

# Soil Mechanics – I

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|-------------------------------|----------------------------|
| <b>Course Code</b><br>CE- 222 | <b>Credit Hours</b><br>2-1 |
|-------------------------------|----------------------------|

## Course Description

This course provides an elementary introduction to Soil Mechanics and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of the nature of soils as engineering materials; common soil classification schemes; the importance of water in the soil and the effects of water movement; and the stress-strain-strength response of soils

## Text Book:

1. Das & Sobhan (2018). Principles of Geotechnical Engineering. 9<sup>th</sup>.
2. Das (2009). Fundamentals of Geotechnical Engineering. 3<sup>rd</sup>
3. Whitlow (2001). Basic soil mechanics, 4<sup>th</sup>.

## Reference Book:

1. Mitchell & Soga (2005). Fundamentals of soil behavior, 3<sup>rd</sup>.
2. Holtz & Kovac (1981) An Introduction to Geotechnical Engineering.
3. Whitlow (2001) Basic Soil Mechanics
4. Terzaghi (1943) Theoretical Soil Mechanics.

## Prerequisites :

Nil.

## ASSESSMENT SYSTEM FOR THEORY

|                   | Without Project (%) | With Project/Complex Engineering Problems (%) |
|-------------------|---------------------|---|
| Quizzes           | 15                  | 10-15   |
| Assignments       | 10                  | 5-10  |
| Mid Terms         | 25                  | 25  |
| Project           | -                   | 5-10  |
| End Semester Exam | 50                  | 45-50   |

## ASSESSMENT SYSTEM FOR LAB

|  |     |
|--|-----|
| Lab Work/ Psychomotor Assessment/ Lab Reports        | 70% |
| Lab Project/ Open Ended Lab Report/ Assignment/ Quiz | 10% |
| Final Assesment/ Viva                                | 20% |

## Teaching Plan

| Week No | Topics/ Learning Outcomes |
|---------|---------------------------|
|---------|---------------------------|

|       |  |
|-------|--|
| 1-2   | Introduction: Origin of soils<br>Soil Formation and Nature of Soil constituents, Clay Soil Formation |
| 3     | Mechanical analysis of soil (sieve analysis & hydrometer analysis)                                   |
| 4-5   | Phase Relationships (Weight-Volume relationship)   |
| 6     | Soil Plasticity  |
| 7-8   | Soil Classification systems: USDA, AASHTO, & Unified Soil Classification System                      |
| 9     | <b>Mid Semester Exam</b>   |
| 11    | Soil Compaction: Introduction, theory, and lab tests Field Density Determination                     |
| 12-14 | Soil Permeability  |
| 13-14 | Seepage and Flow Nets  |
| 15    | In-Situ Stresses   |
| 15-16 | Vertical Stresses in Soil  |
| 17-18 | <b>End Semester Exam</b>   |

### **Practical**

| <b>Experiment No</b> | <b>Description</b>   |
|----------------------|--|
| 1                    | Moisture content determination   |
| 2                    | Sieve analysis.  |
| 3                    | Hydrometer analysis.   |
| 4                    | Atterberg limits.  |
| 5                    | Specific gravity.  |
| 6                    | Moisture content determination.  |
| 7                    | Standard and Modified Compactions  |
| 8                    | Density in situ by core cutter sand replacement and rubber balloon method. |
| 9                    | Permeability by constant and variable head.                                |