I. CATALOG INFORMATION

A. Discipline: ENGINEERING

B. Subject Code and Number: ENGR M08

C. Course Title: SolidWorks II-Engineering Design Practicum

D. Credit Course units:

Units: 3

Lecture Hours per week: 2

Lab Hours per week : 3

Variable Units : No

E. Student Learning Hours:

Lecture Hours:

Classroom hours: 35 - 35

Laboratory/Activity Hours:

Laboratory/Activity Hours 52.5 - 52.5

Total Combined Hours in a 17.5 week term: 87.5 - 87.5

F. Non-Credit Course hours per week _____

G. May be taken a total of: [X] 1 [ ] 2 [ ] 3 [ ] 4 time(s) for credit

H. Is the course co-designated (same as) another course: No [X] Yes [ ]
If YES, designate course Subject Code & Number: _____

I. Course Description:

Develops further the various application and analysis tools available in SolidWorks for a more comprehensive three-dimensional modeling of engineering designs. Explores various features for model configuration and modification, including using linked variables and equations. Advances further the understanding of the engineering design process and problem solving through design projects.

J. Entrance Skills

*Prerequisite: No [ ] Yes [X] Course(s)
ENGR M07

*Corequisite: No [X] Yes [ ] Course(s)

Limitation on Enrollment: No [X] Yes [ ]

Recommended Preparation: No [X] Yes [ ] Course(s)

Other: No [X] Yes [ ]

K. Other Catalog Information:

Applicable towards a certification program known as Certified SolidWorks Professional (CSWP) Certification.

II. COURSE OBJECTIVES

Upon successful completion of the course, a student will be able to:

		Methods of evaluation will be consistent with, but not limited by, the following types or examples.
1	read and understand engineering technical documents regarding product design and generate fully defined three-dimensional models of the design following accepted modeling practices.	Objective exams Quizzes Drawing assignments Homework Design projects
2	modify already created three dimensional models using linked variables and equations.	Objective exams Quizzes Drawing assignments Homework Design projects
3	develop and track numerous configurations of a single three-dimensional model and modify individual features in various configurations.	Objective exams Quizzes Drawing assignments Homework Design projects
4	determine the mass of an existing three-dimensional feature after establishing material specifications.	Objective exams Quizzes Drawing assignments Homework Design projects
5	analyze three-dimensional assemblies and apply collision detection on all assembly components.	Objective exams Quizzes Drawing assignments Homework Design projects
6	establish a coordinate system for a part and an assembly in order to calculate the relative center of gravity.	Objective exams Quizzes Drawing assignments Homework Design projects

7	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.	Objective exams Quizzes Drawing assignments Homework Design projects

III. COURSE CONTENT

Estimated %	Topic	Learning Outcomes
Lecture (must total 100%)		
5.00%	Part creation review	1, 2, 3, 7
10.00%	Understanding link dimensions and dimension equations	1, 2, 3
10.00%	Configurations in modeling	1, 2, 3
10.00%	Design tables and configurations	1, 2, 3, 4
10.00%	Configuration suppression	1, 2, 3, 4
10.00%	Feature modification and mass determination	1, 2, 3, 4
5.00%	Assembly review	1, 2, 3, 4, 5, 6, 7
10.00%	Advanced mates in part and assembly design	1, 2, 3, 5, 6
10.00%	Angle and center of gravity measurement tools	1, 2, 3, 5, 6
10.00%	Modeling and rapid prototyping using 3D printing	1, 2, 3, 4, 5, 6, 7
10.00%	Preparing for the Certified SolidWorks Professional (CSWP) exam	1, 2, 3, 4, 5, 6, 7
Lab (must total 100%)		
50.00%	Creation, modification, and configuration of parts and features of three-dimensional models using various sophisticated application and analysis tools in SolidWorks.	1, 2, 3, 4, 5, 6, 7
25.00%	Analysis of assemblies and assembly components using various sophisticated application and analysis tools in SolidWorks.	1, 5, 7
25.00%	Application of linked variables, equations, and coordinate axes to perform calculations and make modifications related to modelling of parts and assemblies.	2, 4, 6, 7

IV. TYPICAL ASSIGNMENTS

A. Writing assignments

Writing assignments are required. Possible assignments may include, but are not limited to:	
1	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.
2	answer questions about drawing topics covered in the course. An example would be: Briefly explain how an engineer would choose the proper material for a particular design and provide real world examples.

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

B. Appropriate outside assignments

Appropriate outside assignments are required. Possible assignments may include, but are not limited to:	
1	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: Design a multi-component kinematic mechanism to perform a specific set of instructions such as an actuator mechanism used in aircraft landing gear.
2	research fabrication methods that would typically be used to produce student design concepts and explore how geometric features of the design could be refined in order to optimize the product/part cost and manufacturing efficiency. An example would be: Research and present the "best" manufacturing methodology for the robotic chassis design created in class and provide evidence as to why your chosen methodology is the "best"?
3	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 rack and a pinion using SolidWorks Mechanical Mates options and tools.

C. Critical thinking assignments

Critical thinking assignments are required. Possible assignments may include, but are not limited to:	
1	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.
2	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.
3	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, and predict the weight of the assembly according to product specifications.

V. METHODS OF INSTRUCTION

Methods of instruction may include, but are not limited to:

[X] Distance Education – When any portion of class contact hours is replaced by distance education delivery mode (Complete DE Addendum, Section XV)

[X] Lecture/Discussion

[X] Laboratory/Activity

[X] Other (Specify) Drawing demonstrations
Industry print readings

Fabrication methods and planning
Guest speakers

[X] Optional Field Trips

[X] Required Field Trips

VI. METHODS OF EVALUATION

Methods of evaluation may include, but are not limited to:

[ ] Essay Exam	[X] Classroom Discussion	[X] Skill Demonstration
[X] Problem Solving Exam	[X] Reports/Papers/ Journals	[X] Participation
[X] Objective Exams	[X] Projects	[X] Other (specify)

Group presentations

Reverse engineering

3D printing of modeled parts

VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS

Planchard, David C. Official Certified SOLIDWORKS Professional (CSWP) Certification Guide: SOLIDWORKS 2015-2017. SDC, 2017.

Kurowski, Paul. Engineering Analysis with SOLIDWORKS Simulation 2017 . SDC, 2017.

Tran, Paul. SOLIDWORKS 2018 Intermediate Skills. SDC, 2017.

Tran, Paul. SOLIDWORKS 2018 Advanced Techniques. SDC, 2017.

SolidWorks. Dassault Systèmes, 2018 ed.
SolidWorks is a solid modeling computer-aided design (CAD) and computer-aided engineering (CAE) computer program that runs on Microsoft Windows. The school will provide this software for students to use during lectures. Students may choose to purchase the student edition on their own.

VIII. STUDENT MATERIALS FEES

[X] No [ ] Yes

IX. PARALLEL COURSES

College	*Course Number*	*Course Title*	*Units*
Allan Hancock College	MT 114	SolidWorks 2	3
Orange Coast College	CAD 295C	Intermediate Solid Modeling using SolidWorks	3
College of San Mateo	DRAF 111	SolidWorks II	3
Santa Ana College	ENGR 104	Solidworks Intermediate Solid Modeling	3

X. MINIMUM QUALIFICATIONS

Courses Requiring a Masters Degree:
Master's degree in any field of engineering OR bachelor's degree in any of the above AND master's degree in mathematics, physics, computer science, chemistry, or geology OR the equivalent. (NOTE: A bachelor's degree in any field of engineering with a professional engineer's license is an alternative qualification for this discipline.)

XI. ARTICULATION INFORMATION

A. Title V Course Classification:

1. This course is designed to be taken either:

   [ ] Pass/No Pass only (no letter grade possible); or
   [X] Letter grade (P/NP possible at student option)

2. Degree status:
   Either [X] Associate Degree Applicable; or [ ] Non-associate Degree Applicable

B. Moorpark College General Education:

1. Do you recommend this course for inclusion on the Associate Degree General Education list?
   Yes: [ ] No: [X] If YES, what section(s)?

   [ ] A1 - Natural Sciences - Biological Science
   [ ] A2 - Natural Sciences - Physical Science
   [ ] B1 - Social and Behavioral Sciences - American History/Institutions
   [ ] B2 - Social and Behavioral Sciences - Other Social Behavioral Science
   [ ] C1 - Humanities - Fine or Performing Arts
   [ ] C2 - Humanities - Other Humanities
   [ ] D1 - Language and Rationality - English Composition
   [ ] D2 - Language and Rationality - Communication and Analytical Thinking
   [ ] E1 - Health/Physical Education
   [ ] E2 - PE or Dance
   [ ] F - Ethnic/Gender Studies

C. California State University(CSU) Articulation:

1. Do you recommend this course for transfer credit to CSU? Yes: [X] No: [ ]

2. If YES do you recommend this course for inclusion on the CSU General Education list?
   Yes: [ ] No: [X] If YES, which area(s)?

   A1 [ ] A2 [ ] A3 [ ] B1 [ ] B2 [ ] B3 [ ] B4 [ ]

   C1 [ ] C2 [ ] D1 [ ] D2 [ ] D3 [ ] D4 [ ] D5 [ ]

   D6 [ ] D7 [ ] D8 [ ] D9 [ ] D10 [ ] E [ ]

D. University of California (UC) Articulation:

1. Do you recommend this course for transfer to the UC? Yes: [X] No: [ ]
2. If YES do you recommend this course for the Intersegmental General Education Transfer Curriculum (IGETC)? Yes: [ ] No: [X]

IGETC Area 1: English Communication

- [ ] English Composition
- [ ] Critical Thinking-English Composition
- [ ] Oral Communication

IGETC Area 2: Mathematical Concepts and Quantitative Reasoning

- [ ] Mathematical Concepts

IGETC Area 3: Arts and Humanities

- [ ] Arts
- [ ] Humanities

IGETC Area 4: Social and Behavioral Sciences

- [ ] Anthropology and Archaeology
- [ ] Economics
- [ ] Ethnic Studies
- [ ] Gender Studies
- [ ] Geography
- [ ] History
- [ ] Interdisciplinary, Social & Behavioral Sciences
- [ ] Political Science, Government & Legal Institutions
- [ ] Psychology
- [ ] Sociology & Criminology

IGETC Area 5: Physical and Biological Sciences (mark all that apply)

- [ ] Physical Science Lab or Physical Science Lab only (none-sequence)
- [ ] Physical Science Lecture only (non-sequence)
- [ ] Biological Science
- [ ] Physical Science Courses
- [ ] Physical Science Lab or Biological Science Lab Only (non-sequence)
- [ ] Biological Science Courses
- [ ] Biological Science Lab course
- [ ] First Science course in a Special sequence
- [ ] Second Science course in a Special Sequence
- [ ] Laboratory Activity
- [ ]

☐ Physical Sciences

IGETC Area 6: Language other than English

☐ Languages other than English (UC Requirement Only)

☐ U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)

☐ U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)

XII. REVIEW OF LIBRARY RESOURCES

A. What planned assignment(s) will require library resources and use?

The following assignments require 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.

B. Are the currently held library resources sufficient to support the course assignment?

YES: ☒ NO: ☐

If NO, please list additional library resources needed to support this course.

XIII. PREREQUISITE AND/OR COREQUISITE JUSTIFICATION

Requisite Justification for ENGR M07

☒ A. Sequential course within a discipline.

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.

☐ B. Standard Prerequisite or Corequisite required by universities.

☐ C. Corequisite is linked to companion lecture course.

☐

☐ D. Prerequisite or Corequisite is authorized by legal statute or regulation.
Code Section: _____

☐ E. Prerequisite or Corequisite is necessary to protect the students' health and safety.

☐ F. Computation or communication skill is needed.

☐ G. Performance courses: Audition, portfolio, tryouts, etc. needed.

XIV. WORKPLACE PREPARATION

Required for career technical courses only. A career technical course/program is one with the primary goal to prepare students for employment immediately upon course/program completion, and/or upgrading employment skills.

Detail how the course meets the Secretary of Labors Commission on the Achievement of Necessary Skills (SCANS) areas. (For a description of the competencies and skills with a listing of what students should be able to do, go to: http://www.ncrel.org/sdrs/areas/issues/methods/assment/as7scans.htm)

The course will address the SCANS competency areas:

1. Resources: the students will learn to use in, an effective and efficient manner, the various resources at their disposal to analyze, understand, critique, and convert engineering designs into 3D models using SolidWorks, and 3D print using 3D printers. Resources include but are not limited to technological resources, facilities resources, economical resources, and human resources.

2. Interpersonal: the students will work in groups of 2 or 3 to complete a variety of classroom activities or long-term engineering design projects while developing the necessary interpersonal skills to work professionally with one another, the instructor, guest engineers, and later on with their colleagues, supervising engineers, and customers.

3. Information: the students will use information gained from lectures, readings, and engineering drawing software to analyze, understand, critique, and convert engineering designs into 3D models using SolidWorks, and generate the models using a 3D printer.

4. Systems: the students will understand their role as an engineering drafter to help the engineers design structures, systems, and products through the use of engineering drawings and modeling with SolidWorks.

5. Technology: the students will learn about the many different modeling tools and analysis capabilities in SolidWorks in order to facilitate the design of many different structures, systems, and products created by engineers.

The course also addresses the SCANS skills and personal qualities:

1. Basic Skills: the students will use reading, writing, listening, speaking, computer-aided design and modeling skills to complete the course assignments. Emphasis will be placed upon proper technical writing skills and proficient 3D design and

modeling skills using the SolidWorks software.

2. Thinking Skills: the students will think creatively and critically to analyze, understand, critique, and convert the designs of engineers into 3D models using SolidWorks, and generating the models using 3D printing.

3. Personal Qualities: the students will follow the engineering code of ethics in completing all their assignments and in all their interactions with their peers, professors, industry guest speakers, and other individuals with whom they will interact on a professional basis during their time as students and later as industry professionals. This includes conducting themselves in a professional, responsible manner while exhibiting a strong work ethic and the highest standards of honesty and integrity.

XV. DISTANCE LEARNING COURSE OUTLINE ADDENDUM

1. Mode of Delivery

[X] Online (course will be delivered 100% online)

[X] Online with onsite examinations (100% of the instruction will occur online, but examinations and an orientation will be scheduled onsite)

[X] Online/Hybrid (a percentage of instruction will be held online and the remaining percentage of instruction will be held onsite)

[ ] Lab activities will be conducted onsite

[ ] Televideo (Examinations and an orientation will be held onsite)

[ ] Teleconference

[X] Other Field trips both mandatory and voluntary

2. Need/Justification

Improve general student access.

3. Describe how instructors teaching this course will ensure regular, effective contact with and among students.

Students may participate in interactive online activities such as live online lectures (which allows sharing of powerpoint, desktops, free hand drawing, audio/video and chat) and/or live online chats (either as a class or as work groups). Students may also engage in asynchronous communications such as discussion groups, posting written questions/assignments to message boards as well as direct communication with the instructor or fellow students via email. Direct onsite interaction in classes taught via hybrid format.

4. Describe how instructors teaching this course will involve students in active learning.

Live online discussions and chats to permit real time interaction with students (i.e. question and answer sessions). Students may be assigned to post answers and critiques of answers to case studies/discussion questions. Posting of group based assignments. Homework in quiz format and other electronically based assignments (lab simulations, interactive websites) in addition to any typical assignments an instructor may choose to require.

5. Explain how instructors teaching this course will provide multiple methods of content representation.

   Live online lectures, recorded lectures, podcasts, posting of information (text, images, videos, music, textbook based assignments), links to relevant websites.

6. Describe how instructors teaching this course will evaluate student performance.

   Onsite/online testing, exams, quizzes, posting of answers to case studies, discussion boards, homework assignments, research papers, course related projects, peer based grading of posted assignments.

XVI. GENERAL EDUCATION COURSE OUTLINE ADDENDUM

ENGR M08: Not Applicable

XVII. STUDENT MATERIALS FEE ADDENDUM

ENGR M08: Not Applicable

XVIII. REPEATABILITY JUSTIFICATION TITLE 5, SECTION 55041

ENGR M08: Not Applicable

XIX. CURRICULUM APPROVAL

Course Information:

Discipline: ENGINEERING

Discipline Code and Number: ENGR M08

Course Revision Category: New Course

Course Proposed By:

Originating Faculty Scarlet Relle 07/25/2018

Faculty Peer: Scarlet Relle 08/30/2018

Curriculum Rep: Scarlet Relle 08/15/2018

Department Chair: Erik Reese 09/07/2018

Division Dean: Mary Rees 08/26/2018

Approved By:

Curriculum Chair: Jerry Mansfield 09/26/2018

Executive Vice President: _____

Articulation Officer: Letrisha Mai 09/17/2018

Librarian: Mary LaBarge 09/15/2018

Implementation Term and Year: Fall 2019

Approval Dates:

Approved by Moorpark College Curriculum Committee: 10/02/2018

Approved by Board of Trustees (if applicable): 11/13/2018

Approved by State (if applicable): 11/29/2018