



Syllabus: Civil Engineering & Architecture (CEA)

Course Overview:

In this class you will learn about Civil Engineering and Architecture, using the design process to solve real world problems and apply your creative skills to hands-on-projects. You will use state-of-the-art software to design residential and commercial buildings. This course covers topics such as the roles of civil engineers and architects, project planning, building design, project documentation and presentation, and interior design. (Dual/transcripted credit is offered by Milwaukee School of Engineering [MSOE] with transfer possibilities to other colleges and universities.)

Department: Technology & Engineering	Department/Course Website (if applicable): CTE
Course Number: TEC1040	Instructor: Ignacio Retana
Credits Earned/Length of Course: 1 credit / Year long course	Office Hours: NA
Prerequisites: Insert here	Instructor Contact Info: Phone: 608-204-3697 Email: retana@madison.k12.wi.us
Required Materials: Insert here	Other: College Credit/MSOE

Course Standards:

- [Common Core State Standards for Literacy in All Subjects](#)
- [Common Core State Standards for Mathematics -- Standards for Mathematical Practice](#)
- [Next Generation Science Standards](#)
- [Wisconsin Common Career Technical Core Standards](#)
- [Wisconsin Standards for Technology and Engineering](#)
- [Wisconsin Model Academic Standards for Science \(WMAS\)](#)

Course Assessment(s):

- Summative assessments for units: All topics are covered with powerpoint presentations, and supported with specific topic related work-sheets. Unit assessment is based on completion of work sheets.



Syllabus: Civil Engineering & Architecture (CEA)

Course Outline (including Unit(s) of Time and Essential Questions):

Unit 1: Overview of Civil Engineering and Architecture 1st Quarter

Lesson 1.1 History of Civil Engineering and Architecture

Essential Questions

1. How did the art and science of architecture and civil engineering evolve over time?
2. Describe three structural systems used by architects in historical construction projects.
3. How have historical innovations contributed to modern civil engineering and architecture?
4. How are visual design elements and principles manifested in architecture?

Lesson 1.2 Careers in Civil Engineering and Architecture

Essential Questions

1. What abilities and interests do you possess that could translate to a career field related to civil engineering or architecture?
2. What advantages are there to bringing together a group of people with varying backgrounds and skills for brainstorming a solution to a design problem?

Unit 2: Residential Design 2nd Quarter

Lesson 2.1 Building Design and Construction

Essential Questions

1. Why is wood so often used for residential buildings?
2. What alternatives to wood frame construction are available and what are the advantages and disadvantages of each?
3. How are trusses able to span large distances?
4. What framing systems are used to support residential roofs?
5. How are different roof styles and pitches related to different architectural styles?

Lesson 2.2 Cost and Efficiency Analysis

Essential Questions

1. What is the difference between R-value and U-value? When are they used?
2. What are some leading causes of solar gain?
3. What key areas of a building can minimize heat loss?
4. Why is a cost estimate important to create before starting a project?

Lesson 2.3 Residential Design

Essential Questions

1. How do you achieve a balance between cost-saving measures, important features, and environmental responsibility when designing a residential structure?
2. What are the advantages and disadvantages of using 3D architectural software rather than creating hand-produced plans?
3. Why are organizations such as LEED important?



Syllabus: Civil Engineering & Architecture (CEA)

4. When planning a project, how does the availability of public utilities impact the design?
5. What options are available for the management of wastewater from a building?
6. What are the important considerations when design a plumbing system?
7. Why should a designer know about the different types of lighting and their applications?
8. What are the important considerations when designing an electrical system?
9. What information is important when documenting the design of a building?

Unit 3: Commercial Applications 3rd Quarter

Lesson 3.1 Commercial Building Systems

Essential Questions

1. How do Land Use and Development regulations help or hinder development in a community?
2. Why are building codes important in the construction of buildings?
3. How does commercial building design and construction differ from residential building design and construction?
4. What factors influence the choice of commercial construction materials?
5. How do sustainable design alternatives, such as a green roof, impact the environment and quality of life?

Lesson 3.2 Structures

Essential Questions

1. What is structural engineering?
2. What is the function of a structure?
3. How do you determine the loads that must be used to design a structure?
4. In what ways is wind, snow, seismic, dead, and live loads similar to or different from each other?
5. How does the design of a structure impact how loads are dispersed?
6. How does the use of mathematics help in understanding and quantifying the forces and loads on a structure?
7. How does the structure of a building affect the form and function of that building?

Lesson 3.3 Services and Utilities

Essential Questions

1. When planning a project how does the availability of public utilities impact the design?
2. What options are available for the management of wastewater from a building?
3. What are the important considerations when designing an HVAC system?
4. Why is it important for an architect to understand how electrical, plumbing, and HVAC systems are designed and constructed?

Lesson 3.4 Site Consideration



Syllabus: Civil Engineering & Architecture (CEA)

Essential Questions

1. How is land surveying used in the development of a building project?
2. What information is important to consider when planning the placement of driveways, parking spaces, and pedestrian access?
3. How are the needs of a site user and the circulation patterns for the site interrelated?
4. Why is it important to know the soil characteristics of a site when planning a building project?
5. How does development change the characteristics of a site?
6. What steps must be taken to ensure that the improvements made on a property will not adversely affect users or neighboring properties?

Unit 4: Commercial Building Systems 4th Quarter

Lesson 4.1 Commercial Building Design Problem

Essential Questions

1. Why is it important for every team member to understand and carry out the appropriate team role when working together on a project?
2. As the developer of a piece of property, what factors must you consider for cost effectiveness and success of your development?
3. What types of information should you gather about a site before making a decision on site selection?
4. What is meant by “viability analysis”? What kinds of questions should a viability analysis answer?
5. What regulatory agencies should you know? Why is it important to work with them in preparing to develop property?
6. As an owner of the property, what issues are of concern to you and may affect the development of the property?

Lesson 4.2 Commercial Building Design Presentation

Essential Questions

1. How can self-assessment, critiques, and peer reviews help improve our project and presentation skills?
2. How do drawings, renderings, and other documentation relate to and support the goals and criteria of a presentation?

Lesson 5 Career Development/21st Century Skills

1. How do the skills and knowledge I am learning in this class get applied within a job setting?
2. How can I work with a team to develop an answer to a question or solution to problem?
3. How I apply the skills that my future employers will value?



Syllabus: Civil Engineering & Architecture (CEA)

Texts, Technology, and Resources:

Online accessible curriculum per PLTW.org, include Powerpoint presentations

Autodesk Inventor, Revit

Behavior/Attendance Policy:

Students are expected to behave and attend as if at a place of employment. This includes use of cell phone, teamwork and completion of assignments. Students are responsible for completing missed work. Students will have 5 school days from date of absence to make up missed work. It is the responsibility of the student to come during office hours to make up missing assignments, projects or tests

Grading Policy:

100-90	A
89-80	B
79-70	C
69-60	D
59>	F

As a student I agree to not use my cell phone for personal use and only use it in class for assistance in completing my work with permission of the classroom teacher/adult. If I use it without permission, I will hand over my cell phone immediately when asked by the teacher/adult. I also agree to complete all assignments and make up any work due to absences or tardies. If my grade falls below a "C" I will come in at lunch and or after school until my grade has improved to a "C" or better.

_____ date: _____

As a parent/guardian I agree to supporting the teacher by encouraging my student to finish all assignments by seeking support during lunch or after school when necessary.

_____ date: _____



Syllabus: Civil Engineering & Architecture (CEA)

Is there anything that you as a parent/guardian or student would like me to know that may help the student have greater success in my class? If so, please write below.

What is the best way to make contact with parent/guardian, Phone, email, other? Please write down the information.

Thank you
Mr. Retana