Unit 2: Commercial Architecture Design

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

Unit Overview

In this unit, Students will be learning the principles of Commercial Oreinted Design. Through this practice, students will become familiar with standards in design, laws and restrictions, as well as principles of Work Space and Parking Lot Flow. Students will also become familiar with Hotel design, looking at hotel room layouts, as well as kitchen and dining room design. Through these projects, students will be citing past examples and drawing from other designers completed work in order to gain an understanding of the decisions these designers make, and why they are successful in the real world.

Transfer

Students will be able to independently use their learning to...

- Draw upon previously learned knowledge years after it being implemented
- Utilize processes from engineering and architectural professionals in order to construct objects and solve problems
- Read and understand provided specifications for parts, tools, and objects
- Accurately generate objects when prompted, either verbally, or with provided specifications
- Follow a scheduled time frame and deadlines for project development
- Design for flow and real world circumstances being factored in

---

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...

- The individual processes, tools, and procedures for AutoCAD and Inventor software
- Draw upon knowledge and utilize tools in order to generate requested parts, objects and designs from clients
- Properly format and annonate drawings displays in order to convey parts properly to the clients
- How to describe their approach start to finish for generating an object
- Design a roadmap for the process of building different objects and for working on longer scale projects
- Building flow and how the design process can effect productivity
- Placement of equipment and requirements based on needs of the client

Essential Questions

Students will keep considering

- What tools should be used for any given task?
- What would I use this program for in the real world?
- Is there anything I can do with this program beyond a classroom setting?
- Do I foresee myself finding a career or job involving this program?
- Are there jobs in companies that utilize this kind of design and software?
- If I wanted a career in this, what routes can I take?
- What does the design process look like when compared to 2D modeling and design?

Application of Knowledge and Skill

Students will know...

Students will know...

- How to create a variety of basic shapes and objects using AutoCAD
- Dimensioning principles and conventions
- Present and submit drawing documentation in the proper formats
- Both replication and design of objects given different levels of prompt difficulty
- Where to research building dynamics and find examples of layouts to draw inspriration from
- How to follow specifications properly
- How to properly follow a detailed schedule in order meet deadlines and expectations of clients

Students will be skilled at...

Students will be skilled at

- Completing drawing and drafitng tasks quickly and efficiently
- Being able to design anything objects when prompted
- Applying drawing principles to greater design work, such as full on architure or engineering designs
- Replication of drawings based on reading dimensions and analysis of structure of presented objects.
- Reading and Understanding requirements for based on specifications from the Client
- Designing commercial layouts quickly and efficiently
- Utilizing a room and facility's purpose to create better workplace flow for the Client

Academic Vocabulary

Commercial

Manufacturing

Facility

Floor Plan

Cliental

Specifications

Learning Goal 1 - Commercial Manufacturing Facility Design

SWBAT Design a floor plan for a commercial manufacturing facility based on Client Specifications within an alloted time frame

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.C.7	Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.
TECH.8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.

Target 1 - Factory Layout Specifications

SWBAT Generate a floor plan for the factory floor layout of the facility based on Client Specifications

SWBAT Account for roles of different areas of factory floor when it comes to position and flow

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Target 2 - Office Layout Specifications

SWBAT Generate a floor plan for the office floor layout of the facility based on Client Specifications

SWBAT Account for roles of different areas of office floor when it comes to position and flow

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance

	and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Target 3 - Parking Lot Specifications

SWBAT Generate a floor plan for the parking layout of the facility based on Client Specifications

SWBAT Account for roles of different areas of parking when it comes to position and flow

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Learning Goal 2 - Hotel/Resort Design

SWBAT Design a floor plan for a Hotel/Resort based on Client Specifications within an alloted time frame

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.C.7	Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.
TECH.8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.

Target 1 - Room Layout Specifications

SWBAT Generate a floor plan for the hotel room layout based on Client Specifications

SWBAT Account for requirements like room types, different sizes, bed layouts, and capacity

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Target 2 - Kitchen Layout Specifications

SWBAT Generate a floor plan for the hotel kitchen and dining layout based on Client Specifications

SWBAT Account for requirements like equipment, tools, and table layout

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Target 3 - Lobby Layout Specifications

SWBAT Generate a floor plan for the hotel lobby layout based on Client Specifications

SWBAT Account for requirements like lounge seating, front desk design, and storage spaces

TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
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.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Summative Assessment

- Performance Tasks

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

21st Century Life and Careers

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
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.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

- Academic Games
- Classroom Discussions
- Classwork
- Closures
- Do Nows / Warm Ups
- Group Work
- Homework
- Student / Teacher Discussions
- Think-Pair-Share
- After School and Lunch Opportunities
- Bonus Design Challenges Introduced into the Assigned Task

Accommodations/Modifications

- For Commercial Manufacturing Facility, Room Tilesets provided for Students struggling with concepts of room positioning and layout
- For Hotel, Kitchen and Dining Sample Drawings provided with adjustable language labels on objects to make them more easily identifiable

- 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 and Project Requirements will be available
- Preferential Seating will be provided for the sake of demonstrations, note taking, and general physical and behavioral accommodations
- Alternative Assignments for construction can be provided
- While projects are individual, groups can be formulated for students with educational disabilities for other students to provide assistance
- 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)
- Project Time Frame Negotiations and Performance Evaluation for Unfinished Work

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.