College:Engineering Department:Civil Engineering

Course Title: **Geotechnical Engineering**

Course No: 0901416

Credit Hours: 3

Semester:2

About The Course

Course Title: Geotechnical Engineering Class:
Course No:0901416 Lecture Room: 202

Obligatory/ Optional:
Text Book:

The Instructor

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Course Description

Introduction: Definitions: soils, soil mechanics, soil engineering, rock mechanics, geotechnical engineering. To explain what Geotechnical Engineering is and how it is important to civil engineering, to explain how three phase system is used in soil and how are soil properties estimated using three phase system, to explain role of water in soil behavior and how soil stresses. To determine the effect of compaction on soil beneath foundation. To determine shear parameters and stress changes in soil due to foundation loads.

Course Objectives

To explain what Geotechnical Engineering is and how it is important to civil engineering, to explain how three phase system is used in soil and how are soil properties estimated using three phase system, to

explain role of water in soil behavior and how soil stresses. To determine the effect of compaction on soil beneath foundation. To determine shear parameters and stress changes in soil due to foundation loads.

Learning Outcome

To explain what Geotechnical Engineering is and how it is important to civil engineering

Making students aware of how language works to convey meaning as its basic function

Course Outline and Time schedule

Week	Course Outline
First week	Soil mechanics, soil engineering, rock mechanics, geotechnical engineering.
	Scope of soil engineering.
	Comparison between soil and rock.
2nd week	Relationships-Soil as three-phase system in terms of weight, volume, voids ratio, and porosity.
	Definitions: moisture content, unit weights, degree of saturation, void ratio,
	Porosity, specific gravity, mass specific gravity etc.

3rd week	Relationship between volume weight, void ratio- moisture content
4th week	Unit weight- percent air voids, saturation- moisture content, moisture content- specific gravity. Determination of various parameters.
	Specific gravity by density bottle method,
	Plasticity Characteristics of Soil-Introduction to definitions of: plasticity of .
5th week	soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity index
	Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits.
	Classification of Soils-Introduction of soil classification: particle size classification
6th week	textural classification, unified soil classification
	Identification: field identification of soils, general characteristics of soil in different groups
7th week	Compaction of Soil- Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density.
	determination of optimum moisture content and maximum dry density.
	Compaction in field, compaction specifications and field control. Unit weight by sands replacement method.

8th week	**Exam 1**
	Total and Effective stress of Soil, Pore water pressure
	Shear Strength-Principle planes parallel to the coordinate axes,
9th week	Mohr's circle, important characteristics of Mohr's circle, Mohr-Coulomb theory, types of shear test: direct shear test, merits of direct shear test,
	triaxial compression tests
	, test behavior of UU,
10th week	CU and CD tests, relation between major and minor principal stresses,
	unconfined compression test, vane shear test..
11th week	Site Investigation : Ground investigation and testing
	Planning of ground investigations ,
	Site exploration methods ,
12th week	Soil and rock sampling
	Exam2
13th week	Groundwater measurements ,

	Field tests in soil and rock ,
14th week	Field tests in soil and rock ,
	Field tests in soil and rock ,
	Field tests in soil and rock ,
15thweek	Field tests in soil and rock ,.
	Geotechnical reports
	Geotechnical reports

Presentation methods and techniques

Methods of teaching varied according to the type of text, student and situation. The following techniques are usually used:

1- Lecturing with active participations.
2- Problem solving.
3- Cooperative learning.
4- Discussion.
5- Learning by activities.

6- Connecting students with different sources of information

Sources of information and Instructional Aids

For example: … power point , vedios lecture for soil sampling and testing .

- Transparencies
- Distance learning
- Library sources

Assessment Strategy and its tools

The assigned syllabus is assessed and evaluated
Through: feed back and the skills that are acquired by the students

The tools:
1- Digonistic tests to identify the students level and areas of weakness
2- Formal (stage) evaluation
   a) Class Participation 20%
   b) Ist Exam 20%
   c) 2nd Exam 20%
   d) Final Exam 40%

Tool & Evaluation

Tests are permanent tools & assessment, in addition to the activity file which contains curricular and the co-cussiculor activities, research, report papers and the active participation of the student in the lecture.

The following table clarifies the organization of the assessment schedule:

Test	Date	Grade
First Exam		20
2nd Exam		20
Activities & Participation	Students should be notified about their marks	20
Final Exam	Not yet	40

Activities and Instructional Assignment

1- Practical assignments to achieve the syllabus objectives.

2- ……..

Regulations to maintain the teaching-Learning Process in the Lecture:

1- Regular attendance.

2- Respect of commencement and ending of the lecture time.

3- Positive relationship between student and teacher.

4- Commitment to present assignments on time.

5- High commitment during the lecture to avoid any kind of disturbance and distortion.

6- High seuse of trust and sincerity when referring to any piece of information and to mention the source.

7- The student who absents himself should submit an accepted excuse.

8- University relevant regulations should be applied in case the studen,s behavior is not accepted.

9- Allowed Absence percentages is (%).

References :

1. **Smith's Elements of Soil Mechanics**

2. Principal of Geotechnical Engineering, by Baraja Das

3. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons

4. Soil Mechanics by Craig R.F., Chapman & Hall