University Of California, Berkeley
Department of Mechanical Engineering

Engineering 128 – Advanced Engineering Design Graphics [3 Units]

Undergraduate Technical Elective

Syllabus

CATALOG DESCRIPTION

Advanced graphics tools for engineering design. Parametric solid modeling. Assembly modeling. Presentation using computer animation and multimedia techniques.

COURSE PREREQUISITES

- E28, E45

PREREQUISITE KNOWLEDGE AND/OR SKILLS TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

- Basic solids modeling or descriptive geometry, engineering drawing practices
- Recommended text: *Inside 3D Studio Max,* Miller, et. Al, New Riders Publishers, 2005.
- Recommended text: *Pro/Engineer Wildfire Instructor,* David Kelly, McGraw-Hill Publishers, 2005.

COURSE OBJECTIVES

- Introduce advanced techniques for creating, manipulating, and editing solid models.
- Refine solid modeling, assembly modeling, and engineering drawing skills using commercial software.
- Introduce computer animation as a technical presentation method.

DESIRED COURSE OUTCOMES

Upon completion of the course, students shall be able to:

- Create and export complex computer generated solid models using a variety of software tools.
- Create and export computer-generated animations showing the assembly and operation of a moderately complex mechanical device.

TOPICS COVERED

- Working with a 2-dimesional parametric sketching tool
- Dimensional and geometric, hard and soft constraints
- Extruded and rotated features
- Holes, rounds, chamfers, shell, and other features
- Supplementary reference planes
- Sweeps and blends
- Duplicating features

- Assembly modeling
- Extracting drawing from models
- Creating and editing geometry with a surface modeler
- Basic animation techniques, storyboarding, keyframing
- Creating the appearance of materials, cosmetic features
- Parent child relationships between objects
- Advanced keyframing, motion controllers
- Lights and cameras
- Exporting animation files

CLASS/LABORATORY SCHEDULE

There are two 50-minute lectures and one 160-minute computer laboratory session per week.

CONTRIBUTION OF THE COURSE TO MEETING THE PROFESSIONAL COMPONENT

Students learn advanced solid modeling theory and techniques using software tools used by engineers in the field. Economic, manufacturing, and fabrication issues are considered throughout the course as they apply to the topics addressed. Students are required to work in a group through the semester-long design project. As part of this project, students are required to communicate orally and graphically, and make presentations to the class and instructors.

RELATIONSHIP OF THE COURSE TO UNDERGRADUATE DEGREE PROGRAM OBJECTIVES

This course provides valuable training in the use of computer-aided graphics tools for the design and analysis of engineering parts and assemblies. These skills are invaluable for the creation of complex solid models used for mechanical design in the field. This course also provided training in the use of computer-generated animation as a graphical tool for communication with technical and non-technical audiences.

ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES

- Homework assignments on a weekly basis.
- Semester design project

PERSON(S) WHO PREPARED THIS DESCRIPTION: D. K. Lieu