ENGR M07: SOLIDWORKS I-ENGR MECH DESIGN

Originator
abarcenas

College
Moorpark College

Discipline (CB01A)
ENGR - Engineering

Course Number (CB01B)
M07

Course Title (CB02)
SolidWorks I-Engr Mech Design

Banner/Short Title
SolidWorks I-Engr Mech Design

Credit Type
Credit

Start Term
Fall 2021

Catalog Course Description
Matures further engineering drawing skills through computer-aided design (CAD) software in three dimensions using SolidWorks. Enhances three-dimensional (3D) spatial visualization and refinement of 3D modeling representations. Covers principles in mechanical design, design methodology, design for manufacturing, and cultivates topics in engineering materials selection and metal forming/removal theory through various case studies and examples. Advances further the understanding of the engineering design process and problem solving through design projects. Applies to Associate degree.

Taxonomy of Programs (TOP) Code (CB03)
0901.00 - Engineering, General (requires Calculus) (Transfer)

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
B (Transferable to CSU only)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will not be required

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture

Activity

Laboratory

Total in-Class

Total in-Class

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Total Student Learning

Total Student Learning

Minimum Units (CB07)
3
Maximum Units (CB06)
3

Prerequisites
ENGR M04

Entrance Skills

Entrance Skills

ENGR M04

Prerequisite Course Objectives:

1 generate two- and three-dimensional engineering drawings using manual and computer-aided drafting (CAD) for an engineering product using standard drawing conventions recognized in the field of engineering.
2 demonstrate drawing skills and three-dimensional visualization skills by creating isometric, orthographic, auxiliary, and sectional views.
3 apply rules of dimensioning and tolerancing, in addition to standard conventions for symbols, styles, and terminology in engineering drawings.
4 apply the engineering design process to develop creative solutions to engineering problems through reliable independent work and effective teamwork.
5 convey the engineering design process through engineering drawing, modeling, technical writing, and oral presentation.

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	Demonstrate preparedness for the Certified SolidWorks Assiociate-Academic (CSWA-Academic) examination.
2	Demonstrate skills necessary in using SolidWorks software to create 3-D designs of various mechanical parts, components, tools, and machines, and apply all necessary drawing annotations, dimensions, and tolerances.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	generate fully defined, three-dimensional engineering models from two-dimensional, orthographic, and multi-view drawings using SolidWorks.
2	demonstrate proficiency in SolidWorks by creating three-dimensional models using efficient modeling practice.
3	create and import three-dimensional models into the assembly workbench of SolidWorks and fully define the assembly components in relation to each other.
4	demonstrate knowledge and application of standard mechanical design practices and methodologies in determining optimal design concepts.
5	organize and manage a team of peers to collaboratively plan and execute the steps involved in product design and manufacturing which adhere to pre-determined project parameters.

Course Content

Lecture/Course Content

Overview of design for manufacturability Modeling and rapid prototyping using 3D printing Economic and product design considerations in machining Technology of cutting tools Theory of basic metal machining Welding processes Mechanical assembly Fundamentals of metal casting Surfaces and their measurements: dimensions and tolerances

Laboratory or Activity Content

Parametric part modeling using SolidWorks software

Assembly of parts using SolidWorks software

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Skills demonstrations
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Classroom Discussion
Objective exams
Projects
Problem-solving exams
Participation
Reports/Papers/Journals
Skills demonstrations

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Distance Education

Representative Course Assignments

Writing Assignments

answer questions about drawing topics covered in the course. An example would be: Briefly explain how an engineer would choose the proper manufacturing technique for a particular design and provide real world examples.

write technical reports on engineering design projects pertaining to either a particular product design or to a solution of an engineering problem. An example would be: Write a technical report on the design of a tool or a machine that could help ease everyday tasks for a physically challenged individual.

write critiques of an engineering design. An example would be: Analyze the following mechanical assembly drawing by identifying if there are any errors in the drawing and, if so, explain why you consider them as erroneous and how you would fix those errors.

Critical Thinking Assignments

analyze and synthesize information from three-dimensional or two-dimensional object drawings and create models of them using SolidWorks. An example would be: In groups of 2 or 3 conduct a library search to find old engineering drawings of automobiles parts done by hand circa 1900s and produce assembly drawings of those parts using SolidWorks.

design models in SolidWorks to be used for 3D printing. An example would be: In groups of 2 or 3 create drawings and 3D models in SolidWorks of a cutting tool such as a steel strapping cutter and generate it using a 3D printer.

analyze and synthesize concepts in engineering design. An example would be: In groups of 2 or 3, reverse engineer a mechanical toy or a device such as a scooter or a hairdryer. Take the product apart, make measurements, create drawings of its various parts and an assembly drawing, and then correctly put the pieces back together again for the product to operate properly.

Outside Assignments

Representative Outside Assignments

research CAD-related websites for three-dimensional drawings to learn about drawing tools, editing tools, and short-cuts in drawing that are not explicitly covered in class. An example would be: Create a bent spring using the Sweep Revolve tool in SolidWorks.

participate in a field trip to a manufacturing plant or an engineering firm to learn about their products and how engineering drawings are used in their production or industry. An example would be: In your visit to Haas Automation what did you learn about their usage of engineering drawings and drawing software in the operation of their computer numerical control (CNC) machines?

conduct library and/or Internet research to gather information, create drawings, and prepare a group presentation on the design of an engineering product or system. An example would be: Identify the component parts of a drive shaft, explain their functionality, create engineering drawings for each part and an assembly drawing.

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Description
Groover, Mikell P (2015). *Fundamentals of Modern Manufacturing: Materials, Processes, and Systems* (6th). Wiley.

Resource Type
Textbook

Description

Planchard, David C (2017). *Official Guide to Certified SOLIDWORKS Associate Exams: CSWA, CSDA, CSWSA-FEA (SOLIDWORKS 2015 - 2017)*. SDC. 978-163057070

Resource Type

Textbook

Description

Shih, Randy H. (2018). *Solidworks 2018 and Engineering Graphics an Integrated Approach*. SDC. 978-163057154

Resource Type

Software

Description

SolidWorks. Dassault Systèmes.

Library Resources

Assignments requiring library resources

Research, using the Library's print and/or online resources, to acquire the necessary information for the successful completion of the assigned engineering projects pertaining to product design, systems design, and reverse engineering.

Sufficient Library Resources exist

Yes

Distance Education Addendum

Definitions

Distance Education Modalities

Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Instructor will post a question or an erroneous drawing or design, students will respond to the question or attempt to analyze the erroneous drawing or design and suggest how to debug the code or fix the problem solution. The instructor may use pre-recorded lectures for students to watch and study.

E-mail	Instructor will email students with announcements about the course or an upcoming event. Students in turn may email the instructor with their questions or concerns. Students will email their assignments, drawings, designs, projects to the instructor.
Face to Face (by student request; cannot be required)	Students will have the option to meet the instructor and work in the computer lab or in the engineering lab in the presence of the instructor to get one-on-one help from the instructor.
Other DE (e.g., recorded lectures)	Instructor may record the lectures and post them for students to view within a specified timeframe to be ready for the accompanying assignments. Students will upload their assignments, programs or projects to the course webpage.
Synchronous Dialog (e.g., online chat)	Instructor may be available on a certain day or days of the week within a certain time frame to help students and answer their questions via an online chat. Instructor will conduct live lectures on the designated class time.
Telephone	Instructor may provide a phone number for the students where they can leave a voicemail and expect a call back within 24 hours.
Video Conferencing	Instructor may be available on a certain day or days of the week within a certain time frame to help students and answer their questions via live video conferencing. Students may have to present their projects to the instructor and the class via live video conferencing.

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100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
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Examinations

Hybrid (1%–50% online) Modality
Online
On campus

Hybrid (51%–99% online) Modality
Online
On campus

Primary Minimum Qualification
ENGINEERING

Review and Approval Dates

Department Chair
MM/DD/YYYY

Dean
MM/DD/YYYY

Technical Review
MM/DD/YYYY

Curriculum Committee
09/01/2020

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000598762

DOE/accreditation approval date
MM/DD/YYYY