The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name: Rock and Soil Mechanics

0305393

1	Course title	Rock and Soil Mechanics
2	Course number	0305393
3	Credit hours (theory, practical)	3 hours theory;
	Contact hours (theory, practical)	3 hours theory,
4	Prerequisites/corequisites	General Geology 0305101, Structural Geology 0305341, first year math, physics, and chemistry
5	Program title	Environmental and Applied Geology
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Faculty of Science
9	Department	Geology
10	Level of course	undergraduate
11	Year of study and semester (s)	2016-2017 Fall
12	Final Qualification	
13	Other department (s) involved in teaching the course	
14	Language of Instruction	English
15	Date of production/revision	September 2017

Academic standards

Rock and Soil Mechanics is a science/engineering discipline. Our understanding of this subject is developed by adopting the scientific method whereby data is collected by investigation or observation and used to formulate and test hypotheses. It depends on scientists being objective and sharing all their data, methods and ideas with their peers, by publishing their findings. This allows other scientists to further analyse and build on this body of knowledge by which we learn about Engineering Geology. Professional scientists must always acknowledge their sources. **Plagiarism** is the presentation of thought or work of another person as though it is one's own without proper acknowledgment. The University's regulations make it clear that plagiarising is a breach of student discipline and may incur a range of penalties.

16. Course Coordinator: Dr. Fathi Shaqour
Office numbers, office hours, phone numbers, and email addresses should be listed.
Sunday, Tuesday, and Thursday 11:00-12:00
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17. Values/Attitudes

- Appreciate the importance of this subject to Geology students in their practical life.
- Conduct of professional standards.

18. Course Description:

Overview of the physical and engineering properties of soils and rocks; index geotechnical properties of rocks and soils: density, unit weight, porosity, void ratio, Atterburg limits of soils, relative density, and shear strength of soils and rocks; engineering soil and rock classification systems; natural hazards and their engineering significance; and slope stability. Mechanics of Earth materials and how they respond to forces and stresses, exploring in more physical detail the mechanics of rock, soils, and fluids, and how these relate to site vulnerabilities

19. Course aims and outcomes:

A- Aims:
Main aims of the course are the following:

1. Classify and describe rocks and soils,
2. Evaluate compaction theory, construction methods, equipment and QA/QC specifications in earthworks.
3. Use of spreadsheets and audiovisual software & equipment;
4. Log a trial pit, draw the ground profile, sample soil and execute laboratory tests and process the data.
5. Identify failure modes in earthen dams and formulate solutions to prevent failure e.g. determining safe slopes for the earthen dam, quantity of flow and FOS against piping, boiling
6. Evaluate bearing capacity problems using well considered presumptive bearing capacities...
7. Discuss the dangers associated with dam structures during and after construction in light of past failures.
8. Outline Impact of quaternary geology on soils and rocks
9. Engineering classification of rock
10. Tunneling in rocks
11. Provide and reinforce a detailed knowledge of the behavior of engineering soil properties including both physical and mechanical and its applications.
12. Discuss the practical applications of soil in civil engineering context.
13. Expose students to important tests available for the determination of different soil properties.

B- Intended Learning Outcomes (ILOs):
Upon successful completion of this course students will be able to:

1- Demonstrate an understanding of the terms, concepts and principles of rock and soil mechanics,
2- Develop professional skills in rock mechanics and soil mechanics,
3- Develop understanding of rock types and engineering classifications of soils and rocks.
4- Calculate Atterberg soil limits. Understand the weight–volume relationships of soil aggregates.
5- Classify soil type. Perform hydrometer grain size analysis.
6- Review rock soil field investigation.
7- Undertake permeability test in the laboratory, and permeability test in the field.
8- Compute water content.
9- Calculate shear strength of rock and soil.
10- Understand various soil compaction techniques.

20. Outline and Schedule:

Week	Topic
1	1- Introduction: discuss the syllabus, why study the course, General information 2- The basics of rock and soil mechanics, their relationship with other disciplines especially civil engineering, terminology. 3- Origin of Soil and Grain Size
2	4- Weight-Volume Relationships 5- Plasticity and Structure of Soil
3	6- Engineering Soil: Types of soil and soil description, 7- Engineering properties of soils: grain size, Atterberg limits
4	8- Engineering Classification of Soil 9- Engineering properties of soils: strength properties 10- Soil strength testing: direct shear,
5	11- Soil strength testing: uniaxial compressive strength. Soil strength testing: tri-axial compressive testing 12- Soil Compaction 13- **First Exam**
7	14- Index engineering properties of rocks 15- Permeability of soils and rocks 16- Engineering classification of rocks -a
8	17- Engineering classification of rocks -b 18- Construction Uses of rocks and soils: Aggregates 19- Construction Uses of rocks and soils: Aggregates (continue) 20- Riprap and other large rock materials
9	21- Characterization of rock discontinuities and their fundamental properties. 22- Classification of rock masses. 23- In-situ stresses in rocks and methods of stress measurement and interpretations.
10	24- Laboratory testing for the measurement of strength and deformation behaviour of intact rocks and their interpretation to determine the strength and deformation parameters under uniaxial compression, triaxial compression and uniaxial tension. 25- Failure theories of rock including the Griffith criterion and Hoek and Brown criterion
11	26- **Second Exam**
12	27- Strength and deformation behaviour of rock masses. 28- Overview of rock engineering problems 29- Geological classification of rocks, engineering classifications and index properties of intact rocks
13	30- The phenomenon and mechanism of time-dependent deformation of rocks and the measurement and interpretation of time-dependent deformation rock properties.
14	31- Characterization of rock discontinuities and their fundamental properties 32- Classification of rock masses.

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

This course emphasizes the quantitative problem solving to gain a better understanding of geological materials and processes. Therefore, the student will be trained on that through independent and guided solution of problem sets that cover the various and most important aspects covered in the lecture.

22. Evaluation Methods and Course Requirements:

First Test/guizzes	20%	Week 5	Assess a student's understanding, knowledge and competency of theoretical concepts and practical aspects of the course

Mid-term Test	30%	Week 11	material. **Requirement**: Set a written exam on the entire content of the course **Assessment Criteria**: Correct answers, demonstration of understanding of concepts and principles
Final Exam	60%	(Exam period)	
Total	**100 %**		

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Discussion in the class, quizzes, quantitative problem solving and two midterm and a final exam

23. Course Policies:

A- Attendance policies: The rules of the University apply
B- Absences from exams and handing in assignments on time:
Assignments must be handed in on time.
C- Health and safety procedures:
D- Honesty policy regarding cheating, plagiarism, misbehavior:
The regulations of the University of Jordan are applicable
E- Grading policy: The final grade is based on the overall performance of the student to be deduced from
Interest in class through interaction; participation in quizzes, problem set solving and exams:
Below is a tentative grading scale
A: 90-100
A-: 85-89
B+: 80-84
B: 75-79
B-: 70-74
C+: 65-69
C:60-64
C-: 55-59
D+: 50-54
D: 49-45
D-: 40-44
F: 0-39

F- Available university services that support achievement in the course:

24. Required equipment:

Laptop; data show and white board and whiteboard marker

25. References:

Fundamentals of Rock Mechanics" by J.C. Jaeger and N.G.W. Cook Check UJ library and Google books for other references. http://books.google.com.au/books

26. Additional information:

Soil mechanics journals:
Rock mechanics and geo-mechanics journals

Name of Course Coordinator: ---- ----------Signature: ---------- Date: ----------

------- Head of curriculum committee/Department: ---------- Signature: ----------

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Head of Department: ---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

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Dean: ---------- -Signature: ----------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File