

Virginia Western Community College
EGR 122
Engineering Design

Prerequisites

EGR 121 with a grade of C or higher, or departmental approval

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.

Semester Credits: 3 Lecture Hours: 2 Lab Hours: 2

Required Materials**Textbooks:**

Thinking Like an Engineer 5th Edition with MyLab, Stephan, Bowman, Park, Sill, Ohland, ©2022, ISBN-13: 978-0-13-693220-8, Publisher: Pearson. For example: <https://www.pearson.com/en-us/subject-catalog/p/thinking-like-an-engineer/P200000003151/9780137446711>.

(For this course, you need a code for MyLab Engineering access.)

Other Required Materials:

Scientific Calculator: TI-83 or higher (TI-89 or higher recommended), Engineering Computation Paper

Course Outcomes

At the completion of this course, the student should 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

Topical Description

1. **Problem Solving**
2. **Technology Application**
3. **Communication**
4. **Collaboration**
5. **Professional Ethics**
6. **Design Process**
7. **Programming Skills**
8. **Engineering Drawings**
9. **Data Modeling and Analysis**
10. **Design Project**

Notes to Instructors

- All instructors teaching this course in any given semester will use the same textbooks.
- This course and its grades will be structured around a minimum of two in-semester tests, a final exam, homework assignments, and a 10-week or longer group project.
- A broad overview, comprehensive final exam will be given, which must be at least 10% of the final course grade.
- The content of this course will be updated every few years in collaboration with engineering faculty from across the VCCS and at 4-year public institutions in Virginia.

[ADA Statement](#) (PDF)

[Title IX Statement](#) (PDF)