ENGINEERING CORE (ENGR)

Course Descriptions

ENGR 095 CECS First Year Seminars 1 Credit Hour
The goal of this course is to set first year CECS students off to a good start and increase opportunities for their success. It is designed to provide students the opportunity to acquire the necessary skills for successful transition to engineering and computer science pathways through engaging and immersive activities. The topics covered in the course include (but are not limited to) time management, wellness and well-being, study skills and exam preparation, engagement with student orgs and teams, engineering and computer science hands-on activities/ projects, major exploration, internships and research for undergraduates. The course is required for all CECS students placed in Math 080 or Math 090 during their first semester at UM-Dearborn. The course is also available to other first semester freshmen in CECS majors and programs. (F, W).
Restriction(s):
Can enroll if Major is

ENGR 100 Introduction to Engineering and Engineering Design 3 Credit Hours
The purpose of this course is to provide a general introduction to the engineering profession, to engineering design, and programming using MATLAB. The course introduces the design-build-test-learn cycle through lectures, hands-on based laboratory activities, and a team project. Three credit hours (two-hour lecture, three-hour laboratory per week). (F, W).
Corequisite(s): ENGR 100L
Restriction(s):
Can enroll if College is Engineering and Computer Science

ENGR 126 Engineering Computer Graphics 2 Credit Hours
Principles of solid modeling and the representation of solid models using both conventional drawing and computer graphics. Orthographic representation of points, lines, planes and solids. Reference planes. Auxiliary views. Sections, conventions, dimensioning. Fundamentals of computer-assisted graphics in engineering disciplines. Three-dimensional modeling using computer graphics software. Two-hour lectures and two-hour laboratory.
Corequisite(s): ENGR 126L
Restriction(s):
Can enroll if College is Engineering and Computer Science

ENGR 200 Modern Computer Programming for Engineers 4 Credit Hours
This course introduces students to computer programming, numerical methods, and data analysis in the context of engineering applications. Students will explore contemporary computational techniques for modeling, data visualization, optimization, and simulation. Through hands-on projects, students will also evaluate and apply emerging AI-assisted methods for code generation and debugging. (F, W).
Prerequisite(s): MATH 227* or MATH 228* or (MATH 216* and MATH 217*)
Corequisite(s): ENGR 200L
Restriction(s):
Can enroll if Level is Undergraduate
Can enroll if Major is , Mathematics, Mechanical Engineering, Bioengineering

ENGR 216 Computer Meth for Engineers 2 Credit Hours
Computer programming in Matlab or another language used in engineering and applications to basic techniques of numerical analysis. Numerical integration, solution of systems of linear equations, root finding, curve fitting, error properties, numerical precision. Students complete a project, in which they develop and test an engineering data-processing code. (F, W).
Prerequisite(s): ENGR 100 and ENGR 126* and ((MATH 216* and (MATH 217* or MATH 227*) or) or MATH 228*)
Restriction(s):
Can enroll if College is Engineering and Computer Science

ENGR 250 Principles of Engineering Materials 3 Credit Hours
An introductory course in engineering materials. Particular emphasis is given to the correlation of material properties and internal structures; structure of materials; stress- strain curves; temperature effects; phase diagrams; ferrous and non-ferrous alloys; ceramics; polymers; composites; electrical, magnetic, and optical properties; corrosion and failure. Two-hour lectures and two one-hour recitations.
Prerequisite(s): (CHEM 144 or CHEM 134) and MATH 115*
Corequisite(s): ENGR 250R
Restriction(s):
Cannot enroll if Class is
Can enroll if College is Engineering and Computer Science

ENGR 250R Prin of Eng Materials Rec 0 Credit Hours
Recitation component for ENGR 250. Must be taken concurrently with ENGR 250. (F, W).
Corequisite(s): ENGR 250

ENGR 290 Study Abroad Technical Subj 1 to 4 Credit Hours
200-level study abroad course in technical subjects.
Restriction(s):
Can enroll if Class is Freshman or Sophomore or Junior or Senior
Can enroll if College is Engineering and Computer Science

ENGR 299 Experiential Learning in Engineering & Computer Science 1 1 Credit Hour
This course is the first in a sequence of three experiential learning courses in CECS. It provides undergraduate engineering and computer science students with an opportunity to develop skills, abilities, and behaviors through both hands-on learning and exposure to the professional work environment. The course provides supervised work experiences relevant to their degree programs with mutually agreed upon engineering work assignments among the student, employer and faculty advisor. (F,W,S) (F, W, S).
Prerequisite(s): ENGR 100 or CIS 150 or CIS 1501
Restriction(s):
Can enroll if Level is Undergraduate
Can enroll if College is Engineering and Computer Science

ENGR 332 Speech for Professionals 3 Credit Hours
Professionals must effectively communicate in the technical and business environment of a company organization. The course pays particular attention to verbal communications within and between organizations, focusing on multiple audiences and their varying needs for information. Stressing audience awareness, organization, clarity and efficiency in speaking, it will improve speaking skills necessary for confident verbal presentations such as professional briefings and conferences.

ENGR 345 Effective Use of AI Tools for Scientists and Engineers 3 Credit Hours
Generative AI tools like ChatGPT can be in a variety of creative ways, such as writing texts and generating images. However, to get the most from these tools, users have to prompt the system in in effective ways to get the information they desire. In this course, we will explore effective ways of using AI tools to produce the types of outputs typical of scientists and engineers, such as: learning technical information, technical writing involving mathematical and engineering analysis, producing visualizations of data, computer programming, as well as skills such as developing technical presentations and considering the societal impact of emerging technologies. This course will provide a hands-on interactive tour through different AI-based tools to develop these skills. (F, W).

ENGR 350 Nanoscience and Nanotechnology 4 Credit Hours
The terms "nanoscience" and "nanotechnology" have come to mean many different scientific and technical disciplines. The course will introduce students to the fundamentals of nanoscience and nanotechnology. Interesting phenomena about individual nanometer scale objects will be discussed. The difference in properties of objects of nanometer scale, containing hundreds or thousands of atoms and those exhibited by individual atoms or molecules or the properties of materials at the macroscale with which we are most familiar will be covered. The analytical techniques that are used to characterize these objects will be discussed. The manufacturing techniques used to make these objects along with their applications will be covered. Cost benefit analysis of nanotechnology and its future will be discussed. (YR)
Prerequisite(s): PHYS 151 and (CHEM 124 or CHEM 134 or CHEM 144)
Restriction(s):
Cannot enroll if Major is

ENGR 360 Design Thinking : Process, Method & Practice 4 Credit Hours
Design Thinking: Process, Method and Practice is a highly interactive project-based introduction to design, structured as a hands-on course. This course brings a holistic vision to design innovation. Students work in teams that follow a process of immersion of user experiences, exploration of ideas and prototyping of potential solutions. To work effectively as a team, collaboration and project management concepts and methods are introduced. The course consists of two instructional elements: regular class lectures and in class hands-on exercises based on case studies. In addition, a semester long team based project allows students to apply classroom learnings to real life design problems. Teams present their design concepts, showcase prototypes in engaging and thoughtful ways. (F, W).
Restriction(s):
Cannot enroll if Class is

ENGR 390 Study Abroad Technical Subj 1 to 4 Credit Hours
300-Level study abroad topics in technical subjects.
Restriction(s):
Can enroll if Class is Freshman or Sophomore or Junior or Senior
Can enroll if College is Engineering and Computer Science

ENGR 390F Study Abroad Technicl Subj 3 Credit Hours
Topic: Fuel Cell Principles. In this course the physical laws of thermodynamics and fluid mechanics will be applied to industrial components and equipment. Approved as an upper-level ME elective.
Prerequisite(s): ME 230

ENGR 390O Study Abroad Technical Subj 3 Credit Hours
This course covers many topics in Machine Learning. Students will learn to build up deep learning models and review the state-of-the-art deep learning literature to solve real-world computational problems. Students will learn to deploy these methods to real-life applications. In Addition students will learn NoSQL, GPU Programming, as well as Corporate and Social Responsiblity realted to Artificial Intelligence.

ENGR 390P Study Abroad Technical Subj 3 Credit Hours
This course focuses on different theortical concepts in Software Engineering design. Students will focus on the Software Architecture, organize components and services, and create technical Documentation. Students will implement the theory using DevOps. (3 credits)

ENGR 399 Experiential Learning in Engineering & Computer Science 2 1 Credit Hour
This course is the second in a sequence of three experiential learning courses in CECS. The aim of this course is to provide undergraduate engineering and computer science students with an opportunity to develop skills, abilities, and behaviors through both hands-on learning and exposure to the professional work environment. The course provides supervised work experiences relevant to their degree programs with mutually agreed upon engineering work assignments among the student, employer and faculty advisor. (F, W, S).
Prerequisite(s): ENGR 299
Restriction(s):
Can enroll if Class is Junior or Senior
Can enroll if Level is Undergraduate
Can enroll if College is Engineering and Computer Science

ENGR 400 Appl Business Tech for Engr 3 Credit Hours
This course will introduce the students those business skills/tools that will be needed in their jobs soon after graduation and will make them better and well-rounded engineers. They will be able to function better within today's global business environment. The major topics of the course are management finance including cost accounting, organizational behavior, program and project management and business related system thinking. Three hours of lecture per week. (F, W, S).
Restriction(s):
Can enroll if Class is Post-baccalaureate NCFD or Senior
Can enroll if Level is Undergraduate or Professional Development

ENGR 490 Study Abroad Technical Subj 1 to 4 Credit Hours
400-level study abroad course in technical subjects.
Restriction(s):
Can enroll if Class is Freshman or Sophomore or Junior or Senior
Can enroll if College is Engineering and Computer Science

ENGR 492 Exper Honors Directed Research 1 Credit Hour
Full Title: Experiential Honors Directed Research. The Experiential Honor Directed Research project involves performing laboratory/experiential research under the supervision of a faculty member. The course involves regular meetings with the supervising faculty member and reading relevant research articles. Engineering student are expected to design and conduct experiments, and to analyze and interpret data. Computing students are expected to analyze a problem, and identify and define the computing requirements appropriate to its solution. A research project report and an oral presentation are expected at the end of the semester. (F,W,S)
Restriction(s):
Can enroll if Class is Junior or Senior
Can enroll if College is Engineering and Computer Science

ENGR 493 Exper Hnrs Dir Dsgn 1 Credit Hour
Full Title: Experiential Honors Directed Design The Experiential Honors Directed Design project involves the design, analysis, building and testing of software (a computer-based system, process, component, or program) or hardware (a component, assembly, device or system) to meet desired needs. A design project report and an oral presentation are expected at the end of the semester. (F,W,S)
Restriction(s):
Can enroll if Class is Junior or Senior
Can enroll if College is Engineering and Computer Science

ENGR 499 Experiential Learning in Engineering & Computer Science 3 1 Credit Hour
This course is the third in a sequence of three experiential learning courses in CECS. It provides undergraduate engineering and computer science students with an opportunity to develop skills, abilities, and behaviors through both hands-on learning and exposure to the professional work environment. The course provides supervised work experiences relevant to their degree programs with mutually agreed upon engineering work assignments among the student, employer and faculty advisor. (F,W,S) (F, W, S).
Prerequisite(s): ENGR 399
Restriction(s):
Can enroll if Level is Undergraduate
Can enroll if College is Engineering and Computer Science

*An asterisk denotes that a course may be taken concurrently.

Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally