

Florida Department of Education
Curriculum Framework

Program Title: Drafting
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

Secondary – Career Preparatory

Program Number	8725000
CIP Number	0648010102
Grade Level	9-12
Standard Length	4 Credits
Teacher Certification	Refer to the Program Structure section.
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3011 - Architectural and Civil Drafters
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this program is to prepare students for employment or advanced training in the drafting industry. After completing courses in this program, students may elect to continue their studies through courses offered in the Architectural Drafting, Mechanical Drafting or Structural Drafting programs.

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Architecture and Construction career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Architecture and Construction career cluster.

The content includes but is not limited to freehand sketching, drafting by hand and computer and 3D modeling.

Program Structure

This program is a planned sequence of instruction totaling four credits. The four courses, Drafting 1, 2, 3, 4, are considered core courses for the other secondary Drafting programs.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8725010	Drafting 1	BLDG CONSTR @7 7G	1 Credit	17-3011	3	PA
8725020	Drafting 2	DRAFTING @7 7G	1 Credit		3	PA
8725030	Drafting 3	TEC DRAFT 7G	1 Credit		3	PA
8725040	Drafting 4	TEC CONSTR @7 7G	1 Credit		3	PA

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics)

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Apply basic drafting, sketching and Computer-Aided Drawing (CAD) techniques and skills.
- 02.0 Apply the design procedures.
- 03.0 Design and prepare multi-view drawings using 2D sketching and/or CAD software.
- 04.0 Prepare sectional views using 2D sketching and/or CAD software.
- 05.0 Prepare auxiliary drawings using 2D sketching and/or CAD software.
- 06.0 Apply basic dimensioning and annotation using 2D sketching and/or CAD software.
- 07.0 Prepare working drawings.
- 08.0 Prepare pictorial drawings using 2D sketching and/or CAD software.
- 09.0 Prepare surface developments (optional).
- 10.0 Perform basic computer-aided drafting functions using CAD software.
- 11.0 Apply three-dimensional modeling concepts using CAD software.
- 12.0 Design and prepare basic architectural drawings using 2D sketching and/or CAD software.
- 13.0 Demonstrate an understanding of basic civil drawings.
- 14.0 Perform computer-aided drafting functions using 3D modeling software to create an architectural model or other type of model.
- 15.0 Describe the importance of professional ethics and legal responsibilities in the design and construction industry.
- 16.0 Prepare computer-aided three-dimensional architectural drawings.
- 17.0 Research the history of the built environment.
- 18.0 Investigate sustainability issues related to the design, construction and maintenance of the built environment.
- 19.0 Examine career opportunities in drafting and related fields to determine requisite skills, qualifications, supply and demand, market location and potential earnings.

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 1
Course Number: 8725010
Course Credit: 1

Course Description:

This course provides instruction in basic drawing and drafting skills, applied mathematics, multi-view and sectional drawings.

CTE Standards and Benchmarks	
01.0	Apply basic drafting, sketching and Computer-Aided Drawing (CAD) techniques and skills--The student will be able to:
01.01	Use and maintain drafting equipment, measuring scales, drafting instruments and reproduction equipment.
01.02	Identify and use the various drafting media and techniques.
01.03	Demonstrate the use of the alphabet of lines.
01.04	Prepare title blocks and other drafting formats.
01.05	Use various freehand and other lettering techniques.
01.06	Develop skill in sketching and mark making to plan, execute and construct two-dimensional images or three-dimensional models, including presentation graphics.
01.07	Apply geometric construction techniques.
01.08	Solve geometric, algebraic and trigonometric problems related to drafting.
01.09	Demonstrate care of equipment.
01.10	Apply use of effective and accurate architectural and/or engineering vocabulary throughout design and drafting process.
02.0	Apply the design procedures--The student will be able to:
02.01	Analyze challenges and identify solutions for design problems.
02.02	Investigate the use of space, scale and environmental features to create three-dimensional form, or the illusion of depth and form.
02.03	Analyze and apply data and measurements to solve problems and interpret drawings.
03.0	Design and prepare multi-view drawings using 2D sketching and/or CAD software--The student will be able to:

CTE Standards and Benchmarks

03.01	Prepare multi-view scaled drawings.
03.02	Select proper drawing scale, views and layout.
03.03	Prepare drawings containing horizontal and vertical surfaces.
03.04	Prepare drawings containing circles and/or arcs.
03.05	Prepare removed details and conventional breaks.
04.0	Prepare sectional views using 2D sketching and/or CAD software--The student will be able to:
04.01	Prepare drawings containing full sections and half sections.
04.02	Prepare drawings containing offset sections.
04.03	Prepare drawings containing revolved sections.
04.04	Prepare drawings containing removed sections and broken-out sections.
04.05	Prepare a sectional assembly drawing applying material symbols.
05.0	Prepare auxiliary drawings using 2D sketching and/or CAD software--The student will be able to:
05.01	Prepare drawings containing primary auxiliary views.
05.02	Prepare drawings containing auxiliary views that include curved lines.
06.0	Apply basic dimensioning and annotation using 2D sketching and/or CAD software--The student will be able to:
06.01	Prepare drawings containing linear, angular and circular standard dimensions.
06.02	Prepare drawings using general and local notes.
06.03	Apply basic tolerance techniques and nominal and actual dimensions.
07.0	Prepare working drawings--The student will be able to:
07.01	Prepare assembly drawings.
07.02	Prepare detail drawings.
07.03	Prepare technical drawings.
07.04	Modify drawings to include material specifications and parts list.

CTE Standards and Benchmarks

08.0 Prepare pictorial drawings using 2D sketching and/or CAD software--The student will be able to:

08.01 Prepare isometric, oblique and other pictorial drawings.

08.02 Prepare one-point and two-point perspectives.

08.03 Prepare presentation graphics.

09.0 Prepare surface developments (optional)--The student will be able to:

09.01 Prepare developments of prisms, cylinders, cones and pyramids.

09.02 Prepare developments of a transition piece.

09.03 Prepare drawings involving intersecting pieces.

10.0 Perform basic computer-aided drafting functions using CAD software--The student will be able to:

10.01 Demonstrate organizational skills to influence the sequential process when creating drawings.

10.02 Construct geometric figures of lines, splines, circles, arcs, etc., to represent plans and/or mechanical assemblies.

10.03 Create and edit text using appropriate style and size to annotate drawings.

10.04 Create and use multi-leaders.

10.05 Use control accuracy enhancement tools for entity positioning methods such as snap and XYZ.

10.06 Use editing commands.

10.07 Use viewing commands to perform zooming and panning.

10.08 Plot drawings on media using layout and scale.

10.09 Use query commands to interrogate database for entity characteristics, distance, area and status.

10.10 Apply standard dimensioning rules.

10.11 Move, stretch and offset objects.

10.12 Create a radius between objects.

10.13 Trim and extend objects.

10.14 Break and join objects.

CTE Standards and Benchmarks

10.15	Create and edit dimensions and work with dimension styles.
10.16	Change object properties.
10.17	Crosshatch objects.
10.18	Apply external references.
10.19	Isolate and hide objects.
10.20	Use selection set methods.
10.21	Use rectangular and polar arrays.
10.22	Use rotation reference angles.
10.23	Use elements of creativity and organizational principles to create visually coherent views and layouts.
10.24	Create and manage layers or levels.
10.25	Use page setup for plotting.
10.26	Create, insert and edit reusable content such as symbols and blocks or cells.
10.27	Use specific line types.
10.28	Create fills and gradients.
10.29	Edit hatch patterns and fills.
11.0	Apply three-dimensional modeling concepts using CAD software--The student will be able to:
11.01	Use coordinate systems to locate objects in three dimensional space.
11.02	Use basic geometric shapes available in two-dimensional and three-dimensional modeling software.
11.03	Define the parameters used for determining size, placement and orientation of a modeling object.
11.04	Describe the Boolean modeling operations of union, subtraction and intersection.
11.05	Demonstrate extrusion or sweeping techniques that transform two-dimensional objects into three-dimensional objects.
11.06	Describe the 'revolve' or 'lathe' techniques for animating a two-dimensional object and give examples of their application.
11.07	Use scale, rotate and move actions that comprise the transformation technique for animating a three-dimensional object.

CTE Standards and Benchmarks

11.08 Use basic viewing navigation tools such as zoom, rotate and panning.

11.09 Work with materials, techniques and processes through practice and perseverance to create desired result in two-dimensional and three-dimensional models.

11.10 Analyze challenges and identify solutions for three-dimensional design problems.

11.11 Investigate the use of space, scale and environmental features within a model to create three-dimensional form or the illusion of depth and form.

11.12 Apply materials, ideas, images and/or equipment from other content areas to generate ideas and processes for the development of three-dimensional models.

11.13 Investigate the use of various technology, software and media design to reflect creative trends in visual culture.

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 2
Course Number: 8725020
Course Credit: 1

Course Description:

This course provides competencies in basic architectural and civil computer-aided drafting and design, as well as an overview of the history of the built environment.

CTE Standards and Benchmarks	
12.0	Design and prepare basic architectural drawings using 2D sketching and/or CAD software--The student will be able to:
12.01	Solve design problems, through convergent and divergent thinking, to gain new perspectives.
12.02	Apply critical thinking and problem solving skills to develop creative solutions for design problems.
12.03	Draw a site plan.
12.04	Draw a floor plan.
12.05	Draw interior and exterior elevations.
12.06	Draw a roof plan.
12.07	Prepare door/window schedules.
12.08	Draw wall sections.
12.09	Draw a plumbing plan. (optional)
12.10	Draw an electrical plan.
12.11	Draw a Heating, Ventilation and Air Conditioning (HVAC) plan. (optional)
12.12	Draw a roof framing plan. (optional)
12.13	Review and revise plans throughout the design process to refine and achieve design objective.
12.14	Demonstrate flexibility and adaptability throughout the design process.

CTE Standards and Benchmarks

12.15 Define a basic project materials list.

12.16 Calculate a basic project quantity take-off.

13.0 Demonstrate an understanding of basic civil drawings--The student will be able to:

13.01 Apply use of effective and accurate civil terminology throughout the design process.

13.02 Read and interpret civil drawings.

13.03 Read and interpret plan and profile drawings.

13.04 Read and interpret topographic drawings.

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 3
Course Number: 8725030
Course Credit: 1

Course Description:

This course provides instruction in computer-aided drafting skills, professional ethics and career and education planning.

CTE Standards and Benchmarks	
14.0	Perform computer-aided drafting functions using 3D modeling software to create an architectural model or other type of model--The student will be able to:
14.01	Draw lines, arcs, circles, etc. to represent plans and/or mechanical assemblies.
14.02	Create text styles, text justification and multi-line text.
14.03	Create and use multi-leaders.
14.04	Edit dimensions.
14.05	Work with dimension styles.
14.06	Crosshatch objects.
14.07	Apply external references.
14.08	Isolate and hide objects.
14.09	Use selection set methods.
14.10	Use rectangular and polar arrays.
14.11	Use rotation reference angles.
14.12	Use elements of creativity and organizational principles to create visually coherent views and layouts.
14.13	Create and manage layers or levels.
14.14	Use page setup for plotting.
14.15	Create, insert and edit reusable content such as symbols and blocks or cells.

CTE Standards and Benchmarks

14.16	Use specific line types.
14.17	Create fills and gradients.
14.18	Edit hatch patterns and fills.
15.0	Describe the importance of professional ethics and legal responsibilities in the design and construction industry--The student will be able to:
15.01	Evaluate and justify decisions based on ethical reasoning.
15.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities and employer policies.
15.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
15.04	Interpret and explain written organizational policies and procedures.
15.05	Demonstrate personal responsibility, ethics and integrity, including respect for intellectual property, when accessing information and creating design projects.

**Florida Department of Education
Student Performance Standards**

Course Title: Drafting 4
Course Number: 8725040
Course Credit: 1

Course Description:

This course is designed to provide instruction in three dimensional modeling and sustainability issues related to the design, construction and maintenance of the built environment.

CTE Standards and Benchmarks	
16.0	Prepare computer-aided three-dimensional architectural drawings--The student will be able to:
16.01	Use technology to facilitate creative process and techniques.
16.02	Investigate the use of various technologies and resources to inspire creative design
16.03	Compare and analyze traditional and digital media to learn how technology has altered opportunities for innovative responses and results.
16.04	Draw plans and elevations.
16.05	Draw isometric exterior views.
16.06	Draw perspective exterior views.
17.0	Research the history of the built environment--The students will be able to:
17.01	Describe the significance of major architects, engineers or inventors to understand their historical influences.
17.02	Research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
17.03	Identify transitions in design media, technique and focus to explain how technology has changed design throughout history.
18.0	Investigate sustainability issues related to the design, construction and maintenance of the built environment--The student will be able to:
18.01	Describe the impact of the construction industry on the natural environment.
18.02	Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
18.03	Research and recommend sustainable design solutions.

CTE Standards and Benchmarks

18.04 Identify specific design practices that can lessen adverse impacts on the environment.

18.05 Explain the environmentally sustainable features of a building.

18.06 Invite the US Green Building Council to make a presentation. (optional)

19.0 Examine career opportunities in drafting and related fields to determine requisite skills, qualifications, supply and demand, market location and potential earnings--The student will be able to:

19.01 Identify and demonstrate positive work behaviors needed to be employable.

19.02 Develop and use criteria to select works for a digital career portfolio.

19.03 Evaluate and compare employment opportunities that match career goals.

19.04 Examine licensing, certification, education and industry credentialing requirements for careers in design and construction industry.

19.05 Identify opportunities and research requirements for career advancement.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Academic Alignment

Secondary Career and Technical Education courses are pending alignment to the B.E.S.T. (Benchmarks for Excellent Student Thinking) Standards for English Language Arts (ELA) and Mathematics that were adopted by the State Board of Education in February 2020. Academic alignment is an ongoing, collaborative effort of professional educators that provide clear expectations for progression year-to-year through course alignment. This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf>. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

MyCareerShines is an interactive resource to assist students in identifying their ideal career and to enhance preparation for employment. Teachers are encouraged to integrate this resource into the program curriculum to meet the employability goals for each student. Access MyCareerShines by visiting: www.mycareershines.org.

Career and Technical Student Organization (CTSO)

SkillsUSA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>