# Unit 10: Modern Architectural Design

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 4**
Length: **4 weeks**
Status: **Published**

## Summary

Students will gain and develop knowledge and understandings related to modern architectural design. Students will develop previously and newly learned CAD skills to employ this program as a tool to communicate their understanding and ability to apply their research of modern design concepts to a building. These concepts include technology, philosophy and other factors. They may also construct models that describe their solution. This unit will run concurrently with other units throughout the year.

Revision Date: July 2021

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| MA.A-SSE | Seeing Structure in Expressions |
| LA.RH.11-12 | Reading History |
| MA.A-SSE.A | Interpret the structure of expressions |
| | Key Ideas and Details |
| MA.A-SSE.A.1 | Interpret expressions that represent a quantity in terms of its context. |
| LA.RH.11-12.1 | Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of primary and secondary sources, connecting insights gained from specific details to develop an understanding of the text as a whole. |
| MA.A-SSE.A.1a | Interpret parts of an expression, such as terms, factors, and coefficients. |
| LA.RH.11-12.2 | Determine the theme, central ideas, information and/or perspective(s) presented in a primary or secondary source; provide an accurate summary of how key events, ideas and/or author's perspective(s) develop over the course of the text. |
| LA.RH.11-12.3 | Evaluate various perspectives for actions or events; determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain. |
| LA.RST.9-10 | Reading Science and Technical Subjects |
| | Craft and Structure |
| | Integration of Knowledge and Ideas |
| LA.WHST.11-12 | Writing History, Science and Technical Subjects |
| | Text Types and Purposes |
| LA.WHST.11-12.1 | Write arguments focused on discipline-specific content. |
| SCI.HS-ETS1 | Engineering Design |
| SCI.HS-ETS1-1 | Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. |
| | Asking Questions and Defining Problems |
| SCI.HS.ETS1.A | Delimiting Engineering Problems |
| | Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed |

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| | through engineering. These global challenges also may have manifestations in local communities. |
| SCI.HS-ETS1-2 | Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. |
| | Constructing Explanations and Designing Solutions |
| SCI.HS-ETS1-3 | Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. |
| | Constructing Explanations and Designing Solutions |
| CS.9-12.8.2.12.EC.1 | Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made. |
| CS.9-12.8.2.12.EC.2 | Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded. |
| CS.9-12.8.2.12.EC.3 | Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience. |
| 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.2 | Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback. |
| 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.ETW.4 | Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints. |
| CS.9-12.EC | Ethics & Culture |
| CS.9-12.ED | Engineering Design |
| CRP.K-12.CRP1 | Act as a responsible and contributing citizen and employee. |
| CRP.K-12.CRP1.1 | Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good. |
| CRP.K-12.CRP2 | Apply appropriate academic and technical skills. |
| 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.CRP6 | Demonstrate creativity and innovation. |
| CRP.K-12.CRP6.1 | Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand |

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| | how to bring innovation to an organization. |
| CRP.K-12.CRP8 | Utilize critical thinking to make sense of problems and persevere in solving them. |
| CRP.K-12.CRP8.1 | Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others. |
| CRP.K-12.CRP10 | Plan education and career paths aligned to personal goals. |
| CRP.K-12.CRP10.1 | Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals. |
| CRP.K-12.CRP11 | Use technology to enhance productivity. |
| CRP.K-12.CRP11.1 | Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks. |
| SCI.HS-ETS1-2 | Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. |
| SCI.HS-ETS1-4 | Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. |
| SCI.HS-ETS1-3 | Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. |
| SCI.HS-ETS1-1 | Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. |
| SCI.HS-ETS1 | Engineering Design |
| WRK.9.2.12.CAP | Career Awareness and Planning |
| WRK.9.2.12.CAP.12 | Explain how compulsory government programs (e.g., Social Security, Medicare) provide insurance against some loss of income and benefits to eligible recipients. |
| WRK.9.2.12.CAP.13 | Analyze how the economic, social, and political conditions of a time period can affect the labor market. |
| TECH.8.1.12 | Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. |
| TECH.8.1.12.A | Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations. |
| TECH.8.1.12.A.1 | Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources. |
| TECH.8.1.12.A.2 | Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review. |

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| TECH.8.1.12.A.CS1 | Understand and use technology systems. |
| TECH.8.1.12.A.CS2 | Select and use applications effectively and productively. |
| TECH.8.1.12.C | Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. |
| TECH.8.1.12.C.1 | Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community. |
| TECH.8.1.12.C.CS1 | Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. |
| TECH.8.1.12.D | Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. |
| TECH.8.1.12.F | Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. |
| TECH.8.1.12.F.CS1 | Identify and define authentic problems and significant questions for investigation. |
| TECH.8.2.12 | Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. |
| TECH.8.2.12.A | The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live. |
| TECH.8.2.12.A.CS1 | The characteristics and scope of technology. |
| TECH.8.2.12.B.4 | Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants. |
| TECH.8.2.12.B.5 | Research the historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product, and present the competing viewpoints to peers for review. |
| TECH.8.2.12.B.CS4 | The influence of technology on history. |
| TECH.8.2.12.C | Design: The design process is a systematic approach to solving problems. |
| 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.CS1 | The attributes of design. |
| TECH.8.2.12.D.1 | Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review. |
| TECH.8.2.12.D.2 | Write a feasibility study of a product to include: economic, market, technical, financial, and management factors, and provide recommendations for implementation. |
| 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.4 | Assess the impacts of emerging technologies on developing countries. |
| TECH.8.2.12.D.5 | Explain how material processing impacts the quality of engineered and fabricated products. |
| TECH.8.2.12.D.6 | Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions. |

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| TECH.8.2.12.D.CS1 | Apply the design process. |
| TECH.8.2.12.D.CS2 | Use and maintain technological products and systems. |
| TECH.8.2.12.D.CS3 | Assess the impact of products and systems. |
| TECH.9.4.12.CI | Creativity and Innovation |
| TECH.9.4.12.CI.2 | Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). |
| TECH.9.4.12.CT | Critical Thinking and Problem-solving |
| | Engineering design evaluation, a process for determining how well a solution meets requirements, involves systematic comparisons between requirements, specifications, and constraints. |
| | Innovative ideas or innovation can lead to career opportunities. |
| | An individual's income and benefit needs and financial plan can change over time. |
| | 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. |

## Essential Questions/Enduring Understandings

**Essential Questions:**

How do we apply the design loop to the design of buildings?

What factors determine what a building looks like and its form?

How do we communicate designs with CAD?

**Enduring Understandings:**

Architecture is the product of many influences.

Modern architecture is a product of 20th century technology.

Architecture is the product of the design loop.

Architects are part of the construction industry.

## Objectives

**Students will know:**

Architecture is the product of many influences.

Modern architecture is a product of 20th century technology.

Architecture is the product of the design loop.

Architects are part of the construction industry..

**Students will be able to:**

Critically determine what are functional requirements and aesthetic choices in a design.

Analyze how technology affects form in a design.

Solve problems efficiently using the design loop.

Develop a digital portfolio.

## Learning Plan

Preview the essential questions and connect to learning throughout the unit.

Guiding questions: What should a library, concert hall, movie theater, look like? Why? Should a house designed today look the same as one from 50 or 100 or 200 years ago? How has life changed since that time? What characteristics are essential to a house? How has technology changed the way buildings look? What does an office building look like, and why? How do we use the design loop to take into account the differences that make a modern building?

Students to research and write a biography about a famous architect and include examples and analysis of his/her work.

Lecture and demonstration of different presentation techniques that may include airbrush and pen & ink.

Students will design a house, school, concert hall for techno or hip-hop music. The design will demonstrate understanding and application of a contemporary philosophy or approach.

Formative assessments will be conducted throughout the design process.

Summative assessment will be conducted by the student and teacher using a rubric specific to the design problem.

Unit test or quiz.

Writing prompt.

## Assessment

**Formative Assessment:**
Teacher will monitor student progress throughout the learning process.

**Summative assessment:**

Answer the essential questions
Demonstrate through hands-on activities the design of a building that is the product of the design process and is relevant to contemporary time. Communicate the design with drawings and possibly models.Demonstrate the ability to use software and technical drawing conventions to communicate a design effectively.
Design and create presentation drawings for a building that demonstrates understanding of means of egress, curtain wall and steel construction. Maintain a log to explain how the design evolved, including sources of information and criticism. The presentation will be included in an electronic portfolio. The presentation will include a written description that describes the technical aspects of the proposal.The presentation will be evaluated using teacher and student designed rubrics. Write a response to one or more writing prompts. Possible prompts: Identify an important 20th century architect and describe his/her significance. Explain and provide an example of how the phrase, "form follows function" manifests itself in design.

**Alternate Assessment:**
Presentation of concert hall music venue of student choice

**Benchmark:**
Final Exam

## Materials

The CADD LAB-computers equipped with up-to-date AutoCAD and/or other design and drafting software, presentation software, productivity software, a scanner and printers/plotters.

Traditional drafting equipment and supplies-vellum, colored and graphite pencils, pen and ink, drawing boards, tape, scissors, t-squares, triangles etc.

Chip-board, X-acto knives and other model making supplies.

A computer with INTERNET based presentation software (i.e. Prezi and Google Slides) and Microsoft Powerpoint.

Smartboard for demonstrations by the teacher and presentations by students.

## Integrated Accommodation and Modifications Spec Ed, ELL, At-Risk, G&T, Career Education, 504's

See the linked document for Integrated Accommodation and Modifications, Special Education, English Language Learners, At-Risk, Gifted and Talented, Career Education and 504s.