



UNIVERSITETI / UNIVERSITY
"ISA BOLETINI"
MITROVICË

Course Curriculum Model (Syllabus)		
Faculty:	FACULTY OF MECHANICAL AND COMPUTER ENGINEERING	
Department:	Mechanical Engineering and Economic Engineering	
Study Program	MSc in Manufacturing Technology and Management	
Level:	Master	
Code of the course:	202MTM	
Course:	Materials and Surface Engineering	
Course Status:	Mandatory	Mandatory/Elective
Semester:	III	Winter/Summer
Number of hours per week:	2+2	
ECTS:	5	
Time / location:	Wednesday, 9 ⁰⁰ -10 ³⁰ , K5	
Academic Year / Semester	2026/2027	
Language of Instruction:	Albanian (with flexibility in English)	
Lecturer:	Prof. Ass. Dr. Fatlume Zhujani	
Assistant:		
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Course Description	This course introduces the principles and applications of materials and surface engineering, focusing on how surface properties influence performance, durability, and functionality. Students will learn about surface modification, coating technologies, and analysis methods used in engineering practice. Emphasis is placed on industrial applications across aerospace, automotive, biomedical, and energy sectors, with both theoretical and practical perspectives.	
Course Purpose / Course Aims	The course aims to provide students with knowledge and practical understanding of surface engineering and advanced materials technologies. It emphasizes the role of surface treatments and coatings in enhancing wear, corrosion, and thermal resistance, while also addressing sustainability and cost-effectiveness. Students are prepared to select, apply, and evaluate appropriate methods to meet engineering design and industry requirements.	
Course Objectives	• To equip students with theoretical foundations in materials and surface engineering. • To develop applied skills for analyzing and selecting appropriate surface modification and finishing techniques. • To enable implementation of suitable engineering solutions for diverse industrial applications.	

Intended Learning Outcomes (ILOs)	Knowledge • K1: Explain the principles, classifications, and behavior of advanced materials under surface treatments. • K2: Discuss the effects of coatings and modifications on corrosion, wear, friction, and thermal properties. • K3: Describe surface analysis methods and interpret results to evaluate engineered surfaces.
	Skills • S1: Select appropriate advanced materials and surface engineering techniques for given applications. • S2: Analyze coating performance using experimental data and characterization methods. • S3: Use modern engineering tools and techniques for surface design and evaluation. Competence • C1: Design and propose surface treatment solutions to improve performance in engineering products. • C2: Select cost-effective and sustainable approaches for industrial applications. • C3: Collaborate effectively in multidisciplinary teams and present findings in oral and written formats.

	Weeks	Lecture
Program	<i>First week</i>	Introduction to Materials and Surface Engineering: Definition, scope, surface properties, analysis techniques (microscopy, spectroscopy, profilometry).
	<i>Second week</i>	Classification of surface layers: Growth, adhesion, properties, applications, functions.
	<i>Third week</i>	Coating Technologies: Organic and inorganic coatings.
	<i>Fourth week</i>	Coating Methods: Surface hardening, laser treatment, chemical/electrolytic conversion, ion implantation, PVD, CVD (types), thermal spray.
	<i>Fifth week</i>	Electroplating and electroless plating: Principles, applications. Conversion coatings.
	<i>Sixth week</i>	Coating Design and Selection: Material compatibility, application needs, cost factors.
	<i>Seventh week</i>	Midterm Exam.
	<i>Eighth week</i>	Effects of Coatings: Corrosion and wear resistance.
	<i>Ninth week</i>	Friction and Lubrication: Tribological properties. Thermal and mechanical effects (strength, hardness, toughness).
	<i>Tenth week</i>	Applications: Aerospace, automotive, medical, energy, electronics, textiles, construction.
	<i>Eleventh week</i>	Advanced Coating Technologies: Nanocoatings, self-healing coatings.
	<i>Twelfth week</i>	Smart Coatings: Responsive/adaptive properties, high-entropy alloy coatings
	<i>Thirteenth week</i>	Case Studies and Industry Practices- Surface hardening of gears, Analysis of failures due to poor adhesion or wear.
	<i>Fourteenth week</i>	Student Presentations
	<i>Fifteenth week</i>	Final Exam- Review and Feedback and Submission of Projects

Literature / Reading List:	
Literature	Primary Literature: 1. Dear, P.A. (2017). Introduction to Surface Engineering. Cambridge University Press. 2. Dwivedi, D.K. (2018). Surface Engineering: Enhancing Life of Tribological Components (Springer), Book © 2018. 3. Knudsen, O.O. & Amy Forsgren, A. (2017) Corrosion Control Through Organic Coatings (Corrosion Technology). 4. Wierzchon, T. & Burakowski, T. (2020). Surface Engineering of Metals (Materials Science & Technology) 1st Edition. Supplementary / Recent Literature: 5. Wang, J. (2025). Surface Engineering - Foundational Concepts, Techniques and Applications. 6. Mphasha, N.P. & Rabothata, M.S. (2025). Advanced Surface Modification Techniques. open access peer-reviewed chapter 7. Walia, R.S., Murtaza, Q., Pandey, S.M., Tyagi, A. (2022) Surface Engineering, 1st Edition. CRP Press. 8. Gupta G. (2020). Surface Engineering of Modern Materials. Springer.

Teaching and Learning Methods	Lectures, Case Studies, Group Projects, Practical Lab Sessions, Industrial Guest Lectures			
	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	15	15
	Fieldwork	1	2	2
	Midterms, seminars	2	2	4
	Homework	3	2	6
	Self-study	4	3	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:		
	Activity	Weight (%)	
	Midterm Exam	20%	
	Project Report & Defense	30%	
	Seminar Presentation	10%	
	Final Exam	40%	
	Total	100%	
	(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	Attendance, Ethics and Deadlines (Materials and Surface Engineering) Criteria for regular attendance and rules of conduct during the teaching process are established. Students are expected to actively participate in lectures, exercises, laboratory activities, materials analysis, and discussions related to the properties, selection, and treatment of engineering materials. Computer-Based Work All assignments, laboratory reports, materials analyses, projects, and presentations must be prepared using a computer. Students are required to comply with technical and professional standards in analyzing, interpreting, and documenting experimental data and results. Proper use of tables, graphs, micrographs, and other technical presentations is expected. Academic Ethics All assignments, laboratory reports, projects, and presentations must be the original work of the student or assigned group. Copying results, analyses, or materials from other sources without proper citation is strictly prohibited. Any violation of academic integrity will result in negative evaluation. Deadlines Submission deadlines for assignments, laboratory reports, projects, and presentations will be defined at the beginning of the semester or activity. Late submissions will not be accepted without valid justification. Students are responsible for completing all course requirements within the specified deadlines. Consultations Students have the right to request consultations with the instructor regarding materials analysis, surface characterization, interpretation of experimental results, and technical report preparation whenever necessary. 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.
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