EMEC - Mechanical Engineering

EMEC 100. Introduction to Mechanical Engineering. 1 Credit. (1 Lec) F
COREQUISITE: M 151Q. The mechanical engineering profession, logical process of problem solving and design, professionalism, ethics.

EMEC 103. CAE I--Engineering Graphics Communications. 2 Credits. (2 Lab) F,S,Su
PREREQUISITE: ME, MET, or IE majors only. COREQUISITE: M 171Q for ME and IE majors; M 151Q for MET majors. Communication through engineering graphics. The course topics include drawing utilizing sketching, 2-D CAD and 3-D solid modeling software, drawing standards, fits, and tolerances.

EMEC 203. CAE II--Mechanical Engineering Computations. 2 Credits. (1 Lec, 1 Lab) F,S
PREREQUISITE: EMEC majors only. EMEC 103. COREQUISITE: M 172Q. Computer methodology, use of various computer software packages in mechanical engineering applications.

EMEC 250. Mechanical Engineering Materials. 3 Credits. (3 Lec) F,S
PREREQUISITE: WRIT 101W. CHMY 141 for ME majors; CHMY 121N for MET majors. COREQUISITE: EMA 252; M 172Q for ME majors; M 165Q for MET majors. Properties of engineering materials and ceramics as related to their structures. Material selection for engineering applications.

EMEC 299R. Undergraduate Research. 1-6 Credits. (1-6 Ind) F,S,Su
PREREQUISITE: Consent of instructor and approval of department head or director. Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research. May be repeated.

EMEC 291. Special Topics. 1-4 Credits. (1-4 cr.) F,S,Su
PREREQUISITE: None required but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EMEC 292. Independent Study. 1-3 Credits. (1-3 Ind) F,S,Su
PREREQUISITE: Consent of instructor and approval of department head or director. Directed research and study on an individual basis.

EMEC 303. CAE III--Systems Analysis. 3 Credits. (3 Lec) F,S
PREREQUISITE: EMEC 203, M 273Q, M 274. COREQUISITE: EGEN 205. Study of materials used in modern mechanical design. Emphasis placed on the development of models for mechanical system behavior. Topics include: methods of analysis, stability, control, and design. Applications to aerospace, mechanical, and civil engineering.
EMEC 445. Mechanical Vibrations. 3 Credits. (3 Lec) F,S
PREREQUISITE: EMEC 303. Requires completion of all 100-200 level courses (except Core). Vibration problems of single and multiple degree of freedom systems. Introduction to vibration of continuous bodies. Analysis of free and forced vibration problems. Effects of damping.

EMEC 447. Aircraft Structures. 4 Credits. (3 Lec, 1 Ret) S
PREREQUISITE: EMEC 361 or instructor approval. An introduction to the current practices in the design and analysis of aircraft metallic and composite structures. Overview of aircraft design, analysis, testing, and certification with examples. Static and dynamic load condition analysis.

EMEC 465. Bio-inspired Engineering. 3 Credits. (3 Lec) S
PREREQUISITE: EGEN 335, EMEC 320, EGEN 310 for ME majors; consent of instructor for non-majors. Addresses design in nature and resultant solutions as inspiration for solving engineering design problems. Structural, thermal, and fluid concepts in nature will be applied to engineering. Smart structures, self-healing materials, and robotics will be introduced.

EMEC 467. Micro-Electromechanical Systems. 3 Credits. (2 Lec, 1 Lab) On Demand
PREREQUISITE: Senior standing; ELEI 250 and EGEN 205; or consent of instructor. Introduction to sensors and actuators and their working principles. MEMS (microelectromechanical systems) fabrication procedures. MEMS materials and their mechanical properties. Mechanical behavior of microsystems. MEMS packaging and thermal-mechanical stresses in MEMS packages. Reliability issues in MEMS.

EMEC 489R. Mechanical Engineering Design Capstone I. 2 Credits. (1 Lec, 1 Ret) F
PREREQUISITE: EGEN 310R, ME majors only. COREQUISITE: Concurrent enrollment in or prior completion of EMEC 321, EMEC 326, EMEC 342, EMEC 360, EMEC 361, EMEC 445. Senior capstone design experience in Mechanical Engineering. Students, under the guidance of a faculty supervisor, solve real-world design problems.

EMEC 490R. Undergraduate Research. 1-6 Credits. (1-6 Ind) F,S,Su
PREREQUISITE: Junior standing, consent of instructor, and approval of certifying faculty. Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. May be repeated.

EMEC 491. Special Topics. 1-4 Credits. (1-4 cr.) F,S,Su
PREREQUISITE: Course prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EMEC 492. Independent Study. 1-3 Credits. (1-3 Ind) F,S,Su
PREREQUISITE: Junior standing, consent of instructor, and approval of department head or director. Directed research and study on an individual basis.

EMEC 495. Student Teaching: ME Consult. 1-3 Credits. (1-3 Ind; 3 cr. max) F,S,Su
PREREQUISITE: Sophomore standing in ME/MET curriculum and consent of supervising faculty. Students enrolled in this class will provide technical support for selected ME/MET courses.

EMEC 498. Internship. 1-3 Credits. (1 Ind) F,S,Su
PREREQUISITE: Junior standing, EMEC 303, EMEC 320, EMEC 341, and consent of internship coordinator. An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

EMEC 499R. Mech Eng Design Capstone II. 3 Credits. (1 Lec, 1 Ret, 1 Lab) F,S
PREREQUISITE: EMEC 489R or consent of instructor. ME majors only. Senior capstone design experience in Mechanical Engineering. Students implement and test the function of design prototypes, under the guidance of a faculty supervisor.

EMEC 524. Cellular Mechanotransduction. 3 Credits. (3 Lec) F
PREREQUISITE: College of Engineering students-completion of all required mathematics courses in the major; other students—permission of the instructor. Solid and fluid mechanics and relationships to cell biology. This interdisciplinary course brings together topics from both engineering and molecular biology to understand the mechanisms by which cells respond to loading. Topics selected from: musculoskeletal, circulatory, lymphatic, chondrocyte, leukocyte, and cancer cell mechanotransduction.

EMEC 525. Conduction Heat Transfer. 3 Credits. (3 Lec) F
PREREQUISITE: EMEC 326, COREQUISITE: EMEC 510. Advanced topics in conduction heat transfer with emphasis on analytical techniques including separation of variables, Duhamel's theorem, two-phase problems, and numerical techniques.

EMEC 530. Advanced Fluid Mechanics I. 3 Credits. (3 Lec) S
alternate odd years. PREREQUISITE: EGEN 335 or ECHM 321. COREQUISITE: EM 525 or consent of instructor. Review of conservation equations, laminar and turbulent internal flows, potential flows, and Stokes flow.

EMEC 531. Advanced Fluid Mechanics II. 3 Credits. (3 Lec) S
alternate even years. PREREQUISITE: EGEN 335 or ECHM 321. COREQUISITE: EM 525. Laminar boundary layer and free shear flows, internal and external compressible flows.

EMEC 533. Transport Phenomena. 3 Credits. (3 Lec) On Demand
PREREQUISITE: EMEC 531. Comprehensive treatment of mass, momentum, and energy transport. This course is cross-listed with ECHM 533.

EMEC 536. Computational Fluid Mechanics. 3 Credits. (3 Lec) F
PREREQUISITE: EGEN 335 or Instructor Approval. Numerical solutions of fluid flows, discretization methods, solution algorithms, aspects of turbulent flows.

EMEC 545. Advanced Mechanical Vibrations. 3 Credits. (3 Lec) On Demand

EMEC 556. Smart Structures. 3 Credits. (3 Lec) On Demand
PREREQUISITE: EMEC 303 and EMEC 342 and EMEC 445, or equivalent. Analysis and design of intelligent structures for aerospace, mechanical, and civil applications. Topics include piezoelectricity, shape memory effects, magnetorheology, and biomimicking.

EMEC 575. Research or Prof Paper/Project. 1-4 Credits. (1-4 Ind) F,S,Su
PREREQUISITE: Graduate standing. A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee. This course can be used toward fulfilling the requirements for the Master of Science in Mechanical Engineering for non-thesis option students.

EMEC 589. Graduate Consultation. 1-3 Credits. (1-3 Ind) F,S,Su
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies. This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time.

EMEC 590. Master's Thesis. 1-10 Credits. (1-10 Ind; unlimited max) F,S,Su
PREREQUISITE: Master's standing; consent of instructor. May be repeated.

EMEC 591. Special Topics. 1-4 Credits. (1-4 cr.) F,S,Su
PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EMEC 592. Independent Study. 1-3 Credits. (1-3 Ind) F,S,Su
PREREQUISITE: Graduate standing, consent of instructor, approval of department head or director. Directed research and study on an individual basis.

EMEC 594. Seminar. 1 Credit. (1 Sem) F,S
PREREQUISITE: Graduate study or seniors by petition. Course prerequisites as determined for each offering. Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting the discussion material.

EMEC 598. Internship. 1-12 Credits. (1-3 Ind) On Demand
PREREQUISITE: Graduate standing, consent of instructor and approval of graduate program coordinator. An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

EMEC 690. Doctoral Thesis. 1-10 Credits. (1 Ind; max unlimited) F,S,Su
Max credits unlimited. PREREQUISITE: Doctoral standing; consent of instructor.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Adobe Garamond Pro.

The editor may contact Leepfrog for a draft with the correct fonts in place.