

**I. CATALOG INFORMATION**

- A. Discipline: ENGINEERING
- B. Subject Code and Number: ENGR M05
- C. Course Title: 2-Dimensional Computer-Aided Drawing and Design with AutoCAD
- 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:  1  2  3  4 time(s) for credit
- H. Is the course co-designated (same as) another course: No  Yes   
 If YES, designate course Subject Code & Number: \_\_\_\_\_
- I. Course Description:  
 Develops further engineering drawing skills through computer-aided design (CAD) software in two dimensions using AutoCAD. Includes instruction in 2D vector-based drawings for architectural design, industrial design, and various civil, electrical, and mechanical engineering projects. Covers technological approaches and best practices in representing engineering design concepts in response to a problem need. Continues to develop a deeper understanding and a more sophisticated working knowledge of AutoCAD's many features and capabilities in preparation for industry certification, namely the AutoCAD Certified User (ACU) certification.
- J. Entrance Skills  
 \*Prerequisite: No  Yes  Course(s)  
ENGR M04  
 \*Corequisite: No  Yes  Course(s)  
 \_\_\_\_\_  
 Limitation on Enrollment: No  Yes   
 \_\_\_\_\_  
 Recommended Preparation: No  Yes  Course(s)  
 \_\_\_\_\_

Other:

No  Yes 

## K. Other Catalog Information:

Applicable towards AutoCAD Certified User (ACU) certification program

**II. COURSE OBJECTIVES**

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

		<b>Methods of evaluation will be consistent with, but not limited by, the following types or examples.</b>
1	demonstrate computer-aided design (CAD) proficiency by creating two-dimensional drawings using efficient modeling practice.	Objective exams Quizzes Drawing assignments Homework Design projects
2	create 2D drawings and orthographic projections by importing three dimensional models into the drawing workbench in a computer-aided drafting (CAD) software and apply all applicable drawing annotations, dimensions, tolerances, and general drawing rules.	Objective exams Quizzes Drawing assignments Homework Design projects
3	demonstrate knowledge in standard mechanical, electrical, civil, industrial, and architectural design practices and improve methodologies in determining the optimal design concepts.	Objective exams Quizzes Drawing assignments Homework Design projects

**III. COURSE CONTENT**

<b>Estimated %</b>	<b>Topic</b>	<b>Learning Outcomes</b>
<b>Lecture</b> (must total 100%)		
6.25%	2D Spatial Overview	1, 2, 3
6.25%	Drawing Basics	1, 2, 3
6.25%	Using Commands in Detail	1, 2, 3
6.25%	Specifying Coordinates	1, 2, 3
6.25%	Setting up a Drawing	1, 2, 3
6.25%	Lines	1, 2, 3
6.25%	Curves and Points	1, 2, 3
6.25%	Multiple Views - Viewports	1, 2, 3
6.25%	Basic Editing	1, 2, 3
6.25%	Advanced Editing	1, 2, 3
6.25%	Organizing Drawings	1, 2, 3
6.25%	Drawing Information and Annotation	1, 2, 3

6.25%	Dimensioning and Tolerancing	1, 2, 3
6.25%	Complex Objects	1, 2, 3
6.25%	Plotting	1, 2, 3
6.25%	Blocks and XRefs	1, 2, 3
<b>Lab (must total 100%)</b>		
6.25%	2D Spatial Overview	1, 2, 3
6.25%	Drawing Basics	1, 2, 3
6.25%	Using Commands in Detail	1, 2, 3
6.25%	Specifying Coordinates	1, 2, 3
6.25%	Setting up a Drawing	1, 2, 3
6.25%	Lines	1, 2, 3
6.25%	Curves and Points	1, 2, 3
6.25%	Multiple Views - Viewports	1, 2, 3
6.25%	Basic Editing	1, 2, 3
6.25%	Advanced Editing	1, 2, 3
6.25%	Organizing Drawings	1, 2, 3
6.25%	Drawing Information and Annotation	1, 2, 3
6.25%	Dimensioning and Tolerancing	1, 2, 3
6.25%	Complex Objects	1, 2, 3
6.25%	Plotting	1, 2, 3
6.25%	Blocks and XRefs	1, 2, 3

#### 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 water distribution system in a developing part of the world.
2	answer questions about drawing topics covered in the course. An example would be: Briefly explain how an engineer would choose the level of tolerance in dimensioning when designing fasteners such as screws, anchors, nuts, bolts, and washers.
3	write critiques of an engineering design. An example would be: Analyze the following engineering drawing of a floor plan 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.

##### 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: Identify the component parts of a drive shaft, explain their functionality, and create engineering drawings for each part.
2	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?
3	research CAD-related websites for two- and 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 single multi-colored line on a single drawing layer in AutoCAD.

### 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 and create drawings of its various parts, and then correctly put the pieces back together again for the product to operate properly.
2	analyze and synthesize information presented in engineering drawings. An example would be: In groups of 2 or 3 analyze various pictorial views and surfaces of an object, such as a paper airplane, and then construct the object using household material or material provided by the instructor.
3	analyze and synthesize information from three-dimensional or two-dimensional object drawings and create orthographic projections using AutoCAD. An example would be: In groups of 2 or 3 conduct a library search to find old engineering drawings of automobiles done by hand circa 1900s and reproduce their orthographic projections using AutoCAD.

## V. METHODS OF INSTRUCTION

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

- Distance Education – When any portion of class contact hours is replaced by distance education delivery mode (Complete DE Addendum, Section XV)
- Lecture/Discussion
- Laboratory/Activity
- Guest speakers  
Other (Specify) Analyzing and critiquing engineering drawings
- Optional Field Trips
- Required Field Trips

## VI. METHODS OF EVALUATION

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

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Essay Exam                      | <input checked="" type="checkbox"/> Classroom Discussion    | <input checked="" type="checkbox"/> Skill Demonstration |
| <input checked="" type="checkbox"/> Problem Solving Exam | <input checked="" type="checkbox"/> Reports/Papers/Journals | <input checked="" type="checkbox"/> Participation       |
| <input checked="" type="checkbox"/> Objective Exams      | <input checked="" type="checkbox"/> Projects                | <input checked="" type="checkbox"/> Other (specify)     |
- Engineering drawings
- Group presentations

**VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS**

Hamad, Munir. AutoCAD 2019; Beginning and Intermediate. Mercury Learning and Information, 2018.

Omura, George, and Brian C. Benton. Mastering AutoCAD 2019 and AutoCAD LT 2019. Sybex, 2018.

CADArtifex. 100 AutoCAD Exercises - Learn by Practicing: Create CAD Drawings by Practicing with these Exercises. CreateSpace, 2017.

ASCENT - Center for Technical Knowledge. AutoCAD Civil 3D 2018 Fundamentals - Imperial: Autodesk Authorized Publisher. ASCENT, Center for Technical Knowledge, 2018.

AutoCAD. Autodesk, latest ed.

The software gets renewed every year and the latest available edition is installed on the campus computers

**VIII. STUDENT MATERIALS FEES**

No  Yes

**IX. PARALLEL COURSES**

<i>College</i>	<i>Course Number</i>	<i>Course Title</i>	<i>Units</i>
Glendale Community College	ENGR 109	Computer Aided Design AutoCAD 1	3
Diablo Valley College	ENGTC 126	Computer Aided Design and Drafting - AutoCAD	3
East Los Angeles College	EGD TEK 111	2-D Computer Aided Drafting with AutoCAD	3
UC Davis	LND ARC 61	AutoCAD for Landscape Architects	4
CSU Long Beach	MAE 172A	Engineering Design Graphics - AutoCAD	2

**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, pursuant to title 5, section 53410.1.)

**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  
 Letter grade (P/NP possible at student option)

2. Degree status:

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

A1 <input type="checkbox"/>	A2 <input type="checkbox"/>	A3 <input type="checkbox"/>	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>
C1 <input type="checkbox"/>	C2 <input type="checkbox"/>	D1 <input type="checkbox"/>	D2 <input type="checkbox"/>	D3 <input type="checkbox"/>	D4 <input type="checkbox"/>	D5 <input type="checkbox"/>
D6 <input type="checkbox"/>	D7 <input type="checkbox"/>	D8 <input type="checkbox"/>	D9 <input type="checkbox"/>	D10 <input type="checkbox"/>	E <input type="checkbox"/>	

D. University of California (UC) Articulation:

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

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 (non-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 M04

- A. Sequential course within a discipline.

1. apply rules of dimensioning, tolerancing, and use the standard conventions for symbols, styles, and terminology in engineering drawings.

2. apply the engineering design process to develop creative solutions to engineering problems.

3. conduct reliable independent work and develop teamwork, technical writing, and oral presentation skills.

4. generate two- and three-dimensional engineering drawings using manual and computer-aided drafting for an engineering product using standard drawing conventions recognized in the field of engineering.

5. demonstrate drawing skills and three-dimensional visualization skills by creating pictorial isometric, orthographic, auxiliary, and sectional views.

- 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 the designs of architectural, civil, electrical, or mechanical engineers into technical drawings. 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 the designs of architectural, civil, electrical, or mechanical engineers into technical drawings.
4. Systems: the students will understand their role as an engineering drafter to help the architectural, civil, electrical, or mechanical engineers design structures, systems, products from skyscrapers to microchips through the use of engineering drawings.
5. Technology: the students will learn about the many different drawing tools and analysis capabilities in the AutoCAD drawing software in order to facilitate the design of many different structures, systems, and products created by architectural, civil, electrical, or mechanical engineers through engineering drawings.

The course also addresses the SCANS skills and personal qualities:

1. Basic Skills: the students will use reading, writing, listening, speaking, hand drafting and computer-aided drawing skills to complete the course assignments. Emphasis will be placed upon proper technical writing skills and proficient 2-D drawing skills using the AutoCAD software.
2. Thinking Skills: the students will think creatively and critically to analyze, understand, critique, and convert the designs of architectural, civil, electrical, or mechanical engineers into technical drawings.
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

- Online (course will be delivered 100% online)
- Online with onsite examinations (100% of the instruction will occur online, but examinations and an orientation will be scheduled onsite)
- 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
- 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 M05: Not Applicable

#### **XVII. STUDENT MATERIALS FEE ADDENDUM**

ENGR M05: Not Applicable

#### **XVIII. REPEATABILITY JUSTIFICATION TITLE 5, SECTION 55041**

ENGR M05: Not Applicable

#### **XIX. CURRICULUM APPROVAL**

##### A. Course Information:

1. Discipline: ENGINEERING
2. Discipline Code and Number: ENGR M05
3. Course Revision Category: New Course

##### B. Course Proposed By:

1. Originating Faculty Scarlet Relle 07/25/2018
2. Faculty Peer: Scarlet Relle 08/30/2018
3. Curriculum Rep: Scarlet Relle 08/15/2018
4. Department Chair: Erik Reese 09/07/2018
5. Division Dean: Mary Rees 08/26/2018

##### C. Approved By:

Curriculum Chair: Jerry Mansfield 09/26/2018

Executive Vice President: \_\_\_\_\_

Articulation Officer: Letrisha Mai 09/20/2018

Librarian: Mary LaBarge 09/15/2018

D. Implementation Term and Year: \_\_\_\_\_

E. Approval Dates:

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

2. Approved by Board of Trustees (if applicable): \_\_\_\_\_

3. Approved by State (if applicable): \_\_\_\_\_