Arkansas CTE

Architectural/CAD I: Grades 9, 10, 11, 12

Adopted 2006

Practicing Safety

1.1 Define terminology related to practicing safety

1. Use terms appropriately in context 1.1.1

1.2 List general safety guidelines

1. Describe guidelines for safe handling of drafting tools, equipment, and furniture 1.2.1
2. Demonstrate safety precautions regarding electrical equipment used in drafting 1.2.2
3. Outline drafting classroom safety guidelines 1.2.3
4. Demonstrate the use of school emergency plans 1.2.4

Preparing for a Career in Drafting

2.1 Define terminology related to careers in drafting

1. Use terms appropriately in context 2.1.1

2.2 Describe career options in drafting

1. Evaluate career education requirements in architectural drafting for an architect, architectural draftsman, model maker, teacher, and technical illustrator 2.2.1

2.3 List job responsibilities for various drafting occupations

1. Revise a high school career action plan in drafting with several career options 2.3.1
2. Research requirements for a community college architecture major 2.3.2
3. Research requirements for a college major in engineering HVAC systems 2.3.3
4. Explore interest in various occupational areas utilizing drafters 2.3.4

2.4 Identify potential barriers to career advancement

1. List potential barriers to career advancement 2.4.1
2. List common failures made by drafting employees to meet workplace expectations 2.4.2
3. Discuss results of failure to keep current with technical knowledge and skills 2.4.3

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4. Describe workplace discrimination (based upon such factors as gender, ethnicity, age, or physical disability) 2.4.4
5. Discuss state and federal employment laws and company human resources policies 2.4.5

2.5 Describe strategies for removing potentials barriers to career advancement

1. Participate in professional development programs 2.5.1
2. Develop an appreciation of the benefits of constructive criticism 2.5.2

Using Mathematics in Drafting

3.1 Define terminology related to mathematics in drafting

1. Use terms appropriately in context 3.1.1

3.2 Determine mathematic conversions used in preparing architectural drawings

1. Perform calculations to convert inches to feet and feet to inches 3.2.1
2. Perform calculations to convert centimeters to millimeters and millimeters to centimeters 3.2.2
3. Perform calculations to convert cubic feet to cubic yards and cubic yards to cubic feet 3.2.3

3.3 Describe basic mathematical skills used in architectural drafting occupations

1. Apply the principles of addition, subtraction, multiplication, and division involving whole numbers, fractions, mixed numbers, and decimals 3.3.1
2. Convert common fractions to decimal fractions and decimal fractions to common fractions 3.3.2

3.4 Identify mathematical calculations involving practical geometry and trigonometry

1. Apply practical geometry and trigonometry principles using the Pythagorean Theorem (3-4-5 triangle) 3.4.1
2. Use mathematical formulas to calculate area 3.4.2
3. Use mathematical formulas to calculate volume 3.4.3
4. Explain practical applications of the Pythagorean Theorem (3-4-5 triangle) 3.4.4

3.5 Describe procedures to compute material quantities used in residential construction

1. Estimate cubic yards of concrete for footings from architectural drawings 3.5.1
2. Estimate quantities of lumber for floor framing, wall framing, and roof framing 3.5.2
3. Estimate quantities of wall and floor coverings from architectural drawings 3.5.3
4. Estimate quantities of roofing and siding materials from architectural drawings 3.5.4

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5. Estimate quantities of plumbing fixtures and electrical materials from architectural drawings 3.5.5

Orientation to Architectural and Computer-Aided Drafting

4.1 Define terminology related to architecture

1. Use terms appropriately in context 4.1.1

4.2 Describe types of architectural drawings

1. Show components found on architectural floor plans, elevations, and electrical plans 4.2.1
2. Demonstrate various uses for architectural drawings 4.2.2
3. Use the architect's scale to make measurements on architectural drawings 4.2.3
4. Summarize the meaning of scales used on various architectural drawings 4.2.4

4.3 Describe techniques for developing freehand field sketches of architectural features

1. Apply techniques for developing field sketches, using drawing instruments 4.3.1
2. Draw simple field sketches (with or without drawing instruments) of architectural features 4.3.2

4.4 Define freehand lettering

1. Compose typical notes found on architectural and technical drawings, using freehand lettering techniques 4.4.1

Performing Computer-Aided Drafting (CAD) Operations

5.1 Define terminology related to CAD operations

1. Use terms appropriately in context 5.1.1

5.2 Identify components of a CAD system used in an architectural firm

1. Describe the purpose of basic components of a CAD system (CPU, monitor, keyboard, mouse/digitizer, plotter, printer, and CAD software) 5.2.1
2. Describe common features of CAD software programs 5.2.2
3. Navigate CAD system command menus 5.2.3

5.3 Outline the fundamentals of computer skills used in preparing architectural drawings

1. Manage files (i.e., saving, naming, backing up, organizing) 5.3.1
2. Set up a CAD system for architectural drawings 5.3.2
3. Demonstrate ability to perform basic word processing (compose, cut, copy, paste, print) to prepare architectural specifications 5.3.3

5.4 Describe procedures to change CAD drawing setups

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1. Modify drawing limits, units of measurement, text styles and size, and dimension variables 5.4.1

2. Modify settings for various drawing aids (i.e., snap, grid, and polar) 5.4.2
3. Modify settings for various layers for a CAD drawing 5.4.3

5.5 List CAD drawing commands to prepare architectural drawings

1. Use CAD drawing commands to construct lines, circles, arcs, polylines, polygons, ellipses, rectangles, text, and hatch patterns 5.5.1
2. Create blocks or symbols for architectural drawings, using CAD commands 5.5.2
3. Insert various symbols in architectural drawings 5.5.3

5.6 Describe techniques used to edit and modify architectural drawings

1. Use CAD commands to change or modify an architectural drawing (i.e., move, copy, mirror, break, offset, fillet, stretch, scale, rotate, trim/extend, erase, edit text, explode, grips, and array) 5.6.1
2. Use CAD commands to change or modify lines and features of a floor plan, elevation drawing, wall section drawing, or cabinet detail 5.6.2
3. Use CAD commands to modify floor plans and electrical plans 5.6.3

5.7 List features used when adding dimensions on architectural drawings

1. Use CAD dimensioning commands to place size and location dimensions on architectural floor plans, wall sections, elevation drawings, and cabinet details 5.7.1
2. Use CAD commands to place notes and leaders on an architectural drawing 5.7.2
3. Set up and change CAD dimensioning styles for an architectural drawing 5.7.3

5.8 Outline how to organize work using CAD file commands

1. Use CAD file commands to organize files and folders 5.8.1
2. Use CAD file commands to plot, import, and export a drawing file 5.8.2

5.9 Explain methods to create various features when preparing CAD architectural drawings

1. Prepare CAD architectural drawings of floor plans, elevations, wall sections, foundation plans, and site plans, using line types, line weights, dimensions, notes, details, and section views 5.9.1

5.10 Describe techniques to produce plots of CAD drawings

1. Scale architectural drawings using a CAD system 5.10.1
2. Plot drawings to various scales 5.10.2
3. Set and modify plot scale settings for a CAD file 5.10.3
4. Plot architectural drawings having single and multiple view ports 5.10.4

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Orientation to Architectural Drafting

6.1 Define terminology related to architectural drafting

1. Use terms appropriately in context 6.1.1

6.2 Outline key developments in the history of architecture

1. Identify the contributions to modern architecture and building practices made by notable architects 6.2.1
2. Distinguish among the characteristics of architectural styles of historical periods, including Roman, Gothic, and Colonial 6.2.2

6.3 List basic principles behind building codes

1. Evaluate the underlying reasons for building codes, including safety, consumer protection, legal requirements (ADA provisions), standardization of fixtures (electrical, plumbing, HVAC, cabinets), and fire prevention 6.3.1

6.4 Identify items that comprise a set of architectural drawings

1. Discuss types of information necessary to construct a building 6.4.1
2. Identify types of working drawings included in a set of plans for residential construction 6.4.2
3. Explain the reasons for various types of plans needed for building construction 6.4.3

6.5 List the components of a cover sheet for a set of architectural drawings

1. Set scale/size for items on the cover sheet for a set of architectural drawings 6.5.1
2. Create an index for a set of architectural drawings 6.5.2
3. Prepare a cover sheet indicating the content, job identification, and other pertinent information for a set of architectural drawings 6.5.3

Performing Architectural Drafting Operations

7.1 Define terminology related to architectural drafting operations

1. Use terms appropriately in context 7.1.1

7.2 Describe line conventions used on architectural drawings

1. Apply common line symbols to architectural drawings 7.2.1
2. Apply various special line symbols to architectural drawings 7.2.2

7.3 Describe the meaning for symbols used on architectural drawings

1. Give examples of how architectural symbols are used to communicate information for construction of a building 7.3.1
2. Describe techniques for creating and placing various architectural symbols on drawings 7.3.2
3. Describe types of symbols typically found on architectural drawings 7.3.3
4. Research architectural symbols to use on drawings 7.3.4

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7.4 List dimensioning methods used on architectural drawings

1. Demonstrate dimensioning methods used on architectural drawings 7.4.1
2. Demonstrate how notes are used to indicate location and size of construction components on architectural drawings 7.4.2
3. Explain methods for applying dimensions and notes to various architectural features on construction drawings 7.4.3
4. Identify standard abbreviations used with dimensions on architectural drawings 7.4.4
5. Explain procedures and line types used for dimensions, lines, and notes on architectural drawings 7.4.5

7.5 Select information using various architectural reference materials

1. Demonstrate use of a table of contents, indexes, cross-references, etc., in architectural reference materials 7.5.1
2. Research information in product manuals, drafting manuals, building code manuals, Sweets catalog, Thomas Register catalog, and graphic standards manuals 7.5.2
3. Reference construction information using Internet resources 7.5.3

Preparing Floor Plan Drawings

8.1 Define terminology related to floor plans

1. Use terms appropriately in context 8.1.1

8.2 Outline information needed to develop a floor plan

1. Prepare a list of building considerations and desires for construction based on consumer desires and needs (include budget, family size and lifestyle, foot-traffic patterns, kitchen functionality requirements) 8.2.1
2. Sketch a floor plan illustrating walls, windows, doors, kitchen and bathroom cabinets, major appliances, plumbing fixtures, etc., based on design considerations 8.2.2
3. Describe guidelines for applying various symbols for architectural features of a floor plan 8.2.3
4. Describe guidelines for placing dimensions on a floor plan drawing 8.2.4

8.3 Outline the process to prepare a floor plan drawing

1. Use lines and symbols representing building features for a floor plan, including interior and exterior walls, windows, doors, kitchen and bathroom cabinets, major appliances, plumbing fixtures, and HVAC equipment 8.3.1
2. Use guidelines for placing location dimensions and notes for building features on a floor plan of a residential structure 8.3.2
3. Show dimensions and notes for kitchen, bathroom, and other cabinets or millwork on a floor plan 8.3.3

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4. Use guidelines to place room names and general notes on a floor plan 8.3.4
5. Distinguish among factors and considerations to locate stairs on a floor plan for a multi-story structure 8.3.5

Preparing Building Section Drawings

9.1 Define terminology related to the preparation of building section drawings

1. Use terms appropriately in context 9.1.1

9.2 Describe procedures to develop a typical wall section drawing

1. Research building code guidelines for a local community 9.2.1
2. Research and develop a list of building materials, sizes, and uses 9.2.2
3. Research and develop an understanding of building construction standards for foundations, floor framing, wall framing, ceiling and roof framing, cornice construction, and other details found on wall sections 9.2.3
4. Research and prepare a sketch of wall section details 9.2.4
5. Draw footing and foundation details typical of residential construction on a wall section 9.2.5
6. Show floor framing details typical of residential construction on a wall section 9.2.6
7. Prepare wall framing details typical of residential construction, including floor, wall, ceiling, roof, cornice and finished materials 9.2.7

Preparing Electrical Plan Drawings

10.1 Define terminology related to building electrical systems

1. Use terms appropriately in context 10.1.1

10.2 Describe the process to develop an electrical plan drawing

1. Outline construction elements to be included on an electrical plan drawing 10.2.1
2. Outline building codes and standards for the location of components of the electrical system and appliances in residential construction 10.2.2
3. Identify factors that determine the location of electrical symbols, equipment symbols, distribution panel, HVAC, and other major components of an electrical system on an electrical plan drawing 10.2.3

10.3 Describe methods for preparing an electrical plan drawing

1. Give examples of the location of convenience and special purpose outlets on an electrical or floor plan 10.3.1
2. Use guidelines to sketch the layout of lighting for a residential electrical plan, indicating switch type, location, and device control 10.3.2
3. Use guidelines to place electrical symbols, equipment symbols, distribution panel, HVAC, and other major components on an electrical floor plan 10.3.3

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4. Use guidelines to place lighting symbols on a residential electrical floor plan, indicating switch type and location 10.3.4
5. Use guidelines to place notes and symbols on electrical plan drawings 10.3.5

Developing Building Elevations

11.1 Define terminology related to the development of building elevations

1. Use terms appropriately in context 11.1.1

11.2 Identify elements of building elevation drawings

1. Distinguish among characteristics of various architectural styles, site considerations, and desired roof design to draw sketches of exterior building elevations 11.2.1
2. Consider consumer needs and tastes in selection of exterior finish materials 11.2.2
3. Demonstrate how to consult wall section, floor plan, and foundation plan to determine grade line, exterior details, heights of finished floor and ceiling, roof slope, and window and door appearance for preparing building elevations 11.2.3

11.3 Describe how to prepare building elevation drawings

1. Explain methods used to project horizontal dimensions of exterior walls, windows, doors, and other elements from a floor plan 11.3.1
2. Explain methods to project heights of grade lines, depth and thickness of footings, window and door heights, eave line, and roof height from wall section drawings 11.3.2
3. Follow guidelines to place architectural details for windows, doors, railings, gables, and other exterior features on an elevation drawing 11.3.3
4. Follow guidelines to place dimensions, symbols, and notes that identify the elevation, floor and ceiling levels, roof slope, grade lines, etc., on elevation drawings 11.3.4

Preparing a Career Portfolio

12.1 Define terminology related to careers in architecture and architectural drafting

1. Prepare a written list of terms and definitions related to careers in architecture and architectural drafting 12.1.1

12.2 Present a career portfolio

1. Evaluate the benefits of options for displaying drafting work in a professional manner 12.2.1
2. Utilize a variety of media and display materials, giving consideration to several portfolio display methods 12.2.2
3. Discuss the role a portfolio can play in the hiring process 12.2.3

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3 Select and organize material to create a career portfolio

1. Prepare a resume with cover letter, including references and letters of recommendation to be included with a career portfolio 12.3.1
2. Select examples of work for a career portfolio representing a variety of projects and demonstrating the range of talent (e.g., drawings, pictures of models) 12.3.2
3. Select work for a career portfolio that demonstrates ability and versatility 12.3.3
4. Organize a career portfolio into sections labeled by subject areas 12.3.4
5. Develop an index for a career portfolio, including such items as architectural drawings, mechanical drawings, manual drawings, projects, awards, and recognitions (SkillsUSA, academic, and others) 12.3.5
6. Organize materials for a career portfolio in a logical manner for presentation 12.3.6

12.4 Outline guidelines for presenting a career portfolio

1. Demonstrate professional dress for a portfolio presentation 12.4.1
2. Demonstrate an understanding of oral communication skills necessary for presenting a portfolio 12.4.2
3. Demonstrate various techniques for presenting work included in a portfolio 12.4.3

Career and Technical Student Organizations (SkillsUSA/HOSA)

13.1 Define terminology related to student organizations

1. Use terms appropriately in context 13.1.1

13.2 Outline a self-assessment, and identify individual learning styles

1. Show individual strengths 13.2.1
2. Show areas in need of improvement 13.2.2

13.3 Describe self-motivation techniques, and establish short-term goals

1. Prepare a list of short-term goals 13.3.1
2. Discuss ways to change or improve lifestyle, appearance, and behavior 13.3.2

13.4 Give examples of individual time management skills

1. Prepare and maintain a time journal 13.4.1
2. Outline ways to improve time-management skills 13.4.2

13.5 Predict future occupations

1. Research the Internet to explore career opportunities in specified fields of study 13.5.1
2. Prepare a presentation on a specified career area 13.5.2

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5 Identify the customer

1. Differentiate between external and internal customers 13.6.1
2. Identify factors that contribute to poor customer relationships 13.6.2

13.7 Identify the benefits of doing a community service project

1. Outline ways to become involved in the community 13.7.1
2. Develop a community service project 13.7.2

13.8 Describe effective communication with others

1. Note personal barriers to listening 13.8.1
2. Relate a personal plan to overcome barriers to listening 13.8.2

13.9 Give locations for a shadowing activity

1. Summarize and relate an experience of job shadowing 13.9.1

13.10 Identify the components of an employment portfolio

1. Present parts of a portfolio 13.10.1
2. Compile a personal employment portfolio for an interview 13.10.2

13.11 List proficiency in program competencies

1. Construct an interpersonal competency assessment 13.11.1

13.12 Describe how to measure/modify short-term goals

1. Discuss how to pursue short-term goals 13.12.1

13.13 Identify stress sources

1. Prepare a list of personal stress sources 13.13.1
2. Outline techniques to cope with individual sources of stress 13.13.2

13.14 Identify characteristics of a positive image

1. List behaviors and traits that lead to a positive image 13.14.1
2. Note behaviors and traits that lead to a negative image 13.14.2

13.15 Describe how team skills can be applied to a group project

1. Form a team to develop a class project 13.15.1

13.16 Outline how to observe and critique a meeting

1. Attend a formal meeting held in the community 13.16.1
2. Prepare a critique of the meeting attended 13.16.2

13.17 List business meeting skills

1. Relate the basic rules required to ensure an orderly and business-like meeting 13.17.1

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2. Demonstrate with role-playing appropriate meeting skills 13.17.2

13.18 Outline a survey for employment opportunities

1. Compile information on a particular employment opportunity of interest 13.18.1
2. Perform an Internet search of a specific career area 13.18.2

13.19 Select a professional journal for review and develop a three- to five-minute presentation

1. Prepare a presentation on the content, purpose, and distribution of a particular professional journal 13.19.1

13.20 Identify customer expectations

1. List customer expectations 13.20.1
2. Discover the consequences of unmet customer expectations 13.20.2

13.21 List parts of a job application

1. Prepare a job application from various businesses in the community 13.21.1
2. Demonstrate a mock job interview 13.21.2

13.22 Outline your employment portfolio

1. Construct a personal employment portfolio 13.22.1

13.23 Identify supervisory and management roles in an organization

1. Prepare an organizational chart 13.23.1
2. Outline the responsibilities of managers and supervisors 13.23.2

13.24 Outline safety issues

1. Research safety issues in a given career area 13.24.1