

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
 Mechanical Engineering Department
 2023-2024 Spring Semester
SYLLABUS

Code/Name	SEC 402.2 / Experimental Mechanics
Type	Required
Credit/ECTS	6/6
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/4
Semester	Spring
Classroom	D204
Content	This course provides experimental techniques and theoretical analysis for measurements of deformations and analysis of stress in engineering materials subjected to mechanical loadings. Various methods for measurement and characterization of chimerical properties such as elastic modulus, strength, failure strain, toughness, etc. will be discussed. Essential theoretical modeling for analysis of experimental results will be presented.
Prerequisites	
Textbooks	<p><i>Primary</i> Giesecke, F.E., et al, Engineering Graphics, MacMillan Pub, New York, 2004.</p> <p><i>Supplementary</i> Jensen, C.H. Engineering Drawing and Design, McGraw-Hill, 2008.</p>
Objectives	<ul style="list-style-type: none"> • Introduce measurements of mechanical properties of materials, stress and deformations. Measure mechanical properties of different materials under different loading conditions, including stress-strain relationship, Young's modulus, Poisson's ratio, yield strength, hardness, and impact energy. • Learn to follow and adhere to internationally acceptable test standards such as ASTM, ISO standards to generate and process data as well as to write reports and prepare presentations. • Become proficient in operation of materials test system for characterization of mechanical behavior of materials and design experiments. • Learn how to observe the microstructures (grains, grain boundary, etc.) on an optical microscope, and correlate microstructures with macroscopic mechanical properties (including yield strength, ductility, impact energy absorption, etc.). • Introduce optical techniques such as photoelasticity and projection moiré. • Introduce 2D, and 3D Digital Image Collation (DIC) techniques to measure surface strains. • Introduce calibration, data processing, error analysis, laboratory report writing and professional presentations.
Course Outcomes	In this course you will be able to: C01 Recognize and present basic principles in engineering mechanics experiments C02 Use physical quantities within the area of engineering mechanics C03 Present the underlying phenomena which both historically and contemporary constitutes the basics for engineering quantification of properties of machines C04 Select proper experimental method for achieving desired material properties C05 Summarize and present data with graphs and tables collected from experiments C06 Prepare experimental report with statistical analysis of results

Weekly Schedule of Topics

W	Topic
1	Introducing operation of materials test system, Mechanical properties in tension
2	Introducing operation of materials test system, Mechanical properties in tension

3	Mechanical property measurement using extensometer
4	Mechanical property measurement using strain gauges
5	Mechanical properties in compression, loading-unloading and Bauschinger effect
6	Flexural tests using deflectometer
7	Flexural tests using deflectometer
8	Observation of microstructures, measurement of hardness
9	Charpy impact, IZOD impact testing, Fracture Mechanics
10	Delamination mechanics
11	Introducing photoelasticity
12	Projection moiré
13	Brittle coatings to achieve stress analysis
14	Digital Image Correlation

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	5	3	5	5	4	4	3	5	5	4	4
CO2	5	3	5	5	4	4	3	5	5	4	4
CO3	5	3	5	5	4	4	3	5	5	4	4
CO4	5	3	5	5	4	4	3	5	5	4	4
CO5	5	3	5	5	4	4	3	5	5	4	4
CO6	5	3	5	5	4	4	3	5	5	4	4

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions • Students work in groups for project and presentations.

Requirements

Evaluation	Midterm Exam	50%
	Final Exam	50%
	Total	100%

Rubric

Course Policy

1. You must attend at least 70% of the sessions including add-drop period.
2. Be in the class on time.
3. English should always be used to communicate with one another.
4. Mobile phone should be switched off and put away during the class.
5. You cannot talk to your friends during class no matter what the subject is.

Cheating & Plagiarism

- Copying or letting someone to copy your work on exams, assignments, or reports is cheating.
- Cutting and pasting text, figures and tables from the web sources or any other electronic source is plagiarism.
- The consequence of academic dishonesty is to receive a grade of **F** for the course.

Instructor

Name/Surname	Fatih Darıcık	Email	fatih.darıcık@alanya.edu.tr
Room	413	Office Hours	Tuesday: 10:30 – 11:30 Tuesday: 13:30 – 14:30

Prepared by Fatih Darıcık on Feb. 04, 2024