



Course Curriculum Model (Syllabus)		
Faculty:	FACULTY OF MECHANICAL AND COMPUTER ENGINEERING	
Department:	Computer Science and Engineering	
Study Program	BSc. In Computer Science and Engineering	
Level:	Bachelor	
Code of the course:	207CSE	
Course:	Computer-Aided Engineering and Industry 5.0	
Course Status:	Elective	Mandatory/Elective
Semester:	III	Winter/Summer
Number of hours per week:	2+2	
ECTS:	5	
Time / location:	Friday, 9 ⁰⁰ -10 ³⁰ , K3	
Academic Year / Semester	2026/2027	
Language of Instruction:	Albanian (with flexibility in English)	
Lecturer:	Prof. Ass. Dr. Fatmir Azemi	
Assistant:		
Contact details:	Professor	Assistant
Email:		
Telephone:		
Course Description Course Purpose / Course Goals Course Objectives	This course introduces students to Computer-Aided Engineering (CAE) methods and their role in modern smart manufacturing within the framework of Industry 5.0. Students will gain skills in digital modeling, simulation, and analysis, while learning how technologies such as AI, IoT, digital twins, and human-machine collaboration are transforming engineering practice.	
	The aim of this course is to provide students with knowledge and skills in the use of Computer-Aided Engineering (CAE) tools and their integration with the principles of Industry 5.0, focusing on sustainable, smart, and human-centered manufacturing. Students will learn how to apply CAE methods in product design, analysis, and optimization, while understanding the role of Industry 5.0 in enhancing human-machine collaboration. The objectives include the development of practical CAE skills, comprehension of Industry 5.0 applications, and the implementation of innovative and sustainable solutions in engineering practice.	
	- To provide students with knowledge of the fundamentals of Computer-Aided Engineering (CAE). - To introduce modern engineering tools for modeling and simulation. - To explain the principles of Industry 5.0 and its human-centered approach. - To link CAE practices with sustainability, digitalization, and smart manufacturing. - To prepare students for the application of CAE tools in real-world projects.	

Intended Learning Outcomes (ILOs)	Knowledge
	• K1: Explain the role of CAE in engineering and product design. • K2: Describe the key concepts of Industry 5.0 (human-centered, sustainable, resilient). • K3: Identify how digital twins, AI, and IoT interact with CAE tools.
	Skills
	• S1: Use basic CAE software tools for modeling and analysis. • S2: Apply CAE simulations to solve simple engineering problems. • S3: Develop small projects by combining CAE methods with Industry 5.0 principles.
	Competences
	• C1: Work individually and in teams to solve design and simulation tasks. • C2: Propose practical solutions to engineering problems using CAE. • C3: Demonstrate responsibility in using technology for sustainable and ethical engineering.

	Weeks	Lecture
Program	<i>First week</i>	• Introduction to CAE and Industry 5.0 – Course presentation (Syllabus), curriculum, and rules.
	<i>Second week</i>	• Fundamentals of CAE Tools – Concepts of modeling and simulation.
	<i>Third week</i>	• Basics of Finite Element Analysis (FEA).
	<i>Fourth week</i>	• Computer Tools in Mechanical and Electronic Engineering.
	<i>Fifth week</i>	• Integration of CAD, CAM, and CAE.
	<i>Sixth week</i>	• Industry 4.0 vs. Industry 5.0 – Key differences.
	<i>Seventh week</i>	• Digital Twins and Smart Factories.
	<i>Eighth week</i>	• AI and Machine Learning in CAE.
	<i>Ninth week</i>	• Applications of the Internet of Things (IoT) in Engineering.
	<i>Tenth week</i>	• Human–Machine Collaboration and Ergonomics.
	<i>Eleventh week</i>	• Sustainability and Resilience in Industry 5.0.
	<i>Twelfth week</i>	• CAE Case Studies in Modern Industry.
	<i>Thirteenth week</i>	• Project Work – Part I (Design and Simulation).
	<i>Fourteenth week</i>	• Project Work – Part II (Presentation and Discussion).
	<i>Fifteenth week</i>	• Course Review and Final Assessment.

Literature / Reading List:	
Literature	literatura bazë 1. Prepared Lectures 2. Moaveni, S. <i>Finite Element Analysis: Theory and Application with ANSYS</i>. Pearson. 3. Nahavandi, S. <i>Industry 5.0: A Human-Centric Solution</i>. Springer. 4. Rao, S. S. <i>Engineering Optimization: Theory and Practice</i>. Wiley.
	Literatura shitesë • Research papers on CAE and Industry 5.0 applications. • Software manuals (INVENTOR, ANSYS, SolidWorks Simulation, COMSOL).

Teaching and Learning Methods	☐ Lectures and multimedia presentations. ☐ Practical laboratory exercises with CAE software. ☐ Group project work. ☐ Case studies and in-class discussions. ☐ Problem-Based Learning (PBL). ☐ Guest speakers from the industry.			
	Contribution to student workload (which should correspond to student learning outcomes - 1 ECTS credit = 25 hours)			
	Activity	Hours	Days/weeks	Total
	Lectures	2	15	30
	Exercise sessions (with TA)	2	15	30
	Practical work	3	3	9
	Office hours	1	12	12
	Fieldwork	1	2	2
	Midterms, seminars	2	2	4
	Homework	3	3	9
	Self-study	2	6	12
	Final exam preparation	3	3	9
	Time spent in exams	2	2	4
	Projects, presentations, etc.	2	2	4
Total				125

Evaluation	Assessment Methods and Criteria: • Laboratory Exercises: 30% • Project Work (CAE + Industry 5.0 Integration) and Participation: 20% • Final Exam (Theory + Practical): 50%
	(according to the Statute and Regulation for studies of UMIB)

	Final grade	Points (%)	Mark
		91 – 100	10
		81 - 90	9
		71 - 80	8
		61 - 70	7
		51 - 60	6
Academic policies	Criteria for regular attendance and rules of etiquette during the organization of the lesson are set.		
	Computer work:		
	Graphic works, I have to draw and write with a computer. In the works it is obligatory to respect the criteria for both the visual and the content aspect of the required works.		
	Ethics in teaching:		
	Graphic works should be personal works of each student. There will be no tolerance for copying, "borrowing" from the Internet or any other material. The same or similar works will have negative evaluations in the final evaluation of the student.		
	Time:		
	In agreement with the students, the deadlines for submitting works will be determined. There will be no tolerance for delays in the submission of works. Failure to arrive at the time when the assignment is explained does not justify the student for not submitting the paper. The deadline will be given earlier. If you are going to travel abroad, then you need to submit the paperwork in advance. The student has the right to request a consultation with the professor whenever he / she deems it reasonable and necessary for the performance of his / her work.		
	Rules of conduct and academic policies:		
	● active participation of students in lectures o participation in discussion, comments and free expression of opinion, opinion and academic position (with arguments) ● mandatory independent work and use of additional sources of information (various scientific websites, scientific journals, conference proceedings, etc.) ● respecting lecture schedules without compromising academic freedom (silent cell phones) of respecting the word, thoughts and ideas of colleagues, ● it is not allowed to arrive late and leave without a valid reason from the lecture, test or exam o preparation and holding of relevant lectures, (obligation of the teacher). ● if the student is absent more than four times without reason in lectures and exercises, does not receive the signature for attendance. o the student cannot take the exam without an official document, ● if the student is dissatisfied with the grade obtained, has the right to complain in writing to the dean, within two working days after the announcement of the results, UMIB Statute o if the student does not follow the rules, in the exam uses tools that are not allowed, it is evaluated with a negative grade.		
	Plagiarism or cheating will be penalized according to university regulations.		