

## Faculty of Engineering & Technology

### Rock Mechanics

#### Information :

**Course Code :** MAN 301

**Level :** Undergraduate

**Course Hours :** 2.00- Hours

**Department :** Department of Petroleum Engineering

#### Instructor Information :

Title	Name	Office hours
Associate Professor	Ashraf Fahmy Mohamed Ismael	7
Teaching Assistant	Akram Rabie Hamed Ragheb Tobar	

#### Area Of Study :

The course aims to familiarize the 3rd year students with the Stress analysis, strain analysis, stress strain relations, some important problems in rock mechanics, rock behavior and loads, theories of rock failures.

#### Description :

Ability to bear stresses ,compressive strength, tensile strength, deformation response to stresses ,elastic moduli, Poisson's ratio, principal stresses, in-situ stress regime, total-stress and effective-stress, temperature effects, nature and origin of pore pressure, faulting and folding, tectonics, regional structural analysis, regional and localized stress, stresses around boreholes, overburden stress, horizontal stresses, mini-frac tests, formation testers, other pressure transient techniques, and tool deployment unconfined compression, triaxial compression, hydrostatic compression, poly-axial, multi-stage triaxial, thick-walled cylinder, direct tensile strength, indirect (Brazilian) tensile strength, direct shear, uniaxial strain (compaction), and quick look (rock hardness) and scratch tests, geological/mapping methods, wireline logging techniques, anelastic strain recovery, differential strain curve analysis, acoustic anisotropy, deformation mechanisms and common models used in petroleum related rock mechanics.

#### Course outcomes :

##### **a. Knowledge and Understanding: :**

- 1 - Explain mechanical and physical properties for different types of rocks.
- 2 - Recognize laboratory and in-situ tests for different types of rocks.
- 3 - List methodologies of solving rock engineering problems and data collection.

##### **b. Intellectual Skills: :**

- 1 - Select appropriate solutions for engineering problems based on analytical thinking.
- 2 - Think in a creative and innovative way in problem solving and design.

##### **c. Professional and Practical Skills: :**

- 1 - Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
- 2 - Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.

##### **d. General and Transferable Skills: :**

- 1 - Ability to work in a team. Ability to work in a team.

2 -	Ability to share ideas and communicate with others
3 -	Ability to deal with others according to the rules of professional ethics

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Rock as a Material	8	4	4
Analysis of Stress and Strain	8	4	4
Deformation and Failure of Rock	8	4	4
Borehole Failure Criteria	8	4	4
Laboratory Testing of Rocks	4	2	2
Geological Aspects of Petroleum Related Rock Mechanics	16	8	8
Stresses Around Boreholes.	8	4	4

**Teaching And Learning Methodologies :**

Interactive Lecturing
Discussion
Problem Solving

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Final examination	40.00	15	
Homework assignments	15.00		
Mid-term examination	30.00	4	
Participation and performance	5.00		
Quizzes	10.00	10	

**Course Notes :**

Handouts for lectures and lecture notes
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**Recommended books :**

Fundamentals of Rock Mechanics.
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**Periodicals :**

Onepetro
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**Web Sites :**

www.spe.org
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