



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:	111MTM	
Course:	Probability and Statistics	
Course Status:	Mandatory	Mandatory/Elective
Semester:	II	Winter/Summer
Number of hours per week:	2+2	
ECTS:	5	
Time / location:	Monday, 8 ³⁰ -10 ⁰⁰ , K5	
Academic Year / Semester	2026/2027	
Language of Instruction:	Albanian	
Lecturer:	Prof. asoc. dr Faton Merovci	
Assistant:	Ass. Arbërie Krasniqi Avdijaj, Phd Candidate	
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Course Description	This course provides a comprehensive study of probability and statistics with an emphasis on their application in managerial and engineering decision-making. The curriculum covers probability theory, statistical experiments, random variables and distributions, regression, ANOVA, hypothesis testing, confidence intervals, statistical process control, and sampling techniques. Special focus is placed on applying statistical reasoning to complex decision-making scenarios, supported by demonstrations and problem-solving sessions using R software.	
Course Purpose / Course Goals	The purpose of this course is to provide students with essential knowledge of probability and statistical principles, along with the tools that support effective decision-making in engineering management and business contexts. Students will develop the ability to frame managerial problems statistically, analyze data, and interpret results for informed and evidence-based decisions.	
Course Objectives	- To provide a comprehensive understanding of probability and statistical methods relevant to managerial and engineering decision-making. - To analyze complex real-world situations using appropriate statistical approaches. - To critically evaluate the suitability and limitations of different statistical methods in diverse decision-making contexts. - To apply software tools R for statistical modeling, simulation, and data-driven analysis.	

Intended Learning Outcomes (ILOs)	Knowledge K1: Explain the core principles of probability, distributions, and inferential statistics. K2: Understand the role of statistical analysis in managerial and engineering decision-making. K3: Identify the limitations and assumptions of statistical methods in real-world applications.
	Skills S1: Apply statistical techniques such as regression, ANOVA, and hypothesis testing using R software. S2: Analyze datasets, interpret outputs, and draw valid conclusions for decision-making. S3: Utilize statistical process control tools to monitor and improve quality.
	Competences C1: Formulate and solve decision-making problems using statistical reasoning. C2: Critically evaluate statistical results and their implications for managerial and engineering practice. C3: Communicate statistical findings effectively, both independently and collaboratively, in professional contexts.

	Weeks	Lecture
Program	<i>First week</i>	Introduction and overview: Why Probability & Statistics? Probability concepts, discrete random variables (Devore, Ch. 2)
	<i>Second week</i>	Discrete Distributions (Binomial, Poisson, etc.) Continuous Distributions (I): Uniform, Exponential (Devore, Ch. 2,3)
	<i>Third week</i>	Continuous Distributions (II): Normal distribution and applications (Devore, Ch. 4)
	<i>Fourth week</i>	Limits and convergence Data structure and visualization (Devoore, Ch. 1,5)
	<i>Fifth week</i>	Midterm 1
	<i>Sixth week</i>	Fitting a probability distribution (Devore, Ch. 6,7)
	<i>Seventh week</i>	Confidence Intervals (I): Estimation of means (Devore, Ch. 7,9)
	<i>Eighth week</i>	Confidence Intervals (II): Proportions and variances (Devore, Ch. 7,9)
	<i>Ninth week</i>	Confidence Intervals (III) Hypothesis Testing (I): One-sample tests (Devore, Ch. 8,9)
	<i>Tenth week</i>	Hypothesis Testing (II): Two-sample tests (Devore, Ch. 8)
	<i>Eleventh week</i>	Midterm 2
	<i>Twelfth week</i>	Covariance and Correlation One-way ANOVA (Devore, Ch. 10,11)

	Thirteenth week	Linear Regression (I): Simple regression models (Devore, Ch. 12)
	Fourteenth week	Linear Regression (II): Multiple regression Quality Control Methods (SPC charts) (Devore, Ch. 13,16)
	Fifteenth week	Course Review & Final Project/Case Studies

Literature / Reading List:

Literature	1. Jay L. Devore(2016) “Probability and Statistics for Engineering and the Sciences “, 9th Edition 2. Rathi, M. (2025). <i>Introduction to Statistical Computing and Visualization Using R</i>. CRC Press. 3. Sheldon M. Ross(2020) “ <i>Introduction to Probability and Statistics for Engineers and Scientist</i> ”, 6th Editions, Elsevier
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Teaching and Learning Methods	The course combines lectures for theoretical concepts with exercises and computer labs for practical applications. Students learn through case studies, problem-solving tasks, and independent projects. • Structured Lectures: introducing probability and statistical methods, including probability distributions, regression, ANOVA, and hypothesis testing. • Problem-Based Learning (PBL): solving real-world decision-making problems using statistical reasoning. • Flipped Classroom: pre-class reading and preparation with datasets, followed by in-class analysis and discussion. • Project-Based Learning: applying statistical tools (R software) to analyze managerial and engineering datasets. • Case Studies: exploring applications of statistical analysis in business, engineering, and quality control contexts. • Laboratory Demonstrations: practical training in R for statistical modeling, simulation, and interpretation of results. • Guest Lectures: insights from industry experts on data-driven decision-making.			
	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 (Probability and Statistics) Criteria for regular attendance and rules of conduct during the teaching process are established. Students are expected to actively participate in lectures, numerical exercises, statistical analyses, discussions, and problem-solving activities. Computer-Based Work Assignments, statistical analyses, reports, and presentations must be prepared using a computer and appropriate data analysis tools. Students are required to comply with academic and professional standards in the presentation, interpretation, and documentation of statistical results. Proper use of tables, charts, and statistical methods is expected. Academic Ethics All assignments, projects, analyses, and reports must be the original work of the student or assigned group. Copying solutions, 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, 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 assignments, statistical analyses, interpretation of results, and 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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