زانكۆی پۆلیتەكنیكی هەولێر
ERBIL POLYTECHNIC UNIVERSITY

Kurdistan Region Government
Ministry of Higher Education
and Scientific Research
Erbil Polytechnic University

Module (soil mechanics) Catalogue

2023-2024

College/ Institute	**Erbil Technology College**	
Department	**Road Construction Department**	
Module Name	**Soil Mechanics / 2**	
Module Code	**SOM302**	
Degree	**Technical Diploma** ☒ **Bachelor** ☐ **High Diploma** ☐ **Master** ☒ **PhD** ☐	
Semester	**3**	
Qualification	**SMc.**	
Scientific Title	**Soil Mechanics**	
ECTS (Credits)	**6**	
Module type	**Prerequisite** ☐ **Core** ☒ **Assist.** ☐	
Weekly hours	**8**	
Weekly hours (Theory)	**(2)hr Class**	**(162)Total hrs Workload**
Weekly hours (Practical)	**(2)hr Class**	**(162)Total hrs Workload**
Number of Weeks	**12**	
Lecturer (Theory)	**Hozan Khalil Yaba**	
E-Mail & Mobile NO.	**hozan.yaba@epu.edu.iq/07504618166**	
Lecturer (Practical)	**Hozan Khalil Yaba**	
E-Mail & Mobile NO.	**hozan.yaba@epu.edu.iq/07504618166**	
Websites		

Course Book

Course Description	Soil mechanics’’ is the study of the engineering behavior of soil when it is used either as a construction material or as a foundation material. This is a relatively young discipline of civil engineering, systematized in its modern form by Karl Von Terzaghi (1925), who is rightly regarded as the ‘‘Father of Modern Soil Mechanics’’. An understanding of the principles of mechanics is essential to the study of soil mechanics. A knowledge and application of the principles of other basic sciences such as physics and chemistry would also be helpful in the understanding of soil behaviour. Further, laboratory and field research have contributed in no small measure to the development of soil mechanics as a discipline. The application of the principles of soil mechanics to the design and construction of foundations for various structures is known as ‘‘Foundation Engineering’’. ‘‘Geotechnical Engineering’’ may be considered to include both soil mechanics and foundation engineering.
Course objectives	The objective of this course is to introduce Technical Road Department students the basic, principle and application of soil mechanics. This include: • Learn index properties of soils, methods of soil classification and subsurface investigations. • Learn principle of seepage through porous media and effective stress. • Learn principles of consolidation and shear strength.
Student's obligation	• Student should attend lectures (theory part) and practicing in soil mechanics laboratories. • Student should attend exams during the course. • Home works. • Quizzes . • work as a team .
Required Learning Materials	1. Lecture notes will be handled to the students at the beginning of each part to facilitate easier understanding of books and also to read references.

<table>
<tr>
<td></td>
<td>2. Power point presentation for parts of the course as required.

3. White board will be used to explain program commands, draw sketches and solve problems in the lab.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>
<table>
<tr><th colspan="2">Task</th><th>Weight (Marks)</th><th>Due Week</th><th>Relevant Learning Outcome</th></tr>
<tr><td colspan="2">Paper Review</td><td></td><td></td><td></td></tr>
<tr><td rowspan="6">Assignments</td><td>Homework</td><td>5%</td><td></td><td></td></tr>
<tr><td>Class Activity</td><td>2%</td><td></td><td></td></tr>
<tr><td>Report</td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>10%</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Quiz</td><td>8%</td><td></td><td></td></tr>
<tr><td colspan="2">Lab.</td><td>10%</td><td></td><td></td></tr>
<tr><td colspan="2">Midterm Exam</td><td>25%</td><td></td><td></td></tr>
<tr><td colspan="2">Final Exam</td><td>40%</td><td></td><td></td></tr>
<tr><td colspan="2">Total</td><td>100%</td><td></td><td></td></tr>
</table>
</td>
</tr>
<tr>
<td>Specific learning outcome:</td>
<td>At the end of year, student will be have :
information on soil types, soil properties , soil composition , soil grain-size distribution ,soil consistency, plasticity and Atterberg limits, soil permeability ,stresses in soil, soil classification ,soil stabilization , consolidation ,lateral earth pressure ,soil compaction , CBR California Bearing Ratio, swelling and shear stress.
Information on all soil laboratories tests.</td>
</tr>
<tr>
<td>Course References:</td>
<td>1. Title: Principles of Geotechnical Engineering
Authors : Braja M.Das
2. Title: Physical and Geotechnical Properties of Soil</td>
</tr>
</table>

	Authors: Joseph E.Bowel 3. Title: Soils Mechanics in Engineering Practise". 3rd Edition Authors : Tergazhi, Karl, Ralph, B. Teck, and Mesri, Publisher :Gholamreza(1988) 4. Title: Basic Soil Mechanic". 4th edition. Authors : Whitlow, R Publisher:Pearson Education Limited England. (2001) 5. Title: Manual of Soil laboratory Testing Authors: Head, K.H Publisher: Volume 1". Pentech Press, London. (1981) 6. Paper and magazins from internet

Course topics (Theory)	**Week**	**Learning Outcome**
1.Introduction: 1.1. Definition of soil. 2.1 Forming of soil.	1	
2. Soil composition and soil properties: 2.1. Soil phase. 2.2. Soil properties like: Water content, void ratio, porosity, total density, etc.),solving example.	2&3	
3. Soil grain – size distribution: 3.1. Sieve analysis. 3.2. Hydrometer Analysis. 3.3. Consistency. 3.4.plasticity and Atterberg limits.	4	
4. Soil classification: 4.1. Using the unified classification system.	5	
5. Permeability: 5.1. Introduction, Darcy law, type of flow, laboratory test, solving example	6	
6. Stresses in soil: 6.1Total, Effective and Neutral stresses, solving example.	7&8	

7. Soil compaction and Swelling: 7.1 Introduction, Objective and factors affecting compaction. 7.2 Laboratory Compaction tests. 7.3 Type of swelling	9	
8. Foundations: 8.1Introduction 8.2Type of foundations	10	
9. Shear stress: 9.1Moher – coulomb equation. 9.2Direct shear test. 9.3 Principal stresses	11	
10.California Bearing Ratio (CBR): 10.1 Application of this method. 11. Consolidation: 11.1The relation between the consolidation and settlement of soil.	12	
Practical Topics	**Week**	**Learning Outcome**
Introduction on the soil lab Water content test	1	
Organic content test & Specific gravity test	2	
Sieve analysis test	3	
Hydrometer test	4	
Liquid limit test , Plastic limit ,Shrinkage limit test	5	
Constant head permeability test	6	
Falling head permeability test	7	
Standard compaction test, Modified compaction test	8	
Filed density (sand cone test)	9	
Filed density (Core cutter test)	10	
Direct shear test	11	
California bearing ratio(C.B.R) test, Consolidation test	12	