

ENGINEERING-MECHANICAL (EGM)

EGM101. Design With Additive Manufacturing. 1 Credit.

This course will present students with practical experience in the design of products. Students will learn the principals of design including the design, build, analyze paradigm. Students will leverage the power of 3D printing to take a novel product from concept to manufacture.

Prerequisites:

- EGG 101 (may be taken concurrently) with a minimum grade of C- and PHY 201 with a minimum grade of C- and PHY 211 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration): Mechanical Engineering (521)

EGM193. Engineering - Mechanical Selected Topics. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate

EGM201. Design Using Reverse Engineering. 1 Credit.

Building upon the practical experiences in Design with Additive Manufacturing (EGM101), students will use the principals of design by reverse engineering an existing product. Emphasis will be placed on improved design and functionality by reverse engineering as existing product from initial inspection to manufacture during this laboratory.

Prerequisites:

- EGM 101 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration): Mechanical Engineering (521)

EGM211. Statics. 3 Credits.

Statics is the branch of engineering mechanics that is concerned with the analysis of forces on physical systems in static equilibrium. This class will help you interpret the forces supporting objects we encounter in our daily lives. Topics include: force systems, equilibrium, structural analysis, distributed forces, internal forces, friction, and virtual work. Finally, an introduction to mechanics of materials will be covered.

Prerequisites:

- PHY 201 with a minimum grade of C- and PHY 211 with a minimum grade of C- and MAT 252 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM212. Dynamics. 3 Credits.

Analysis of motions of particles and rigid bodies encountered in engineering. Topics include: velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate.

Prerequisites:

- EGM 211 with a minimum grade of C- and MAT 359 (may be taken concurrently) with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration): Mechanical Engineering (521)

EGM221. Engineering Materials. 3 Credits.

The relationship between the structure of materials and the resulting mechanical, thermal, electrical, and optical properties. Topics include: Atomic structure, bonding, atomic arrangement; crystal symmetry, crystal structure, habit, lattices, defects and the use of X-ray diffraction, phase equilibria, and micro-structural development. Applications to design.

Prerequisites:

- CHE 201 with a minimum grade of C- and CHE 211 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration): Mechanical Engineering (521)

EGM293. Engineer-Mechanical Sel Topics. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate

EGM295. Indep Study Mechanical Engineering. 1-12 Credits.

Restrictions:

- Must have the following level: Undergraduate

EGM301. Design of Measurement Instrumentation. 1 Credit.

Building upon the practical experiences in EGM 101 & EGM 201, students will use the principles of design, to design an experiment to measure a physical quantity. In addition to designing the experiment, students will be required to design and manufacture the instrumentation for the experiment. Students will be expected to plan the design process of both the experiment and the instrumentation, as well as, prepare a proposal detailing the design including time and cost schedules.

Prerequisites:

- EGM 101 with a minimum grade of C- and EGE 201 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM302. Finite Element Analysis. 3 Credits.

An introduction to the theory and practice of the finite element methods. One and two dimensional elements are studied, including structural elements. Primary fields of applications are strength of materials (deformation and stress analysis), dynamics, and heat transfer. Extensive use of commercial finite element software packages, through in-class (hands-on) experiences, and a course project.

Prerequisites:

- EGM 322 with a minimum grade of C- and EGM 332 with a minimum grade of C- and EGM 334 (may be taken concurrently) with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM311. Kinematics of Machines. 3 Credits.

This course will focus on the application of kinematics to the analysis, synthesis, and design of mechanisms. Specific topics covered will include linkage synthesis (graphically and analytically), position analysis, velocity analysis, acceleration analysis, cam design, and gear trains.

Prerequisites:

- EGM 212 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM312. System Dynamics. 3 Credits.

This course will focus on the modeling of dynamic systems in the mechanical. Electrical, thermal, and fluid domains. Steady-state and transient response will be addressed within the time domain and frequency domain techniques.

Prerequisites:

- EGM 311 with a minimum grade of C- and (EGE 200 with a minimum grade of C- or EGE 250 with a minimum grade of C-) and (EGE 201 with a minimum grade of C- or EGE 209 with a minimum grade of C-)

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM322. Mechanics of Materials. 3 Credits.

Integrated approach to mechanics of materials. Topics include: stress and strain in structural elements; mechanical properties of materials; extension; torsion and bending of members; thermal stress; pressure vessels; static indeterminacy, stress transformation, Mohr's circle, strain energy, failure criteria, and buckling.

Prerequisites:

- EGM 221 with a minimum grade of C- and EGM 323 (may be taken concurrently) with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM323. Materials Lab. 1 Credit.

Study of the properties, behavior, and performance of engineering materials including: stress-strain relations, strength, deformation, fracture, creep, and cyclic fatigue. Introduction to experimental techniques common to mechanical engineering: interpretation of experimental data, comparison of measurements to numerical/analytical predictions, and formal engineering report writing.

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM331. Thermodynamics. 3 Credits.

Properties of working fluids and fundamental relations for processes involving the transfer of energy. Topics include: First and second laws of thermodynamics, entropy, reversible and irreversible processes, properties of pure substance. Application to engineering problems.

Prerequisites:

- CHE 201 with a minimum grade of C- and CHE 211 with a minimum grade of C- and PHY 202 with a minimum grade of C- and PHY 212 with a minimum grade of C- and MAT 252 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM332. Fluid Mechanics. 3 Credits.

Analysis of steady ideal and viscous fluid flow systems using the continuity, Bernoulli and momentum equations. Boundary layer theory is treated in terms of viscous and pressure drag, lift, and its importance in heat and mass transfer. Dimensional analysis and dynamic similitude are studied to provide an understanding of flow systems analysis and modeling. Introduction to pipe flow and open channel flow.

Prerequisites:

- EGM 212 with a minimum grade of C- and EGM 331 (may be taken concurrently) with a minimum grade of C- and MAT 359 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM333. Thermo-Fluids Lab. 1 Credit.

An introduction to experimental methods in Mechanical Engineering: review and use of pressure, temperature, and flow measuring devices. Experimentation, data acquisition and analysis selected from within the thermo-fluids area.

Prerequisites:

- EGM 331 with a minimum grade of C- and EGM 332 (may be taken concurrently) with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM334. Heat Transfer. 3 Credits.

The course discusses quantitatively the three main modes of heat transfer; which are conduction, convection, and radiation. A combined approach will be followed that will stress both the fundamentals of the rigorous differential description of the involved phenomena and the empirical correlations used for engineering design.

Prerequisites:

- EGM 331 with a minimum grade of C- and EGM 332 with a minimum grade of C- and (EGE 200 with a minimum grade of C- or EGE 250 with a minimum grade of C-) and (EGE 201 with a minimum grade of C- or EGE 209 with a minimum grade of C-)

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM335. Thermo System Design. 3 Credits.

Thermodynamics of power cycles, refrigeration, air conditioning, and combustion processes; analysis, design, and testing of systems involving both conventional and renewable energy sources for power generation, heating, and cooling applications.

Prerequisites:

- EGM 331 with a minimum grade of C- and EGM 332 (may be taken concurrently) with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM393. Engineer-Mechanical Sel Topics. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate

EGM441. Mechanical Vibrations. 3 Credits.

The objective of this course is for students to learn analytical, experimental, and numerical treatment of vibration phenomena. Topics include linear oscillator analysis (Laplace transforms, complex harmonic balance, Fourier transforms, eigenvalue problems, modal analysis, and simulation), experimental methods, and an introduction to nonlinear dynamic systems. Free and forced vibrations of mechanical systems with lumped inertia, springs, and dampers are the primary emphasis.

Prerequisites:

- EGM 212 with a minimum grade of C- and MAT 362 with a minimum grade of C-

Restrictions:

- Must have the following level: Undergraduate
- Must have the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Mechanical Engineering (521)
 - Electrical Engineering (517)

EGM493. Engineer-Mechanical Sel Topics. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate

EGM494. Fieldwork Mechanical Engineering. 1-12 Credits.

Restrictions:

- Must have the following level: Undergraduate

EGM495. Indep Study Mech Engineering. 1-12 Credits.

Restrictions:

- Must have the following level: Undergraduate