechanical Engineering with thermal design components.

**Outcome (d):** Our students will have the ability to function on multidisciplinary teams.

**Goal:** Students will be able to understand and apply the principles of effective teamwork
Outcome (e): Our students will have the ability to identify, formulate, and solve engineering problems.

**Goals:** Students will be able to
1. Determine information needs when solving real-world problems
2. Formulate solution strategies to complex real-world problems.

Outcome (f): Our students will have an understanding of professional and ethical responsibility.

**Goals:** Students will be able to
1. Understand ethical responsibilities and make ethical decisions in the use of others’ work
2. Understand practice of safety in the laboratory and industry
3. Understand professional registration and the benefits and responsibilities in engineering practice

Outcome (g): Our students will have the ability to communicate effectively.

**Goals:** Students will be able to
1. Demonstrate technical writing skills
2. Demonstrate formal presentations skills
3. Demonstrate interpersonal skills
4. Demonstrate visual communication.

Outcome (h): Our students will have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

**Goal:** Students will be exposed to social science and humanities courses that will provide them with an understanding of the effect of engineering solutions in a global and societal context.

Outcome (i): Our students will recognize the need for and the ability to engage in life-long learning.

**Goal:** Students will
1. Appreciate the need for life-long learning
2. Be encouraged to be active members in professional societies and attend professional meetings.
3. Have the ability to retrieve information from public sources.

Outcome (j): Our students will have knowledge of contemporary issues.

**Goal:** Our students will have knowledge of contemporary issues.

Outcome (k): Our students will have the ability to use the technical skills and modern engineering tools necessary for engineering practice.

**Goal:** Students will be able to
1. Employ advanced analytical methods to solve problems
2. Use computer applications and technical skills relevant to the field:
   • Word processing and presentation software
   • Data acquisition
   • Computer-aided graphics
   • Finite element methods
   • Symbolic manipulation
   • Spread sheets
   • System modeling or numerical manipulation package such as MATLAB
   • Programming.