

# ENGINEERING: GENERAL (EGN)

## **EGN 1041C - Computational Tools for Eng (2 Credits)**

Introduction to logical problem solving strategies and computation tools for engineers.

**Prerequisite(s):** MAC 2311 and (EGN 1006L (may be taken concurrently) or EGS 1006L (may be taken concurrently))

## **EGN 2111C - Engineering Computer Graphics (3 Credits)**

Spatial visualization, descriptive geometry and design communication methodology. Computer graphics techniques used to conceive, model, analyze, simulate, and evaluate design ideas. Emphasis on state-of-the-art Computer-Aided design and geometric modeling software tools.

**Prerequisite(s):** MAC 2311

## **EGN 3060C - Intro to Mechatronic Design (3 Credits)**

Introduction to microprocessor controlled electromechanical systems and design. Interfacing sensors and actuators, electrical and mechanical prototyping and construction. Use of the engineering design process to develop computer-controlled electromechanical projects.

**Prerequisite(s):** (PHY 2049C or (PHY 2049 and PHY 2049L)) and (EGM 3420C or COP 2001)

## **EGN 3331C - Mechanics of Materials (3 Credits)**

Analysis of deformable solids subjected to force systems. One, two, and three-dimensional stress and strain relationships for linear elastic solids. Statically determinate and indeterminate axial force, torsion, and bending members. Stress transformations, pressure vessels, and combined loading. Introductory aspects of column buckling.

**Prerequisite(s):** EGM 3420C and EGN 1041C

## **EGN 3343C - Thermodynamics (3 Credits)**

Fundamental concepts of basic thermodynamics including first and second law topics, equations of state and general thermodynamic relationships. Work, heat and energy transformations. Relation of properties. Laws, concepts and modes of analysis common to all applications of thermodynamics in engineering.

**Prerequisite(s):** (CHM 1045C or (CHM 1045 and CHM 1045L)) and (PHY 2048C or (PHY 2048 and PHY 2048L))

**Attribute(s):** SUSC - Sustainability Component

## **EGN 3433C - Design for Manufacturing (3 Credits)**

This course introduces students to the design, manufacture, and assembly of products with a focus on biomedical applications. Students will become familiar with computer-aided techniques for design, with common manufacturing processes, and with the analysis of parts and assemblies.

**Prerequisite(s):** MAC 2312 and (PHY 2048C or (PHY 2048 and PHY 2048L)) and EGN 1041C

## **EGN 3441C - Data Sci & Eng Sys Analysis (3 Credits)**

An introduction to the integration of data, data analytics, and systems thinking for the analysis and design of engineering projects.

**Prerequisite(s):** EGN 1041C and (EGM 3420C or ENV 3006C)

## **EGN 3641C - Engineering Entrepreneurship (3 Credits)**

Introduces students to engineering entrepreneurship through case studies and the process of implementing an engineering service learning project.

**Prerequisite(s):** EGN 3331C or COP 2001 or EGN 3343C or EGN 3433C

## **EGN 4900 - Directed Engineering Research (1-4 Credits)**

Supervised research on an engineering topic. Content is selected by students in conjunction with the faculty advisor and is usually specific to the students' engineering discipline. Research is conducted by students directly under the supervised direction and with the consent of a faculty mentor. ~ Admission to the U.A. Whitaker School of Engineering and approval of the student's Department Chair are required. The course may be repeated with different content.

## **EGN 4908 - Engineering Independent Study (1-4 Credits)**

Independent study for students under the direction of a faculty mentor. The topic will be determined between the student, the faculty mentor, and the department chair. Instructor permission required. This course may not cover engineering topics already covered in the curriculum.

## **EGN 4910 - Engineering Research (1-3 Credits)**

Research projects are developed by one or more students under the supervision of a faculty mentor. The research project is designed to hone skills in applying research principles, obtain practice in data collection and analysis, and to develop knowledge and skills in potential professional areas. Student/instructor contract required.

## **EGN 4930 - Special Topics in Engineering (1-4 Credits)**

This course will be developed to allow the inclusion of contemporary engineering content that will be suitable for any of the engineering degree disciplines. The course will also contain interdisciplinary content which exposes recent developments in engineering science and design.

## **EGN 4940 - Engineering Internship (1-3 Credits)**

An experiential learning exercise that allows for practical application of knowledge acquired in the classroom. Applicable to unpaid internships held within the current academic year or subsequent summer. This work is usually completed off campus and the student will have a qualified supervisor at the site as well as a faculty mentor who will jointly evaluate the student's progress.

**Attribute(s):** SUSC - Sustainability Component, WBLI - Work based learning indicator

## **EGN 5932C - Special Topics Engineering (1-4 Credits)**

Courses centering around topics of current interest or of special interest to students or faculty. Topics may vary according to interests and need of students. The course may be repeated with different content.

## **EGN 6228C - GIS for Engineers (3 Credits)**

To provide a basic understanding of geographic information system concepts as applied to environmental and civil engineering using ArcGIS. It includes spatial data acquisition, metadata development, spatial query, spatial analysis, mapping, and dynamic visualization.

## **EGN 6345 - Introduction to Energy Systems (3 Credits)**

Fundamental energy concepts and analysis methods for power generation, heating and transportation. Mechanisms of heat transfer; First and second laws of thermodynamics, enthalpy, entropy and available energy of systems in equilibrium; Process efficiency.

## **EGN 6430 - Advanced Engineering Analysis (3 Credits)**

Methods of analysis applied to engineering problems. Topics include a review of vector calculus, linear algebra, analytical solutions and numerical integration of differential equations, finite integrals, and computer simulation and modeling.

## **EGN 6457 - Research Methods (3 Credits)**

The application of statistical analyses to engineering problems. The course emphasizes theory and methods of conducting advanced research, including the scientific method.

**EGN 6730 - Renewable Sustainable Systems (3 Credits )**

Well-to-wheels analysis, lifecycle energy and emissions, total cost. Skill sets, methodologies and tools needed to analyze various technologies on a consistent basis for a given application.

**EGN 6941 - Project (3 Credits )**

Individual work culminating in a professional practice-oriented report.

**EGN 6971 - Thesis 1 (3 Credits )**

Research under the supervision of a faculty advisor. The research work will culminate with an acceptable thesis proposal.

**EGN 6973 - Thesis 2 (3 Credits )**

Continuing research under the supervision of a faculty advisor. The research work will culminate with an acceptable thesis.