Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: EGDT
Course and Section #: 2100-X01
Course Title: ARCHITECTURAL MATERIALS AND METHODS
Credits: 3

Course Description

Introduces traditional architectural materials and methods of design and materials used in commercial construction. Covers wood, masonry, and concrete construction as well as finish materials. Builds skills related to organizing, detailing, dimensioning, and scheduling construction documents of a commercial type building. Industry standard BIM modeling software will be used in conjunction with traditional CAD software as well. Students are expected to have a strong working knowledge of Revit and AutoCAD in order to successfully complete the assignments and projects. Students will build on their knowledge gained through residential drafting and design as common materials and construction methods for commercial structures are explored. Throughout the semester students will be exposed to the work that the engineer or architect will do to develop a typical project.

Course Attributes

This course has the following attributes:

☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☒ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☐ Open Elective

Other: *Click here to enter text.*

Instructor Information

Instructor Name: Stanley Lance Heal

Student Learning Outcomes

- Comprehend the vocabulary of various building materials and their specific uses.
- Define the traditional foundation and framing methods of building projects.
- Explain a number of different roof structures and the proper detailing of these elements.
- Comprehend the National CAD standard and incorporate it into the documentation process.
- Correctly identify ADA requirements for a commercial building.

- Describe various door and window types and produce drawings with appropriate and clear detailing.
- Define interior and exterior finish materials and produce drawings with appropriate detailing.
- Demonstrate the principles of masonry construction and detailing.
- Research and evaluate new building materials and methods of construction.

Course Materials and Texts

- Construction Materials, Methods, and Techniques: Building for a Sustainable Future. William P. Spence, Eva Kultermann, 5th Edition Copyright 2017
- Access to a computer, Revit Building Information Modeling Software, and a reliable internet connection

Course Requirements

Course Assignments, Assessments, and Grading Policy

Assignments

The intention of homework assignments is to provide you with hands-on experience with both AutoCAD and Revit software and apply drafting principles and practices in producing architectural drawings and models. Take advantage of these assignments because they will assist you, more than any one single thing, to understand the software and proper architectural drafting principles.

When assignments are completed they will need to be submitted to the instructor through the CANVAS system. This means that the instructions have been followed and the assignment is complete.

You will be expected to complete various drawing assignments throughout the semester beginning with fundamental drawings and proceeding to more difficult discipline specific drawing assignments. Each drawing must meet certain standards as explained in the course materials. The more you understand and represent that understanding in the drawings the better the grade you will receive.

Exams

Exams will be used to test your retention of the curriculum. Because of the video lessons and tutorials included throughout this course, it may be easy for you to simply follow along with the videos without "applying" what is covered. Exams will be created that will allow you to show what you have learned and are valuable tools that help us to see what you are understanding and what might need a bit more work. Exams are timed and you are permitted to use any of the course resources.

Quizzes

There are quizzes intended to assess your understanding of building materials and methods. Quizzes do not reflect your knowledge of AutoCAD or Revit. The quizzes are taken from the class lessons, learning material, and reading from the required textbook.

Required or Recommended Reading Assignments

- Chapter 1: The Construction Industry: An Overview
- Chapter 4: The Building Site
- **Chapter 5: Soils**
- **Chapter 6: Foundations:**
- Chapter 7: Concrete

- Chapter 8: Cast in Place Concrete
- Chapter 9: Pre-Cast Concrete
- Chapter 11: Clay Masonry
- Chapter 12: Concrete Masonry
- Chapter 13: Stone
- Chapter 14: Masonry Construction
- Chapter 15: Ferrous Metals
- Chapter 16: Non-Ferrous Metals
- Chapter 17: Steel Frame Construction
- **Chapter 18: Wood, Plastics, and Composites**
- **Chapter 19: Products Manufactured from Wood**
- Chapter 20: Wood and Metal Light Frame Construction
- Chapter 21: Heavy Timber Construction
- Chapter 22: Finishing the Exterior and Interior of Light Wood Frame Buildings
- Chapter 24: Thermal Insulation and Vapor Barriers
- Chapter 27: Roofing Systems
- Chapter 28: Glass
- Chapter 29: Doors, Windows, Entrances, and Storefronts
- Chapter 38: Fire Suppression Systems
- Chapter 40: Heating, Air-Conditioning, Ventilation, and Refrigeration
- Chapter 37 Learning Objectives:

General Description of the Subject Matter of Each Lecture or Discussion

Week 1

- Gain an understanding of the scope of the construction industry.
- Identify the different phases and activities that make up the building design and construction planning process.
- Recognize the types of drawings and specifications used in a set of construction documents.
- Be familiar with the roles and responsibilities of owners, architects, and contractors.
- Recognize the make-up and organization of construction documents.
- Categorize the types of project delivery methods used in commercial construction and how they are administered.
- Describe the phases and administrative procedures that serve to organize the on-site construction phase.

Week 2

- Upon successful completion of this module, students will be able to:
- Define the types of site surveys that are required to document site conditions.
- Be aware of the problems that may occur during excavation and techniques to control them.
- Discuss the types of structures used to control surface and subsurface storm run-off.
- Be familiar with paving materials and applications.
- Understand the planning and construction of different earthwork components and techniques.

Week 3

- Identify the various types of Portland cement and cite their purposes and uses.
- Be familiar with the properties of Portland cement and their effect on concrete.
- Discuss the role of water in concrete and its desired properties.
- List the types of aggregate used in concrete and their desirable characteristics.
- Understand the purposes of various concrete admixtures and their effect on concrete.
- Be aware of how commonly used concrete tests are conducted and what they reveal about a mix.
- Discuss the processes for preparing, transporting, handling, and placing cast-in-place concrete.
- Explain how cast-in-place concrete walls, beams, and columns are formed, reinforced, and poured.
- Discuss the finishes used on concrete surfaces.
- Know how concrete is cured.
- Cite various types of formwork used for cast-in-place concrete.
- Identify and describe types of concrete-reinforcing materials.
- Prepare sketches illustrating the various types of monolithically cast slab and beam floors and roofs.
- Describe the procedure for casting and erecting tilt-up concrete walls.
- Explain briefly what is meant by lift-slab construction.
- Describe and identify the major types of precast concrete units.
- Explain how precast units are manufactured.
- Cite the advantages and limitations of using precast concrete structural units.
- Explain the differences between pre-stressed and non-pre-stressed precast concrete units.
- Discuss the differences between pre-tensioned and post-tensioned structural concrete units.
- Describe the various types of precast concrete slab units and their applications.
- List standard type sizes of precast concrete columns, beams, girders, and wall panels.
- Discuss the procedure for erecting precast concrete units and the types of connections used.

Week 4

- Describe how clay bricks are made.
- Identify various clay masonry products and explain how they are typically used.
- Be aware of the grades, types, and classes of clay masonry products.
- Use the properties of clay masonry products to select materials for various applications.
- Describe how concrete masonry units are manufactured.
- Use information about the physical properties of concrete masonry units when making material selections.
- Recognize the many types of concrete masonry units and be able to select those suitable for various applications.
- Discuss the characteristics and uses of various stones used in building construction.
- Identify the various types of commercially available stone.
- Understand the processes used to quarry and work stone to make it useful for building construction.
- Select stone for a project based on the requirements of the job.
- Define manufactured stone.

- Name the various brick positions and bond patterns used in masonry wall construction.
- Specify how openings are spanned in masonry walls.
- Understand the function of expansion and control joints in masonry construction.
- Recognize the types of brick and concrete masonry wall assemblies and the properties associated with them.
- Explain the advantages and disadvantages of various mortar joints.
- Describe the process used to lay brick, concrete masonry, and structural clay tile units.
- Identify different styles of stone masonry construction.
- Recognize proper construction of structural clay-tile walls.

Week 5

- Explain the processes for mining and processing iron ore and for producing pig iron and steel.
- Develop knowledge of the properties of ferrous metals to consider when making material selection decisions.
- Be familiar with the various steel identification systems and the Unified Numbering System for Metals and Alloys.
- Select nonferrous metals for a wide range of applications.
- Know the properties of nonferrous metals and how these will influence a material's performance.
- Understand the effects of galvanic corrosion and how to design to eliminate it.

Week 6

- Define the types of drawings required for structural steel buildings.
- Describe the procedure for fabricating and erecting the structural steel frame of a building.
- Be familiar with the fastening techniques used to join structural steel members.
- Describe fire-protection procedures for structural steel members required by building codes.
- Discuss steel framing systems using manufactured components.

Week 7

- Understand the structural composition of trees and identify species used in construction.
- Make decisions pertaining to the influence of defects in lumber on various applications.
- Identify standard inch and metric lumber sizes.
- Use information about lumber grades to specify products that serve an intended purpose.
- Use data from the In-Grade Testing Program.
- Use information about properties of wood when selecting species.
- Apply the structural properties of wood when designing structural members.
- Take action to protect wooden structures from damage by insects and moisture.
- Apply technical information on industrial plywood to make construction specification decisions.
- Select the appropriate reconstituted wood-panel products for various applications.
- Categorize and select hardwood plywood for construction applications.
- Identify and choose engineered wood structural components used for building construction.
- Be aware of the many types of construction products manufactured from wood.

Week 8

- Develop an understanding of the methods used to construct light frame buildings.
- Understand the differences in framing when using the various materials and products available.
- Be aware of the influence codes and ordinances have on the design of light frame buildings.

Week 9

- Understand the requirements of the building code as it pertains to heavy timber construction.
- Become familiar with the materials and methods for framing heavy timber buildings and the types of connections used.

Week 10

- Have an understanding of the many materials and design possibilities available for finishing the exterior of light wood frame buildings.
- Be familiar with the many materials and processes and some of the installation procedures required to finish light wood frame building interiors.

Week 11

- Select appropriate types of insulation for various applications in the design of a building.
- Understand how insulation is used to control heat transfer.
- Be aware of the problems caused by moisture penetrating the insulation and learn how to design an assembly of materials to reduce moisture transmission.
- Recognize the vast array of roofing systems available.
- Select the proper roofing system for various applications.
- Understand the proper installation of roofing systems.

Week 12

- Identify the various types of glass products used in building construction.
  Select appropriate glass products for various applications.
- Identify the types of doors, windows, entrances, and storefronts available.
- Apply this information to the decision-making processes as these units are selected for a building.
- Understand the properties of various units as they relate to fire, security, privacy, and operation

Week 13

- Have an understanding of the fire codes and the agencies that maintain them.
- Develop a working knowledge of the various types of fire-suppression systems.
- Understand the many factors to be considered when designing heating and air-conditioning systems.
- Make decisions concerning needs and types of ventilation systems for acceptable indoor air quality.
- Understand the impacts of the fuels used by heating, air-conditioning, and ventilation systems.
- Select appropriate air heating and cooling systems.
- Select appropriate designs for steam and hot-water heating systems.
- Discuss the systems and equipment available for cooling systems in large buildings.

Week 14

- Understand the codes related to the design and installation of conveying systems.
- Understand the various operating mechanisms used on elevators.
- Be familiar with additional conveying systems used in buildings.

Required Course Syllabus Statements

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Using Remote Testing Software
☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of

the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.