

Architecture I

LENGTH OF TIME: 1 semester, 90 minutes

GRADE LEVEL: 9 -12

COURSE STANDARDS:

Standard - 3.4.10.A2

Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

Standard - 3.4.10.A3

Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.

Standard - 3.4.10.B1

Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.

Standard - 3.4.10.B2

Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.

Standard - 3.4.10.B4

Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.

Standard - 3.4.10.C1

Apply the components of the technological design process.

Standard - 3.4.10.C2

Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.

Standard - 3.4.10.C3

Illustrate the concept that not all problems are technological and not every problem can be solved using technology.

Standard - 3.4.10.D1

Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.

Standard - 3.4.10.D2

Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Standard - 3.4.10.D3

Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.

Standard - 3.4.10.E2

Compare and contrast how the engineering design and management of agricultural systems require knowledge of artificial ecosystems and the effects of technological development on flora and fauna.

Standard - 3.4.10.E3

Compare and contrast the major forms of energy: thermal, radiant, electrical, mechanical, chemical, nuclear and others.

Standard - 3.4.12.A3

Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

Standard - 3.4.12.C2

Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

Standard - 3.4.12.D2

Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

Standard - 3.4.12.E3

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Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Standard - 3.4.12.E4

Synthesize the effects of information and communication systems and subsystems as an integral part of the development of the Information Age.

Standard - 3.4.12.E5

Explain how the design of intelligent and non-intelligent transportation systems depends on many processes and innovative techniques.

Standard - 3.4.12.E6

Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.

RELATED PA ACADEMIC STANDARDS FOR SCIENCE AND TECHNOLOGY

3.1 Unifying Themes

- A. Systems
- B. Models
- C. Patterns
- D. Scale

3.2 Inquiry and Design

- D. Problem Solving in Technology

3.4 Physical Science, Chemistry and Physics

- A. Matter

3.6 Technology Education

- B. Information Technology
- C. Physical Technologies

3.7 Technological Devices

- A. Tools
- B. Instruments
- C. Computer Operations
- D. Computer Software
- E. Computer Communication Systems

3.8 Science, Technology and Human Endeavors

- A. Constraints
- B. Meeting Human Needs
- C. Consequences and Impacts

NATIONAL TECHNOLOGY STANDARDS

The students will develop an understanding of:

1. The Characteristics and Scope of Technology.
2. The Core Concepts of Technology.
3. The Relationships among Technologies and the connections between technology and other fields.
4. The cultural, social, economic, and political effects of technology.
5. The effects of technology on the environment.
6. The role of society in the development of and use of technology.
7. The influence of technology on history.
8. The Attributes of design.

9. Engineering Design.
10. The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
11. Apply the design process.
12. Use and maintain technological products and systems.
13. Assessing the impact of products and systems.
14. Medical technologies.
15. Agricultural and related biotechnologies.
16. Energy and power technologies.
17. Information and communication technologies.
18. Transportation technologies.
19. Manufacturing technologies.
20. Construction technologies.

PERFORMANCE ASSESSMENTS:

Students will demonstrate achievement of the standards by:

1. Using the Computer Aided Design program Autodesk Revit in the creation of all drawings and projects. The skills needed in the use of this program will be introduced with each of the various types of drawings.
544218032. Redesigning an existing product by creating Multiview and Exploded Drawings of an existing object and using these drawings to create a promotional brochure.
544218033. Constructing two and three dimensional drawings through the interpretation of written and visual directions. Developing/constructing two and three dimensional drawings utilizing descriptive geometry. Some terms that will be used are: parallel, point, line, plane, perpendicular, angle, tangent, arc, polygon.
544217584. Completing one group design project.
544216912. Developing a time frame that will be established for the completion of a series of drawings. Students will develop a personal time line for the completion of that particular set of drawings.
544217864. Career education will be defined by all students through specific applications on each type of drawing. These applications will be ongoing and specific to various careers: i.e. One process involves the relationship between the designer and the manufacturer and what problems and criteria are needed.
544216296. A portfolio of drawings that include Multiviews, Isometrics, Auxiliary, Working Drawings and Revolutions.

DESCRIPTION OF COURSE:

The two most familiar forms of communication are written and oral. The third form is visual, which for the majority of people is the easiest to utilize. In Drafting and Design Concepts I, the student will develop an understanding of two and three dimensional drawings including their application in the work place. Multiview, Isometric, Auxiliary, Working, Exploded and Architectural will be drawings that will be explored. Drafting methods will be applied through research, models, interdisciplinary study, and development of career exploration. Students will use the Computer Aided Design

program Autodesk Revit for the creation of all drawings. Emphasis will be placed on developing problem solving and critical thinking skills in the planning and construction of design projects.

TITLES OF UNITS:

1. Descriptive Geometry	1 week
544217248. Computer Aided Design - ACADLT	2
weeks	
544217752. Multiviews	2
weeks	
544217808. Isometrics	
2 weeks	
544216352. Auxiliary	
2 weeks	
544217976. Working Views	
3 weeks	
544216576. Design Projects	
3 weeks	
544216577. Residential Architecture	
1 week	
544216408. Careers	

SAMPLE INSTRUCTIONAL STRATEGIES:

1. Organizing data activities
544216464. Interpreting data activities
544216632. Discussion
544216968. Writing activities
544217024. Research tasks
544217080. Cooperative learning
544217472. Problem solving tasks
544217473. Brainstorming
544217474. Hands on Activities
544217475. Computer Aided Design
544217476. Modeling

MATERIALS:

1. Mechanical Drawing - Helsel, 1985 - McGraw Hill
544217528. Engineering Drawing and Design – Madsen, 1991 - Delmar
544216744. Drafting Tools/Equipment
544218928. Calculators
544218872. Instructor created materials
544218648. Resource people
544218649. Computers
544218650. Autodesk Revit
544218651. Visual Home 3D

- 544218652. Scanners
- 544218653. Digital Camera

METHODS OF ASSISTANCE AND ENRICHMENT:

- 544218760. Lutron Electronics
- 544218761. Davro Instruments
- 544218762. Amplifier Research

All of these companies provide mentoring opportunities for both the student and the instructor.

PORTFOLIO DEVELOPMENT

The following items are appropriate for inclusion in their portfolios:

1. All computer aided design work of two and three dimensional items.
2. Redesign project
3. Styles brochure
4. Architectural drawings
5. PowerPoint presentations

METHODS OF EVALUATION:

1. Problem solving activities with rubrics
- 544218984. Projects with rubrics
 - 544219096. Drawings with rubrics
 - 544218088. Presentations with rubrics

INTEGRATED ACTIVITIES:

1. Concepts
 - Researching design changes in a product
 - Transferring Computer Aided Design skills from one program to another
2. Communications
 - Computer Aided Design
 - Brochures
 - PowerPoint presentations
 - Researching the Internet
3. Thinking/Problem Solving
 - Solving problems using the Systems Approach
 - Analyzing data to create designs
 - Creation of two and three dimensional work
4. Application of Knowledge
 - Creation of a promotional brochure
 - Construction of three dimensional models
 - Editing of prior work

5. Interpersonal Skills

- Interviewing professionals for a design project
- Working with another student on a design project