

# Drafting

## Drafting and Design Technician

### Program Description

This program is designed to provide students with entry level skills in the fields of mechanical, electrical, civil and architectural drafting and/or design.

### Certificate of Achievement and Associate in Science Degree

A Certificate of Achievement can be obtained upon completion of the 31-31.5-unit major. The Associate in Science Degree can be obtained by completing the 31-31.5-unit major, general education requirements, and electives. All courses in the major must be completed with a minimum grade of C or a P if the course is taken on a Pass/No Pass basis.

### Program Outcomes

Students who complete the Drafting and Design Technician Certificate of Achievement/ Associate Degree will be able to:

1. Demonstrate proficiency using industry standard computer aided drafting/ design CAD (AutoCAD) software program.
2. Demonstrate proficiency at reading, drawing, and dimensioning industry standard mechanical drawings.
3. Demonstrate proficiency at reading, drawing, and dimensioning industry standard civil drawings.
4. Demonstrate proficiency at reading, drawing, and dimensioning industry standard electronic drawings.
5. Demonstrate proficiency at reading, drawing, and dimensioning industry standard architectural drawings.

REQUIRED COURSES .....	Units
DRFT 045 Introduction to Computer-Aided Drafting (CAD) .....	4
DRFT 055 Mechanical Drafting - Level I .....	3
DRFT 058 Solid Modeling with Solidworks.....	3
DRFT 060 Architectural Drafting I.....	3
DRFT 075 Electronic Drafting.....	3
DRFT 080 Civil Drafting I.....	3
DRFT 161 Introduction to REVIT Architecture Software .....	3
IT 140 Industrial Materials.....	3
IT 151 Vocational Mathematics .....	3
IT 171 Making Things 1 - 3D Technology .....	1
IT 172 Making Things 2 - 2D Technology .....	1
One Course from List A.....	1-1.5
<b>Required Major Total Units .....</b>	<b>31-31.5</b>

List A: (Select one course).....	Units
OCED 070 Occupational Soft Skills.....	1.5
OCED 090 Occupational Work Experience .....	1
OCED 091 General Work Experience.....	1
<b>Solano General Education.....</b>	<b>21</b>
<b>Electives (as needed to reach 60 units).....</b>	<b>7.5-8</b>
<b>Total Degree Units Solano GE.....</b>	<b>60</b>

This is a Gainful Employment Program. For additional information, please visit [http://www.solano.edu/gainful\\_employment/](http://www.solano.edu/gainful_employment/) and select "Drafting Technician."

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## Survey and Civil Drafting Technician

### Program Description

This program is designed to provide students with entry-level skills in the fields of Surveying Technician, Civil Drafting Technician, and/or mapping technician.

### Certificate of Achievement and Associate Degree

A Certificate of Achievement can be obtained upon completion of the 26-26.5-unit major. An Associate in Science degree may be obtained by completing the 26-26.5-unit major, general education requirements, and electives. All courses for this major must be completed with a minimum grade of C or a P if the course is taken on a Pass/No Pass basis.

### Program Outcomes

Students who complete the Survey and Civil Drafting Technician Certificate of Achievement/ Associate Degree will be able to:

1. Demonstrate proficiency using industry standard computer aided drafting/ design CAD (AutoCAD) software program.
2. Demonstrate proficiency at reading, drawing and dimensioning industry standard civil drawings.
3. Demonstrate basic understanding in using industry standard survey equipment including Transit, Theodolite, and Level.

<b>REQUIRED COURSES</b> .....	<b>Units</b>	<b>List B: (select one course)</b> .....	<b>Units</b>
DRFT 045 Introduction to Computer-Aided Drafting (CAD) .....	4	OCED 070 Occupational Soft Skills .....	1.5
DRFT 060 Architectural Drafting I.....	3	OCED 090 Occupational Work Experience .....	1
DRFT 080 Civil Drafting I .....	3	OCED 091 General Work Experience .....	1
DRFT 140 Surveying.....	3	<b>List C: (select one course)</b> .....	<b>Units</b>
DRFT 161 Introduction to REVIT Architecture Software .....	3	GEOL 001 Physical Geology .....	3
IT 151 Vocational Mathematics .....	3	GEOL 005 Geology of California .....	3
One course from List A .....	3	IT 050 Alternative Energy Technologies .....	3
One course from List B .....	1-1.5	<b>Solano General Education</b> .....	<b>21</b>
One course from List C .....	3	<b>Electives (as needed to reach 60 units)</b> .....	<b>12.5-13</b>
<b>Required Major Total Units</b> .....	<b>26-26.5</b>	<b>Total Degree Units Solano GE</b> .....	<b>60</b>
<b>List A: (select one course)</b> .....	<b>Units</b>		
GEOL 010 Introduction to Geographic Information Systems .....	3		
GEOG 010 Introduction to Geographic Information Systems.....	3		

This is a Gainful Employment Program. For additional information, please visit [http://www.solano.edu/gainful\\_employment/](http://www.solano.edu/gainful_employment/) and select "Survey Technician / Civil Drafting Technician."

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## *Computer Aided Drafting (CAD) Technician Job-Direct Low Unit Certificate*

The required courses must be completed with a minimum grade of C.

<b>REQUIRED COURSES</b> .....	<b>Units</b>
DRFT 045 Introduction to Computer-Aided Drafting (CAD) .....	4
DRFT 079 Blueprint Reading.....	3
One course from List A.....	3
One course from List B.....	3
<b>Total Units</b> .....	<b>13</b>

<b>List A:</b> (select one course).....	<b>Units</b>
DRFT 058 Solid Modeling with Solidworks.....	3
DRFT 161 Introduction to REVIT Architecture Software .....	3

<b>List B:</b> (select one course).....	<b>Units</b>
DRFT 055 Mechanical Drafting - Level I .....	3
DRFT 060 Architectural Drafting I .....	3
DRFT 075 Electronic Drafting .....	3
DRFT 080 Civil Drafting I .....	3

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## *Maker Space Technology*

### **Program Description**

This program is an overview of basic design of manufacturing skills and concepts. Students will learn basic 2D and 3D CAD (Computer Aided Design) skills and how to output those designs using common Maker Space machines and tools such as 3D printers, laser cutters, and CNC (Computer Numeric Controlled) machines. The program also provides a basic overview of manufacturing systems such as motors, wiring and controllers, and the related career opportunities available to individuals with these skills.

### **Certificate of Achievement**

A Certificate of Achievement can be obtained upon completion of the 15.5-17-unit major. All courses must be completed with a minimum grade of C or a P if the course is taken on a Pass/No Pass basis.

### **Program Outcomes**

Students who complete the Survey and Civil Drafting Technician Certificate of Achievement/ Associate Degree will be able to:

1. Demonstrate an understanding of the main principles of Mechatronics.
2. Demonstrate an ability to safely use a 3D printer, laser cutter, CNC machine, basic hand and power tools, and basic electronics.
3. Demonstrate and ability to create a CAD drawing and output to a Maker Space machine.

### **REQUIRED COURSES ..... Units**

DRFT 045 Introduction to Computer-Aided Drafting (CAD) .....	4
or	
DRFT 145 AutoCAD Basics .....	1
and	
DRFT 079 Blueprint Reading.....	3
DRFT 151 3D Modeling with Fusion 360.....	1.5
or	
DRFT 058 Solid Modeling with Solidworks.....	3
IT 101 Introduction to Mechatronics .....	3
IT 171 Making Things 1 – 3D Technology .....	1
IT 172 Making Things 2 - 2D Technology .....	1
IT 173 Making Things 3 – Tool Use and Safety .....	1
IT 174 Making Things 4 – Basic Electronics .....	1
IT 175 Maker Space Technology Lab .....	3
<b>Total Units .....</b>	<b>15.5-17</b>

This is a Gainful Employment Program. For additional information, please visit [http://www.solano.edu/gainful\\_employment/](http://www.solano.edu/gainful_employment/) and select “Maker Space Technology.”

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## **DRFT 045**

### **Introduction to Computer-Aided Drafting (CAD)**

*Course Advisory: SCC minimum English and Math standards.*

*Transferable to UC/CSU*

*Hours: 48-54 lecture, 48-54 lab.*

Introduces the drafting student to CAD (AutoCAD) technology and terminology. The student shall complete a series of related drawing problems using a CAD work station. Fundamentals of creating and modifying engineering and architectural related drawings. This course also introduces students to blocks and advanced layering concepts.

**4.0 Units**

## **DRFT 046**

### **Advanced Computer Aided Drafting (CAD)**

*Prerequisite: DRFT 045 with a minimum grade of C.*

*Transferable to UC/CSU*

*Hours: 32-36 lecture, 48-54 lab.*

Develops advanced proficiency in CAD. Covers symbol libraries, isometrics, external references (XREFS), 3-D drawing, basic solid modeling, tables and customization techniques.

**3.0 Units**

## **DRFT 050 Basic Drafting**

**1.5 Units**

*Course Advisory: SCC minimum English and Math standards.*

*Transferable to CSU*

*Hours: 8-9 lecture, 48-54 lab.*

Fundamentals of drafting using hand drafting tools-- pencil, paper, triangles, scales, compass, etc. Students will use traditional methods of construction for polygons, orthographic views, pictorial drawings, simple architectural floor plans and other technical drafting constructions and will be giving hands on training in technical sketching. This course is intended to give additional training in visualization and object manipulation without the aid of a computer and is a recommended elective for drafting students, or for non-drafting students (in fields such as welding, mechatronics, engineering, etc) who may need to create technical drawings without a computer.

## **DRFT 055 Mechanical Drafting - Level I**

**3.0 Units**

*Prerequisite: DRFT 045 with a minimum grade of C; DRFT 058 with a minimum grade of C (may enroll concurrently).*

*Transferable to CSU*

*Hours: 32-36 lecture, 48-54 lab.*

Techniques and standards of mechanical drafting. Main topics include orthographic drawings, sections, pictorials, threads, fasteners, basic tolerance concepts, ANSI standards and working drawings. Basic mechanical design principles, with a special emphasis on electro-mechanical packaging, are introduced.

## **DRFT 058 Solid Modeling with Solidworks**

**3.0 Units**

*Course Advisory: SCC minimum English standard; knowledge of drafting concepts.*

*Transferable to CSU*

*Hours: 32-36 lecture, 48-54 lab.*

Designed to teach the basic concepts and skills necessary to create, view, and manipulate objects and engineering drawings in three dimensional space using Solidworks software. Student will create models in 3D printer, output support documentation and drawings, and incorporate design process concepts in designs.

## **DRFT 060 Architectural Drafting I**

**3.0 Units**

*Prerequisite: DRFT 045 with a minimum grade of C.*

*Transferable to CSU*

*Hours: 32-36 lecture, 48-54 lab.*

Covers basic methods and practices of architectural drafting and design. Students will design a complete set of plans for a single family dwelling in accordance with local building regulations. Course includes an introduction to the Title 24 energy requirements and standards. Recommended for non-majors and drafting majors.

## **DRFT 075 Electronic Drafting**

**3.0 Units**

*Prerequisite: DRFT 045 with a minimum grade of C.*

*Transferable to CSU*

*Hours: 32-36 lecture, 48-54 lab.*

Designed for drafters to develop skill in reading and drawing plans related to electronics. Topics include terminology, component identification, schematic symbols, cable drawings, electro-mechanical design from the electronic perspective. Special emphasis is placed on basic printed circuit board design. Students will design through-hole and surface mount printed circuit boards.

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## **DRFT 079 Blueprint Reading**

**3.0 Units**

*Course Advisory: SCC minimum English and Math standards.  
Transferable to CSU  
Hours: 40-45 lecture, 24-27 lab.*

Provides an understanding and interpretation of a variety of blueprints. Emphasizes the ability to recognize and identify features of mechanical blueprints and architectural blueprints. Also includes basic development of freehand sketching abilities.

## **DRFT 080 Civil Drafting I**

**3.0 Units**

*Prerequisite: DRFT 045 with a minimum grade of C.  
Course Advisory: IT 151 with a minimum grade of C  
Transferable to CSU  
Hours: 32-36 lecture, 48-54 lab.*

An introduction to civil drawing with emphasis on land division, breakdown of survey notes, office procedures and related math computations. Includes instruction in a variety of industry standard maps, including subdivision maps, assessors parcel maps and topographic maps.

## **DRFT 085 Civil Drafting II**

**3.0 Units**

*Prerequisite: DRFT 080 with a minimum grade of C.  
Course Advisory: IT 151 with a minimum grade of C  
Transferable to CSU  
Hours: 32-36 lecture, 48-54 lab.*

Designed for the advanced civil drafting student with emphasis on computer programs and experience compatible with the industry standards. Includes the study of plan and profile, cross-section and earthwork calculations.

## **DRFT 092 Special Problems**

**1.0 to 3.0 Units**

*Prerequisite: DRFT 050.  
Transferable to CSU  
Hours: 48-162 lab by arrangement*

Individualized projects for advanced students who demonstrate competency to carry out individual work. Students may take this course up to the maximum number of units over multiple semesters.

## **DRFT 130**

**3.0 Units**

### **Advanced Printed Circuit Board Design**

*Prerequisite: DRFT 075 with a minimum grade of C.  
Hours: 32-36 lecture, 48-54 lab.*

Learn how to design complex circuit boards from schematic layout to artwork generation. Course requires completion of a complete set of drawings for a printed circuit board, including proper documentation, all based on industry standards. Through-hole and surface mount technology are studied.

## **DRFT 140 Surveying**

**3.0 Units**

*Prerequisite: DRFT 080 with a minimum grade of C.  
Course Advisory: IT 151 with a minimum grade of C  
Hours: 32-36 lecture, 48-54 lab.*

Presents the principles and practices of surveying. Topics include measurement of directions, distances and elevations. Students will learn the use and care of electronic survey equipment, transits, tapes and levels and be introduced to topics that include transverse calculations, horizontal and vertical curves, measuring standards and mapping.

## **DRFT 145 AutoCAD Basics**

**1.0 Unit**

*Hours: 16-18 lecture, 8-9 lab.*

Introduction to AutoCAD (ACAD) software including basic draw and edit commands, file standards, and file printing. Other commands covered include basic layering tools and manager, drawing scales, entity properties and printing. A basic course for anyone wanting to complete simple drawings for work or 2D applications such as a laser cutter. The course is also beneficial to individuals that are required to make minor edits to engineering drawings.

## **DRFT 151 3D Modeling with Fusion 360**

**1.5 Units**

*Hours: 16-18 lecture, 24-27 lab.*

Covers the use of Fusion 360's 3-Dimensional modelling and editing capabilities. Students will learn to develop 3D objects and assemblies through sketching, modeling and editing tools, before creating drawings and outputting models for 3D printing. This course is especially designed for students interested in Maker Technology. Fusion 360 is a web based program that is free to students and home based inventors. Companies who use Fusion 360 purchase licenses.

## **DRFT 161**

**3.0 Units**

### **Introduction to REVIT Architectural Software**

*Prerequisite: DRFT 060 with a minimum grade of C (may enroll concurrently); Permission of Instructor. Course Advisory: Understand architectural concepts and terminology as it relates to a single story house.*

*Hours: 32-36 lecture, 48-54 lab.*

Introduction to REVIT architectural software, basic commands and software workflow. Students will learn to design architectural structures in 3-Dimensions. Students will create building models using 3D design concepts, incorporate schedules, details and sections, add dimensions and produce working drawings and documentation.