

COURSE OUTLINE

Engineering Concepts

Course Description

EN 115. Engineering Concepts. 2 hours credit. Prerequisite: MA 060 or its equivalent with a C or better. This course will enable the student to formulate engineering problems and use solution techniques in engineering design projects using software and hardware.

Course Relevance

This course is designed to be an introduction to the field of engineering. The student who takes this course will determine whether he/she enjoy(s) and has the aptitude to solve engineering problems. It will also help determine which engineering field the student wishes to pursue.

Required Materials

None

Supplemental materials:

Working Model software provided. Knowledge Revolution publisher.

Learning Outcomes

The intention is for the student to be able to

1. Design projects within design constraints
2. Create software and hardware models

Primary Learning PACT Skills that will be DEVELOPED and/or documented in this course

Through the student's involvement in this course, he/she will develop and document his/her achievement of the following primary PACT skills:

1. Problem Solving
 - The student will develop problem solving skills through the use of multi-step problems
2. Field-Related Technology
 - The student will develop field-related technology skills through the use of working model software

Secondary (developed but not documented)

Teamwork
Reading
Listening

Major Summative Assessment Task

These learning outcomes and the primary Learning PACT skills will be demonstrated by:

1. Completing an engineering design project requiring several design steps which integrate software and hardware

Course Content

- I. Themes – Key recurring concepts that run throughout this course:
 - A. Learning math and technical skills
 - B. Working as a team
- II. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
 - A. Resolving hardware and software conflicts
 - B. Refining models to match physical reality
- III. Concepts – Key concepts that must be understood to address the Issues:
 - A. Graphing
 - B. Design software
 - C. Visualization
 - D. Number sense
- IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
 - A. Number sense
 - B. Conversion factors
 - C. Software skills
 - D. Geometry
 - E. Construction skills

Learning Units

- I. Conversion factors
 - A. Metric vs. English
 1. Prefixes
 2. Basic units
 - B. Compound units
 - C. Density units
 - D. Accuracy vs. precision
- II. Introduction to Working Model software
 - A. Icons
 1. Rectangular body
 2. Springs
 3. Pins
 4. Connectors
 5. Anchors
 - B. Object properties
 1. Geometry
 2. Appearance
 3. Properties

- III. Presenting data
 - A. Graphing model data
 - 1. Axes
 - 2. Data range
 - 3. Exporting data
 - B. Throwing arms
 - 1. Length change
 - 2. Pivot ratio change
 - 3. Mass change

- IV. Building a model
 - A. Working with PVC pipe
 - 1. Cutting
 - 2. Gluing
 - B. Comparing PVC model to working model software
 - 1. Adjusting parameters
 - 2. Modeling a 3D object in 2D

Learning Activities

Independent learning activities will be assigned to assist the student to achieve the intended learning outcomes. Activities identified in the syllabus, such as class discussion, lecture, reading, in-class presentations, group work or projects will also contribute to learning.

Grade Determination

Grade determination will be based on assessment tasks and other activities such as exams, assignments, group work or projects that the instructor identifies in the syllabus.