



**The University of Jordan
School of Engineering**

| Department | Course Name | Course Number | Semester |
|------------------------|----------------|---------------|----------|
| Mechanical Engineering | Materials Lab. | 0934374 | |

2019 Course Catalog Description

This laboratory serves mainly the measuring and/or determination of some material properties (strain and stress, yield stress, ultimate stress, fracture stress). Non destructive testing of materials (NDT), micro and macro examination of materials and phase diagrams for steel. It is equipped with machines for conducting tests, such as: Tension, impact fatigue, bending, creep, hardness, and photo elasticity tests.

Instructors

| Name | E-mail | Sec | Office Hours | | Lecture Time | |
|------|--------|-----|--------------|---------|--------------|---------|
| | | | Sun/Tus/Thu | Mon/Wed | Sun/Tus/Thu | Mon/Wed |
| | | | | | | |
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Text Books

| | Text book 1 | Text book 2 |
|---------------------------------|-------------------|-------------|
| Title | Laboratory Manual | |
| Author(s) | | |
| Publisher, Year, Edition | | |

References

| | |
|-----------------------|---|
| Books | 1) J. Gere & B. Goodno "Mechanics of Materials" , Cengage Learning, 2009, Seventh Edition 2) R. C. Hibbeler, "Mechanics of Materials", 3) F. P. Beer, and E. R. Johnston, "Mechanics of Materials", McGraw Hill. 4) L. G. Kraige, "Mechanics of Materials", John Wiley and Sons. 5) P. Popov, "Mechanics of Materials", Prentice Hall |
| Journals | |
| Internet links | |

Prerequisites

| | |
|--------------------------------|---------------------------------|
| Prerequisites by topic | - |
| Prerequisites by course | Strength of Materials I 0934372 |
| Co-requisites by course | |
| Prerequisite for | |

Topics Covered

| Week | Topics |
|------|---|
| 1 | Dividing students into group |
| 2 | Introduction, rules, safety issues, reports |
| 3 | Tension Test |
| 4 | Torsion Test |
| 5 | Strain Gauge Experiment |
| 6 | Creep Test |
| 7 | Hardness Tests |
| 8 | Impact Tests |
| 9 | Fatigue Test |
| 10 | Photoelasticity |
| 11 | Non-Destructive Testing |

Measurable Student Outcomes (SOs) and Course Outcomes

| SOs | Course Outcomes |
|-----|---|
| 6 | <ol style="list-style-type: none"> 1. Understand the mechanical behaviour of materials under different loading conditions like: tension, compression, torsion, fatigue, creep, impact loading and surface deformation (Hardness tests). 2. Understand the basics of the theory of photo-elasticity and some modern non-destructive testing techniques. 3. Students will be able to analyse the stress-strain diagram and other material behaviour curves, do curve fitting and use computers to analyse and interpret data to find important relations for the materials and compare between theoretical and experimental data. |
| 5 | <ol style="list-style-type: none"> 4. Students will have the ability to use computers to write a correct-language reports that should include: cover page, abstract, data observed, sample calculation, results and discussion, practical applications, uncertainty analysis and conclusions. (At least one experiment “Non-Destructive Testing” to be submitted as group report. |

Evaluation

| Assessment Tools | Expected Due Date | Weight |
|------------------|--|--------|
| Reports | Weekly: One report for each experiment that should include the following: Cover page (5%); Abstract (10%); Data observed (10%); Sample calculation (10%); Results and discussion (including applications) (20%); Uncertainty analysis (10%); Practical examples (5%); Conclusions (10%); Correct language (10%); Page numbering (5%); and Figures & Tables (5%). | 30 % |
| Midterm Exam | According to the department schedule | 30 % |
| Final Exam | According to the department schedule | 40 % |

Contribution of Course to Meet the Professional Components

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Relationship to Student Outcomes

| SOs | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------------|---|---|---|---|---|---|---|
| Availability | | | | | | | |

Relationship to Mechanical Engineering Program Objectives (MEPOs)

| MEPO1 | MEPO2 | MEPO3 | MEPO4 | MEPO5 |
|-------|-------|-------|-------|-------|
| | | | | |

ABET Student Outcomes (SOs)

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|---|--|
| 1 | An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics |
| 2 | An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors |
| 3 | An ability to communicate effectively with a range of audiences |
| 4 | An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |
| 5 | An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives |
| 6 | An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions |

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| 7 | An ability to acquire and apply new knowledge as needed, using appropriate learning strategies |
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Updated by ABET Committee, 2021