J. Sargeant Reynolds Community College
Course Content Summary

Course Prefix and Number: EGR 122 Credits: 3

Course Title: Engineering Design

Course Description:

Applies engineering methods to a semester-long team design project with an emphasis on engineering software involving 2D and 3D computer aided design; data modeling and analysis; and iterative programming solutions. Covers design drawings and dimensioning; spreadsheet software usage; mathematical scripting language; and professional practices. 3 credits. Prerequisite: EGR 121 or departmental permission. Lecture 2 hours. Laboratory 2 hours. Total 4 hours per week. 3 credits

General Course Purpose:

Prepare students for further study in any Engineering curriculum

Course Prerequisites/Corequisites:

EGR 121 or departmental permission

Course Objectives (Lab Objectives designated with *):
Upon completing the course, the student will be able to:

Problem Solving

- Identify and solve problems using engineering methodologies
- Technology Application
- Use spreadsheet, word processing and presentation software to collect, organize, analyze and present engineering data

Communication

- Effectively communicate engineering work in oral, written, and visual formats, using graphical information as relevant

Collaboration

- Improve teamwork skills through a semester-long project

Professional Ethics

- Explore important contemporary issues facing engineering through case study and/or design project

Design Process

- Apply the engineering design process including needs identification, specification, analysis of design alternatives, planning, prototyping, testing, and delivery

- Consider sustainability and economic, societal, and environmental impact of design options

Programming Skills

- Write computer programs for engineering analysis using mathematical scripting software to include looping structures and user-defined functions*
- Develop and apply flowcharts to create algorithms

Engineering Drawings

- Produce and interpret drawings appropriate to various engineering or related disciplines*
- Produce engineering sketches by hand*
- Demonstrate foundational skill with 2D and 3D computer aided engineering software, to include dimensioning, scaling, orthographic, isometric and exploded views, and assembly*
- Demonstrate an understanding of tolerances and precision

Data Modeling and Analysis

- Model systems and analyze data using linearization, correlation, and normal distribution

Design Project

- Apply the design process in a semester-long team project*
- Demonstrate a basic level of understanding of project management methods
- Demonstrate knowledge of basic intellectual property considerations
- Create appropriate design drawings*
- Create and evaluate a physical prototype*
- Write a formal design report documenting the considerations in the design process
- Deliver engineering presentation and demonstrate prototype
- Evaluate team dynamics, and project process and results

Major Topics to be Included:

- Problem Solving
- Technology Application
- Communication
- Collaboration
- Professional Ethics
- Design Process
- Programming Skills
- Engineering Drawings
- Data Modeling and Analysis
- Design Project

Effective Date/Updated: August 1, 2023