ENGR110 : Computer Aided Design AutoCAD II

General Information

Author:	• Christopher Herwerth
Course Code (CB01) :	ENGR110
Course Title (CB02) :	Computer Aided Design AutoCAD II
Department:	ENGR
Proposal Start:	Spring 2025
TOP Code (CB03) :	(0953.20) Civil Drafting
CIP Code:	(15.1304) Civil Drafting and Civil Engineering CAD/CADD.
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000584261
Curriculum Committee Approval Date:	06/12/2024
Board of Trustees Approval Date:	07/16/2024
Last Cyclical Review Date:	06/12/2024
Course Description and Course Note:	ENGR 110 is an advanced course in computer aided design. Advanced techniques and concepts of computer-aided design (CAD) will be practiced with an emphasis on three-dimensional design and modeling for architectural, construction and engineering applications. Students completing this course typically demonstrate strong computer-aided-design skills applicable to employment as a CAD technician or technologist.
Justification:	Mandatory Revision
Academic Career:	• Credit
Mode of Delivery:	
Author:	
Course Family:	

Academic Senate Discipline

Primary Discipline:	• Engineering Support (Surveying. engineering aides)
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

Not Applicable

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	108
Total Course Out-of-Class Hours	54
Total Student Learning Hours	162

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

☐ Variable Credit Course

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	1.5	3
Laboratory Hours	4.5	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	27
Laboratory	81
Studio	0

Total	108

Course Out-of-Class Hours

Lecture	54
Laboratory	0
Studio	0
Total	54

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

ENGR109 - Computer Aided Design AutoCAD I (in-development)

Objectives
- Create a complete set of CAD drawings that communicates technical information for a complex geometric part or assembly.
- Evaluate CAD designs to determine clarity and manufacturability.
- Organize revised CAD drawings that document the iterative engineering design process.
- Develop auxiliary and section views in drawings.
- Organize drawings using the layers function to efficiently display features.
- Practice clear and concise dimensioning techniques.
- Demonstrate use of line techniques.

Entry Standards

Entry Standards

Course Limitations

Cross Listed or Equivalent Course

Specifications

Methods of Instruction

Methods of Instruction	Lecture

Methods of Instruction	Laboratory

Methods of Instruction	Multimedia

Methods of Instruction	Collaborative Learning

Methods of Instruction	Demonstrations

Methods of Instruction	Presentations

Out of Class Assignments

- Calculations (e.g. analyze a geometric shape to determine dimensions and reference angles)
- Essays (e.g. a short essay on the environmental impact of a manufacturing facility or construction project)
- Projects (e.g. gather data on a 3-D object or structure and create a CAD model)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Midterm exam
Exam/Quiz/Test	Final examination (e.g. the AutoCAD Certified User Exam is an optional industry certificate that can be administered as a final exam)

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Shih, Randy H.	AutoCAD 2024 Tutorial: Second Level 3D Modeling	SDC Publications	2023	978-1-63057-608-0

Other Instructional Materials (i.e. OER, handouts)

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Demonstrate a working knowledge of computer aided drafting and design through a series of design problems.

Create, maintain, and utilize a series of standard user libraries within the computer aided drafting system.

Demonstrate an advanced knowledge of the CAD software package.

Exhibit a working knowledge of operating system commands.

Organize and create project drawing files in logical electronic filing and library paths.

Take the Autodesk Certified User Exam or the Autodesk Certified Professional exam.

Create three dimensional drawings of complex geometric objects using AutoCAD.

SLOs

Construct advanced computer aided design (CAD) model drawings while working efficiently with a minimum number of actions.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.	
	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.	
ENGR Civil Engineering	Apply knowledge of mathematics, science and engineering; identify, form and solve engineering problems	
	Demonstrate introductory skills using modern engineering tools necessary for engineering practice.	
ENGR Engineering Technology - CAD & Design Drafting	Demonstrate skills in the production of working drawings of engineering structures	
	Demonstrate techniques to accomplish drawings and 3D models utilizing different various computer aided design (CAD) software	
ENGR Engineering Entrepreneurship Skill Award	Learn hands-on skills and problem solving techniques for businesses related to engineering design, installation, manufacturing, testing, technical sales, maintenance, and other such topics in engineering technology.	
	Learn the engineering design process and how technical products are made, assembled, and integrated into complex systems.	
ENGR Computer Engineering AS	demonstrate appropriate technical written, verbal, drawing, and communication skills;	

ENGR Mechanical Engineering - A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills;
ENGR Electrical Engineering A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills;

Create three dimensional design drawings of complex geometric objects using AutoCAD while following industry safety and best practices and standards.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
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	Demonstrate introductory skills using modern engineering tools necessary for engineering practice.
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	Demonstrate techniques to accomplish drawings and 3D models utilizing different various computer aided design (CAD) software
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	Learn the engineering design process and how technical products are made, assembled, and integrated into complex systems.
ENGR Computer Engineering AS	demonstrate appropriate technical written, verbal, drawing, and communication skills;
ENGR Mechanical Engineering - A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills;
	use science and mathematical skills required for occupational needs;
ENGR Electrical Engineering A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills;
	use science and mathematical skills required for occupational needs;

Produce accurate models while demonstrating professional level speed and efficiency commensurate with architectural, construction and engineering industry employment expectations.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
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	Learn the engineering design process and how technical products are made, assembled, and integrated into complex systems.
ENGR Mechanical Engineering - A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills;
	use science and mathematical skills required for occupational needs;

ENGR Computer Engineering AS	demonstrate appropriate technical written, verbal, drawing, and communication skills;
ENGR Electrical Engineering A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills; use science and mathematical skills required for occupational needs;

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Introduction (2 hours)
- Brief history of computer aided design
- Definitions of computer aided engineering and computer aided drafting
- Review of AutoCAD 2D workspace
- AutoCAD certified user examination

AutoCAD Pictorial Views (2 hours)
- Definitions of pictorial views
- Isometric drawings
- Geometry for isometric view

User Coordinate System and 3D Workspace (2 hours)
- Modeling in 3D space
- Manipulating the coordinate systems
- Creating a three-dimensional structure

Wireframe Modeling (2 hours)
- Tools to create and view a 3D wireframe model
- Dynamic Rotation and other viewing tools

3D Surface Modeling (2 hours)
- Surface meshing
- Tools for meshing and visualization
- Moving objects between layers

Solid Modeling (2 hours)
- Setting up layers
- Concepts of solid geometry
- Boolean operation
- Visual styles
- Binary tree

Extrusion (2 hours)
- Creating and extruding regions
- Cutting
- Aligning user coordinate system
- Mass properties of solid models

- Sketching on 3D model surfaces

Multiview Drawings (2 hours)
- Setting up and manipulating standard views
- Auxiliary views in model modes
- Title blocks
- Viewports

Advanced Modeling (2 hours)
- Efficiently design techniques
- Using symmetrical features in designs
- Revolved features
- Mirror Image
- Positioning and cutting
- Modeling strategy
- Offset geometry
- Combining parts
- Shell feature
- Thin-walled designs
- Extracted surfaces
- Rendering

Engineering Design Process (2 hours)
- Conceptual design
- Failure and iteration

Sustainability in Engineering Design (4 hours)
- Efficient use of materials
- Computer and data energy use
- Safety
- Mitigating environmental impact

Industry standards (3 hours)
- American Society of Mechanical Engineers (ASME)
- ASME Y-14.5
- American Society of Civil Engineers (ASCE)
- Other professional organizations
- Designing to codes

Total Hours: 27

Laboratory/Studio Content

Introduction (2 hours)
- Brief history of computer aided design
- Definitions of computer aided engineering and computer aided drafting
- Review of AutoCAD 2D workspace
- AutoCAD certified user examination

AutoCAD Pictorial Views (6 hours)
- Definitions of pictorial views
- Isometric drawings
- Geometry for isometric view

User Coordinate System and 3D Workspace (9 hours)
- Modeling in 3D space
- Manipulating the coordinate systems
- Creating a three-dimensional structure

Wireframe Modeling (6 hours)
- Tools to create and view a 3D wireframe model
- Dynamic Rotation and other viewing tools

3D Surface Modeling (6 hours)
- Surface meshing
- Tools for meshing and visualization
- Moving objects between layers

Solid Modeling (7 hours)
- Setting up layers
- Concepts of solid geometry
- Boolean operation
- Visual styles
- Binary tree

Extrusion (7 hours)
- Creating and extruding regions
- Cutting
- Aligning user coordinate system
- Mass properties of solid models
- Sketching on 3D model surfaces

Multiview Drawings (8 hours)
- Setting up and manipulating standard views
- Auxiliary views in model modes
- Title blocks
- Viewports

Advanced Modeling (8 hours)
- Efficiently design techniques
- Using symmetrical features in designs
- Revolved features
- Mirror Image
- Positioning and cutting
- Modeling strategy
- Offset geometry
- Combining parts
- Shell feature
- Thin-walled designs
- Extracted surfaces
- Rendering

Engineering Design Process (6 hours)
- Conceptual design
- Failure and iteration

Sustainability in Engineering Design (8 hours)
- Efficient use of materials
- Computer and data energy use
- Safety
- Mitigating environmental impact

Industry standards (8 hours)
- American Society of Mechanical Engineers (ASME)
- ASME Y-14.5
- American Society of Civil Engineers (ASCE)
- Other professional organizations
- Designing to codes

Total Hours: 81

Additional Information

Is this course proposed for GCC Major or General Education Graduation requirement? If yes, indicate which requirement in the two areas provided below.

No

GCC Major Requirements

No Value

GCC General Education Graduation Requirements

No Value

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No Value

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

No Value

If additional resources are needed, add a brief description and cost in the box provided.

No Value