8th Semester

CAD CAE in materials engineering

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 801**	**SEMESTER**	8th Semester
COURSE TITLE	**CAD CAE in materials engineering**		
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	Scientific area / Skills development		
PREREQUISITES	Introduction to Solid Mechanics, Design and Analysis of Materials Experiments		
TEACHING AND EXAMINATION METHODS	Face-to-face		
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: • Understand the theory and limitations of Finite Element Method • Create accurate Computer Aided Engineering (CAE) models • Handle modern commercial CAE software for pre- and post-processing • Understand and Evaluate analysis results
General Skills	• Search for, analysis and synthesis of data and information, with the use of the necessary technology • Work in an international context • Advance free, creative and causative thinking • Work in teams • Decision-making • Modeling and solving real-world problems • Working in a multidisciplinary environment • Generate new research ideas

3. COURSE CONTENT

This course bridges the gap between material science theory and computational mechanics, introducing students to the practical application of the Finite Element Method (FEM) in engineering design. Moving beyond simple geometric modeling, students will learn to translate physical problems into accurate Computer-Aided Engineering (CAE) models. The curriculum emphasizes the theoretical foundations and inherent limitations of numerical simulation.

Key topics:

- Fundamentals of Finite Element Theory
- Advanced Pre-processing & Material Modeling.
- Simulation Setup and Boundary Conditions
- Result Interpretation and Validation

4. LEARNING & TEACHING METHODS - EVALUATION

Teaching method	Face-to-face.
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, Matlab, CAE software 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
Short assignments / quizzes	10
Independent study	70
Exam preparation	16
Final written exam	2
Total	**150**

Student evaluation	Report Oral exams Written Exams with Problem Solving (Summative)

5. SUGGESTED BIBLIOGRAPHY

EUDOXUS

To be specified in EUDOXUS.

Additional bibliography for study

- Daryl L. Logan. (2017). A First Course in the Finite Element Method (6th Edition). Cengage Learning.