ENGR112 : Computer Aided Design SOLIDWORKS II

General Information

Author:	• Christopher Herwerth
Course Code (CB01) :	ENGR112
Course Title (CB02) :	Computer Aided Design SOLIDWORKS II
Department:	ENGR
Proposal Start:	Spring 2025
TOP Code (CB03) :	(0924.00) Engineering Technology, General (requires Trigonometry)
CIP Code:	(15.0000) Engineering Technologies/Technicians, General.
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000626464
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 112 teaches the advanced concepts of the SOLIDWORKS software, its use as a mechanical engineering design and manufacturing tool, and the ability to fabricate, design, and create parts and assemblies. Topics include mechanical design modeling in the 3D environment, complex solid and surface modeling, digital input and output, analysis, and integrating SOLIDWORKS with other Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) programs for a productive design workflow.
Justification:	Mandatory Revision
Academic Career:	• Credit
Mode of Delivery:	No value
Author:	• Christopher Herwerth
Course Family:	No value

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 CSU only

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

ENGR111 - Computer Aided Design SOLIDWORKS I (in-development)

Objectives

- Complete a series of problems demonstrating basic knowledge and skills in utilizing a computer aided drafting system.
- Demonstrate a basic knowledge of computer aided manufacturing by completion of a series of engineering documents.
- Utilize the computer system to complete a series of basic design problems.
- Exhibit a working knowledge of the operating system commands through the completion of a comprehensive engineering design problem.
- Demonstrate all aspects of sketching including geometrics, types of lines, dimensions, and modifications.
- Practice standard drawing procedures and content such as number of views, type of views, appropriate dimensions to call out in views, details in title block, and basic geometric tolerancing.
- Construct working drawings, configuration, and assemblies.

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

Out of Class Assignments

- Homework problems (e.g. calculate the volume or weight of a part and compare to computer estimate)
- Essay (e.g. short essay on sustainable engineering design and manufacturing processes)
- Project (e.g. create a solid model and manufacture a prototype using 3D printing, machining or CNC mill or lathe)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Midterm examination
Exam/Quiz/Test	Final examination
Exam/Quiz/Test	Certified SOLIDWORKS Associate (CSWA) exam, Optional, (e.g. industry recognized certification, provided by SOLIDWORKS through an online computer-based examination)

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Tran, Paul.	SOLIDWORKS 2024: Advanced Techniques	Mission KS: SDC	2024	978-1-63057-635-6
Planchard, David C.	Engineering Design with SOLIDWORKS 2024	Mission KS: SDC	2023	978-1-63057-630-1

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

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Navigate the SOLIDWORKS interface.

Create parametric engineering parts and assemblies in a Computer Aided 3D Modeling environment.

Create 2D representational drawings from 3D models.

Prepare models to be digitally fabricated with computer aided manufacturing (CAM) techniques.

Utilize lofting and surfacing tools in SOLIDWORKS to create complex parts.

SLOs

Apply the various tools in the SOLIDWORKS software program to complete advanced engineering parts. 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	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	demonstrate appropriate technical written, verbal, drawing, and communication skills;
	design a system, component, or process with supervision of a licensed engineer to meet desired needs.
ENGR Electrical Engineering A.S. Degree Major	use science and mathematical skills required for occupational needs;
ENGR Mechanical Engineering - A.S. Degree Major	use science and mathematical skills required for occupational needs;

Design components based on various engineering and manufacturing requirements. Expected Outcome Performance: 70.0

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ENGR Electrical Engineering A.S. Degree Major	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	use science and mathematical skills required for occupational needs;
ENGR Mechanical Engineering - A.S. Degree Major	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	use science and mathematical skills required for occupational needs;
ENGR Computer Engineering AS	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	design a system, component, or process with supervision of a licensed engineer to meet desired needs.

Complete conceptual and production models of engineering design to be manufactured utilizing working drawings.
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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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

User Interface (1 hour)
- Menus and toolbars
- Model preparation
- Viewport navigation
- Application settings
- Reference planes
- 2D and 3D sketch and features

3D Sketch (2 hours)
- Adding 3D lines
- Creating sweep profiles
- Understanding 3D sketch and planes
- Working with composite curves

Plane Creation (2 hours)
- Sketching the base profile
- Showing a sketch
- Creating various new work planes

Advanced Modeling (2 hours)
- Creating a transition body
- Constructing new work planes
- Extruding text and other information
- The parametric tree and history

Sweep (4 hours)
- Sweep with a composite curve
- Creating the sweep path
- Creating the sweep profile
- Defining and creating a helix
- Combining sketches using composite curves
- Advanced modeling - sweep versus lofting
- Applying draft options
- Choosing between sweep and loft

Lofts (4 hours)
- Creating loft profiles
- Creating solid loft features
- Loft with guide curves
- Creating a curve through reference points
- Constructing loft sections
- Creating loft features
- Lofted Surface

- Creating offset distance planes
- Splitting, deleting, and thickening surfaces
- Calculating the angle between faces

Advanced Surfaces (2 hours)
- Using offset and ruled surfaces
- Using the splitting lines
- Using offset, ruled, and knit surfaces

Surfaces Versus Solid Modeling (2 hours)
- Sketching the sweep path and profile
- Knitting surface bodies
- Advantages and disadvantages of solids versus surfaces

Simulation (2 hours)
- Setting up units
- Adding a fixture and loads
- Material selection
- Analyzing the model

Top-down Tooling Assembly (1 hour)
- Creating radiate surfaces
- Adding parts into an assembly document
- Opening an Initial Graphics Exchange
- Specification (IGES) file

Assemblies (3 hours)
- Inserting parts into an assembly
- Making an assembly section view
- Adding sub-components

External References and Repairing Errors (1 hour)
- Interpreting external reference symbols
- Repairing and or replacing relations and dimensions

Introduction to Simulation (1 hour)
- Simulation X-press

Total Hours: 27

Laboratory/Studio Content

User Interface (5 hours)
- Menus and toolbars
- Model preparation
- Viewport navigation
- Application settings
- Reference planes
- 2D and 3D sketch and features

3D Sketch (6 hours)
- Adding 3D lines
- Creating sweep profiles
- Understanding 3D sketch and planes
- Working with composite curves

Plane Creation (6 hours)
- Sketching the base profile
- Showing a sketch
- Creating various new work planes

Advanced Modeling (6 hours)
- Creating a transition body
- Constructing new work planes
- Extruding text and other information
- The parametric tree and history

Sweep (8 hours)
- Sweep with a composite curve
- Creating the sweep path
- Creating the sweep profile
- Defining and creating a helix
- Combining sketches using composite curves
- Advanced modeling - sweep versus lofting

- Applying draft options
- Choosing between sweep and loft

Lofts (8 hours)
- Creating loft profiles
- Creating solid loft features
- Loft with guide curves
- Creating a curve through reference points
- Constructing loft sections
- Creating loft features
- Lofted Surface
- Creating offset distance planes
- Splitting, deleting, and thickening surfaces
- Calculating the angle between faces

Advanced Surfaces (6 hours)
- Using offset and ruled surfaces
- Using the splitting lines
- Using offset, ruled, and knit surfaces

Surfaces Versus solid Modeling (6 hours)
- Sketching the sweep path and profile
- Knitting surface bodies
- Advantages and disadvantages of solids versus surfaces

Simulation (6 hours)
- Setting up units
- Adding a fixture and loads
- Material selection
- Analyzing the model

Top-down Tooling Assembly (6 hour)
- Creating radiate surfaces
- Adding parts into an assembly document
- Opening an Initial Graphics Exchange
- Specification (IGES) file

Assemblies (7 hours)
- Inserting parts into an assembly
- Making an assembly section view
- Adding sub-components

External References and Repairing Errors (6 hour)
- Interpreting external reference symbols
- Repairing and or replacing relations and dimensions

Introduction to Simulation (5 hour)
- Simulation X-press

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