

# **Civil Engineering Principles**

Instructor: Dr. Robert Wilson

## **Module 1: Introduction to Civil Engineering**

This module explores the historical background, evolution, and scope of civil engineering. It highlights how civil engineering impacts everyday life through infrastructure like roads, buildings, bridges, and dams. Students will understand the importance of civil engineers in society and the diverse fields they can specialize in, such as structural, geotechnical, transportation, and environmental engineering. It also sets the stage for how civil engineers solve real-world problems using science, mathematics, and innovation.

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## **Module 2: Engineering Mechanics**

This module introduces the core principles of statics and dynamics. Students learn how forces and moments act on physical bodies and how to analyze equilibrium. Concepts such as Newton's laws, free-body diagrams, and moment calculations are covered with practical examples from civil structures like beams and columns. Understanding these fundamentals is crucial for analyzing and designing safe structures.

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## **Module 3: Construction Materials and Techniques**

This module delves into the properties, uses, and testing of key construction materials such as concrete, steel, timber, and composites. It emphasizes material selection based on performance, cost, and environmental impact. Construction methods like formwork, curing, and sustainable practices are also introduced. Case studies and site practices reinforce the application of materials in real construction scenarios.

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## **Module 4: Surveying and Site Planning**

This module teaches basic land surveying techniques and the importance of accurate measurements in planning and execution. Students learn about instruments like total stations, theodolites, and GPS. Concepts such as leveling, contouring, and topographic mapping are introduced. The module also covers how survey data informs decision-making in site development and layout.

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## **Module 5: Basics of Structural Design**

The final module introduces the basics of structural design and the application of building codes and safety standards. It covers the load-bearing systems of structures, including dead loads, live loads, wind, and seismic forces. Students learn about the design process from conceptualization to detailed drawings and understand the interdisciplinary nature of civil engineering design work.

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