BTU BUSINESS & TECHNOLOGY UNIVERSITY

AI SYLLABUS

SOIL ARCHITECTURE

Course Title: Soil Architecture

Course Description:

This course explores the fundamentals of soil architecture and how it impacts construction, landscaping, and sustainable design. Students will gain an understanding of soil types, properties, and behaviors, and learn how to incorporate this knowledge into architectural design and construction projects.

Course Goals:

- To introduce students to the concept of soil architecture and its role in sustainable design.
- To provide students with a foundation in soil science, including the physical, chemical, and biological properties of soil.
- To teach students about the relationship between soil architecture and the built environment.
- To equip students with the skills and knowledge needed to incorporate soil architecture into their design projects.

Course Outline:

Week 1: Introduction to Soil Architecture

- Introduction to the course and its goals
- Overview of soil architecture and its relationship to architecture and construction
- Soil as a building material and its advantages and disadvantages

In this first week, students will be introduced to the concept of soil architecture and its importance in sustainable design. We will discuss the benefits and challenges of using soil as a building material and explore the role of soil architecture in creating environmentally responsible designs.

Week 2: Soil Science Basics

- Soil composition, structure, and texture
- Physical properties of soil, including density, porosity, and water-holding capacity
- Chemical properties of soil, including pH and nutrient content

During this week, students will learn the fundamentals of soil science, including the physical and chemical properties of soil. They will gain an understanding of how different soil types affect construction and design, and explore the characteristics of soil that make it a versatile and unique material.

Week 3: Soil Mechanics and Behavior

- Soil mechanics and its relationship to engineering and construction
- Soil behavior under load, including compression, settlement, and shear
- Soil stabilization techniques, including compaction and soil reinforcement

In this week, we will delve into the mechanics of soil and how it behaves under various loads and stresses. Students will explore techniques for stabilizing soil, including compaction and soil reinforcement, and discuss the engineering principles that are applied to create stable, safe soil-based designs.

Week 4: Soil as a Foundation Material

- Soil as a foundation material and its advantages and disadvantages
- Foundation types and their suitability for different soil types
- Soil testing and site investigation techniques

During this week, we will examine the use of soil as a foundation material, including its advantages and disadvantages. Students will learn about the different types of foundations and their suitability for various soil types, as well as the techniques for testing and investigating soil before and during construction.

Week 5: Soil Erosion and Landscaping

- Soil erosion and its impact on landscaping and the built environment
- Techniques for preventing soil erosion, including vegetation and retaining walls
- Landscaping with soil, including the use of berms, swales, and terracing

In this week, we will explore the relationship between soil erosion and the built environment. Students will learn about the techniques used to prevent soil erosion, including the use of vegetation and retaining walls, and they will explore ways to incorporate soil into landscaping, such as berms, swales, and terracing.

Week 6: Soil Architecture in Practice

- Case studies of soil architecture in practice, including examples of earth buildings, green roofs, and soil-based construction techniques
- Incorporating soil architecture into design projects, including the use of soil as a building material and the integration of soil in landscaping and site design.

During the final week, we will examine examples of soil architecture in practice, including a variety of case studies such as earth buildings, green roofs, and soil-based construction techniques. Students will also learn how to incorporate soil architecture into their own design projects, exploring the use of soil as a building material and the integration of soil in landscaping and site design.

Assessment and Evaluation:

- Class participation: 20%
- Homework assignments: 30%
- Midterm exam: 20%
- Final project: 30%

Required Readings:

1. "Building with Earth: Design and Technology of a Sustainable Architecture," by Gernot Minke
2. "Soil Mechanics in Engineering Practice," by Karl Terzaghi
3. "The Soil Will Save Us: How Scientists, Farmers, and Foodies Are Healing the Soil to Save the Planet," by Kristin Ohlson
4. "The Earth-Sheltered House: An Architect's Sketchbook," by Malcolm Wells
5. "Foundations and Earth Retaining Structures," by Muni Budhu

Course assignments:

1. Soil Analysis Report: Students will conduct a soil analysis of a site and submit a report detailing the physical and chemical properties of the soil. The report should also include a discussion of the soil's suitability for different construction techniques and an assessment of any potential challenges related to the soil.
2. Case Study Analysis: Students will choose a case study of a building or site that incorporates soil architecture and write an analysis of the design, construction, and environmental impact. The analysis should focus on how soil architecture was used, the advantages and disadvantages of the approach, and any lessons that can be learned from the case study.
3. Site Design Proposal: Students will develop a site design proposal that incorporates soil architecture. The proposal should include plans, sections, and elevations that show how soil is integrated into the design, as well as a written description of the proposed design approach and an assessment of the environmental impact.
4. Presentation: Students will give a presentation on a specific aspect of soil architecture, such as soil stabilization techniques, soil-based construction, or landscaping with soil. The presentation should include a literature review, case studies, and a critical analysis of the topic.
5. Final Project: For their final project, students will develop a design proposal for a building or site that incorporates soil architecture. The project should include plans, sections, and elevations that demonstrate the proposed design approach, as well as a written description of the design concept,

the environmental impact, and an assessment of the potential challenges and benefits of the proposed approach.

Classroom Policies:

Attendance:
Attendance is mandatory for all class meetings. Absences may be excused in the case of documented illness or emergency, but students are responsible for catching up on any missed material.

Participation:
Active participation in class discussions and group activities is essential to the success of the course. Students are expected to come to class prepared and ready to engage in meaningful dialogue and debate.

Late Assignments:
Late assignments will be accepted up to three days after the due date, but with a penalty of 10% per day. No assignments will be accepted after three days.

Academic Integrity:
All work submitted in this course must be the original work of the student. Plagiarism, cheating, and other forms of academic dishonesty will not be tolerated and will result in a failing grade for the assignment or the course. Students are expected to adhere to the academic integrity policy of the institution.

Accessibility Statement:
The instructor is committed to making this course accessible to all students. If you have a disability that requires accommodations, please contact the instructor as soon as possible to discuss your needs. Accommodations may include, but are not limited to, alternative testing arrangements, note-taking assistance, and accessible course materials.

Course resources:

1. Textbooks: Textbooks such as "Building with Earth: Design and Technology of a Sustainable Architecture" by Gernot Minke and "The Earth-Sheltered House: An Architect's Sketchbook" by Malcolm Wells can provide a good foundation for the course.
2. Academic Papers and Articles: There are many academic papers and articles that explore different aspects of soil architecture, including soil testing, soil stabilization techniques, and the use of soil in sustainable design. These can be accessed through academic databases such as JSTOR and ScienceDirect.
3. Case Studies: Case studies of buildings or sites that incorporate soil architecture can provide valuable insights into the use of soil in design and construction. Examples of such case studies include the Rammed Earth House by David Easton and the Green Magic Homes.
4. Guest Speakers: Inviting guest speakers who are experts in soil architecture can provide students with a unique perspective and insights into the field. For example, a soil scientist or a soil engineer could be invited to talk about their work and experiences.

5. Field Trips: Visiting construction sites or buildings that incorporate soil architecture can provide students with an opportunity to observe the use of soil in practice. This can help students to better understand the challenges and benefits of using soil in construction and design.
6. Online Resources: There are many online resources available on soil architecture, such as videos, podcasts, and blogs. These can provide students with additional information and perspectives on the topic.