

ENGR 25 Course Outline as of Fall 2002**CATALOG INFORMATION**

Dept and Nbr: ENGR 25 Title: ENGR GRAPH & DESIGN

Full Title: Engineering Graphics and Design

Last Reviewed: 2/24/2020

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.50	17.5	Lecture Scheduled	43.75
Minimum	3.00	Lab Scheduled	1.50	17.5	Lab Scheduled	26.25
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 87.50

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

Catalog Description:

Basic principles of engineering graphics including: orthographic projection, descriptive geometry, and geometric tolerancing are introduced with an emphasis on solutions to mechanical and civil engineering problems in three dimensional space. AutoCAD coverage emphasizes 3D solid modeling, but includes 2D commands and working drawings in a project and oral presentation format. Engineering group design processes are introduced and applied using design contests.

Prerequisites/Corequisites:

MATH 27 (formerly MATH 57) with a grade of 'C' or better.

Recommended Preparation:

Course Completion of APTECH 46 (or APTECH 56 or ENGR 56 or ENGR 22)

Limits on Enrollment:**Schedule of Classes Information:**

Description: Graphical solutions to engineering problems using sketching and computer-aided design methods (AutoCAD). Focus is on three dimensional visualization and problem solving. Engineering design in a group project format. (Grade Only)

Prerequisites/Corequisites: MATH 27 (formerly MATH 57) with a grade of 'C' or better.
Recommended: Course Completion of APTECH 46 (or APTECH 56 or ENGR 56 or ENGR 22)
Limits on Enrollment:
Transfer Credit: CSU;UC. (CAN ENGR2)
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	Area	Effective:	Inactive:	
CSU GE:	Transfer Area	Effective:	Inactive:	
IGETC:	Transfer Area	Effective:	Inactive:	
CSU Transfer:	Transferable	Effective:	Spring 1989	Inactive:
UC Transfer:	Transferable	Effective:	Spring 1989	Inactive:

CID:

Certificate/Major Applicable:
Not Certificate/Major Applicable

COURSE CONTENT

Outcomes and Objectives:

The student will:

1. Make freehand pictorial and orthographic sketches of objects.
2. Construct auxiliary views and section views.
3. Learn the terminology and standards of geometric tolerancing.
4. Develop three dimensional visualization skills.
5. Practice teamwork through group projects.
6. Understand models of the engineering design process.
7. Practice public speaking and group communication skills.
8. Construct solid models of objects in AutoCAD.
9. Develop networking and practical experience by making a CAD drawing for a local company.

Topics and Scope:

1. Freehand sketching of isometric and orthographic views.
2. Primary auxiliary views of objects to show true shape surfaces.
3. Section views and hatching patterns.
4. Layout, outline, assembly, and detail drawings.
5. Measurement of true length, true angles, grades, slopes, azimuths, and bearings.
6. Review of conventional dimensioning and tolerancing.
7. ASNI hole basis standards for clearance, interference, and transition fits.
8. Geometric dimensioning and tolerancing: datums, symbols, material modifiers.

9. Discussion of algorithms for the engineering design process.
10. Concurrent engineering and design for manufacturing concepts.
11. Documentation standards for engineering projects.
12. Common requirements for engineering presentations.
13. Solid modeling primitives in AutoCAD: box, cylinder, torus, cone, wedge, sphere.
14. Solid modeling construction in AutoCAD: revolve, extrude, union, subtract, intersection, fillet, chamfer, section, slice, interference, align, 3Darray, 3Dmirror, 3Drotate.
15. Parametric modeling in CAD.
16. Geometric dimensioning and tolerancing in AutoCAD.

Possible additional topics:

1. Perspective drawings.
2. Graphical solution of civil engineering problems: Ore vein outcropping, dam construction, cut and fill, pipe profiles.
3. Graphical solution of robotics problems: work space volume, forward kinematics, inverse kinematics.
4. Graphical solution of mechanical engineering problems: shear/bending diagrams, torsion diagrams, force diagrams, maxwell diagrams (trusses), displacement diagrams (cams), sheet metal layout.
5. Finite element analysis.

Assignment:

1. 10-15 manual solutions worksheets.
2. 5-10 CAD drawing assignments.
3. 1 CAD project with a local engineering company.
4. 1 oral presentation of an AutoCAD topic.
5. 1-2 design project documentation portfolios.
6. 1-2 constructed models for engineering design contest.
7. 2-4 exams on manual solution methods.
8. 2-4 exams on CAD material.
9. Final exam.

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.

Writing
0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems, Exams, PROJECTS

Problem solving
30 - 40%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Class performances, Performance exams, ASSIGNMENTS AND PROJECTS

Skill Demonstrations
15 - 30%

Exams: All forms of formal testing, other than skill performance exams.

Completion, MANUAL AND CAD DRAWINGS AND PROBLEM SOLUTIONS

Exams
35 - 50%

Other: Includes any assessment tools that do not logically fit into the above categories.

MODEL DESIGN AND CONSTRUCTION ORAL PRESENTATIONS

Other Category
0 - 5%

Representative Textbooks and Materials:

Earle, ENGINEERING DESIGN GRAPHICS, 8th Edition, Addison Wesley 1994
Jensen and Helsel, ENGINEERING DRAWING AND DESIGN, 5th Edition, Glencoe/McGraw Hill 1996
Duff: Freehand Sketching for Engineering Design, PWS, 1995