
Civil Engineering and Architecture (CEA) Course Description

Civil Engineering and Architecture is the study of the design and construction of residential and commercial building projects. The course includes an introduction to many of the varied factors involved in building and site design and construction including building components and systems, structural design, storm water management, site design, utilities and services, cost estimation, energy efficiency, and careers in the design and construction industry.

The major focus of the CEA course is to expose students to the design and construction practices of residential and commercial building projects, design teams and teamwork, communication methods, building codes and ordinances, engineering design calculations, and technical documentation. Problem solving skills and design experience are gained through an activity-project-problem-based (APPB) teaching and learning pedagogy. Used in combination with a teaming approach, APPB-learning challenges students to continually hone their interpersonal skills and creative abilities while applying math, science, and technology knowledge learned in other courses to solve design problems and communicate their solutions.

Students will use industry standard 3D architectural modeling software to facilitate site and building design and technical documentation. As the course progresses and the complexity of the design problems increase, students will learn more advanced computer modeling skills as they become more independent in their learning, more professional in their collaboration and communication, and more experienced in problem solving and design.

Civil Engineering and Architecture is a high school level course that is appropriate for 10th or 11th grade students interested in careers related to civil engineering and architecture. No previous knowledge is assumed, but students should be concurrently enrolled in college preparatory mathematics and science courses in order to facilitate the use and understanding of appropriate math and science concepts necessary for the successful completion of CEA coursework.

Civil Engineering and Architecture is one of the specialization courses in the Project Lead The Way[®] high school pre-engineering program. The course applies and concurrently develops secondary level knowledge and skills in mathematics, science, and technology.

The course of study includes:

- Overview of Civil Engineering and Architecture
 - History of Civil Engineering and Architecture

- Past Civil Engineering and Architecture
 - Principles and Elements of Design
 - Architectural Styles
 - Careers in Civil Engineering and Architecture
- Residential Design
 - Building Design and Construction practices
 - Building codes
 - Building components
 - Green technology and LEED
 - Universal Design
 - Affordable housing design
 - Site plans
 - Cost estimates
 - Energy efficiency
 - Storm water analysis
 - Water supply
 - Plumbing
 - Electrical systems
 - Wastewater management
 - Design and construction documentation
 - 3D architectural software
- Commercial Applications
 - Commercial Buildings
 - Building codes
 - Land Use and Development
 - Commercial building components
 - Structural Design
 - Steel deck
 - Precast concrete floors
 - Steel joints
 - Structural steel beams
 - Spread footings
 - Services and Utilities
 - Energy Codes
 - Plumbing (Optional)
 - Electrical systems (Optional)
 - Heating, Ventilating and Air-Conditioning systems
 - Wastewater management
 - Site Considerations
 - Land surveying
 - Soil analysis
 - Road design (Optional)
 - Parking lot design
 - Storm water management
 - Site grading (Optional)
 - Low impact development

- Commercial Building Design
 - Commercial Building Design Project
 - Property description
 - Site discovery
 - Commercial project viability
 - Project management
 - Commercial Building Design Presentation