ARCHITECTURAL COMPUTER AIDED DESIGN II

Architectural Computer-Aided Design (CAD) II will expand upon concepts studied in Architectural Computer-Aided Design (CAD) I. A similar problem solving computer-based approach will be employed. Expanded and new topics include: electrical plan, mechanical plan (plumbing and heating) as well as structural details, beam and loading calculations, greater detailed interior design, elevations, foundation systems, and alternative materials. Students will apply information learned to design and draw a complete set of plans of a residential house. Grades 10-12

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Intro to AutoCAD Architectural Desktop	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS: **3.1.12** **3.2.12** **3.7.12** **3.8.12**	**UNIT OBJECTIVES:** After completing this unit, students will be able to: - Properly use AutoCAD Architectural Desktop though the completion of the software tutorial. - Draw a basic floor plan, basement plan, elevations, and a final 3d drawing of a house.
ACTIVITIES: Students will discuss, demonstrate and practice the topics to complete exercises that meet the above objectives. **RESOURCES:** - CAD Software - Computer Equipment	**ASSESSMENTS:** Students will be evaluated upon the following: - Accuracy - neatness - solution of the problem - proper use of software **REMEDIATION:** **ENRICHMENT:**

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Basic House Design Review	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS: **3.1.12** **3.2.12** **3.7.12** **3.8.12**	**UNIT OBJECTIVES:** After completing this unit, students will be able to: - Recognize different styles of houses - List the chief advantages to each design - Map traffic circulation for maximum efficiency
ACTIVITIES: Students will discuss, demonstrate and practice the topics to complete exercises that meet the above objectives. **RESOURCES:** - CAD Software - Computer Equipment	**ASSESSMENTS:** Students will be evaluated upon the following: - solution of the problem - identify different aspects of design **REMEDIATION:** **ENRICHMENT:**

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Room Planning Review/Sketching the floor plan	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS:
3.1.12
3.2.12
3.7.12
3.8.12

UNIT OBJECTIVES:
After completing this unit, students will be able to:
- Discuss factors and plan appropriate sleeping, living and service areas
- Use and apply properly sized rooms, hallways, closets and stairwells
- Use and apply sketching techniques in ¼" scale.
- Design a sketch of a two story house which is at least 2500 sq. ft.

ACTIVITIES:

- Students will discuss, demonstrate and practice the topics to complete exercises that meet the above objectives.
- Students will demonstrate using the ¼" scale by sketching a floor plan of a small building of their choice.
- Students will explain how to properly arrange rooms.

RESOURCES:

- CAD Software
- Computer Equipment

ASSESSMENTS:

Floor plan is based on the following:
- neatness
- accuracy
- Correct use of ¼" scale
- Correct room sizing
- Proper arrangement of rooms

REMEDIATION:

ENRICHMENT:

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Creating floor plans using Auto CAD Architectural Desktop	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS:
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UNIT OBJECTIVES:
After completing this unit, students will be able to:
- Use Architectural Desktop to design and draw a floor plan of a building that is less than 2000 square feet.
- Select the proper types of windows and doors for their house and place them in the appropriate places on their floor plan
- Dimension a floor plan
- Modify appropriate thicknesses and proper heights to walls and materials being used on the walls, as well as labeling rooms & dimension all rooms and exterior walls
- Learn about the applications and structural considerations of using headers when placing windows/doors on the floor plan that meet building codes.

ACTIVITIES:

- Draw the floor plan on Architectural Desktop using appropriate size rooms, stairwells, hallways, doors, windows, walls and apply materials needed to construct the floor plan.
- Demonstrate how to draw and dimension a floor plan
- Properly place windows and doors in the drawing and properly label each.

ASSESSMENTS:

Floor plan is based on the following:
- neatness
- accuracy
- Proper arrangement of rooms
- Proper size rooms, stairwells, hallways, doors and windows.
- Proper size walls and material applications
- Proper use and applications of headers and other structural membranes

RESOURCES:

- CAD Software
- Computer Equipment

REMEDIATION:

ENRICHMENT:

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Creating a window and door schedule	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS: **3.1.12** **3.2.12** **3.7.12** **3.8.12**	**UNIT OBJECTIVES:** After completing this unit, students will be able to: - Discuss and understand different types of windows/doors - Discuss and understand the difference between a rough opening and a final opening for a window/door - experiment with different sizes, styles, and cost of both windows and doors - Students will list all the door and windows used in the window and door schedule - Students will choose and list styles, sizes, quantities, and prices of both windows and doors. - Students will label doors as D1, D2, D3, etc., and windows as W1, W2, W3, etc.
ACTIVITIES: Demonstrate the proper layout of a window and door schedule that includes the following: - Window/door number ex: W1, W2, D2, etc. - Quantity - A description - Rough opening - Final opening - Unit price - Total price **RESOURCES:** - CAD Software - Computer Equipment	**ASSESSMENTS:** Floor plan is based on the following: - neatness - accuracy - proper use and selection of the different types of windows and doors - proper placement of both windows and doors - usage/application of different sizes, styles, and cost of both windows and doors **REMEDIATION:** **ENRICHMENT:**

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Creating a basement plan using Architectural Desktop	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS: **3.1.12** **3.2.12** **3.7.12** **3.8.12**	**UNIT OBJECTIVES:** After completing this unit, students will be able to: - Discuss, understand, locate, and place footers, block/concrete walls, I beams, lolly columns, and pilasters in a basement plan. - Students will layout a detailed foundation plans using Architectural Desktop. - Students will select and label windows and doors on their basement plan using Auto CAD. - Students will learn how to properly layout and span beams, joists, columns, and pilasters to create a basement plan that will be in ordinance with National Building Codes.
ACTIVITIES: Demonstrate an understanding for the following by creating a basement plan that includes the following and complies with national building codes: - A footer - A concrete/block wall - Lolly columns - I beams - Basement windows/doors - Floor joists properly laid out **RESOURCES:** - CAD Software - Computer Equipment	**ASSESSMENTS:** Basement plan is based on the following: - neatness - accuracy - Correct and proper layout and spanning applications of floor joists, I Beams, block walls, footers, and windows/doors. **REMEDIATION:** **ENRICHMENT:**

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Drawing Final Elevations with Architectural Desktop	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS: **3.1.12** **3.2.12** **3.7.12** **3.8.12**	**UNIT OBJECTIVES:** After completing this unit, students will be able to: - Create final elevations using Architectural Desktop for the four sides of a house. - Demonstrate and determine proper location of size of windows and doors on a wall elevation. - Experiment with and apply different roof pitches, different exterior material applications (wood siding, vinyl, stone, stucco, and brick) and stairs. - Understand and apply structural considerations when using different framing materials (lumber and laminated beams/ headers/ joists/rafters)
ACTIVITIES: - In CAD demonstrate the layout of height measurements in final elevation for windows, doors, walls, and roof pitches. - Demonstrate the proper locations for both windows and doors. - Apply structural framing considerations on the final elevations that work with different exterior material applications **RESOURCES:** - CAD Software - Computer Equipment	**ASSESSMENTS:** Elevations are based on the following: - neatness - accuracy - Accuracy and proper location of windows, doors, wall heights, and roof pitches - Correct leveling of all parts of the elevation **REMEDIATION:** **ENRICHMENT:**

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Drawing a wall section of a house	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

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UNIT OBJECTIVES:

After completing this unit, students will be able to:

- Students will experiment and apply design and structural applications to complete a wall section of their house that complies with national building codes.
- Students will experiment with spanning floor joists, ceiling joists, rafters, and beams to construct a wall section

ACTIVITIES:

- Students will experiment with spanning floor joists, ceiling joists, rafters, and beams to construct a wall section
- Students will learn the following terms and how to include them in the wall section:

Sill plate	floor joist
sub floor	sole plate
Studs	top plate
joists	rafters
Ridge beams	main beam
footer	block walls

RESOURCES:

- CAD Software
- Computer Equipment

ASSESSMENTS:

Wall Section is based on the following:

- Proper locations and applications of all the applications listed in the activities
- Neatness
- Accuracy
- Structural Considerations & code confirmation

REMEDIATION:

ENRICHMENT:

COURSE: Architectural CAD	GRADES: 10 - 12
UNIT: Creating a Plot Plan and implementing zoning considerations	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

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UNIT OBJECTIVES:

After completing this unit, students will be able to:

- Properly position a house on a piece of land with respect to directional markings.
- Properly use, design and identify a fictional septic system, water sources, and trees and shrubs.
- Accurately dimension the parcel of land.
- Will understand the importance and placement of property setbacks, well and septic locations in respect to each other and in respect to neighboring well/septic systems

ACTIVITIES:

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- Explain proper dimensional markings in respect to the arrangement of a floor plan (ex: south side is tiled, living area is located).
- Demonstrate the proper use of landscaping symbols
- Student will discuss, demonstrate and explain the proper layout for a water source and septic system.
- Dimension the plot plan so setbacks are met as well as the location of the well/septic.

RESOURCES:

- CAD Software
- Computer Equipment

ASSESSMENTS:

Plot plan is based on the following:

- neatness
- accuracy
- Proper use of trees and shrubs
- Proper placement of septic and water source
- Proper use of dimensioning.
- Proper use of setbacks for the building, water, & waste applications

REMEDIATION:

ENRICHMENT:

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Creating a Plumbing Plan	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

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UNIT OBJECTIVES:

After completing this unit, students will be able to:

- Understand the two functions of a residential plumbing system.
- Use Auto CAD to run water and sewage lines.
- Understand and apply waste lines to the drawing
- Understand and apply hot and cold water applications in the drawing

ACTIVITIES:

- Use software to design a freshwater and sewage system.
- Properly place and design waste lines to the drawing
- Properly place and design hot and cold water lines to the drawing

RESOURCES:

- CAD Software
- Computer Equipment

ASSESSMENTS:

Model is assessed on the following:

- proper locations of pipe
- does it function properly
- accuracy

REMEDIATION:

ENRICHMENT:

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Creating an Electrical Plan	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS: **3.1.12** **3.2.12** **3.7.12** **3.8.12**	**UNIT OBJECTIVES:** After completing this unit, students will be able to: - Learn about the National Electric Code and create an electrical plan that shows the proper location of lights, switches, outlets, some detectors, and doorbells on a floor plan that complies with code. - Identify common electrical symbols. - Draw, locate, and properly label different electrical symbols on their floor plan so it complies with the National Electric Code. - Design your own electrical symbol key to identify different electrical symbols on their electrical plan
ACTIVITIES: - Identify common electrical symbols - Identify the proper wall height for outlets and switches - Discuss and demonstrate the proper and accurate location of electrical symbols - Properly place all electrical symbols on the floor plan to comply with the National Electric Code. **RESOURCES:** - CAD Software - Computer Equipment	**ASSESSMENTS:** Model is assessed on the following: - Proper location of electrical symbols - Proper use of software's' electrical symbols - Neatness - Accuracy - Complication of the National Electric Code. **REMEDIATION:** **ENRICHMENT:**

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: 3D Rendering of House	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

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UNIT OBJECTIVES:
After completing this unit, students will be able to:
- Use Architectural Desktop to create a finished 3 dimensional rendering of their house.

ACTIVITIES:

- Students will use Architectural Desktop to draw/design a finished rendering of their house.
- The finished rendering must be detailed. Details include: windows, doors, siding, roofing, must be colored and look like a final product of the house.

RESOURCES:

- CAD Software
- Computer Equipment

ASSESSMENTS:

Model is assessed on the following:
- Neatness
- Craftsmanship
- Accuracy
- Proper placement of windows/doors
- Proper size walls
- Proper use of roof pitches

REMEDIATION:

ENRICHMENT:

Put extras such as landscaping, sidewalk, and driveway on this drawing.

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: Material Estimation/ Bill of Materials	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS: **3.1.12** **3.2.12** **3.7.12** **3.8.12**	**UNIT OBJECTIVES:** After completing this unit, students will be able to: - Research current prices for building materials. - List all material use in construction of their house. - Calculate total material cost.
ACTIVITIES: - Student will list and price all materials used in construction of their model house. - Student list must include: footer, excavation, block, lolly column, main beam, floor joists, studs, ceiling joists, rafters, collar ties, ridge beam, plywood, windows, doors, siding, sofit, facia & roofing materials **RESOURCES:** - CAD Software - Computer Equipment	**ASSESSMENTS:** Model is assessed on the following: - proper calculations - proper estimation of materials - Instructor evaluation of overall products **REMEDIATION:** **ENRICHMENT:**

COURSE: Architectural CAD II	GRADES: 10 - 12
UNIT: House Construction/ Finished Model of House	

NATIONAL STANDARDS: Standards 1, 2, 3: The Nature of Technology. Standards 4, 5, 6, 7: Technology and Society. Standards 8, 9, 10: Design. Standards 11, 12, 13: Abilities of a Technology World. Standards 14-20: The Designed World

STATE STANDARDS:
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3.8.12

UNIT OBJECTIVES:
After completing this unit, students will be able to:
- Experiment with the construction of a ¼" = 1' scale model of your house
- Construct and experiment with finishing windows, doors, exterior materials such as siding, stone, brick or stucco, roofing materials, decks, porches, and landscaping.

ACTIVITIES:

Students will use the following materials to construct the house:
- Balsa wood
- Foam core
- Cardboard
- Sand Paper
- Wood
- Plywood
- Plaster
- Optional materials include: stone/brick/stucco

RESOURCES:

- CAD Software
- Computer Equipment

ASSESSMENTS:

Model is assessed on the following:
- Neatness
- Craftsmanship
- Accuracy
- Proper placement of windows/doors
- Proper size walls

REMEDIATION:

ENRICHMENT: