

Standards/Measurement Criteria

Drafting and Design Technologies

ARCHITECTURAL DRAFTING – OPTION A

CIP No. 15.1300.2

***This indicates the “technical skill standards” for this program that will be assessed on the end-of-program Drafting and Design Technologies standards assessment.**

1.0 EXPLORE CAREER PATHWAYS IN DRAFTING AND DESIGN TECHNOLOGY

- 1.1 Survey the fields of mechanical, civil, architectural and electrical/electronic drafting
- 1.2 Relate interests, skills and personal orientation to career choices
- 1.3 Use technology to research career path information
- 1.4 Survey salary ranges associated with different positions in design and drafting technology

2.0 DEMONSTRATE JOB SEARCH SKILLS NEEDED TO OBTAIN A CAREER IN DRAFTING AND DESIGN TECHNOLOGIES

- 2.1 Explain the steps in a job search
- 2.2 Identify employment opportunities in drafting and design technologies utilizing on-line and off-line resources
- 2.3 Critique a job application

3.0 DEMONSTRATE APPROPRIATE WORK HABITS FOR SUCCESSFUL EMPLOYMENT IN THE FIELD OF DRAFTING AND DESIGN

- 3.1 Use drafting and design technology vocabulary in context
- 3.2 Apply basic oral and written communication skills
- 3.3 Contribute to a team effort
- 3.4 Practice leadership skills in achieving a group goal
- 3.5 Plan, organize and implement drafting and design activities

4.0 PARTICIPATE IN LEADERSHIP ACTIVITIES SUCH AS THOSE SUPPORTED BY CAREER AND TECHNICAL STUDENT ORGANIZATION SkillsUSA

- 4.1 Discuss the roles and responsibilities that leaders and members bring to an organization
- 4.2 Discuss characteristics and importance of an effective team member
- 4.3 Explain characteristics of effective workplace teams
- 4.4 Describe techniques to involve each member of the team
- 4.5 Participate in career development events

- 4.6 Develop and implement a personal and professional growth plan
- 4.7 Identify proper business etiquette
- 4.8 Define decision-making techniques and processes
- 4.9 Practice effective meeting management
- 4.10 Demonstrate business etiquette
- 4.11 Practice decision-making processes

5.0 EXPLORE PRINCIPLES OF INDUSTRIES RELYING ON DRAFTING AND DESIGN TECHNOLOGY

- 5.1 Recognize relationship between trades/professions related to drafting and design to facilitate smooth workflow
- 5.2 Discuss how quality of work affects profitability in drafting and design
- 5.3 Explain the role and major functions of drafting and design in different industries
- 5.4 Analyze current trends in drafting and design
- 5.5 Identify needs and requirements of internal and external customers in drafting and design

6.0 EXPLORE LEGAL AND ETHICAL ISSUES IN DESIGN/ENGINEERING INDUSTRIES

- 6.1 Define ethics in the drafting and design environment
- 6.2 Examine the relationship between ethics and the law as it related to drafting and design
- 6.3 Explain ethical workplace behavior and how it applies to organizational policies and culture
- 6.4 Identify workers' rights regarding the workplace issues including safety, drug testing, harassment, discrimination, privacy, etc.

7.0 PRACTICE SAFE AND PRODUCTIVE WORKING PROCEDURES IN DRAFTING AND DESIGN ENVIRONMENTS

- 7.1 Identify responsibilities of professionals in drafting and design technology in creating and maintaining a safe work environment
- 7.2 Explain the importance of the OSHA (Occupational Safety and Health Administration) Standards and HazCom (Hazard Communication Standard)
- 7.3 Apply safety/environmental policies and procedures
- 7.4 Identify security issues related to computer hardware, software and data
- 7.5 Explain issues regarding software copyright, software licensing, and software copying
- 7.6 Practice ergonomically sound working procedures

8.0 APPLY PROBLEM SOLVING AND DECISION MAKING PROCESSES TO DRAFTING AND DESIGN RELATED SITUATIONS

- 8.1 Apply problem-solving processes
- 8.2 Describe methods of establishing priorities
- 8.3 Solve problems individually and as part of a team
- 8.4 Generate creative ideas using critical thinking skills in solving drafting and design related problems
- 8.5 Evaluate facts, use logic and reason in decision making

9.0 DEMONSTRATE TECHNOLOGICAL LITERACY FOR DRAFTING AND DESIGN OPERATIONS

- 9.1 Examine the uses of technology in the drafting and design fields
- 9.2 Demonstrate basic usage of computers (input, storage, output)
- 9.3 Access information electronically (i.e. Internet, CD-ROM, memory stick)
- 9.4 Apply file and disk management techniques
- 9.5 Import text and graphics from other software programs
- 9.6 Export text and graphic information in different formats to other software programs

10.0 USE MATHEMATICAL PROCESSES TO SOLVE PROBLEMS IN DRAFTING AND DESIGN TECHNOLOGY

- 10.1 Identify and use common measurement tools used in drafting and design technology and their functions
- 10.2 Select appropriate measurement techniques for the specific needs of different drafting and design fields
- 10.3 Perform mathematical calculations in the context of drafting and design related problems
- 10.4 Recognize and use metric units of length, weight, volume and/or temperature in mathematical problems
- 10.5 Recognize and use imperial units of length, weight, volume and/or temperature in mathematical problems
- 10.6 Use technology in the solution of math-related problems

11.0 INTERPRET SCHEMATICS, BLUEPRINTS, AND TECHNICAL DRAWINGS

- 11.1 Interpret dimensions, symbols, legends, scales, and directions/orientations
- 11.2 Analyze how content and information are communicated in schematics, blueprints, and technical drawings
- 11.3 Analyze schematics, blueprints, and technical drawings for clarity, completeness and accuracy
- 11.4 Recognize cross referencing on technical drawings

12.0 PRACTICE SKETCHING, DRAWING AND VISUALIZATION SKILLS FOR DRAFTING AND DESIGN

- 12.1 Identify and analyze composition elements
- 12.2 Employ common types of drafting media and surfaces in traditional or digital form
- 12.3 Illustrate the basic elements and principles of drafting and design using traditional or digital media
- 12.4 Identify basic design methods like Golden Mean, Cheng, or Greek Styles

13.0 DEMONSTRATE BASIC OPERATION OF COMPUTER HARDWARE AND SOFTWARE UTILIZED IN DRAFTING AND DESIGN TECHNOLOGY

- 13.1 Identify computer hardware associated with drafting and design technology
- 13.2 Apply basic commands of CAD software
- 13.3 Store and retrieve data for CAD software
- 13.4 Demonstrate the operation of hardware items that support data output from CAD application software (e.g., printer, projector, etc.)
- 13.5 Output 2D plotted drawings

14.0 DEVELOP A PLAN FOR A CAREER IN DRAFTING AND DESIGN

- 14.1 Investigate the variety of drafting and design career options in design, engineering and manufacturing
- 14.2 Develop career goals based on interests, aptitudes, and research
- 14.3 Manage personal and career goals
- 14.4 Describe factors that contribute to job satisfaction and success

15.0 PREPARE FOR EMPLOYMENT IN DRAFTING AND DESIGN

- 15.1 Develop a resume
- 15.2 Develop an electronic/scannable format resume
- 15.3 Create a drafting/design portfolio with industry-specific work samples
- 15.4 Complete job application process, including electronic applications
- 15.5 Demonstrate interviewing skills, including pre-interview preparation and post-interview follow-up
- 15.6 Research a drafting and design organization as a potential employee

16.0 PARTICIPATE IN WORK-BASED LEARNING EXPERIENCES IN DRAFTING AND DESIGN

- 16.1 Use technology appropriate for the job
- 16.2 Demonstrate positive work behaviors
- 16.3 Demonstrate safe and healthy work behaviors
- 16.4 Recognize and adapt to changes in the workplace
- 16.5 Participate in a variety of work-based experiences, paid or non-paid, in drafting and design

17.0 DEMONSTRATE ORAL COMMUNICATION SKILLS FOR DRAFTING AND DESIGN

- 17.1 Conduct formal/informal research to collect appropriate topical information and data
- 17.2 Use questioning techniques to obtain needed information from audience
- 17.3 Interpret oral and nonverbal communications of audience
- 17.4 Demonstrate active listening during communications
- 17.5 Demonstrate appropriate technologies for a formal presentation
- 17.6 Deliver presentation incorporating both appropriate verbal and nonverbal communication techniques

18.0 DEMONSTRATE WRITTEN COMMUNICATION SKILLS FOR DRAFTING AND DESIGN

- 18.1 Conduct formal/informal research to collect appropriate topical information and data
- 18.2 Organize information and develop an outline
- 18.3 Write business communication documents using appropriate format for the situation
- 18.4 Using appropriate technology, prepare draft document using established rules for grammar, spelling and sentence construction

19.0 EVALUATE BUSINESS AND FINANCIAL MANAGEMENT PRACTICES NEEDED IN DRAFTING AND DESIGN INDUSTRIES

- 19.1 Review bidding and billing structures used by drafting and design firms
- 19.2 Review a budget for a design project
- 19.3 Develop time and production schedules for a project
- 19.4 Describe the impact of rework, excessive labor costs, scope creep, and lack of teamwork on a project budget

20.0 PARTICIPATE IN LEADERSHIP ACTIVITIES SUCH AS THOSE SUPPORTED BY CAREER AND TECHNICAL STUDENT ORGANIZATION SkillsUSA

- 20.1 Determine the roles and responsibilities that leaders and members bring to an organization
- 20.2 Describe how personal characteristics affect leadership ability
- 20.3 Compare/contrast leadership and management styles
- 20.4 Evaluate characteristics of effective teams
- 20.5 Describe how cultural/ethnic differences affect interpersonal interactions/communications within a group
- 20.6 Evaluate characteristics of an effective team player
- 20.7 Practice techniques to involve each member of the team
- 20.8 Demonstrate team work
- 20.9 Practice effective meeting management
- 20.10 Demonstrate business etiquette

20.11 Practice decision-making processes

21.0 APPLY MATHEMATICAL CONCEPTS TO PROBLEMS IN DRAFTING AND DESIGN

- 21.1 Apply basic mathematical skills to drafting and design operations
- 21.2 Apply mathematical calculations involving practical geometry and trigonometry
- 21.3 Calculate and evaluate geometric figures
- 21.4 Create geometric constructions utilizing technical sketching techniques
- 21.5 Determine/select appropriate dimensioning systems (e.g., decimal, metric)

***22.0 APPLY MEASUREMENT AND SCALE CONCEPTS IN DESIGN DRAFTING**

- 22.1 Identify types of measurement used in drafting and design
- 22.2 Select proper measurement tools
- 22.3 Perform measurements with hand held instruments
- 22.4 Determine and apply appropriate scale
- 22.5 Transcribe illustrations accurately

***23.0 INTERPRET ENGINEERING DOCUMENTS AND CONTROL DOCUMENTS**

- 23.1 Interpret dimensions, symbols, legends, scales, and directions/orientations
- 23.2 Analyze how content and information are communicated in schematics, blueprints, and technical drawings
- 23.3 Analyze schematics, blueprints, and technical drawings for clarity, completeness, and accuracy
- 23.4 Recognize cross-referencing on technical drawings
- 23.5 Identify and describe basic types of drawings
- 23.6 Locate and interpret information on specific documents
- 23.7 Check prints for dimensional accuracy, completeness, and note detail
- 23.8 Compare schematics to dimensional drawings
- 23.9 Verify drawing elements
- 23.10 Identify conflicting data

***24.0 CREATE TECHNICAL DRAWINGS**

- 24.1 Identify, select and use fundamental drafting techniques for drawings
- 24.2 Demonstrate freehand lettering technique
- 24.3 Identify and utilize line types and line weights
- 24.4 Create title blocks
- 24.5 Format borders
- 24.6 Apply notes and dimensions
- 24.7 Plot or print drawings using the correct layout
- 24.8 Organize and maintain drawings and supporting documents

***25.0 UTILIZE BASIC COMPUTER CONCEPTS, OPERATIONS AND INFORMATION TECHNOLOGY APPLICATIONS**

- 25.1 Use computer hardware and input/output devices for drafting/design problems
- 25.2 Apply basic commands of operating system software
- 25.3 Apply file and disk management techniques
- 25.4 Import and export data files using different formats (dxf, dxb, Tiff, gif, pcx, eps, spd, or other formats as required)
- 25.5 Prepare files for electronic transfer
- 25.6 Access and use the Internet for file transfer
- 25.7 Access and use a computer network for file management and transfer

***26.0 USE A CADD/VDCM (Virtual Design and construction Modeling) SYSTEMS AND PROCEDURES**

- 26.1 Explore and determine applicability of CADD/VDCM systems to the project
- 26.2 Analyze drawings using CADD/VDCM software functions/commands
- 26.3 Use CADD/VDCM software commands to set up drawing scale, format, dimensioning, etc.
- 26.4 Apply layers/visible items, colors, line types, editing commands, and grouping techniques
- 26.5 Control entity properties
- 26.6 Incorporate standard parts, symbol libraries, and/or templates
- 26.7 Control viewing commands
- 26.8 Create and manipulate views by modifying coordinate system settings
- 26.9 Minimize a drawing file for storage and transmission

***27.a DETAIL PROJECTION VIEWS/COMPONENTS**

- 27.1a Determine views for projection (i.e., plan, top, front, etc.)
- 27.2a Identify, create and place views for orthographic projections
- 27.3a Identify, create and place auxiliary views to determine true size, shape, and location of non-orthogonal features
- 27.4a Identify, create and place appropriate section views
- 27.5a Construct full, half and offset section of an object
- 27.6a Utilize various material hatch patterns in section views

***28.a EXPLORE ARCHITECTURAL DRAFTING AND DESIGN CONCEPTS AND PROBLEMS**

- 28.1a Use architectural terminology in context
- 28.2a Interpret legal land descriptions and draft finished site plan
- 28.3a Read and interpret architectural blueprints
- 28.4a Read and interpret plat and/or plot maps
- 28.5a Apply architectural symbols to a drawing
- 28.6a Use industry-standard application software for architectural drafting to solve a problem

***29.a DEMONSTRATE DESIGN DRAFTING CONCEPTS AS RELATED TO ARCHITECTURAL DESIGN USING CADD SYSTEMS**

- 29.1a Draft a floor plan from preliminary sketch
- 29.2a Draft a foundation/basement foundation plan
- 29.3a Draft a roof plan
- 29.4a Draft an electrical plan locating receptacle, switch, and lighting outlets
- 29.5a Draft a plumbing plan showing drain vent system
- 29.6a Draft an HVAC plan locating HVAC diffusers, outlets, equipment
- 29.7a Draft a reflected ceiling plan combining elements of electrical and HVAC plans
- 29.8.a Draft, locate and label fasteners on production, assembly drawings and parts lists
- 29.9a Prepare and draft a window and door schedule
- 29.10a Apply appropriate dimensions with annotations
- 29.11a Develop a set of working drawings for a residential or small commercial structure
- 29.12a Draft cabinet elevations
- 29.13a Prepare bill of materials for drawings

***30.a CREATE DRAWINGS OF STRUCTURAL SECTIONS AND DETAILS USING CADD/VDCM SYSTEMS**

- 30.1a Draft structure shapes and details
- 30.2a Draft longitudinal and/or cross sections and details
- 30.3a Draft wall sections and details
- 30.4a Draft a stairway section
- 30.5a Draft structural elevations

***31.a CREATE PICTORIAL DRAWINGS AND MODELS**

- 31.1a Identify and create isometric drawings using both manual and electronic techniques
- 31.2a Identify and create perspective drawings (1-point and 2-point) using both manual and electronic techniques
- 31.3a Identify and render materials