

Department of Mechanical Engineering
FED - 101C Fundamentals of Engineering Design, CAD and Graphics
Component

Description:

Study technical graphics and the computer for technical drawings and visualization. Discuss geometry commonly used in engineering design graphics, orthographic projections, dimensioning techniques, tolerance, and introduction to auxiliary and sectional views. Apply the software program Pro/ENGINEER® to various problems. Interdisciplinary course coordinated by the Office of the Dean of Freshman Studies and the Office of the Dean, Newark College of Engineering.

Prerequisites by Topic:

None

Co-requisite:

1. HSS 100 Spring or HSS 101 Fall

Textbook(s)/Materials Required:

1. A package (ISBN 0-07-403479-0) consisted of:
 - a. Fundamentals of Graphics communication, 2nd Edition, Bertoline et al, WCB/McGraw-Hill, 1998, ISBN 0-07-289201-3
 - b. Student CD-ROM to accompany fundamentals of Graphics Communication, 2nd Edition, ISBN 0-07-365478-7
 - c. Problems for Engineering Graphics Communication and Technical Graphics communication, Revised Edition, Bertoline, Irwin McGraw-Hill, 1997, ISBN 0-256-26780-4
2. Pro/ENGINEER Tutorial and MultiMedia CD
A click-by-Click Primer
Release 20/2000i with MultiMedia CD

Text by Roger Toogood
University of Alberta

CD by Jack Zecher
Indiana University Purdue University Indianapolis
ISBN: 1-887503-93-5

Course Objectives:

1. Students will develop the ability to think and visualize objects in a three-dimensional world.
2. Students will develop and communicate the design concepts using traditional graphics and computer models.
3. Freshman students will learn computer applications for solving problems.

Topics:

1. Introduction to design process – technical graphics including traditional hands drawing, computer modeling, and computer generated drawings as communication tools in the design.
2. Theory and Traditional Engineering Graphics – Hands Drawing
 - a. traditional tools of Engineering Graphics.
 - b. The alphabet of lines.
 - c. Metric, Engineer, and Architect scales.
 - d. Techniques for lines, arcs using traditional tools.
 - e. Technical sketching.
 - f. Pictorial drawing – Perspective, Oblique, and Axonometric (Isometric, Dimetric, and Trimetric).
 - g. Multi-view drawing – Front & Rear, top & Bottom, Right & left-Side views.

- h. Border and title block.
- i. Dimensioning techniques and tolerance.
- j. Introduction to auxiliary and sectional views.
- 3. Solid modeling using software package Pro/ENGINEER.
 - a. Model created using protrusion/extrusion.
 - b. Adding holes and cuts on the existing model.
 - c. Model creation by revolving the section.
 - d. Creating rounds, chamfers, and slots.
 - e. Copying and mirroring the features.
 - f. Modifying part by changing the dimension parameters.
- 4. Computer Generated Engineering Drawing
 - a. Selecting sheet format of border and title block.
 - b. Creating the views such as front, top, right side views- add 3-D view as additional view on the drawing.
 - c. Adding dimensions.
 - d. Cosmetic changes of the dimensions
 - e. Adding a note.
 - f. Changing the part/drawing – exploring associativity.
- 5. Assembly Operations
 - a. Assembly constraints
 - 1. Mate and Mate Offset.
 - 2. Align and Align Offset.
 - 3. Orient.
 - 4. Insert.
 - b. Assembly and Part Modifications.
 - c. Exploding the assembly.
 - d. Assembly drawing.

Schedule:

Professional Component:

Program Objectives Addressed:

Prepared by:

Heril Surjanhata,

Date: September 18, 2000.

Course Objectives - FED – 101C Fundamentals Of Engineering Design, Cad/Graphics Component

Objective 1: To develop the ability to think in real world 3-D.				
Strategies and Actions	Student Learning Outcomes	Outcome (a-k)	Prog. Object.	Assessment Methods/Metrics
Students will be lectured about 3-D pictorial view of an object, oblique and axonometric projections (isometric, trimetric, and diametric), isometric free-hands sketching, and multi-view projections. Students will use solid modeling software to create a part or object, so that the visualization of an object from any direction can be easily done.	Students will be able to visualize an object in 3-D.	(a-k):		Quizzes; Classroom Participation; Assignments/Projects
Objective 2: To develop and communicate the design concepts using traditional graphics and computer models.				
Students will be lectured about using the traditional tools to do hands drawings such as 3-D sketching, multi-view with dimensions. Pro/ENGINEER as solid modeling will be used to generate solid model, then detailed drawings	Students will be able to produce technical drawings either by hands or computer generated.	(a-k):		Quizzes; Classroom Participation; Assignments/Projects
Objective 3: To enable freshman students to learn computer applications for solving problems.				
Students will be instructed in using solid modeling package Pro/ENGINEER. Microsoft Office is also available for students to write technical report and presentations.	Students will be able to develop ability to create parts, and assemble the parts to create a functional assembly as part of problem solving.	(a-k):		Quizzes; Classroom Participation; Assignments/Projects
Objective 4: To couple the FED-101D, Design component with HSS 101 and HSS101H and enable engineering faculty and humanities faculty to work together to improve both oral and written communication.				
Students will have their Design Component running parallel with CAD/Graphics Component.	Students will be able to use their CAD/Graphics knowledge to develop their design ideas from sketches into computer solid models.	(a-k):		Quizzes; Classroom Participation; Assignments/

Department of Chemical Engineering, Chemistry & Environmental Science
FED 101D– 001, 009 Fundamentals of Engineering Design
Design Component

Description:

Interdisciplinary teams work on open-ended engineering projects. Modules introduce real engineering problems from Chemical, Civil, Electrical, Industrial, Mechanical, Environmental, Biomedical, Manufacturing Engineering and Optical Science and Engineering. Covers product design and development, processes, manufacturing and measurements. Interdisciplinary course coordinated by the Office of the Dean of Freshman Studies and through the Office of the Dean, Newark College of Engineering.

Prerequisites:

None

Co-requisite:

1. HSS 100 Spring or HSS 101 Fall

Textbook(s)/Materials Required:

1. “Freshman Engineering Design: Chemical Engineering Module” NJIT, 2000.

Course Objectives:

1. Freshmen will work on real engineering problems at the start of their education prior to the senior capstone design courses.
2. Students will learn the team approach to problem solving.
3. Freshmen will learn computer applications for problems in the freshman year.
4. The FED 101D Design component, HSS 101 and HSS 101H faculty will work together to improve both oral and written communications skills of students.

Topics:

1. Safety
2. Dimensions
3. Unit Conversions
4. Measurements and Statistics
5. Data Evaluation
6. Written/oral presentations
7. Reports
8. THEMIC APPROACH: Environmental Cleanup

Schedule:

Professional Component:

Program Objectives Addressed:

Prepared by:

S. Sofer,

Date: September 18, 2000

Department of Civil and Environmental Engineering
FED 101D - Fundamentals Of Engineering Design

Description:

Interdisciplinary teams of students work on open-ended engineering problems. Modules introduce real engineering problems from Chemical, Civil, Electrical, Industrial, Mechanical, Environmental, Biomedical, Manufacturing Engineering and Optical Science and Engineering. Covers product design and development, processes, manufacturing and measurements. Interdisciplinary course coordinated by the Office of the Dean of Freshman Studies and through the Office of the Dean, Newark College of Engineering.

Prerequisites:

None

Co-requisite:

1. HSS 100 Spring or HSS 101 Fall

Textbook(s)/Materials Required:

None

Course Objectives:

- 1 Freshmen will work on real engineering problems at the start of their education prior to the senior capstone design courses.
2. Students will learn the team approach to problem solving.
3. Freshmen will learn computer applications for problems in the freshman year.
4. The FED 101D Design component, HSS 101 and HSS 101H faculty will work together to improve both oral and written communications skills of students.

Topics:

1. Introduction to the Civil and Environmental Module; introduction to the design process; Overview of the concepts of contaminant cleanup: Superfund, Brownfields
2. Overview of the Civil and Environmental Engineering Module Project; problem statement and inventory of contaminants.
2. Data collection including field trip to the site and review information.
3. Discuss various methods of clean up and estimation of cleanup costs
4. Discuss political, social, economic, environmental, safety, ethical and related issues. Evolve development strategy and initiate conceptual design
5. Discuss cost estimate and finalize design after a few iterations
6. Discuss written and oral technical reporting
7. Presentation by student teams
8. Rebuttal by student teams to issues aroused during presentation.

Schedule:

Professional Component:

Program Objectives Addressed:

Prepared by:

Dorairaja Raghu,

Date: September 18, 2000

Department of Electrical and Computer Engineering
FED 101D - Fundamentals Of Engineering Design

Description:

Interdisciplinary teams of students work on open-ended engineering problems. Modules introduce real engineering problems from Chemical, Civil, Electrical, Industrial, Mechanical, Environmental, Biomedical, Manufacturing Engineering and Optical Science and Engineering. Covers product design and development, processes, manufacturing and measurements. Interdisciplinary course coordinated by the Office of the Dean of Freshman Studies and through the Office of the Dean, Newark College of Engineering.

Prerequisites:

None

Co-requisite:

1. HSS 100 Spring or HSS 101
Fall

Textbook(s)/Materials Required:

1. "The Electrical Engineering Module" NJIT, 1995

Course Objectives:

1. Freshmen will work on real engineering problems at the start of their education prior to the senior capstone design courses.
2. Students will learn the team approach to problem solving.
3. Freshmen will learn computer applications for problems in the freshman year.
4. The FED 101D Design component, HSS 101 and HSS 101H faculty will work together to improve both oral and written communications skills of students.

Topics:

1. Electric circuits and the analogy to water flow.
2. Voltage, currents and resistance.
3. Ohm's Law and Kirchnoff's Law.
4. Measurement techniques.
5. Wiring techniques using a designer's proto-board
6. Measurements of the characteristics of diodes, transistors, photoresistors, and solar cells.
7. Transistor circuits.
8. The design process (guided).
5. Tests & oral presentation

Schedule:

This module represents 15 weeks of laboratory/class instruction, 2 hrs per week: Total 30 hrs.

Professional Component:

Program Objectives Addressed:

Prepared by:

J. Strano,

Date: September 28, 2000

Course Objectives - FED – 101D - Fundamentals Of Engineering Design – Design Component

Objective 1: To enable freshman to work on real engineering problems at the start of their education prior to the senior capstone design courses				
Strategies and Actions	Student Learning Outcomes	Outcomes (a-k)	Prog. Object.	Assessment Methods/Metrics
Discipline specific modules and inter. disciplinary modules are developed to give students a “hands on” experience.	Students working on the various specific modules are learning the principles of engineering design and the solution of open-ended problems.	(a-k):		Examinations; Student Surveys; Written Reports; Oral Pres.; Team Effort; Evaluations
Objective 2: To enable students to learn the leaner approach to problem solving.				
Students work in teams of 2, 3, or 4 on the assigned modules.	Students working on the modules learn the dynamics of team effort, leadership, scheduling, cooperation, responsibility, conflict resolution	(a-k):		Student Surveys; Classroom/Lab.; Team Oral Pres.; Team Effort on Design; individual report writing.
Objective 3: To ignite interest in engineering in the freshman year with “hands-on” experience.				
Discipline and Interdisciplinary modules all involve some “hands-on” experience	Modules teach the principles at an early stage of eng. with “hands on” , “real life” problems	(a-k):		Student Surveys; Classroom/Lab. Observation; Written Reports; Oral Pres.
Objective 4: To improve student retention				
Institutional Research group performs statistical studies	Students are excited and intrigued by the eng. problems and are determined to complete the eng. program.	(a-k):		Statistical Studies by Institute Research group
Objective 5: To initiate curriculum change.				
FED is introduced in the freshman year and we are working to develop threads from the first year to the fourth year. To teach design and communication skills	Students critical thinking skills, incorporate team effort in all their curriculum courses and improve oral and written communication skills. Students learn from the modules and give faculty suggestions for curriculum reform	(a-k):		Improved performance in senior design capstone courses; Students have told us that FED course has aided them in subsequent courses
Objective 6: To enable freshman to learn computer applications to problems in the freshman year.				
All modules involve the use of the computer to complete the project.	Students learn how to apply the computer eng. problems and to their communications skills.	(a-k):		Report Calculations and Correlation; Written Reports; Oral Pres.
Objective 7: To couple FED 101D, Design Component with HSS 101 and HSS 101H and enable engineering faculty and humanities faculty to work together to improve both oral and written communication skills				
Design and Humanities Faculty are paired. to develop common objectives to improve written and oral reports	Students learn how to write and orally present better reports because the paired faculty have coordinated their effort to improve communication skills.	(a-k):		Improved Written Reports; Improved Oral Pres.