



## **DRAFTING AND DESIGN TECHNOLOGY/TECHNICIAN, GENERAL**

**[CIP Code 15.1301](#)**

This document is a Program of Study for Drafting and Design Technology/Technician programs at the secondary level. This program of study is considered a framework, not a curriculum. From this framework educators may use this as a tool to provide structure for developing learning modules, unit plans, or daily lesson plans that meet the tasks or standards within the program of study. This program of study is based on research, experience, and many resources. The goal is to train a workforce that is skilled, knowledgeable, and able to meet the needs of the industry today and well into the future.

Drafters prepare technical drawings and plans, which are used to build everything from manufactured products such as toys, toasters, industrial machinery, and spacecraft to structures such as houses, office buildings, and oil and gas pipelines. In the past, drafters sat at drawing boards and used pencils, pens, compasses, protractors, triangles, and other drafting devices to prepare a drawing by hand. Now, most drafters use Computer Aided Design and Drafting (CADD) systems to prepare drawings. Consequently, some drafters may be referred to as *CADD operators*.

With CADD systems, drafters can create and store drawings electronically so that they can be viewed, printed, or programmed directly into automated manufacturing systems. CADD systems also permit drafters to quickly prepare variations of a design. Although drafters use CADD extensively, it is only a tool. Drafters still need knowledge of traditional drafting techniques, in addition to CADD skills. Despite the nearly universal use of CADD systems, manual drafting and sketching are used in certain applications.

Drafters' drawings provide visual guidelines and show how to construct a product or structure. Drawings include technical details and specify dimensions, materials, and procedures. Drafters fill in technical details using drawings, rough sketches, specifications, and calculations made by engineers, surveyors, architects, or scientists. For example, drafters use their knowledge of standardized building techniques to draw in the details of a structure. Some use their understanding of engineering and manufacturing theory and standards to draw the parts of a machine; they determine design elements, such as the numbers and kinds of fasteners needed to assemble the machine. Drafters use technical handbooks, tables, calculators, and computers to complete their work.

Drafters usually work in comfortable offices. They may sit at adjustable drawing boards or drafting tables when doing manual drawings, although most drafters work at computer terminals much of the time. Because they spend long periods in front of computers doing detailed work, drafters may be susceptible to eyestrain, back discomfort, and hand and wrist problems. Most drafters work a standard 40-hour week; only a small number work part time.

Employers prefer applicants who have completed postsecondary school training in drafting, which is offered by technical institutes, community colleges, and some 4-year colleges and universities. Employers are most interested in applicants with well-developed drafting and mechanical drawing skills; knowledge of drafting standards, mathematics, science, and engineering technology; and a solid background in CADD techniques.

High school courses in mathematics, science, computer technology, design, computer graphics, and, where available, drafting are useful for people considering a drafting career. Employers prefer applicants who have also completed training after high school at a technical institute, community college, or 4-year college or university.

Community colleges offer courses similar to those in technical institutes but include more classes in theory and liberal arts. Often, there is little or no difference between technical institute and community college programs. However, courses taken at community colleges are more likely to be accepted for credit at 4-year colleges. After completing a 2-year associate degree program, graduates may obtain jobs as drafters or continue their education in a related field at a 4-year college. Most 4-year colleges do not offer training in drafting, but they do offer classes in engineering, architecture, and mathematics that are useful for obtaining a job as a drafter. Technical training obtained in the Armed Forces also can be applied in civilian drafting jobs. Some additional training may be necessary, depending on the technical area or military specialty. Training differs somewhat within the drafting specialties, although the basics, such as mathematics, are similar. In an electronics drafting program, for example, students learn how to depict electronic components and circuits in drawings. In architectural drafting, they learn the technical specifications of buildings.

Mechanical ability and visual aptitude are important for drafters. Prospective drafters should be able to draw well and perform detailed work accurately and neatly. Artistic ability is helpful in some specialized fields, as is knowledge of manufacturing and construction methods. In addition, prospective drafters should have good interpersonal skills because they work closely with engineers, surveyors, architects, and other professionals and, sometimes, with customers.

## **Assumptions of This Program of Study**

High-quality programs should meet the following standards:

- Promote **positive working relationships**
- Implement a **curriculum** that fosters all areas of skill development – cognitive, emotional, language, physical, and social
- Use developmentally, culturally, and linguistically appropriate and **effective teaching approaches**
- Provide **ongoing assessments** of student progress
- Employ and support qualified **teaching staff**
- Establish and maintain collaborative relationships **with families**
- Establish and maintain relationships and use resources of the **community**
- Provide a safe and healthy learning **environment**
- Implement strong program organization and supervision policies that result in **high-quality teaching and learning**
- Integrate academic skills and aptitudes necessary for gainful employment and promoting a foundation of **lifelong learning**

## **Academic Rigor**

Research shows that career success requires the same level of college-prep courses as postsecondary success requires. The Department of Education's focus is to ensure that every

student graduates prepared for college and a career. In order to be successful in this program of study, students should follow the academic sequence as determined by Pennsylvania's high school reform efforts.

## **Resources Used for This Program of Study**

- MAVCC (Multistate Academic Vocational Curriculum Consortium)  
<http://www.mavcc.org/>
- NOCTI (National Occupational Competency Testing Institute <http://www.nocti.org/>)
- O\*NET <http://online.onetcenter.org/>
- Pennsylvania Approved Certifications for Industry-Recognized Certifications for Career and Technical Education Programs  
[http://www.portal.state.pa.us/portal/server.pt/community/instructional\\_resources/7392/industry-recognized\\_certifications\\_for\\_career\\_and\\_technical\\_education\\_programs/507887](http://www.portal.state.pa.us/portal/server.pt/community/instructional_resources/7392/industry-recognized_certifications_for_career_and_technical_education_programs/507887)
- Pennsylvania Department of Labor & Industry High Priority Occupations  
[http://www.portal.state.pa.us/portal/server.pt/community/high\\_priority\\_occupations/12910](http://www.portal.state.pa.us/portal/server.pt/community/high_priority_occupations/12910)
- VTECS (A Consortium of Innovative Career and Workforce Development Resources)  
<http://www.vtecs.org/>

## **CIP Code**

### **15.1301 DRAFTING AND DESIGN TECHNOLOGY/TECHNICIAN, GENERAL**

#### **Pennsylvania CIP**

An instructional program that generally prepares individuals to apply technical knowledge and skills as each relates to gathering and translating of data or specifications including basic aspects of planning, preparing and interpreting mechanical, architectural, chemical, structural, civil, pneumatic, marine, electrical/electronic, topographical and other drawings and sketches used in various engineering fields. Instruction is designed to provide experiences in drawing and CAD; the use of reproduction materials, equipment and processes; the preparation of reports and data sheets for writing specifications; the development of plan and process charts indicating dimensions, tolerances, fasteners, joint requirements and other engineering data; the development of models; and drafting multiple view assembly and sub-assembly drawings as required for manufacture, construction and repair of mechanisms.

## **Integrate Academic Career Education and Work Standards for Student Success**

As students participate in career exploration activities and rigorous studies from elementary grades through graduation, they learn to appreciate the relationship between their classroom learning and the skills needed within the workplace. The academic and workplace skills within the Academic Standards for Career Education and Work are expected to be addressed within classrooms and achieved by all students throughout Pennsylvania. No student should leave secondary education without a solid foundation in these Standards.

[http://www.portal.state.pa.us/portal/server.pt/community/state\\_board\\_of\\_education/8830/state\\_academic\\_standards/529102](http://www.portal.state.pa.us/portal/server.pt/community/state_board_of_education/8830/state_academic_standards/529102)

CEW Standards Tool Kit for teachers to implement CEW Standards  
[www.pacareerstandards.com](http://www.pacareerstandards.com)

## **Pennsylvania Approved Certifications**

[http://www.portal.state.pa.us/portal/server.pt/community/instructional\\_resources/7392/industry-recognized\\_certifications\\_for\\_career\\_and\\_technical\\_education\\_programs/507887](http://www.portal.state.pa.us/portal/server.pt/community/instructional_resources/7392/industry-recognized_certifications_for_career_and_technical_education_programs/507887)

## **The Program of Study Documents**

- Crosswalk Template for Task Alignment (excel) – Drafting & Design Technology/ Technician, General – Instructions: Indicate the number code(s) of your school’s program competency or competencies aligned to each program of study competency.
- Crosswalk Template for Task Alignment (pdf) – Drafting & Design Technology/ Technician, General – Instructions: Indicate the number code(s) of your school’s program competency or competencies aligned to each program of study competency.
- Scope and Sequence Template (word) – Enter secondary technical Program of Study courses. Postsecondary courses will be determined when the Statewide Articulation Agreement for this Program of Study is complete.
- Scope and Sequence Template (pdf) – Enter secondary technical Program of Study courses. Postsecondary courses will be determined when the Statewide Articulation Agreement for this Program of Study is complete.
- PA Academic Standards/Eligible Content Alignment to Drafting & Design Technology/ Technician, General Task List (excel) – Crosswalk of PA Academic Standards/Eligible Content for Reading, Writing, Speaking and Listening (RWSL), Math, and Science aligned to Program of Study Secondary Competency List.
- PA Academic Standards/Eligible Content Alignment to Drafting & Design Technology/ Technician, General Task List (pdf) – Crosswalk of PA Academic Standards/Eligible Content for Reading, Writing, Speaking and Listening (RWSL), Math, and Science aligned to Program of Study Secondary Competency List.

### **For more information, contact:**

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