

| | Unit 1 Overview of Civil Engineering | Unit 2 Introduction to Projects | Unit 3 Project Planning | Unit 4 Site Planning | Unit 5 Architecture | Unit 6 Structural Engineer | Unit 7 Presentations and Reports |
|--|---|---------------------------------|-------------------------|----------------------|---------------------|----------------------------|----------------------------------|
| Civil Engineering & Architecture | <p>Compare and contrast civil engineering and architecture.</p> <p>Describe the various individuals and agencies and their roles during the design and development of a civil engineering project.</p> <p>Describe the postsecondary and career opportunities in the field of Civil Engineering and Architecture.</p> <p>Communicate the current common practices utilized in Civil Engineering and Architecture and apply them to develop a project.</p> <p>Identify the criteria and constraints, and gather information to promote viable decisions regarding the development of a project.</p> <p>Work individually and in pairs to produce a solution to a project.</p> <p>Develop an understanding of how software is used as a tool to aid in the solution and then the communication of a project.</p> <p>Communicate about for designing a development project using various drawing methods, sketches, graphics, or software.</p> <p>Attend ideas, notes, and presentations based on personal review and feedback from others and will document it.</p> <p>Describe in daily journals the advantages and disadvantages of various information-gathering, communications, and data management tools.</p> <p>Develop two- and three-dimensional sketches and graphics using manual and computer-assisted processes.</p> <p>Work effectively (productively) as a team.</p> <p>Communicate their ideas and information to each other.</p> <p>Determine the viability of their project ideas.</p> <p>Research zoning ordinances and regulations to determine the necessary procedures to finish the project.</p> <p>Communicate their team's design idea and explain why they believe it will be viable.</p> <p>Communicate understandings of the relationship of structures and land and the responsibility of designers to have a plan.</p> <p>Determine the next steps to be taken and how they will proceed in developing their project.</p> <p>Answer essential questions and conclusions provided in the related activities.</p> <p>Conduct a survey of their personal residence and write their observations about the locations of the electrical, water, and gas lines.</p> <p>Apply concepts learned to team project.</p> <p>Develop and be able to read a contour map.</p> <p>Create a bubble diagram of a specified site.</p> <p>Apply principles of reading a contour map and creating a bubble diagram to their team project.</p> <p>Refine the pros and cons of local, state, and federal regulations on site development.</p> <p>Write about their point of view and record it in their journal.</p> <p>Apply what they have learned to their team project.</p> <p>Interpret topographical data and design criteria to create and document the vertical and horizontal lines of a site.</p> <p>Apply appropriate codes and parameters to design a suitable and assessable parking lot for a retail establishment.</p> <p>Research answers to questions identified in the preface.</p> <p>Conduct simple experiments to determine the content and characteristics of a soil sample and use the results in design.</p> <p>Calculate the amount of water a rainstorm will drop on a parking lot design and use that information in the design.</p> <p>Using a site plan with contours, locate and create a cut and fill plan for the proposed foundation.</p> <p>Present findings of their research on a specific utility by completing an information handout sheet.</p> <p>Communicate information to their peers using schematic symbols.</p> <p>Mathematically compute utility needs of a project and size the utility supply lines correctly.</p> <p>Analyze and determine the selection and placement of plantings to ensure the proper use of resources and deliverables.</p> <p>Apply what they have learned to their team project and landscape the site of the related structure or structures.</p> <p>Determine the source of water for their site.</p> <p>Estimate the water pressure for their site.</p> <p>Select an appropriate method of managing wastewater for their site.</p> <p>Perform preliminary design calculations and layouts of the selected wastewater management system.</p> <p>Apply their knowledge of architectural styles gained from Activity 1.1 Architectural Styles to the design of the structure.</p> <p>Apply their knowledge of floor plans to the structures for their team's project.</p> <p>Research and design an appropriate energy system for the team's project.</p> <p>Calculate and determine the heat loss or gain of the energy systems used in their team project.</p> <p>Compare and contrast the various elevation views and communicate their understanding of how elevations are used in design.</p> <p>Compare and contrast sections and details explaining their purposes in a set of architectural plans.</p> <p>Draw the sections and details of their team's project.</p> <p>Identify and create the necessary schedules for their team's project.</p> <p>Research and teach team members about mechanical, electrical, and protection systems.</p> <p>Determine the mechanical, electrical, and protection systems necessary for their team's project.</p> <p>Draw the diagrams for the mechanical, electrical, and protection systems for their team's project.</p> <p>Identify the work of a structural engineer.</p> <p>Determine the live and dead loads of a structure using load tables and appropriate mathematics.</p> <p>Identify the regions of the United States that are susceptible to seismic loads.</p> <p>Research the different types of loads acting on a structure and write a brief description with a diagram in their project.</p> <p>Identify cooling materials, types of roof systems, rafters, and trusses; calculate the load for roof members; and determine the strength of columns and beams required for a structure.</p> <p>Size floor members according to loads and modify a section details to show the sizing of supporting materials for a structure.</p> <p>Research the various foundation types, draw sketches of each one, and describe their use.</p> <p>Prepare a foundation detail for their team's project.</p> <p>Conduct their presentation of their project including the appropriate drawings, renderings, models, documentation, and reports.</p> <p>Conduct oral presentations regarding the design and development of a team project.</p> | | | | | | |
| Michigan Grades 9-12 Science Standards Link | | | | | | | |
| SCIENCE GRADE 9-12: http://www.michigan.gov/documents/Biology_HCSE_1682_02_7.pdf | | X | X | | | | |
| STANDARD B1: INQUIRY, REFLECTION, AND SOCIAL IMPLICATIONS | | X | | | | | |
| IRSB1.1 Scientific Inquiry | | | | | | | |
| IRSB1.1C Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision). | | | | | | | |
| IRSB1.1H Design and conduct a systematic scientific investigation that tests a hypothesis. Draw conclusions from data presented in charts or tables. | | | | | X | | |
| IRSB1.2 Scientific Reflection and Social Implications | | X | X | | | | |
| IRSB1.2C Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information. | | | | | | | |
| IRSB1.2F Critique solutions to problems, given criteria and scientific constraints. | | X | X | | | | |
| IRSB1.2g Identify scientific tradeoffs in design decisions and choose among alternative solutions. | | X | | | | | |
| IRSB1.2i Explain the progression of ideas and explanations that leads to science theories that are part of the current scientific consensus or core knowledge. | | | | | | | |
| IRSB1.2j Apply science principles or scientific data to anticipate effects of technological design decisions. | | | | | | | X |
| STANDARD B2: ORGANIZATION AND DEVELOPMENT OF LIVING SYSTEMS | | | | | | | |
| ODLSB2.5x Energy Transfer | | | | | | | |
| ODLSB2.6d Explain how higher levels of organization result from specific complex interactions of smaller units and that their maintenance requires a constant input of energy as well as new material. (recommended) | | | | | | | |
| STANDARD B3: INTERDEPENDENCE OF LIVING SYSTEMS AND THE ENVIRONMENT | | | | | | | |
| ILSEL3.p1A Provide examples of a population, community, and ecosystem. (prerequisite) | | | | | | | X |
| ILSEL3.p4A Recognize that, and describe how, human beings are part of Earth's ecosystems. Note that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. (prerequisite) | | | | | | | X |
| ILSEB3.2 Ecosystems | | | | | | | |
| ILSEB3.2B Describe energy transfer through an ecosystem, accounting for energy lost to the environment as heat. | | | | | | | X |
| ILSEB3.3 Element Recombination | | | | | | | X |
| ILSEILSEB3.5e Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of population dynamics within ecosystems. | | | | | | | X |