Design and analysis of materials experiments

1. GENERAL			
SCHOOL	Faculty of Sciences in collaboration with Faculty of Engineering, Aristotle University of Thessaloniki		
DEPARTMENT	Materials Science and Engineering		
LEVEL OF STUDIES	ISCED level 7 (5-year Integrated Master's programme) ISCED level 6 (4-year BSc programme)		
COURSE CODE	**MSEN 403**	**SEMESTER**	4th Semester
COURSE TITLE	**Design and analysis of materials experiments**		
TEACHING ACTIVITIES Lectures, tutorials/problem sessions, laboratory/computer exercises (where applicable), case studies and guided self-study.		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
		4 (3L + 1T)	6
COURSE TYPE	Mandatory / Scientific area / Skills development		
PREREQUISITES	None		
TEACHING AND EXAMINATION METHODS	Face-to-face lectures and guided problem-solving sessions; short in-class quizzes; final written examination.		
COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE URL	https://elearning.auth.gr/course/view.php?id=xxxxx		

2. LEARNING OUTCOMES	
Learning Outcomes	By the end of this course, students will be able to: • Plan robust experimental processes. • Analyze forces and moments in 3- and 2-Dimensional space • Evaluate the statistical validity of experimental conclusions
General Skills	• • Search for, analysis and synthesis of data and information, with the use of the necessary technology • Work autonomously • Advance free, creative and causative thinking • Adapting to new situations • Decision-making • Modeling and solving real-world problems • Working in a multidisciplinary environment

3. COURSE CONTENT
Description: This course bridges the gap between material characterization and statistical decision-making. Students will move beyond "trial-and-error" approaches, learning to systematically vary

multiple processing parameters simultaneously. The curriculum focuses on identifying critical factors that influence material performance and optimizing processes to achieve superior material properties.

Key topics:

- Fundamentals of Statistics in Materials.
- Analysis of Variance (ANOVA).
- Process Optimization
- Experimental processes planning and execution

4. LEARNING & TEACHING METHODS - EVALUATION	
Teaching method	Face-to-face. Lectures, guided problem sessions, short demonstrations, and small-group activities/case studies.
Use of ICT	Use of ICT in Course Teaching, Use of ICT in Communication with Students Description: Use of Information and Communication Technologies (ICT) in teaching the course with tools of modern distance learning (MS-Teams) and asynchronous education (e-learning). Use of learning aids based on ICT: Excel Use of ICT in student assessment: Electronic grading (e-learning). Use of ICT in communication with students: e-leaning, email, MS-Teams.
Teaching organization	The supervised and unsupervised workload per activity is indicated below (total workload complies with ECTS standards).

Activity	Workload/semester (hours)
Lectures	39
Tutorials / problem sessions	13
Mid term evaluation	20
Independent study	60
Exam preparation	16
Final written exam	2
Total	**150**

Student evaluation	Assessment language: English. Written Exams with Problem Solving with Short Answer Written Exams with Problem Solving (Summative)

5. SUGGESTED BIBLIOGRAPHY
EUDOXUS
Montgomery, D. C. (2017). Vector mechanics for engineers: Statics (9th ed.). John Wiley & Sons, Inc.
Additional bibliography for study