Unit 3: Architectural Design

Content Area: **Industrial Technology**
Course(s): **Auto CAD I**
Time Period: **1 marking period**
Length: **10 Weeks**
Status: **Published**

Unit Overview

In this unit, Students will be applying the knowledge obtained through the previous units in order to properly design architecture. Students will be exploring all the details that go into residential architecture design, designing not just a formal floor plan, but also looking at the foundation, and the entire properties their house will exist in. Students also get insight into following constraints and design project processes, focusing on finding the most efficient path that still fulfills the needs of the client. A consentration on handicap design is a major highlight in the course, giving students more insight in to the difficulties that can come with the focus on accomedations and why it is important.

Transfer

Students will be able to independently use their learning to

- Complete real world tasks typically asked of architects and engineers
- Work as a drafter for any design firm without any college experience
- Utilize design principles normally used by engineerings and architects
- Apply critical thinking skills for any task, especially ones focused on utilizing design aspects
- Understanding principles of building, building codes of different states, and how those codes affect design choices
- Research materials when selecting for building

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand

- How to understand and apply safe designs during the design process
- Materials have different properties and uses in design
- Accessbility implementation in architectural design
- The importance of the foundation, and how it affects designing a home or building
- Layout of a site and how to effeciently place objects within a fixed space
- How to decide on a design layout quickly

Essential Questions

Students will keep considering...

- What should I look for when designing a home or building?
- How do I place objects within different spaces, both on site and inside a building?
- How to do create a comfortable design to accomidate for a handicapped individual?
- What should I be looking out for during the design process for objects going between floors?
- How does window and door placement affect a home?
- What are common pitfalls that occur within architectural design?
- What aspects should I consider when choosing room placement inside a house or building?
- How do stairs and doors fit in my design?

Application of Knowledge and Skill

Students will know...

Students will know

- How to quickly decide on a layout for a house or building
- How to organize objects and rooms on a floor plan
- How to accomidate design for handicapped individuals
- How to place beams and why beam placement is important
- What a foundation plan is and how it works
- Why doors, windows, stairs, and rooms are placed where they are
- How pathways affect over site design
- How to properly scale objects in a design based on criteria
- Proper symbology used within blue print designs

Students will be skilled at...

Students will be skilled at

- Efficiently decided on location and placing objects within a blue print design space
- Utilizing proper symbology within a blue print design space
- Designing handicap accomidations within given circumstances and criteria
- Following request design criteria regardless of the client when designing
- Presented documentation in proper formats to be submitted to the client
- Understanding the design process, including sequencing and planning

Academic Vocabulary

Floor Plan

Foundation Plan

Site Plan

Beam

Girder

Pillar Supports

Concrete Piling

Architecural Design

Accessibility

Property Lines

Annotation

Specifications

Learning Goal 1 - Floor Plan

SWBAT Create a floor plan of a home following specific design criteria laid out by a client

TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.
TECH.8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 1 - Introduction, The Do's and Dont's of Architectural Design

SWBAT Design their worst possible floor plan

SWBAT Sketch a floor plan to demonstate understanding of floor plan design do's and dont's

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 2 - Room and Door Design and Placement

SWBAT Explain the process of "home flow"

SWBAT Place rooms inside a home design plan that demonstrates an understanding of "home flow"

SWBAT Place doors in correct locations in order to not impeded the rest of design

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 3 - Designing for Accessibility

SWBAT Design accomidations for handicapped individuals in a home, given what particular accomidations are needed

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 4 - Task / Performance Understanding and Assessment

SWBAT Complete a floor plan of a home, given a set of parameters for needed rooms, room sizes, and handicapped accomidations

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Learning Goal 2 - Foundation Plan

SWBAT Design a foundation plan in order to support their previously constructed home successfully

TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.

TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.
TECH.8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 1 - Introduction

SWBAT Idenitify the parts of a foundation plan, and their significance

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 2 - Concrete Wall Structure

SWBAT Construct a concrete wall structure for the foundation based on the home design project

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 3 - Girder and Pillar Placement and Function

SWBAT Place girders and pillars in their design plan in order to support the home design project layout

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 4 - Labeling and Annotating Foundation

SWBAT Label and Annotating all the parts of their foundation design to properly reflect an understanding of each of the pieces of the foundation

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 5 - Task / Performance Understanding and Assessment

SWBAT Submit all final documentation for their designed foundation to demonstrate understanding of all the steps required to create a foundation

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Learning Goal 3 - Site Plan

SWBAT Design a site plan that include their home design project, based on criteria laid out for them by the client

TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.
TECH.8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 1 - Introduction

SWBAT Choose different features to add to their site plan based on criteria laid out by the client

SWBAT Decide on placement of features to their site plan

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials

	and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 2 - House Placement and Property Lines

SWBAT Sketch property lines based on the design criteria laid out by the client

SWBAT Place house in a unspecfied location based on the needs and demands of the client

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 3 - Porch, Deck, and Driveway Specifications

SWBAT Place a porch, decking, and driveway in their site plan design based on criteria laid out by the client

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 4 - Athletic Fields, Landscaping, and Activity Options

SWBAT Choose and place activities options, atheletic fields and landscaping in proper locations on their site plan based on criteria laid out by the client

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 5 - Accessibility for Site Plan

SWBAT Construct pathways for easy accessibility for the client

SWBAT Design accomidations for handicapped individuals in their design based on the needs laid out by the client

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 6 - Labeling and Annotating Site Plan

SWBAT Properly annonate their completed site plan with all features labeled and accounted for in a list included in their final submission

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Target 7 - Task / Performance Understanding and Assessment

SWBAT Print document in an accurate presentable format to be submitted to the client for final review

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.

Summative Assessment

- Performance Task
- Test/Quiz
- Benchmark Exam Drawing
- Challenge Drawing of Marking Period

21st Century Life and Careers

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CAEP.9.2.12.C	Career Preparation
CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.5	Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.
CAEP.9.2.12.C.9	Analyze the correlation between personal and financial behavior and employability.

Formative Assessment and Performance Opportunities

- 504 Accomodations
- Challenging / Enrichment Tasks
- Grouping
- IEPs
- Drawing of the Month
- Scaffolding Questions
- Use of Technology

Accommodations/Modifications

- Alternative colors will be provided for students with colorblind issues on each of the demonstration drawings for each phase of the project
- For the Floor Plan Lesson, Room Tileset for Students struggling with understanding of instruction and demonstration for layout
- Project Time Frame Negotiations and Performance Evaluation for Unfinished Work, given communication with the instructor on issues
- If Vision issues with computer screens, can adjust size of text font and icons to fit the needs of the students
- If ESL, Language adjustments can be implimented into AutoCAD
- If ESL, Alternative Notes can be provided
- Preferential Seating will be provided for the sake of demonstrations, note taking, and general physical and behavioral accommodations
- 504 Accomodations
- Additional Challenging / Enrichment Tasks
- Grouping
- IEPs
- Drawing of the Month
- Scaffolding Questions
- General Use of Technology Accommondations (Adjusted to meet needs of student in accordance to

504/IEP)

Unit Resources

- AutoDesk Design Handbook
- General AutoCAD Practice Websites - https://www.investintech.com/resources/blog/archives/5947-free-online-autocad-tutorials-courses.html
- Khan Academy
- Youtube Tutorials - https://www.youtube.com/channel/UC0bEfqT1FZudcnyegNvtu1A?view_as=subscriber

Interdisciplinary Connections

LA.RH.9-10.3	Analyze in detail a series of events described in a text; draw connections between the events, to determine whether earlier events caused later ones or simply preceded them.
LA.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text, to analyze information presented via different mediums.
LA.WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
9-12.HS-ETS1-1.1	Asking Questions and Defining Problems
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking
9-12.HS-ETS1-4.ETS1.B.1	Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs.