Unit 4: Commercial Building Design

Content Area: **Science**
Course(s): **Civil Eng & Arc**
Time Period: **Semester 2**
Length: **3 weeks**
Status: **Published**

Standards

- MS.ETS1.1 - Engineering Design Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- MS.ETS1.2 - Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- MS.ETS1.3 - Engineering Design Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- MS.ETS1.4 - Engineering Design Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.3	Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis.
CS.9-12.8.2.12.ED.5	Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
CS.9-12.8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
CS.9-12.8.2.12.NT.2	Redesign an existing product to improve form or function.
CS.9-12.ED	Engineering Design
CS.9-12.NT	Nature of Technology
	Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems. Decisions on trade-offs involve systematic comparisons of all costs and benefits, and final steps that may involve redesigning for optimization.
	Engineers use science, mathematics, and other disciplines to improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs. Technology, product, or system redesign can be more difficult than the original design.
	Engineering design evaluation, a process for determining how well a solution meets requirements, involves systematic comparisons between requirements, specifications, and constraints.

Enduring Understandings

Students will understand that …

- Detailed planning, documentation, and management of a project are essential to its success.
- People work in teams to produce solutions to complex problems.
- A legal description of property is used to identify real estate in a legal transaction and can be found in a deed, mortgage, plat or other purchase documents.
- The selection of a site and the project being planned are interrelated. A site should be thoroughly researched to determine whether it is compatible with the project.
- Legal, physical, and financial conditions as well as the needs of the surrounding community should be taken into consideration when determining the viability
- Critiques and reviews are used to inform and provide suggestions for improvement.
- Presentations and displays of work provide the means to effectively promote the implementation of a project.
- A well-done presentation will enhance the quality of a team's project.

Essential Questions

- If you had to describe one strategy that would most help an architect/engineer be a good and effective building project designer, what would it be?
- How important is it to an architect' or civil engineer's success that s/he possess "people skills"?

Knowledge and Skills

It is expected that students will…

- Demonstrate an ability to identify, formulate, and solve engineering problems.
- Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
- Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering
- Demonstrate an ability to identify, formulate, and solve engineering problems.
- Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
- Assemble and organize work from a commercial project to showcase the project in an effective and professional manner.
- Create visual aids for a presentation that include the appropriate drawings, renderings, models, documentation, and the rationale for choosing the proposal for project development.
- Conduct an oral presentation to present a proposal for the design and development of a commercial building project.

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit

Resources

- Teamwork.ppt
- Legal Descriptions.ppt
- Selecting a Solution Path.ppt
- Project Management.ppt
- Commercial Building Project Portfolio