

# Drafting/CAD

## Degree and Certificate Awarded

Associate in Science Degree, Drafting/CAD

Certificate of Achievement, Drafting/CAD

## Program Description

The 21st century is witnessing a rapid growth in science, engineering and technology. This will require society to read, write and draw the language of technology—*drafting*.

Drafting is used in a wide variety of business, industrial, professional and governmental activities, including the following:

Anthropology	Industrial Technology
Archeology	Interior Design
Architecture	Landscape Architecture
Art—Design	Landscape Horticulture
Automotive Services	Machine Shop/Welding
Computer Drafting	Mapping
Computer Science	Marine Diving Technology
Electronics	Mathematics—Applied
Engineering	Mechanical/Elect. Systems
Environmental Studies	Physics—Applied
Geology/Geography	Surveying
Graphics—Design	Technical Illustration

Santa Barbara City College's Drafting/CAD Department offers comprehensive training for entry-level positions. California certificated and professionally experienced instructors teach all departmental courses, with heavy emphasis on the laboratory use of modern drafting equipment.

Full college credit is granted for each course successfully completed. Students who complete the 31.0 units of required Drafting/CAD courses and the controlled electives earn a Certificate of Achievement in Drafting/CAD. Those who also complete institutional and General Education course requirements earn the Associate in Science Degree in Drafting/CAD. The department offers all courses with an open-door policy—both for majors and non-majors.

## Program Student Learning Outcomes

1. Ability to prepare and understand technical drawings.
2. Ability to use computer software to generate technical drawings.
3. Obtain occupational knowledge and skills related to drafting.

4. Understand methods, materials and technical skills related to design and construction.

## Department Offices

Armando M. Arias del Cid, *Chair* (OE-24, ext. 2436)

Alan Price, *Dean* (A-218, ext. 3044)

## Faculty and Offices

Armando M. Arias del Cid, *Chair* (OE-24, ext. 2436)

Laura Welby (OE-16A, ext. 2522)

## Certificate of Achievement Requirements: Drafting/CAD

(See *Sample Program*)

### Department Requirements (31 units)

DRFT 101 — Basic Drafting .....	3
DRFT 130/ENGR 130 — Computer-Assisted Draft and Design I.....	5
DRFT 131/ENGR 131 — Computer-Assisted Draft and Design II.....	5

*Plus 15 units of Drafting electives selected from the following:*

DRFT 120 — Architectural Drafting I.....	3
DRFT 121 — Architectural Drafting II.....	3
DRFT 124 — Architectural Rendering I.....	3
DRFT 125 — Architectural Rendering II.....	3
DRFT 126 — Landscape Drafting I <b>or</b> .....	3
EH 126 — Landscape Drafting I.....	3
DRFT 127 — Landscape Drafting II <b>or</b> .....	3
EH 127 — Landscape Drafting II.....	3
DRFT 129 — Principles of Residential Construction.....	3
DRFT 132 — Comp-Assist Draft and Design III.....	5
DRFT 290 — Work Experience in Drafting.....	1-4
DRFT 299 — Independent Study Drafting.....	1-4
ENGR 105 — Engineering Graphics.....	4
MAT 136 — Computer Animation I.....	3
MAT 137 — Visual Effects for Film, TV and Gaming.....	3
MAT 138 — 3D Character Animation .....	3

*Plus 3 units of controlled electives selected from the following:*

ENGR 115 — Statics and Strength of Materials.....	4
---	---

ENGR 117 — Electronic Circuits .....	3
ENGR 117L — Electronic Circuits, Lab .....	1
<i>+ENGR 140 will also satisfy this requirement.</i>	

*Note: Up to 16 of the 18 units of electives required may be DRFT 290 Work Experience in Drafting.*

*Students must complete all department requirements for the certificate with a cumulative GPA of 2.0 or better.*

### **AS Degree Requirements: Drafting/CAD**

An Associate in Science Degree in Drafting/CAD can be obtained by satisfying the Certificate of Achievement in Drafting/CAD requirements and the General Education and institutional requirements for the Associate in Science Degree. See "Graduation Requirements" in the *Catalog* Index.

### **Planning a Program of Study**

Students are advised to see a college counselor and the Department Chairperson in planning a program of study. Many factors need to be considered in the plan, including:

1. Academic goals, i.e., bachelor's degree, associate degree, or certificate programs.
2. Career and occupational goals, i.e., professional, paraprofessional, technical, occupational, or trade.
3. Program majors, such as Architecture, Engineering, Computer Science, Graphic Design, Electronic/Computer Technology and others.
4. The Drafting/CAD Department advises the student to make the choice between pursuing Architectural Drafting or Mechanical Drafting early in his/her education.

*Note: Students who have completed the Certificate of Completion requirements can continue on to the Associate in Science Degree by satisfying General Education and SBCC requirements for the AS Degree.*

### **Honors and Awards**

The Drafting/CAD Department selects one student each year as "Outstanding Student." Selections are made by the department faculty and are based on academic achievement and service to the college.

### **Tutorial Opportunities**

Each semester, the Drafting/CAD Department is allocated funds to hire student tutors. Students who have performed well in a course and who demonstrate interest in teaching are selected by the department to tutor students currently enrolled in courses. The

purpose of this program is two-fold. Students currently taking courses receive excellent peer tutoring and tutors learn the techniques of teaching. Tutors also find that to teach is to learn.

### **Special Department Resources**

A wide range of resources is available to all students enrolled in the Drafting/CAD Program. Students have access to exceptionally well-equipped laboratories with modern drafting furniture, computers, machines and supplies. Blueprinting facilities are available. Light tables and special mapping tables are available in the Drafting laboratory. A CAD (Computer-Assisted Drafting) laboratory is the department's latest modern facility addition.

The department sponsors several events, programs and services to help the student become better acquainted with the professional world of drafting. These include seminars, guest lectures, films, internships and work experience liaison with area employers.

### **Advising**

In addition to the college counselor for the Drafting/CAD Department and the Career Center, the Department Chairperson advises students who are planning academic, professional or occupational programs and investigating career goals. Contact, Armando M. Arias del Cid, OE-24, (805) 965-0581, ext. 2436.

### **Program Cost and Outcome**

For planning purposes, the webpage below provides information on the cost of attendance, program length (assuming a student attends full-time), financing options and historical student completion rates:

[www.sbcc.edu/financialaid/gainfulemployment/Drafting%20CAD.htm](http://www.sbcc.edu/financialaid/gainfulemployment/Drafting%20CAD.htm)

## **Drafting/CAD Courses**

### **DRFT 101 — Basic Drafting (3) — CSU, UC**

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Fundamental concepts of technical drafting. Topics include drafting standards and conventions; multiview orthographic projections; non-perspective pictorial views; planning, elevation and section views; manual and computer-aided drafting tools; and annotations. Emphasis placed on architectural and engineering technical drafting.

**DRFT 102/CT 118 — Measuring and Calculating  
(3) — CSU**

*Skills Advisories: MATH 1  
Hours: 54 lecture*

Introduction to measuring and calculating used in residential wood construction. Topics include working with common and decimal fractions, using the standard tape measure, using a calculator for construction, estimating material, understanding the special triangles used in roof rafter calculations, rafter length calculation, and stair stringer calculation.

**DRFT 105/ENGR 105 — Engineering Graphics  
(4) — CSU, UC**

*Skills Advisories: MATH 1 and Eligibility for ENG 100 and 103  
Hours: 108 (54 lecture, 54 lab)*

Graphic/visual communication, emphasizing the engineering design process. Topics include the design process, freehand sketching, multiviews, dimensioning, tolerancing, auxiliary views, sectional views and computer-aided-drafting.

**DRFT 120 — Architectural Drafting I  
(3) — CSU**

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Fundamental concepts in architectural drafting. Topics include architectural drafting standards and conventions, multiview orthographic projections, floor plan, elevation and section views, manual and computer-aided drafting tools, output and delivery methods.

**DRFT 121 — Architectural Drafting II  
(3) — CSU**

*Prerequisites: DRFT 120 with a minimum grade of “C”  
Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Topics include drafting standards, conventions, CAD standards, MasterFormat and construction documents. Emphasis in project deliverables includes cover sheet, site plan, floor plans, roof plan, elevations, sections, wall sections, schedules, interior elevations, details, manual and computer-aided drafting tools and output/delivery methods.

**DRFT 124 — Architectural Rendering I  
(3) — CSU**

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Fundamentals of architectural rendering using manual and computer-aided drafting tools, including interior and exterior one/two-point perspectives, oblique, and isometric drawings. Rendering techniques include surfaces, textures, shades, shadows, figures and foliage. Emphasis on compiling a portfolio of architectural presentation drawings.

**DRFT 125 — Architectural Rendering II  
(3) — CSU**

*Prerequisites: DRFT 124 with a minimum grade of “C”  
Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Advanced architectural rendering, using manual and computer-aided drafting tools, including presentation drawings, two-point perspectives, oblique and isometric drawings. Rendering techniques include surfaces and textures, shades and shadow, figures and foliage. Emphasis on compiling a portfolio of architectural presentation drawings.

**DRFT 126/EH 126 — Landscape Drafting I  
(3) — CSU**

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Principles of drafting and plan reading for landscape architecture and ornamental horticulture. Style research, drafting of plans, elevations and details.

**DRFT 127/EH 127 — Landscape Drafting II  
(3) — CSU**

*Prerequisites: EH 126 with a minimum grade of “C” or  
DRFT 126 with a minimum grade of “C”  
Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Advanced drafting and plan reading, using manual and computer drafting tools, for landscape architecture and ornamental horticulture fields. Includes site plans, elevations and details.

**DRFT 129 — Principles of Residential Construction  
(3) — CSU**

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 54 lecture*

Overview of residential construction for homeowners, remodelers, drafters and designers. Topics include building codes, materials, grading, foundations, framing, mechanical systems, doors and windows, roofing and drywalling.

**DRFT 130/ENGR 130 —  
Computer-Assisted Drafting and Design I  
(5) — CSU, UC\***

*Prerequisites: DRFT 101 with a minimum grade of "C" or DRFT 120 with a minimum grade of "C" or DRFT 126 with a minimum grade of "C"*

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 126 (72 lecture, 54 lab)*

Intermediate AutoCAD: Set up, drafting, editing, output and delivery. Coverage of latest AutoCAD features. (\*UC transfer limit: DRFT 130, 131 and 132 combined: maximum credit, one course).

**DRFT 131/ENGR 131 — Computer-Assisted  
Drafting and Design II  
(5) — CSU, UC\***

*Prerequisites: DRFT 130 with a minimum grade of "C"*  
*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 126 (72 lecture, 54 lab)*

Advanced AutoCAD: File Management and CAD Standards for Project-Driven Productivity, 3D Modeling. (\*UC transfer limit: DRFT 130, DRFT 131 and 132 combined: maximum credit, one course)

**DRFT 132/ENGR 132 — Computer-Assisted  
Drafting and Design III  
(5) — CSU, UC\***

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Course Advisories: DRFT 129  
Hours: 126 (72 lecture, 54 lab)*

Introduction to Autodesk Revit®. Designed to meet the needs of students who want to learn the basics of industry-standard building information modeling software. (\*UC transfer limit: DRFT 130, 131 and 132 combined: maximum credit, one course)

**DRFT 136/MAT 136 — Computer Animation I  
(3) — CSU**

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Course Advisories: ART 124A and 140 and 141 and DRFT 131/ENGR 131  
Hours: 90 (36 lecture, 54 lab)*

Fundamentals of computer animation, including modeling, animation and rendering. Focus on computer animation tools and techniques. Builds a solid foundation for developing character animation and special-effect sequences.

**DRFT 138/MAT 138 — 3-D Character Animation  
(3)— CSU**

*Skills Advisories: Eligibility for ENG 100 and 103  
Hours: 90 (36 lecture, 54 lab)*

Advanced 3-D computer animation course on character animation, including character design, modeling techniques for bodies, heads, hands and feet, skeletal and muscle systems, facial animation and lip-syncing to dialogue.

**DRFT 142 — Product Design Fundamentals  
(3) — CSU**

*Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

In this product design studio, students are introduced to the process of product design and develop the skills necessary for bringing design ideas to fruition. They explore product design practice as the intersection of creativity, critical thinking and practical application in commerce, and learn to approach designed objects as challenges to meet human needs.

**DRFT 143 — Product Design and Rapid  
Prototyping Workshop  
(3) — CSU**

*Prerequisites: DRFT 142  
Skills Advisories: MATH 1 and Eligibility for ENG 103  
Hours: 72 (45 lecture, 27 lab)*

Students turn their design concepts into physical objects through hands-on experience in the complete cycles of product design applied to small-scale additive manufacturing. Tailored to expose students to selected software used for product design and visualization, with emphasis on 3D modeling applications with capabilities, features, and support for rapid prototyping with 3D printers.

**DRFT 146 — 3D Printing Fundamentals**

**(3) — CSU**

*Skills Advisories: Eligibility for ENG 103 and proficiency in MATH 1*

*Hours: 72 (45 lecture, 27 lab)*

Fundamentals of 3D printing. Topics include history of 3D printing, the present state of rapid prototyping, the future of rapid prototyping, best practices, materials for additive manufacturing, and the business side of additive manufacturing. Identifying sources for 3D printing. Operation, servicing and maintenance of 3D printers. Legal aspects and ramifications of rapid prototyping.

**DRFT 148 — 3D Modeling with Solid Works**

**(3) - CSU**

*Skills Advisories: Eligibility for ENG 103 and proficiency in MATH 1*

*Hours: 72 (45 lecture, 27 lab)*

3D modeling with Solid Works and ProE.

**DRFT 290 — Work Experience in Drafting**

**(1-4) — CSU**

*Limitation on Enrollment: (1) Employed or available for employment in an occupation directly related to the Drafting major; and (2) Must be enrolled in no less than seven (7) units, including Work Experience.*

*Hours: 60-300 lab*

(1) Available for employment in an occupation related to Drafting and (2) must be enrolled in no less than seven (7) units. May be taken for 1, 2, 3 or 4 units of credit. Maximum (4) units per semester for a maximum of (16) units.

**DRFT 299 — Independent Study in Drafting**

**(1-4) — CSU**

*Limitation on Enrollment: Completion of a minimum of 12 units at SBCC, with a 2.5 GPA, and a minimum of 6 (six) units completed in Drafting.*

*Skills Advisories: MATH 1 and Eligibility for ENG 103*

*Hours: 48-192 lab*

Provides students with an opportunity to engage in Independent Study in Drafting. Students work under direction of sponsoring faculty member on a project directly related to drafting.