

New Course Checklist

1. Need for this new course:

- a. There is a need for an entry-level Computer Aided Design/Drafting (CAD) Technology course in the Manufacturing area. This course will augment the existing Computer Aided Manufacturing (CAM) program. The existing manufacturing courses do not include any courses in design or drafting. The existing CNC certificate program needs an additional course in CAD to train students to work in the current industry.

The CAD program will help students to understand and interpret basic drawings and help them in programming in CAM software. Students who do not have the knowledge of design and drafting have a very difficult time understanding blueprint reading or other courses related to the certificate program.

- b. The need for entry-level CAD personnel is growing rapidly in the San Bernardino areas. The Machine Trades Industry Advisory Committee has highly recommended the entry-level program in order for students to have a working knowledge of prints and design concepts. (See attached Advisory Committee Minutes)

According to U.S. Department of Labor, Bureau of Labor Statistics, there will be an increase of 45.5% in need for individuals with computer aided design skills and programming. Manufacturing CAD has a strong emphasis in part design and programming which is a high growth area in the manufacturing design sector. (See attached U.S. Department of Labor Statistics)

New career track in CAD design is growing very rapidly. The CAD designer are not just drafting but doing independent design work under the supervision of professional degreed engineer/architect. This area is specially growing in fields such as Civil Engineering and Land Development, Architectural Design, Landscape Architecture, and Steel detailing work.

- c. This new course will enhance the Basic CNC Certificate by providing students another skill area for employment. The computer aided design course will provide students basic skills in three areas of software, CAD, Solid Modeling, and Rapid Proto-type technology. By providing students entry-level CAD knowledge, they will be able to pursue entry-level jobs, as well as enhance their knowledge in the CNC programming areas.

2. Cultural Diversity:

This course provides entry-level skills to students of various ethnicities and various age groups from high school students to adult learners, both male and female.

3. Rationale for other requests:

a. Course Repeatability:

This course is repeatable once in order for students to learn the various aspects of the software when designing either in two-dimensional, solids, or modeling processes. It will be necessary for students to understand basic concepts before repeating the course. Repeating the course will allow students to do modeling processes, which is significantly different than the entry-level CAD course.

b. Credit/No-credit grading only:

Not Applicable

c. Cross-listed courses

Not Applicable

4. Feasibility-Budget implication:

- a. Is new equipment needed? No
- b. Will new faculty need to be hired? No
- c. Must facilities be modified or acquired? No

5. Articulation:

This new course will not articulate with UC or CSU but will be part of the Introduction to Computer Numerical Control Certificate. This course will also act as a feeder program for the existing architecture program in the Science Division.

6. Resources:

This new course will not need any resources from the library.

EQUATING COURSES WITH CRAFTON HILLS

Not Applicable

CROSS-LISTED COURSES

Not Applicable

“STAND ALONE” AND UPPPER DIVISION COURSES

Not Applicable

I. COURSE INFORMATION:

- A. Division: Technical
Department: Machinist Technology
Course ID: MACH 075x2
Course Title: Introduction to Computer Aided Drafting Technologies
Units: 3
Lecture: 1 hour
Laboratory: 6 hours
Prerequisite: None
Corequisite: None
Dept. Advisory: None
- B. Catalog Description: An introduction to Computer Aided Drafting (CAD) and design. Emphasis is placed on industry convention, AutoCAD commands and menus to create and plot two-dimensional drawings. Students are also introduced to three-dimensional solid modeling using AutoCAD, Inventor, and SolidWorks and its application in design and rapid prototyping.
- C. Schedule Description: An introduction to Computer Aided Drafting (CAD) Technology to create two-dimensional engineering drawings. Utilize AutoCAD, Inventor, and SolidWorks to introduce students to 3-D drawings and its application in design and rapid prototyping.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: Two

III. EXPECTED OUTCOMES:

Upon successful completion of the **first** semester, the student should be able to:

- A. Utilize basic drawing, editing and dimensioning commands in AutoCAD to create, modify, store and plot 2-D engineering drawings.
- B. Apply dimensioning data to multi-view drawings in accordance with common industry practices and standards.
- C. Determine appropriate tolerances, global or explicit, to components of a technical drawing to assure a working fit.
- D. Manage engineering documents in a networked computer environment.
- E. Draw a simple solid 3-D model using SolidWorks.

Upon successful completion of the **second** semester, the student should be able to:

- A. Draw a simple solid 3-D model using SolidWorks AND download the drawing to create accurate scale model using a rapid prototype machine.
- B. Create a solid model utilizing Mate components within the software.
- C. Develop a solid model utilizing extrude and revolve features.
- D. Design a two-part assembly and print out as a solid model feature.

IV. COURSE CONTENT:

- A. Introduction to two-dimensional CAD
 1. Tour of CAD software
 2. How to enter commands
 3. How to create geometric shapes
- B. CAD and print reading procedures
 1. The alphabet of lines
 2. Understanding orthographic projection drawings
 3. Lettering and dimensioning
 4. Geometric dimensioning and tolerancing
- C. Two-dimensional drawing
 1. Basic objects: Circles, arcs, polygons, etc.
- D. Drawing aids and controls
 1. Object snap
 2. Coordinate entry

3. Construction aids
- E. Drawing and editing
 1. Drawing solid shapes
 2. Polylines, chamfers, fillets
- F. Drawing sketches for solid models
 1. Editing and extruding
- G. Preparing a drawing for rapid prototyping
 1. Drawing setup
 2. Exporting documents to rapid prototyping machine
- H. Operation of rapid prototyping machine
 1. Machine setup
 2. Build materials
 3. Model geometry setup

V. METHODS OF INSTRUCTION: (Please check all that apply and add any additional not listed.)

- Lecture
- Class and/or small group discussion
- _____ Critical evaluation of texts, newspapers, journal articles, and other printed research
- _____ Critical evaluation of films, videotapes, audiotapes, or other media forms
- Classroom demonstrations
- _____ Field trips
- _____ Guest speakers
- _____ Other:
- _____ Other:
- _____ Other:

VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:

- A. Reading Assignment. Reading assignments are required and may include (but are not limited to) the following: After reading the chapter on Introduction to Two-Dimensional CAD, discuss in small groups how to enter commands.
- B. Writing Assignment. Writing assignments are required and may include (but are not limited to) the following: Write a report on how to create geometric shapes.
- C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following:
 - Students will perform analysis and evaluation of assigned readings and/or classroom materials and utilize this analysis in classroom discussion.
 - Students will design a part for a product, and analyze the structural requirements for the part.
 - Students will select a rapid prototyping process that is appropriate for the intended use of the model or prototype based upon the material properties used in and impacted by the process.

VII. EVALUATION:

A student's grade will be based on multiple measures of performance and will reflect the objectives explained above. A final grade of "C" or better should indicate that the student has the ability to successfully apply the principles and techniques taught in this course. These evaluation methods may include, but are not limited to, the following (Please check all that apply, and add additional ones not listed):

- _____ Portfolios
- Projects
- Written papers or reports
- Presentations (oral and visual)
- _____ Work performance (internships or field work)

- Lab work
- Comprehensive examinations (cumulative finals or certifications)
- Peer evaluation
- Self evaluation
- Classroom participation
- Homework
- Other:
- Other:
- Other:

VIII. TYPICAL TEXTS:

- A. Wohlers, Terry T., Applying AutoCAD 2005, 1st Edition, Glencoe/McGraw–Hill, Peoria, IL, 2005
- B. Planchard, D. C., Engineering Design with SolidWorks 2005, 1st Edition, SDC Publication, New York, 2005
- C. Tickoo, Sham, AutoDesk Inventor for Designers R-9, 1st Edition, CADCIM Technologies, Schereville, IN, 2004

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

- A. Hand held calculator
- B. Two 3.5" floppy disks