

The Department of Composite Materials Engineering is requesting the addition of the following to the graduation requirement of its students (Department meeting minutes of 12/05/2013 is attached).

Statement to be added to the catalog:

The student must take the Fundamentals of Engineering (FE) exam as part of the requirements for graduation from the Composite Materials Engineering Program. This exam is usually taken in the senior year. Please see this web site (<http://ncees.org/exams/fe-exam/>) for more information about the FE exam.

Additional information about the FE exam (from the above web site):

The Fundamentals of Engineering (FE) exam is typically the first step in the process leading to the Professional Engineer (P.E.) license. It is designed for recent graduates and students who are close to finishing an undergraduate engineering degree. The FE is a computer-based exam that is administered year-round in testing windows at NCEES*-approved Pearson VUE test centers.

The FE contains 110 multiple-choice questions. The exam appointment time is 6 hours long, which includes a nondisclosure agreement, tutorial (8 minutes), the exam (5 hours and 20 minutes), a scheduled break (25 minutes), and a brief survey.

*NCEES: National Council of Examiners for Engineering and Surveying

Justification:

The Fundamentals of Engineering (FE) exam is the only uniform, nationally used exam that tests candidates on the material covered in college engineering degree programs. For educators and administrators, the exams have the potential to provide a wealth of information about the relative strengths and weaknesses of students in a program.

NCEES offers free institutions reports that break down the performance of students and graduates from their programs, comparing results on specific content areas to national averages. These reports can be an excellent means of evaluating program outcomes (see <http://ncees.org/licensure/educator-resources/>).

The CME Department has been encouraging the students to take the FE exam since the inception of the program, but has never required it as part of the graduation requirement. When all the students will be required to take the exam, the department will be able to better assess the student outcomes with more complete set of data.

Department meeting minutes of 12/05/2013

Minutes:

- R-1) Meeting minutes of 11/14/2013 were approved.
- R-2) **The Department will add “taking the FE exam” as a requirement for graduation. The date of the implementation of this requirement depends on the approval process and university regulations.**
- R-3) M. Lund will purchase the necessary items (estimated cost of around \$900) to make the tubular oven (currently in ST B9) functional. The oven will be used for sample preparation of metals and their composites.

* This item will be added to the Department Policies and Procedure Book.

Composite Materials Engineering

203 Stark Hall (507.457.5685)
Composite Materials Engineering
Fariborz Parsi (Chairperson)

Faculty

Beckry Abdel-Magid, Professor; BS, University of Khartoum; MS, PhD, University of Wisconsin-Madison; 1990 –
Keith Dennehy, Professor; BS, Rensselaer Polytechnic Institute; MS, Youngstown State University; MBA, University of Utah; PhD, Rensselaer Polytechnic Institute; 1990 –
Maryam Eslamloo-Grami, Professor; BS, MS, Shiraz University, Iran; PhD, University of California-Davis; 1993 –
Fariborz Parsi, Professor; BS, MS, PhD, University of South Carolina, Columbia; 1991 –
Saeed Ziaee, Associate Professor; BS, PhD, University of Texas at Austin; 2003 –

Purpose

The Department of Composite Materials Engineering offers the Bachelor of Science degree in composite materials engineering. Composites represent a new group of manufactured materials. These lightweight materials, which have high strength and stiffness, are formed by combining reinforcing fibers in a polymer, ceramic, or metal matrix. Over the past three decades, the use of composites has grown significantly in the following industries: aerospace, automotive, biotechnology, construction, electronics, marine, and sporting goods. The future for people educated in the engineering of composite materials is very promising.

The Composite Materials Engineering (CME) Program has been developed to meet the engineering needs of the composites industry and is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Graduates from this program will be prepared to practice engineering at a professional level and to enter the composites industry in positions that provide opportunities for professional growth. Graduates also will be prepared to enter graduate-level programs in composite materials and other related engineering disciplines.

The CME Program is the only accredited undergraduate program in the United States that offers a Bachelor of Science degree in composite materials engineering. Majors in the program may choose to focus on the design, analysis, and manufacture of composite structures (mechanical focus); or on the development, processing, and chemistry of the materials used in composites including fibers, matrices and fiber/matrix systems (chemical focus).

Mission/Objectives/Outcomes

The mission of the CME Program is to develop creative minds and innovation in the field of composite materials through education, applied research, and scholarly pursuits in collaboration with the composites community and industry.

- The Educational Objectives of the CME Program are to prepare graduates to become engineers who:
 - a. Apply their knowledge and expertise to develop innovative and effective solutions for the composites industry

- b. Communicate and work effectively in diverse environments
 - c. Grow and develop professionally
- The Student Outcomes of the CME Program are demonstrated by students who have attained:
 1. An understanding of the fundamentals of mathematics, science, and engineering science and their application in engineering.
 2. The ability to identify, formulate, model, and solve engineering problems.
 3. The ability to use state-of-the-art engineering tools (experimental, computational, and statistical) necessary to select, analyze, design, fabricate, and test materials.
 4. The ability to design and conduct experiments as well as to analyze and interpret data related to structure, properties, processing, and performance of materials.
 5. The theoretical knowledge and hands-on ability to confidently design components, systems, and processes to meet the needs of the composites industry within a set of realistic constraints including economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
 6. The ability to communicate effectively in oral, written and visual forms.
 7. The ability to work effectively in a team environment.
 8. An understanding of the proper response to ethical issues and their responsibility to the engineering profession.
 9. An understanding of the impact of their engineering decisions in a global, economic, environmental, and societal context.
 10. Knowledge of contemporary issues.
 11. Recognition of the need for and an ability to engage in life-long learning.

High School Preparation

The Department of Composite Materials Engineering recommends that high school preparation for the CME major include two years of algebra, one year of geometry, one-half year of trigonometry, one-half year of college algebra, as well as one year each of physics and chemistry. Without this background, it is unlikely that a student will be prepared to complete the degree requirements in four years. In addition, courses in industrial technology will be helpful.

Admission to the Program

Admission to the CME major is selective and is determined by the Composite Materials Engineering Admissions Committee. Before students can be considered for admission to the CME major, they:

- Must complete 4 S.H. of English composition, 3 S.H. of speech communication, and a minimum of 38 S.H. of required lower-division engineering, physics, mathematics, and chemistry courses. These courses can be taken at WSU or transferred from other institutions. However, courses with grades below "C" will not be accepted in transfer.
- Must have obtained a grade of "C" or higher in the courses required for admission into the CME Program and have a minimum GPA of 2.5 in these required courses. Students will not be allowed to enroll in upper-division 300-level engineering courses until either they are admitted into the major or they are granted special permission from their Department of Composite Materials Engineering major advisor.

Probation Policy

CME majors will be placed on probation if their previous semester's GPA in courses required for the major falls below 2.0 or if they do not complete at least one course in the major each semester. Students will be disqualified from the major if

they have been on probation for two consecutive semesters or for three non-consecutive semesters after admission to the major. Petition for reinstatement will be considered by the Department of Composite Materials Engineering.

General Education Requirements

The General Education requirements for CME majors consist of 46 SH credits distributed across the ten General Education Goal Areas. These include the courses listed below under goal areas 1 through 4 and three SH credits in each of goal areas 5 through 10 including dual listed courses. In addition, twelve SH credits of intensive courses are required; these courses are shown under Intensives below. Note: Students who receive a waiver from certain General Education courses must take an equal number of credit hours of elective courses to meet the 128-credit requirement.

General Education Program for CME Majors

FE exam requirement

In addition to the successful completion of the required courses, the student must also take the "Fundamentals of Engineering (FE) exam" prior to graduation. More information about the FE exam can be found at <http://ncees.org/exams/fe-exam/>. (to be added in the catalog)

Course Descriptions

[Expand All Courses |](#)

Course descriptions include the following elements:

Course Code, Number, and Titles: The course code indicates the department or program in which the course is housed. The course number indicates the level at which the course should be taken. Generally, first-year students take 100-level courses; sophomores, 200-level; juniors, 300-level; and seniors, 400-level. Students are required to limit course selection to courses not more than one level above their class standing. First-year students are not permitted to enroll in 400-level courses. Undergraduate students who need 12 or fewer semester credits to complete all baccalaureate degree requirements may request permission from the Director of Graduate Studies to take courses for graduate credit to complete a regular course load during the semester of graduation. However, undergraduate students may not enroll in courses at the 600-level or 700-level.

Credits: The number of semester hours of credit given upon completion of the course.

Course Content: A brief description of subject matter gives students an idea of what to expect in the course.

Prerequisites: If required or recommended, a prerequisite is either a course that must be completed prior to enrolling in the course or some other requirement that must be met prior to enrolling in the course.

Grading Method: If a course is offered on a grade-only or pass/no credit-only basis, that status is included in the course description. A department's general pass/no credit policy is included in its listing of program requirements. Students should check the policy before enrolling in a course on a pass/no credit basis.

Frequency of Offering: Course descriptions may indicate how often the course is offered.

Note:

⊙ = Oral Intensive

◆ = Math/Critical Analysis Intensive

△ = Writing Intensive

Composite Materials Engineering

- CME 102 - Introduction to Engineering
- CME 103 - Understanding Engineering (for non-majors)
- CME 182 - Engineering Graphics and Design
- CME 210 - Computer Applications in Engineering
- CME 250 - Statics
- CME 260 - Mechanics of Materials
- CME 270 - Dynamics
- △ CME 285 - Properties of Materials
- CME 300 - Thermodynamics
- CME 350 - Fluid Mechanics
- CME 360 - Introduction to Composite Materials

- CME 370 - Heat and Mass Transfer
- CME 390 - Composites Manufacturing
- △ CME 394 - Polymer Science and Characterization
- CME 401 - Engineering Economics
- CME 410 - Polymer Processing
- CME 420 - Manufacturing Systems Analysis
- CME 430 - Rheology
- CME 450 - Mechanics of Composites
- △ CME 451 - Transport Phenomena Laboratory
- △ CME 452 - Mechanical Characterization Laboratory
- CME 460 - Introduction to Finite Element Analysis
- © CME 475 - Design Project I
- CME 480 - Design Project II
- CME 485 - Advanced Microscopic Techniques
- © CME 491 - A/B Engineering Seminar
- © CME 491A - Engineering Seminar
- © CME 491B - Engineering Seminar
- CME 499 - Independent Study

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Composite Materials Engineering (CME) - BS Major

[Return to: WSU Colleges & Undergraduate Programs](#)

106 S.H. (No Minor Required)

Core Requirements (97 S.H.)

Lower-Division (56 S.H.)

Mathematics - MATH (16 S.H.)

- MATH 212 - Calculus I (4 S.H.)
- MATH 213 - Calculus II (4 S.H.)
- ◆ MATH 312 - Multivariable Calculus (4 S.H.)
- ◆ MATH 313 - Differential Equations (3 S.H.)
- MATH 314 - Linear Algebra for Differential Equations (1 S.H.)

Chemistry - CHEM (12 S.H.)

- CHEM 212 - Principles of Chemistry I (4 S.H.)
- CHEM 213 - Principles of Chemistry II (4 S.H.)
- CHEM 340 - Organic Chemistry Survey (4 S.H.)

Physics - PHYS (8 S.H.)

- PHYS 221 - University Physics I (4 S.H.)
- PHYS 222 - University Physics II (4 S.H.)