



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:	112MTM	
Course:	Advanced Manufacturing Scheduling and Optimization	
Course Status:	Elective	Mandatory/ Elective
Semester:	II	Winter/ Summer
Number of hours per week:	2+1	
ECTS:	5	
Time / location:	Monday, 9 ⁰⁰ -10 ³⁰ , P01	
Academic Year / Semester	2026/2027	
Language of Instruction:	Albanian (with flexibility in English)	
Lecturer:	Prof. Ass. Dr. Fatmir Azemi	
Assistant:		
Contact details:	Professor	Assistant
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Telephone:		
Course Description	This course focuses on modern techniques for scheduling and optimization in manufacturing environments. Topics include classical scheduling theory, machine scheduling, shop floor control, and optimization algorithms such as linear programming, genetic algorithms, and swarm intelligence. Students will apply these concepts to real-world manufacturing problems using simulation and decision-support tools.	
Course Purpose / Course Goals	The course aims to equip students with theoretical and practical knowledge of scheduling and optimization methods to enhance efficiency, reduce lead times, and improve productivity in advanced manufacturing systems.	
Course Objectives	- Understand key concepts in scheduling theory and manufacturing operations. - Apply optimization models to real manufacturing scenarios. - Utilize simulation tools and algorithms to support scheduling decisions. - Analyze and compare scheduling strategies in terms of performance and resource utilization.	

Intended Learning Outcomes (ILOs)	Knowledge: K1: Understand classical and modern scheduling approaches. K2: Describe optimization principles and models used in manufacturing systems. K3: Identify application areas of algorithms in production scheduling. Skills: S1: Apply scheduling and optimization techniques to real problems. S2: Use appropriate software tools for modeling and simulation (e.g., FlexSim, MATLAB, Legin, etc.). S3: Interpret and evaluate the outcomes of optimization strategies. Competences: C1: Design efficient production schedules in dynamic environments. C2: Select suitable optimization methods depending on manufacturing constraints. C3: Work collaboratively to develop sustainable scheduling strategies.

	Weeks	Lecture
Program	<i>First week</i>	Introduction to Scheduling and Optimization
	<i>Second week</i>	Basic Scheduling Concepts and Terminology
	<i>Third week</i>	Single Machine Scheduling Models
	<i>Fourth week</i>	Flow Shop and Job Shop Scheduling
	<i>Fifth week</i>	Constraints and Resource Allocation
	<i>Sixth week</i>	Introduction to Optimization Techniques
	<i>Seventh week</i>	Midterm Exam
	<i>Eighth week</i>	Linear Programming in Scheduling
	<i>Ninth week</i>	Metaheuristics: Genetic Algorithms and PSO
	<i>Tenth week</i>	Simulation-Based Optimization
	<i>Eleventh week</i>	Multi-Objective Scheduling and Decision Making
	<i>Twelfth week</i>	Scheduling in Smart and Lean Manufacturing
	<i>Thirteenth week</i>	Industry Applications and Case Studies
	<i>Fourteenth week</i>	Student Presentations
	<i>Fifteenth week</i>	Review and Final Project Submission

Literature / Reading List:				
Literature	- Pinedo, M. – Scheduling: Theory, Algorithms, and Systems, Springer. - Baker, K. R. – Introduction to Sequencing and Scheduling, Wiley. - Deb, K. – Multi-objective Optimization using Evolutionary Algorithms, Wiley. - Chand, S. & Davis, J. – Theory and Practice of Manufacturing Scheduling, Springer. - Recent articles from journals such as: International Journal of Production Research, Journal of Manufacturing Systems, Computers & Industrial Engineering			
Teaching and Learning Methods	The course uses a mix of traditional and modern approaches to help students gain theoretical knowledge and practical problem-solving skills. The main methods include: - Lectures – to explain core scheduling and optimization concepts. - Problem-Based Learning (PBL) – solving real scheduling problems with innovative solutions. - Flipped Classroom – learning materials provided in advance; class time used for discussions and exercises. - Project-Based Learning – developing projects that simulate manufacturing scheduling scenarios. - Case Studies – analysing real-world scheduling and optimization cases from industry. - Computer Simulations – applying software tools (e.g., MATLAB, FlexSim, Legin, etc) for modelling and optimization. - Guest Lectures – sessions from industry professionals on modern scheduling practices.			
	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	

Attendance, Ethics and Deadlines (Advanced Manufacturing Scheduling and Optimization)

Criteria for regular attendance and rules of conduct during the teaching process are established. Students are expected to actively participate in lectures, exercises, case analyses, simulations, and production optimization activities.

Computer-Based Work

Assignments, optimization models, simulations, technical reports, and presentations must be prepared using appropriate planning, scheduling, and optimization software tools. Students are required to comply with technical and professional standards in modeling, analysis, interpretation, and documentation of results. Clear presentation of models, algorithms, input data, and optimization results is mandatory.

Academic Ethics

All assignments, projects, simulations, and reports must be the original work of the student or assigned group. Copying models, analyses, codes, 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, projects, and reports 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 scheduling models, optimization problems, simulations, interpretation of results, and technical report preparation whenever necessary.

Rules of conduct and academic policies:

- active participation of students in lectures or 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 or 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. or 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 or 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.