

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.

Attributes:

- Critical Thinking Introductory

Restrictions:

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

Prerequisites:

- EGG101 Minimum Grade of C-*
- PHY201 Minimum Grade of C-
- PHY211 Minimum Grade of C-

* May be taken at the same time

May not be repeated for credit

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

May be repeated for credit

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.

Attributes:

- Information Mgmt Intro

Restrictions:

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

Prerequisites:

- EGM101 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

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

Prerequisites:

- PHY201 Minimum Grade of C-
- PHY211 Minimum Grade of C-
- MAT252 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

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

Prerequisites:

- EGM211 Minimum Grade of C-
- MAT359 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

EGM213. Dynamics Laboratory. 1 Credit.

An introduction to experimental methods in Mechanical Engineering relating to rigid body kinematics, and dynamics of vibrating systems. Experimentation, data acquisition and analysis / interpretation of experimental data, comparison of measurements to numerical/analytical predictions, and formal engineering report writing.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM212 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

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

Prerequisites:

- CHE201 Minimum Grade of C-
- CHE211 Minimum Grade of C-

May not be repeated for credit

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

May be repeated for credit

EGM295. Indep Study Mechanical Engineering. 1-12 Credits.**Restrictions:**

- Must have the following level: Undergraduate

May be repeated for credit

EGM301. Design of Measurement Instrumentation. 1 Credit.

Building upon the practical experiences in EGM101 & EGM201, 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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM101 Minimum Grade of C-
- EGE201 Minimum Grade of C-

May not be repeated for credit

EGM302. Intro to Finite Element Analysis. 3 Credits.

An introduction to the theory and practice of finite element analysis. Basic computation of one and two-dimensional structural elements (such as truss, beams, and plane elements) are introduced. Complex applications of commercial finite element packages in the areas of statics, strength of materials, and heat transfer are covered through in-class (hands-on) experiences, and projects.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM322 Minimum Grade of C-
- EGM331 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

EGM303. Advanced Computer Aided Design. 3 Credits.

Building from a foundation of existing fundamental Computer Aided Design skills, students will develop requisite skills and management techniques to gain an understanding and appreciation to effectively use CAD from project inception to completion.

Restrictions:

- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - BS CE/MS Elec. Engineering (268)
 - BS EE/MS Elec. Engineering (269)
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGG101 Minimum Grade of C-

May not be repeated for credit

EGM304. Design of Machine Elements. 3 Credits.

Using concepts of failure prevention, this course introduces machine component design. A wide range of engineered mechanical elements (such as fasteners, shafts, and springs) are analyzed considering manufacturing, design, and implementation. The principles of material selection and processing (including welding, machining, casting, forming, and molding) and their design are introduced. Finally, geometric interaction of elements is considered through fits and tolerances with emphasis on function, performance, and reliability.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - BS CE/MS Elec. Engineering (268)
 - BS EE/MS Elec. Engineering (269)
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM311 Minimum Grade of C-
- EGM322 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM212 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM311 Minimum Grade of C-
- EGE200 Minimum Grade of C- or EGE 250 Minimum Grade of C-
- EGE201 Minimum Grade of C- or EGE 209 Minimum Grade of C-

May not be repeated for credit

EGM322. Mechanics of Materials. 3 Credits.

An introduction to solid mechanics, with topics including stress and strain in structural elements, mechanical properties of materials, extension / torsion / bending of members, combined loadings, static indeterminacy, stress / strain transformations, Mohr's circle, failure theories, buckling and strain energy.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM221 Minimum Grade of C-
- EGM211 Minimum Grade of C-

May not be repeated for credit

EGM323. Materials Lab. 1 Credit.

Study of the properties, behavior, and performance of engineering materials including: stress-strain relations, strength, deformation, and fracture. 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 not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM322 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- CHE201 Minimum Grade of C-
- CHE211 Minimum Grade of C-
- PHY202 Minimum Grade of C-
- PHY212 Minimum Grade of C-
- MAT252 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM212 Minimum Grade of C-
- EGM331 Minimum Grade of C-*
- MAT359 Minimum Grade of C-

* May be taken at the same time

May not be repeated for credit

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.

Attributes:

- Critical Thinking Intermediate
- Information Mgmt Intrmd

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM331 Minimum Grade of C-
- EGM332 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM331 Minimum Grade of C-
- EGM332 Minimum Grade of C-
- EGE200 Minimum Grade of C- or EGE 250 Minimum Grade of C-
- EGE201 Minimum Grade of C- or EGE 209 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM331 Minimum Grade of C-
- EGM332 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

EGM336. HVAC. 3 Credits.

Fundamentals of single and multistage vapor-compression refrigeration cycles and their component devices will be studied in depth. Psychrometric fundamentals and air treatment techniques common in air conditioning systems will be covered. Load estimation calculations will be performed.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - BS CE/MS Elec. Engineering (268)
 - BS EE/MS Elec. Engineering (269)
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM331 Minimum Grade of C-
- EGM332 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

EGM340. Mechanical Measurements. 3 Credits.

This course will explore the background, theory, and practice of engineering measurements. Topics will include design of measurement systems, test plans, statistics, analog/digital sampling methods, and measurement instrumentation.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE200 Minimum Grade of C-

May not be repeated for credit

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
- Must not be enrolled in the following class: Freshman

May be repeated for credit

EGM421. Mechanical Behavior of Materials. 3 Credits.

Fundamentals for understanding and manipulating the mechanical behavior of engineering materials. Building upon the principles of materials science and solid mechanics, this course covers the mechanisms, as well as the material structure-property relationship, behind material failure that includes fracture, fatigue and creep. Further, the theories and models for predicting and preventing material failure will be introduced through case studies on machinery and IC circuitry.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - BS CE/MS Elec. Engineering (268)
 - BS EE/MS Elec. Engineering (269)
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM322 Minimum Grade of C-

May not be repeated for credit

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.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGM212 Minimum Grade of C-
- MAT362 Minimum Grade of C-

May not be repeated for credit

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
- Must not be enrolled in the following class: Freshman

May be repeated for credit

EGM494. Fieldwork Mechanical Engineering. 1-12 Credits.**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit

EGM495. Indep Study Mech Engineering. 1-12 Credits.**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit