

# TECHNOLOGY STUDIES: DESIGN DRAFTING TECHNOLOGY

BEFORE ENROLLING IN DEGREE APPLICABLE COURSES, IT IS RECOMMENDED THAT YOU COMPLETE ENGL 001A AND READ 053.

## DESIGN DRAFTING TECHNOLOGY (DRAFT)

Mission College offers students the opportunity to major in a program of Design Drafting Technology, leading to an Associate of Science Degree and/or Technician Certificate in the fields of Electronic Design, Mechanical Design and/or Electro/Mechanical Design.

The Mechanical, Electronic or Electro/Mechanical Design Drafting Technician Certificate will be awarded to students who complete the units of required drafting courses and demonstrate technical proficiency as a Designer. The Design programs require between 36 and 38 units to complete, depending on the student's elective course choices. An Associate of Science Degree in Design Drafting Technology will be awarded to students who earn a Design Drafting Certificate and meet all other college requirements for graduation. Consult the Design Drafting advisor for detailed information.

**NOTE:** It is highly recommended that each student keep a complete record of work to present for evaluation by university program advisors and/or employers.

### Student Learning Outcomes:

Students who complete courses in the Design Drafting Technology Department will demonstrate skills necessary to be successful mechanical, electronic or electro-mechanical designers as determined by industry. Students will demonstrate successful team building strategies and will:

- Produce design documentation to industry standards using Computer-Aided Design/ Drafting (CAD) software.
- Apply principles of geometric dimensioning & tolerancing, materials and process design specifications to production drawings.
- Apply mechanical design concepts in 3D using the latest solid-modeling software.
- Produce electronic printed circuit board designs, including surface-mount and IC technology, using CAD schematic PCB software.

Students will be assessed through a multitude of assessment methods including written quizzes, tests and papers and hands-on individual and group projects.

### Highlights:

- State-of-the-art Computer Aided drafting laboratory.
- Experienced instructors, many are Designers in local industry.
- The latest releases of electronic, mechanical and solid modeling CAD software.

### Career Options:

- CAD Designer/ Drafter (E/M-Mech, HVAC, Facility, Arch, Civil)
- CAD Technician (MFG, HVAC, ENG.)
- CAD Printed Circuit Board designer
- CAD Printed Circuit Board checker
- Quality control and Documentation technician
- CAD Checker/ Manager
- Planning Assistants

Some career options may require more than two years of college study. Classes beyond the Associate Degree level may be required for preparation for transfer to a university program.

### A.S. Degrees:

- Design Drafting-Electronic
- Design Drafting-Mechanical
- Design Drafting-Electro/Mechanical

### Certificates:

- Design Drafting-Electronic
- Design Drafting-Mechanical
- Design Drafting-Electro/Mechanical

Only courses completed with a grade of C or better may be used to satisfy requirements for a certificate.

### Schedule Matrix (subject to change):

COURSE	FALL	SPRING	SUMMER	WEEKEND
DRAFT 022	E			
DRAFT 051A	E	E		X
DRAFT 051B	E	E		X
DRAFT 051C		E		
DRAFT 055A	E	E		
DRAFT 055B	E	E		
DRAFT 055C	E	E		
DRAFT 058A	E	E		X
DRAFT 058B	E	E		X
DRAFT 058C	E	E		X
DRAFT 058D	E	E		X
DRAFT 060	E			
DRAFT 070	E	E	X	X
DRAFT 071A	E	E		
DRAFT 071B	E	E		
DRAFT 072	E	E		X
DRAFT 075	E			
DRAFT 092		E		
DRAFT 103		E		

D= DAY CLASSES; E= EVENING CLASSES; X= WEEKEND

### Design Drafting - Electronic - A.S. Degree and Certificate

Core Curriculum Courses (Required)	Units
DRAFT 022..... Descriptive Geometry .....	3.0
DRAFT 051A ..... Technical Drafting - Beginning .....	3.0
DRAFT 051B ..... Technical Drafting - Intermediate .....	3.0
DRAFT 051C ..... Technical Drafting - Advanced Generalization .....	3.0
DRAFT 058A ..... Electronic Drafting.....	3.0
DRAFT 058B ..... Electronic Drafting - Printed Circuit Board Design.....	3.0
DRAFT 058C ..... Electro/Mechanical Packaging Design.....	3.0
DRAFT 058D ..... Surface Mount and Integrated Circuit Design Technology .....	3.0
DRAFT 070..... Introduction to CAD.....	3.0
DRAFT 071A ..... Advanced CAD Applications - Electronic .....	3.0
DRAFT 071B ..... CAD Applications-PCB.....	3.0
DRAFT 092..... Design Drafting Laboratory/Portfolio .....	2.0
<b>Plus one of the following:</b>	<b>Units</b>
CET 052 ..... DC Principles .....	4.0
DRAFT 055A ..... Illustration/3-D CAD .....	3.0
DRAFT 060..... Dimensioning & Tolerancing .....	3.0
DRAFT 072..... CAD Applications-Electronics .....	3.0
DRAFT 103..... Materials and Processes.....	2.0
<b>Total Program A.S. Degree/Certificate Requirements:.....</b>	<b>36.0 - 38.0</b>

### Design Drafting - Mechanical - A.S. Degree and Certificate

Core Curriculum Courses (Required)	Units
DRAFT 022..... Descriptive Geometry .....	3.0
DRAFT 051A ..... Technical Drafting - Beginning .....	3.0
DRAFT 051B ..... Technical Drafting - Intermediate .....	3.0
DRAFT 051C ..... Technical Drafting - Advanced Generalization .....	3.0
DRAFT 060..... Dimensioning & Tolerancing .....	3.0
DRAFT 103..... Materials and Processes.....	2.0
DRAFT 092..... Design Drafting Laboratory/Portfolio.....	2.0
DRAFT 058C ..... Electro/Mechanical Packaging Design.....	3.0
DRAFT 070..... Introduction to CAD.....	3.0
DRAFT 072..... CAD Applications-Electronic .....	3.0
DRAFT 055A ..... Illustration/3-D CAD .....	3.0
DRAFT 055B ..... Solid Modelling Illustration .....	3.0
<b>Plus one of the following:</b>	<b>Units</b>
DRAFT 058A ..... Electronic Drafting.....	3.0
ENGR 003 ..... Science at Work .....	4.0
<b>Total Program A.S. Degree/Certificate Requirements:.....</b>	<b>36.0 - 38.0</b>

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## Design Drafting -Electro/Mechanical A.S. Degree and Certificate

Core Curriculum Courses (Required)	Units
DRAFT 022..... Descriptive Geometry .....	3.0
DRAFT 051A ..... Technical Drafting - Beginning .....	3.0
DRAFT 051B ..... Technical Drafting - Intermediate .....	3.0
DRAFT 051C ..... Technical Drafting - Advanced Generalization .....	3.0
DRAFT 058A ..... Electronic Drafting.....	3.0
DRAFT 058B ..... Electronic Drafting - Printed Circuit Board Design .....	3.0
DRAFT 058D ..... Surface Mount and Integrated Circuit Design Technology .....	3.0
DRAFT 060..... Dimensioning & Tolerancing .....	3.0
DRAFT 070..... Introduction to CAD.....	3.0
DRAFT 071..... CAD Applications - Electronic .....	3.0
DRAFT 092..... Design Drafting Laboratory/Portfolio.....	2.0
DRAFT 103..... Materials and Processes.....	2.0
<b>Plus one of the following:</b>	<b>Units</b>
DRAFT 055A ..... Illustration/3-D CAD .....	3.0
DRAFT 055B Illustration/Solid Modelling .....	3.0
DRAFT 058C ..... Electro/Mechanical Packaging Design.....	3.0
DRAFT 072..... CAD Applications-Mechanical.....	3.0
DRAFT 071B ..... CAD Applications-PCB.....	3.0
<b>Total Program A.S. Degree/Certificate Requirements:.....</b>	<b>36.0 - 38.0</b>

## DESIGN DRAFTING TECHNOLOGY (DRAFT)

See the Industrial Technology Program for a description of the required TECH courses.

### 022 • DESCRIPTIVE GEOMETRY **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 903  
Prerequisite: DRAFT 051A  
Acceptable for credit: California State University

The student determines the true size, shape and length of lines, planes and intersections not congruent with the standard orthographic planes of projection. This course, created for Design Drafting majors, helps develop the student's ability to visualize in three dimensions, and is useful to anyone pursuing a career in Engineering and Design. *Materials Fee: \$5.00. Pass/No Pass Option.*

### 051A • TECHNICAL DRAFTING-BEGINNING **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 903, DRAFT 070  
Acceptable for credit: California State University

The study of drafting practices includes orthographic projections (multi-view), full and half sections, primary auxiliaries, pictorial drawing, dimensioning practices freehand sketching and lettering practice. Basic computer aided drafting (CAD) will be experienced. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

### 051B • TECHNICAL DRAFTING-INTERMEDIATE **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 903, DRAFT 072  
Prerequisite: DRAFT 51A  
Acceptable for credit: California State University

This course is a continuation of the study of orthographic projection, plus secondary auxiliaries, threads and fasteners, revolutions developments and intersections, dimensioning and tolerancing, axonometric projection, broken out, revolved, removed and offset section drawings. CAD will be used to produce drawings. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

### 051C • TECHNICAL DRAFTING-ADVANCED GENERALIZATION **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 903  
Prerequisite: DRAFT 51B and DRAFT 072  
Acceptable for credit: California State University

This course will introduce the American National standards and specifications as they are applied to the following special fields in drafting: machine drafting (detail and sub-assemblies), sheet metal fabrication drawing, casting and forging drawings, gears and cams, welding representation (weldments). Design process and documentation standards will be stressed. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

### 055A • ILLUSTRATION: 3-D CAD **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 903  
Prerequisite: DRAFT 070, DRAFT 051A  
Acceptable for credit: California State University

In this course the student will study and create 3-D communications using traditional technical illustration techniques and computer aided modeling programs. Computer generated, three dimensional, solid model, illustrations will be created using a computer to shape, shadow and graphically represent the desired design. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

### 055B • ILLUSTRATION: SOLID MODELING **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 903  
Prerequisite: DRAFT 055A  
Acceptable for credit: California State University

In this course the student will study and create three dimensional representational drawings using a computer-modeling program. Computer generated, three dimensional, solid models, will be created using a computer to shape, shadow and graphically represent the desired object for the purpose of manufacturing. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

### 055C • ADVANCED 3D SOLID MODELING **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Prerequisite: DRAFT 055B  
Acceptable for credit: California State University

This course introduces the student to three-dimensional solid modeling used in the design and fabrication of mechanical parts and assemblies. Using computer solid-modeling software the student will create advance 3D shapes connecting solid model parts into working assemblies for the study of function and the analysis of tolerances and fits. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

### 058A • ELECTRONIC DRAFTING **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 000C  
Corequisite: DRAFT 071A  
Acceptable for credit: California State University

This is a study of computer aided design (CAD) electronic drawing, symbols, method and techniques which covers block diagrams, schematics, interconnecting and wiring diagrams, printed circuits, electronic assembly drawings, and electronic terminology. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

### 058B • PRINTED CIRCUIT BOARD DESIGN **3.0 units**

*Total Lecture 36.8 hours, Total Lab 72 hours*  
Advisory: MATH 903  
Prerequisite: DRAFT 058A  
Acceptable for credit: California State University

This course is an introduction to CAD schematic capture printed circuit design. Discrete, analog and digital printed circuit layout and trace techniques will be taught along with printed circuit documentation and parts list requirements. The student will gain an understanding of production considerations for the manufacturing of printed circuit boards. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

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## 058C • ELECTRO/MECHANICAL PACKAGING DESIGN 3.0 units

Total Lecture 36.8 hours, Total Lab 72 hours

Advisory: MATH 903

Prerequisite: DRAFT 051A

Acceptable for credit: California State University

This course covers the design and drafting of electro/mechanical exterior and interior parts, mounting frames, and unit enclosures. The functional and aesthetic design aspects of enclosures will be studied. *Materials Fee: \$5.00. Pass/No Pass Option.*

## 058D • SURFACE MOUNT & INTEGRATED CIRCUIT DESIGN TECHNOLOGY 3.0 units

Total Lecture 36.8 hours, Total Lab 72 hours

Advisory: MATH 903

Prerequisite: DRAFT 058B

Acceptable for credit: California State University

This is an advanced design course for printed circuit/electro-mechanical designers. The course includes the terminology and design of land patterns for surface mount components based on manufacturability, solderability and reliability identified in industrial specifications. This course will also include basic integrated circuit mask design and the design of multilayer printed circuit boards as they relate to surface mount design technology. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

## 060 • DIMENSIONING AND TOLERANCING 3.0 units

Total Lecture 54.4 hours

Advisory: MATH 903

Prerequisite: DRAFT 051A

Acceptable for credit: California State University

This course covers interpretation of drawings for manufacturing as prescribed by the American National Standards Institute (ANSI Y14.5M); application of the precepts described in the ANSI Y14.5M; and a discussion of the advantages and methods for implementation of this geometric system to ensure quality and reliability of product. *Materials Fee: \$5.00. Pass/No Pass Option.*

## 070 • INTRODUCTION TO COMPUTER AIDED DRAFTING 3.0 units

Total Lecture 36.8 hours, Total Lab 72 hours

Advisory: MATH 903 and DRAFT 051A

Acceptable for credit: California State University

This course introduces the beginning student to the operation of Computer Aided Design and Drafting (CADD) systems. Students receive hands-on instruction using AutoCad software on both MS DOS and WINDOWS platforms. Formal written assignments and laboratory-project work are required. The CADD skills provided are a prerequisite for industry employment. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

## 071A • COMPUTER AIDED DESIGN APPLICATION ELECTRONIC 3.0 units

Total Lecture 36.8 hours, Total Lab 72 hours

Advisory: MATH 903 and DRAFT 070

Corequisite: DRAFT 058A

Acceptable for credit: California State University

This class is designed to accommodate the needs of students and the electronic industry in the area of Computer Aided Design and Drafting systems equipment operation. Students will be afforded the opportunity to acquire "hands-on" experience using Protel Schematic capture and Advanced PCB Computer Aided Drafting system. These skills are a prerequisite for employment as an operator in industry. Formal laboratory and written assignments are required. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

## 071B • CAD APPLICATIONS-ELECTRONICS PCB 3.0 units

Total Lecture 36.8 hours, Total Lab 72 hours

Advisory: MATH 903

Prerequisite: DRAFT 071A

Acceptable for credit: California State University

This class is an advanced design course for printed circuit designers. The course teaches and uses the automated Computer-Aided-Design (CAD) program Protel Advanced PCB (Printed Circuit Board). Students learn to use the CAD system to design and document multi-layer printed circuit boards. Using schematic capture, design rules check, loading the netlist, manual and autorouting, students will design and produce professional electronic design documentation used in the contemporary electronic industry. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

## 072 • COMPUTER AIDED DESIGN APPLICATIONS MECHANICAL 3.0 units

Total Lecture 36.8 hours, Total Lab 72 hours

Advisory: MATH 903

Prerequisite: DRAFT 070

Acceptable for credit: California State University

This class is designed to accommodate the needs of students and the industry in the area of Advanced Mechanical Computer-Aided Design and Drafting (CADD) systems equipment operation. Students will be afforded the opportunity to acquire "hands-on" experience in the operation of an AutoCAD system for up to four hours a week. These skills are a prerequisite for employment as an operator in the industry today. Formal lab and written assignments are required. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

## 075 • DESIGN DRAFTING LABORATORY/PORTFOLIO 2.0 units

Total Lab 108.8 hours

Advisory: MATH 903

Prerequisite: DRAFT 051C, DRAFT 058D, DRAFT 072

This is a self-paced course individualized instruction course using Computer Aided Design and Drafting (CADD) application software in conjunction with the PC computer systems. Depending on the needs of the student one or more of the four different CADD application software packages available will be used to gather, develop and formalize a student portfolio demonstrating his/her design capabilities. This course will culminate with a formal portfolio presentation. This should be taken the final semester of the certificate/Associate Degree program. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

## 103 • MATERIALS AND PROCESSES 2.0 units

Total Lecture 36.8 hours

Advisory: MATH 903

Acceptable for credit: California State University

Materials and Processes has two areas of technological curriculum. The Industrial Materials curriculum involves the study of engineering materials to include the physical properties, classifications, testing and applications as related to drafting and design documentation. The Manufacturing Processes curriculum involves the study of the production techniques used to convert materials into finished products to include the selection criteria, economics of manufacturing and quality considerations. *May be repeated one time. Materials Fee: \$5.00. Pass/No Pass Option.*

## DIRECTED STUDIES

Directed Studies consists of independent work of special interest to the student and are offered in a number of departments. No more than a total of 6 units in all departments may be counted toward and Associate Degree. Consult your instructor or a counselor for more information.

## 091, 092, 093 DIRECTED STUDIES

For (091): Lab by arrangement 3 hours

For (092): Lab by arrangement 6 hours

For (093): Lab by arrangement 9 hours

Total Lab 54.4 hours 108.8, 161.6 hours

1.0 unit

2.0 units

3.0 units

Prerequisite: An interview appointment must be made with the instructor to determine objectives and to write a contract.

Acceptable for credit: May be acceptable at the University of California and/or California State University campuses contingent upon a review of the course outline. Please consult a counselor for details.

Directed studies are investigations of special interest to the student which are related to, but not included in regular courses offered by the college. *Pass/No Pass Option. Repeatable to a maximum combined limit of 6 units.*