

2027



Master's program in Engineering Management

UNIVERSITY OF DUNAÚJVÁROS

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Program description

Master's degree in Technical Management (Engineering Management)	
Institution responsible for education	Dunaújvárosi Egyetem
ID of Institution	FI60345
Address	2400 Dunaújváros, Táncsics Mihály utca 1/A
Responsible leader	Prof. Dr. habil István András, Rector
Leaders responsible for education	
Institution responsible for course	Institute of Technology
Director of institute	Prof. Dr. habil Róbert Sánta, University Professor
Responsible for course	Dr. Ildikó Angerer Petrovickijné, Associate Professor
Parameters of education	
Level of education	master's program
Educational level	The training corresponds to Level 7 of the Hungarian Qualifications Framework (MKKR) and the European Qualifications Framework (EQF).
Qualification indicated in the diploma in Hungarian	Certified Technical Manager
Qualification indicated in the diploma in English	Engineering Management
Time of education	4 semesters
Number of credit scores to be acquired	120
Educational objective of the study program	
The aim of the program is to train technical managers who, through their knowledge and skills in natural sciences, engineering and informatics, business and organizational sciences, and languages, are capable of managing complex technical-economic tasks—specifically, participating in the technical and economic planning and development of technological processes, managing implementation, assessing and evaluating results, and making related decisions. They are also prepared to continue their studies in a doctoral program.	
Condition for admission	
a) The Technical Management Bachelor's degree program may be taken into account with full credit recognition. b) Admission to the master's program is conditional upon the student having acquired—based on their bachelor's studies—at least 30 credits out of the following 50 credits: - 20 credits in natural sciences (mathematics, physics, chemistry, mechanics, materials science, biology); - 10 credits in economics and humanities (economics, business economics, quality assurance, environmental management, economic statistics, social sciences); - 20 credits in professional studies (technical drawing, machinery and structures, informatics and applications, manufacturing and technology, management, finance, public administration and law, and specialized professional knowledge in technical, technological, management, and business fields). Any credits missing from the listed areas must be acquired during the master's program in accordance with the higher education institution's academic and examination regulations. c) Furthermore, the completion of the credits specified in point b) may be taken into account for: Bachelor's degree programmes in the fields of engineering, informatics, and economic sciences, as well as the Bachelor's degree programme in Agricultural and Food Industry Mechanical Engineering from the field of agricultural sciences.	
Prerequisite(s) for starting the internship	The prerequisite for starting the internship is 1 completed semester and a minimum of 20 credit points.
Professional practice	The professional practice shall take at least 4 weeks

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Professional internship through work earliest time and conditions for the acceptance of the experience	Acceptance of the internship based on work experience can be requested if the student can prove that he/she has previous or current employment aligns professionally with the program's learning outcomes and competency requirements. Students may initiate a request for recognition with the course coordinator after registering for the professional internship course. Work experience may be accepted as a professional internship if: - the duration of full-time employment reaches two years, and the position held is professionally relevant and substantially linked to the program's training and exit requirements, - the student applied competencies expected within the program during their employment (e.g., professional planning, analysis, development, operational, organizational, or economic tasks), - the work did not consist solely of administrative or unskilled/repetitive tasks. Documents to be submitted: Employer's certificate, including: - employer's name and address, and contact details, - duration of employment (start and end dates), - number of weekly working hours, - job title, - job description, and an authorized signature. Student professional report (minimum length of 4 pages), including: - a brief overview of the organization, - a professional description of the activities performed, - a presentation of the methods, tools, and technologies used, and a description of the competencies acquired.
Conditions for issuing the Final certificate (absolutorium)	Section 108, Paragraph 47 of the Nftv.: "Certifies the successful completion of examinations prescribed in the curriculum and—with the exception of the preparation of the thesis (diploma work)—the fulfillment of other academic requirements and the acquisition of credit points prescribed in the training and outcome requirements; it attests, without qualification or grading, that the student has fully met the academic and examination requirements prescribed in the curriculum." The University stipulates the fulfillment of prescribed foreign professional language requirements as a condition for the issuance of the final certificate (*abszolutorium*); this requirement entails completing a professional subject—linked to the training program and prescribed by the institute responsible for the major—in a foreign language. To meet the foreign professional language requirement, students have the option to register for and complete an English-language preparatory course from the group of freely elective subjects free of charge. Students who hold a state-recognized complex language proficiency certificate at an intermediate (B2) level or higher, or an equivalent secondary school-leaving certificate or degree (previous legal wording: for bachelor's programs, an intermediate "Type C" general language certificate or an intermediate [B2 level] complex general language certificate), are exempt from the requirement to complete the professional language studies specified in the curriculum. A student may be exempted from meeting the foreign professional language requirements prescribed by the University upon submission of a request to that effect, provided that the conditions set out in Sections 62–64 of Government Decree 87/2015 (IV. 9.) on the implementation of certain provisions of Act CCIV of 2011 on National Higher Education are met.
Academic prerequisite(s) for commencing the thesis	Prerequisites for registering for the Thesis course include completing the final examination subjects and earning a minimum of 85 credits. Students may begin writing the thesis once they have provided proof of completing their professional internship and the thesis outline has been approved by the institute director or head of department.
Thesis	The thesis research means the solution of a Engineering management problem or the elaboration of a research task on such a special field, on which it can be completed on the basis of the knowledge acquired by the student during the years of his studies with the guidance of the first and second supervisor in one semester. The candidate proves with writing the thesis that he has adequate expertise in the practical use of the factual knowledge that he has learnt, and that he is able to do the tasks of an engineering business manager and that he is familiar not only with the course material, but with the related special literature,

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	as well, and he is able to apply that in a value-creating way. Formatting requirements: The length of the thesis must be between 50 and 70 pages.
Final exam	The final examination serves to assess and evaluate the knowledge, skills, and competencies required to obtain the degree; during the examination, the student must also demonstrate the ability to apply the knowledge acquired. The final examination consists of the defense of the thesis and oral examinations in the subjects specified in the curriculum. Students are also required to present their thesis in a foreign language in accordance with the regulations of the institute responsible for the study programme; however, a student may be exempted from this requirement upon submission of a request to that effect, provided the conditions set out in Sections 62–64 of Government Decree 87/2015 (IV. 9.) on the implementation of certain provisions of Act CCIV of 2011 on National Higher Education are met.
Condition(s) for admission to the final examination	Admission to the final examination is conditional upon obtaining the certificate of completion of studies (*abszolutórium*) and having a thesis or portfolio accepted for review.
Subjects of the final exam	Final Exam Subjects 1 (FE1) (Complex): - DUEN(L)-MGT-263 Quality assurance and reliability - DUEN(L)-MGT-250 Energy and environmental policy Final Exam Subjects 2 (FE2) (Complex): - DUEN(L)-TGT-158 Advanced strategic management - DUEN(L)-MGT-217 Advanced corporate finance - DUEN(L)-TGT-159 Sustainable Human Resource Management - DUEN(L)-TGT-218 ESG -focused Management
Average of the certificate	The degree result is calculated as follows: $(ZV1 + ZV2 + D + TA) / 4$: - (ZV1) grade for the first final examination subject - (ZV2) grade for the second final examination subject - (D) grade for the thesis, composed as follows: - o Grade received for the review: 1/3 - o Presentation: 1/3 - o Ability to debate and answers to questions: 1/3 - (TA) weighted academic average based on all credits earned during the entire period of study—excluding the thesis preparation (the result must be rounded to two decimal places).
Qualification of the certificate	- excellent 4.51 – 5.00; - good 3.51 – 4.50; - average 2.51 – 3.50; - sufficient 2.00 – 2.50
Conditions for issuing a diploma	A successful final examination is a prerequisite for the issuance of the diploma certifying the completion of higher education studies (Section 51 (1) of the Nftv.).
Mobility window	During the program, students should ideally take advantage of the mobility window in the 3 rd and 4 th semesters. Since mobility depends both on the capacity of the foreign institution and the student's travel options, we incorporate this window flexibly into the curriculum in accordance with the principles set out in Section 45 of the Student Requirements System Study and Examination Regulations. A designated member of the International Office will assist in the selection of the host institution.
Work schedule	Full-time (daytime); part-time (correspondence)

Professional competencies to be acquired

a) knowledge

Understands the general and specific principles, rules, interrelationships, and procedures of natural sciences, engineering sciences, and business and organizational sciences required for practice in the technical field.

- Is familiar with the functional operation and requirements of technical equipment and production systems, as well as the characteristics of their impact mechanisms on health.
- Is familiar with the conditions and methods for establishing and improving cost-effective operations.
- Is familiar with the operating principles of organizations as goal-oriented systems.
- Is familiar with technical, business, and management activities and their interrelationships.
- Is familiar with the theory and methodology required for establishing, managing, and developing manufacturing and service enterprises.
- Is familiar with the technical, economic, and legal regulations concerning quality management, environmental protection, consumer protection, product liability, and occupational health and safety.
- Possesses widely applicable problem-solving techniques necessary for research and scientific work.
- Is familiar with major quantitative analysis methods, as well as the underlying principles of operations research, mathematical programming, probability theory, and mathematical statistics.

b) abilities

Able to apply and practically utilize acquired knowledge and problem-solving techniques within the technical field.

- Able to review production and service processes from technical, economic, human, and other social perspectives, and to communicate with representatives of various specialized fields.
- Able to prepare and implement business plans, perform tasks related to the preparation of technical and economic decisions and make such decisions, and develop and implement innovation strategies.
- Able to apply integrated knowledge regarding technical equipment, technological processes, materials and technologies, as well as related fields of electronics and information technology.
- Able to perform technical value analysis tasks, ensure quality assurance for production systems and technologies, and improve quality and efficiency indicators in business operations.
- Able to coordinate the planning and implementation of innovation processes.
- Able to coordinate tasks requiring multidisciplinary technical knowledge and manage their implementation.
- Characterized by creativity, flexibility, and strong skills in communication, argumentation, cooperation, and problem-solving.
- Able to apply statistical and econometric tools to conduct in-depth research activities

c) attitude

- Is open and receptive to learning about professional and technological developments and innovations in the field, and to proactively applying this knowledge.
- Adopts the professional and ethical values associated with the field.
- Strives to plan and execute tasks at a high professional standard, whether working independently or in teams.
- Demonstrates a readiness for continuous learning, broad and thorough general knowledge, advanced analytical and synthesizing skills, and environmental awareness; is also capable of promoting health.
- Possesses strong ethical integrity and a capacity for critical and self-critical reflection.
- Is capable of collaboration and teamwork, and—with sufficient experience—of performing independent leadership roles.
- Respects the professional opinions and achievements of others.
- Employs a systems-oriented mindset and approach.

d) autonomy and responsibility

Capable of independently resolving tasks of a technical and economic nature.

- Makes decisions independently—and accepts responsibility for them—after careful consideration and consultation with representatives from various fields (primarily technical, economic, and legal).
- Characterized by initiative, a willingness to assume responsibility, and decision-making ability.
- In making decisions, takes into account occupational health and safety, technical, economic, and legal regulations, as well as professional and ethical considerations.
- Evaluates the work of subordinates, fosters their professional development by sharing critical feedback, and mentors colleagues in responsible and ethical professional practice.
- Independently monitors technical, technological, economic, financial, legal, and social changes relevant to their field.

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Full-time Program

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Subject code	Subject name	Credit	Requirement	Semesters - Classes per week												Prerequisite	
				1			2			3			4				
				ea	gy	l	ea	gy	l	ea	gy	l	ea	gy	l		
DUEN-IMA-156	Business mathematics	5	E	0	3	0											
DUEN-MUA-152	Up-to date materials and production technologies	5	E	2	0	1											
DUEN-IMA-155	The basics of data mining	5	E	1	0	2											
DUEN-TVV-252	Management skills	5	E	2	1	0											
DUEN-TGT-157	Advanced project management	5	E	1	0	2											
-	Optional course	5	E/M														
DUEN-TGT-254	Logistics	5	E				2	1	0								
DUEN-MGT-263	Quality assurance and reliability	5	E				2	1	0								
DUEN-IMA-253	Operations research M	5	E				1	0	2								
DUEN-MGT-264	Applied mechanics and modelling	5	E				1	2	0								
DUEN-TGT-255	Business statistics and data mining	5	E				1	2	0							DUEN-IMA-156	
-	Optional course	5	E/M														
DUEN-MUG-096	Thesis 1	15	E							0	4	0					
DUEN-MGT-250	Energy and environmental policy	5	E							2	1	0					
DUEN-TGT-158	Advanced strategic management	5	E							1	2	0					
DUEN-TGT-159	Sustainable human resources management	5	E							1	2	0					
DUEN-MUG-097	Thesis 2.	15	E										0	4	0	DUEN-MUG-096	
DUEN-ISR-220	Applications of artificial intelligence in industry	5	M										1	0	2		
DUEN-TGT-217	Advanced corporate finance	5	M										1	2	0		
DUEN-TGT-218	ESG oriented management	5	M										1	2	0		
DUEN-MGT-000	Industrial placement (4 weeks)	0															
	Number of Theoretical/Practice/Lab classes per week			6	4	5	7	6	2	4	9	0	3	8	2		
	Total number of classes per week			15			15			13			13				
	Total credit points	120															

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Optional course																
Subject code	Subject name	Credit	Requirement	Semesters - Classes per week												Prerequisite
				1			2			3			4			
				ea	gy	l	ea	gy	l	ea	gy	l	ea	gy	l	
DUEN-MUA-115	Special materials and technologies	5	M	2	0	1										
DUEN-MUG-116	Measurement Technology and Signal Processing	5	M	1	0	2										
DUEN-MUG-220	Computer modeling and simulation	5	M				1	0	2							
DUEN-MUG-255	Maintenance strategies	5	M				2	1	0							
Optional course																
Subject code	Subject name	Credit	Requirement	Semesters – weekly hours												Prerequisite
				1			2			3			4			
				Ea	gy	l	ea	gy	l	ea	gy	l	ea	gy	l	
DUEN-TGT-113	Business Ethics for Leaders	5	M	1	2	0										
DUEN-TGT-114	Communication in Leadership and Organization	5	M	1	2	0										
DUEN-TGT-216	Business Competence Development Training	5	M				0	3	0							
DUEN-TGT-219	Innovative decision-making models	5	M				1	2	0							

Brief description of the subjects in the Technical Management Master's program

Business mathematics

Title of the subject		Hungarian		Üzleti matematika				Level	MSc		
		English		Business mathematics				Code	DUEN(L)-IMA-156		
Responsible Academic Unit				Institute of Informatics, Department of Computer Systems and Control Engineering							
Compulsory prerequisite subject											
Type		Weekly teaching hours						Requirement	Credits	Language of instruction	
		Lecture		Gyakorlat		Lab					
Full time		weekly	0	weekly	3	weekly	0	E	5	English	
part time		Per semester	0	Per semester	15	Per semester	0				
Teacher responsible for the course				name		Dr. habil Nagy Bálint			position:	Associate Professor	
Educational goals				Goals, development objectives							
				The aim of the course is to develop a modelling and optimisation-oriented approach required for the mathematical foundation of business decision-making. The course builds on the basic mathematical knowledge acquired during BSc studies. Its development objectives are to strengthen students' ability to formalise business phenomena mathematically, critically interpret applied models, and independently use quantitative methods in business decision-making situations. The course promotes model-based thinking, optimisation skills, and risk-aware decision-making.							
Typical delivery methods				Lecture	Lectures are used to present theoretical relationships, models and methods.						
				Seminar	Classroom practical sessions include guided and independent problem solving, student contributions, presentations and case-study analysis. Practical sessions support the application and interpretation of mathematical methods through business examples and exercises.						
				Lab							
Requirements				Knowledge							
				students understand fundamental mathematical models and methods used in business decision support, the principles and limitations of mathematical formalisation, and the role of mathematical tools in major economic applications.							
				Knowledge: students understand fundamental mathematical models and methods used in business decision support, the principles and limitations of mathematical formalisation, and the role of mathematical tools in major economic applications.							
				Skills							
				students can formulate business problems as mathematical models, analyse decision situations using quantitative methods, interpret results, communicate conclusions clearly, and recognise limitations of model validity.							
				Attitude							
				students are open to applying quantitative methods to business problems, strive for structured model-based thinking, critically evaluate model results, and aim for data-based and rational business decisions.							
				Autonomy and responsibility:							
				students can independently analyse simple business problems mathematically, apply quantitative methods responsibly in decision preparation, consciously consider the consequences and risks of model-based decisions, and cooperate with professionals from other fields when interpreting mathematical results in a business context.							
Brief description of the subject content				Students become familiar with the concepts of fundamental mathematical models and methods used in business decision support. They understand the principles and limitations of the mathematical formalisation of business phenomena and the role and meaning of mathematical tools used in key economic applications. Course topics include mathematical models of business problems; the relationship between models and reality; variables, parameters and objectives; functions in a business context; demand, supply,							

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	cost and revenue functions; linear and nonlinear models; exponential growth and decay; compound interest and discounting; marginal revenue and cost; single-variable optimisation; profit maximisation and cost minimisation; multivariable business models; linear programming; sensitivity and robustness; uncertainty and probability models; and the mathematical foundations of financial decisions.
Types of student activity	Acquisition of theoretical material under guidance and independently. Problem-solving under guidance and independently. • Learning theoretical material under guidance: 10% • Independent learning of theoretical material: 30% • Guided problem-solving: 30% • Independent problem-solving: 30%
Required reading and resources	• Knut Sydsaeter, Peter Hammond, Arne Strom, Andres Carvajal: Essential Mathematics for Economic Analysis, PEARSON Education Limited, 2021 • Winston, Wayne L.: Operations Research: Applications and Algorithms, Cengage Learning, 2022
Recommended reading and its availability	• Ferenczi, M. (2020). A matematika alapjairól. Typotex Kiadó • Obádovics J. Gyula: Integrálszámítás és alkalmazása - Matematikai olvasókönyv II., Scolar kiadó kft. 2024, ISBN 9789635094011 • Medvegyev, P. (2021). Pénzügyi matematika. Typotex. ISBN 978 963 279 255 2.
Assignments	During the study period, a maximum of 40 points can be earned from the mid-term tests. An offered grade of pass (2) can be obtained by achieving 25 points from the mid-term tests. During the exam period, 40 points can be earned through a 45-minute written test. Based on the maximum available 80 points, the final grades are determined as follows: • 0–40: Fail (1) • 41–48: Pass (2) • 49–56: Satisfactory (3) • 57– Good (4) Students who achieve at least 57 points out of the 80 points are eligible for an oral exam to obtain an excellent (5) grade.
Description of midterm tests	As stated during the first class.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted. Artificial intelligence is allowed for checking homework assignments, accelerating the learning process, and generating sample examples for a better understanding of concepts, but its use is strictly prohibited in mid-term tests.

Up-to date Materials and Production Technologies

Title of the subject		Hungarian		Korszerű anyag és gyártástechnológiák				Level	MSc		
		English		Up-to date Materials and Production Technologies				Code	DUEN(L)-MUA-152		
Responsible Academic Unit				Institute of Engineering, Department of Mechanical and Energy Engineering							
Compulsory prerequisite subject											
Type		Weekly teaching hours						Requirement	Credits	Language of instruction	
		Lecture		Gyakorlat		Lab					
Full time		weekly	2	weekly	0	weekly	1	E	5	English	
Part time		Per semester	10	Per semester	0	Per semester	5				
Teacher responsible for the course				name		Dr. Vizi Gábor			position:	Associate Professor	
Educational goals				Goals, development objectives							
				By gaining an understanding of the components of life-cycle management in industrial facilities, students will be able to plan the activities, take the necessary measures, make the required decisions and carry out the necessary actions to optimise the life-cycle of a plant or selected equipment, taking into account the reliability of operation and maintenance, the cost-effectiveness of the production process and other (quality, safety and environmental) considerations.							
				by taking into account the reliability of operation and maintenance, the cost-effectiveness of the production process, and other (quality, safety, environmental) considerations.							
				Students should become familiar with the most important materials and manufacturing processes, their theoretical foundations, and, on this basis, be able to apply these processes in practice, as well as understand the structural and other changes occurring in materials and the reasons behind them. Students should be able to defects							
Typical delivery methods				Lecture	Lectures using a blackboard for all students.						
				Seminar							
				Lab	Use of a projector and overhead projector. Computer lab sessions for groups of up to 20 students						
Requirements				Knowledge							
				By mastering the subject, the student gains a comprehensive overview of the theoretical foundations of modern materials and manufacturing technologies, which are closely based on the principles of physics and mathematics.							
				Skills							
				They will be able to interpret the interrelationships between material selection, manufacturing processes, and operation, as well as identify the causes of processes occurring within materials and structures.							
				Attitude							
				The course develops students' analytical thinking and decision-preparation skills regarding lifecycle management and maintenance tasks, utilizing assessments based on physical and mathematical principles.							
				Autonomy and responsibility:							
				Based on the knowledge acquired, the student is capable of making professionally sound technological decisions and communicating them in a professional manner.							
Brief description of the subject content				To deepen the knowledge acquired in the materials technology, machining and other manufacturing processes covered in the BSc programme, and to gain a more detailed understanding of their theoretical background.							
				The theoretical background to shape- and dimension-precise manufacturing, NNS plastic forming processes, high-precision casting and powder metallurgy processes, and modern surface treatment processes, as well as the theoretical foundations of these processes. The latest welding and thermal processing techniques and their theoretical foundations. The theoretical foundations and application aspects of specialised high-precision machining and specialised machining processes.							

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	The relationship between maintenance and life-cycle management. Spare parts strategies (stock management, disappearance of manufacturers and suppliers, and their replacement). The human aspect of life-cycle management.
Types of student activity	Full-time program: • Attendance and note-taking during lectures (20%) • Completion of practical classes (20%) • Development of an individual laboratory assignment (10%) • Preparation of a presentation (10%) • Independent study (40%) Part-time program: • Attendance and note-taking during lectures (12%) • Conducting laboratory measurements (8%) • Development of an individual assignment (15%) • Preparation of a presentation (15%) • Independent study (50%)
Required reading and resources	• R.K. RAJPUT: Textbook of Manufacturing Technology (Manufacturing processes) LAXMI PUBLICATIONS (P) LTD 113, Golden House, Daryaganj, New Delhi-110002 • Niebel-Draper-Whysk: Modern Manufacturing process Engineering McGraw-Hill Publishing Company 1989 p986.
Recommended reading and its availability	• ASM Metals Handbook, Vol.1. - 21. ASM International, Miami, FL, USA. • T. Jagadeesha: Non-Traditional Manufacturing Processes I.K. International Publishing House 2016 p268.
Assignments	Task descriptions, laboratory measurement guides (DUE Moodle)
Description of midterm tests	The instructor compiles the questions for the in-class tests from the review questions found at the end of the lecture materials.
Framework and rules for the use of artificial intelligence	Artificial intelligence (AI) is partially permitted in this course. Students may use AI-based tools exclusively for understanding the curriculum, independently processing theoretical content, and practicing problem-solving techniques. This includes requesting explanations, illustrations, helpful examples, or alternative solution steps. Permitted uses of AI: • Supporting a better understanding of theoretical material (explanations, supplementary examples) • Checking practice exercises and searching for solution ideas • Facilitating the independent learning process (e.g., definitions of concepts, illustrations) Prohibited uses of AI: AI may not be used in any situation that affects the evaluation of semester performance. It is strictly prohibited to: • Use AI for mid-term exams, retakes, or makeup exams • Generate or rewrite homework, assignments, or any work submitted for evaluation using AI • Substitute classroom problem-solving with AI • Automatically generate solutions or solution plans using AI

Fundamentals of Data Mining

Title of the subject		Hungarian		Adatbányászat alapjai						Level		MSc	
		English		Fundamentals of Data Mining						Code		DUEN(L)-IMA-155	
Responsible Academic Unit				Institute of Informatics, Department of Computer Systems and Control Engineering									
Compulsory prerequisite subject													
Type		Weekly teaching hours						Requirement	Credits	Language of instruction			
		Lecture		Number of lessons		Lab							
Full time		weekly	1	Weekly	0	weekly	2	E	5	English			
part time		Per semester	5	Per semester	0	Per semester	10						
Teacher responsible for the course				Name		Dr. Bognár László				position:	College teacher		
Educational goals				Goals, development objectives									
				The aim of the course is to provide students with a fundamental understanding of the logic, key concepts and methods of data analysis, with particular emphasis on data preparation, descriptive analysis and visualisation.									
				The course develops students' data-driven way of thinking, their analytical approach and their ability to interpret data analysis results correctly. It also helps students to recognise the limitations of analytical conclusions and to be capable of making well-founded, data-driven decisions.									
Typical delivery methods				Lecture	Lecture theatres, blackboards, computers and projectors are used, and online learning materials (notes and lecture slides) are made available to students.								
				Seminar									
				Lab	Computer practicals in laboratories equipped with the appropriate software, use of projectors and computers, and online learning materials are available to students.								
Requirements				Knowledge									
				The student is familiar with the fundamental concepts of data analysis, the distinctions between data, information, and knowledge, as well as the principles of data preparation, descriptive data analysis, data visualization, and simple data mining methods.									
				Skills									
				They are aware of the possibilities and limitations involved in interpreting data analysis results, with particular regard to the distinction between correlation and causation, as well as the role of biases and model limitations. The student is able to interpret data analysis problems, follow the logic of the analysis, and understand descriptive statistical indicators and visualizations. They are capable of critically analyzing results derived from data, identifying relationships and patterns, and formulating conclusions based on the analysis findings.									
				Attitude									
				The student is open to a data-driven mindset and strives to interpret analysis results objectively and critically. They acknowledge the inherent uncertainties and limitations of data analysis and attach importance to drawing well-founded, responsible conclusions.									
Brief description of the subject content				Autonomy and responsibility:									
				The student independently interprets data analysis results within a guided framework and recognizes their responsibility regarding the reliability and applicability of the analyses. They are aware of the role that data and the conclusions drawn from them play in supporting decision-making, and they approach the use and communication of data responsibly.									
Brief description of the subject content				The aim of the course is to provide an overview of basic data-related concepts, types of data sources, and the logic behind data preparation and fundamental data analysis procedures. The course introduces the most important methods of descriptive data analysis, whilst also covering the basics of data visualisation and report generation, the									

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	identification of correlations and patterns, a simplified interpretation of basic data mining methods, and the critical evaluation of results.
Types of student activity	Mastering theoretical material under guidance and independently. Solving problems under guidance and independently. Studying theoretical material under guidance: 10% Studying theoretical material independently: 30% Solving problems under guidance: 30% Solving problems independently: 30%
Required reading and resources	• Nussbaumer Knafllic, Cole: Storytelling with Data, John Wiley & Sons Inc, 2025, ISBN 1394388098 • Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. Multivariate Data Analysis (8th ed.) Cengage Learning, 2019. ISBN: 9781473756540.
Recommended reading and its availability	• Izenman, A. J.: Modern Multivariate Statistical Techniques: Regression, Classification, and Manifold Learning (2nd ed.) Springer, 2013. ISBN 978-0-387-78188-4
Assignments	Two midterms during the term time and an exam during the exam period.
Description and schedule of the in-class test	The instructor compiles the questions for the in-class tests from the review questions found at the end of the lecture materials.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted. Artificial intelligence is permitted for checking homework, accelerating the learning process, and generating sample examples to facilitate the understanding of concepts, but its use is prohibited during exams.

Management knowledge

Title of the subject		Hungarian		Vezetési ismeretek				Level	MSc		
		English		Management knowledge				Code	DUEN(L)-TVV-252		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Number of lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	2	weekly	1	weekly	0	E	5	English	
part time		Per semester	10	Per semester	5	Per semester	0				
Teacher responsible for the course				name		Prof. Dr. habil Rajcsányi-Molnár Mónika			position:	University Professor	
Educational goals				Goals, development objectives							
				The aim of the course is to build on the students' basic knowledge of management and organisation acquired during their BSc studies and to introduce them to the fundamentals of strategic thinking and plan-ning, project-oriented management, and systems-oriented production management. By acquiring the knowledge provided by the course, students will be able to understand planning processes in work organisations, allocate resources effectively, and solve problems efficiently. Through practical examples, students will be able to interpret their theoretical knowledge and recognise relevant interrelationships.							
Typical delivery methods				Lecture		For all students, in a lecture hall equipped with a projector or online via MS Teams.					
				Seminar							
				Lab		Tabletop exercise in groups of up to 30 people.					
Requirements				Knowledge							
				- Has knowledge of the conceptual framework, key relationships, and theories relevant to their field of specialization. - Understands the fundamental principles and methods for designing and modifying the organizational and management systems of organizations and institutions. - Is familiar with management learning, knowledge acquisition, and data collection methods, their ethical limitations, and problem-solving techniques. - Acquires the theoretical and methodological foundations of strategic thinking and strategic management. - Recognizes the importance of managing work organizations and achieving managerial effectiveness, and understands which factors contribute to it and to what extent. - Understands the relationship between projects and corporate strategy, as well as the systems-theoretical interpretation of these and production management							
				Skills							
				- Is able to acquire the skills required for the holistic design of complex systems based on systems thinking and a process-oriented approach. - Is able to comprehensively plan and manage the utilization of technical, economic, environmental, and human resources. - Is able to organize their own work and that of others efficiently and humanely, and to lead work teams.Is able to manage, organize, and monitor the material and information flows of a business and its work organization, and to coordinate their improvement. - Is able to address problems creatively, solve complex tasks flexibly, engage in lifelong learning, and demonstrate a commitment to diversity and value-based principles. - Demonstrates a well-developed sense of responsibility, evaluation and self-evaluation skills, and the ability to analyze and synthesize information							
				Attitude							
				It strives to continuously develop both their own knowledge and that of their colleagues through self-directed learning and further professional training.							

	• Is open to and able to accept opinions that differ from their own or are unfamiliar to them. • Is willing and able to work collaboratively in teams and share their knowledge with others. • Strives to ensure that decisions are made with full consideration of applicable legislation and ethical standards. • Strives to uphold and promote the ethical principles of workplace and organizational culture. • Strives to approach their work comprehensively, based on systems thinking and a process-oriented mindset. • In the course of their work, explores opportunities to define research, development, and innovation objectives and strives to achieve them. Autonomy and responsibility: • Develops new areas of knowledge and initiates new practical solutions with creative initiative and independence. • Is able to take a leading role and cooperate effectively in formulating practical issues that affect their work and the future of their organization. • Takes responsibility for the consequences of their actions and decisions. • Is able to independently perform management tasks related to the technical and economic processes of a business and manage its operations. • Demonstrates a strong sense of responsibility for sustainable development
Brief description of the subject content	Characteristics of strategic thinking and planning, including a historical overview. The processes and stages of corporate strategic planning. The business environment and methodologies for its analysis and evaluation. Development of the corporate objectives system, its levels, and planning for its implementation. Definition and regulation of authority, responsibility, and task structures. Characteristics of organizational capabilities. Development of the value chain. The relationship between projects and corporate strategy. The project management system and the management, organizational, and methodological tools used in project management. The concepts of production, control, and production management, and their interpretation from a systems theory perspective. The production process and its structural types
Types of student activity	Processing theoretical material (guided and independent): 40% Problem-solving (guided and independent): 40% Case study analysis, group work, and collaborative work on complex tasks: 20% Collection, processing, and presentation of professional information related to the subject area: 20%
Required reading and resources	1. Baldegger, R. (2025). Management in a dynamic environment: Concepts, methods, and tools (2nd ed.). Springer Gabler. https://doi.org/10.1007/978-3-658-45116-5 2. Geerts, J. M. (2024). Maximizing the impact and ROI of leadership development: A theory- and evidence-informed framework. Behavioral Sciences, 14(10), Article 955. https://doi.org/10.3390/bs14100955
Recommended reading and its availability	1. Hajar, M. A., Alkahtani, A. A., Ibrahim, D. N., Darun, M. R., Al-Sharafi, M. A., - Tiong, S. K. (2021). The approach of value innovation towards superior performance, competitive advantage, and sustainable growth: A systematic literature review. Sustainability, 13(18), Article 10131. https://doi.org/10.3390/su131810131
Assignments	To obtain the signature, students must submit the practice assignments posted in the Moodle system by the deadlines—as part of the continuous assessment process—and achieve a minimum overall performance of 61%. <u>If a student fails to meet these requirements, a refusal of the signature will be recorded.</u>
Description of midterm tests	The instructor compiles the questions for the in-class tests from the review questions found at the end of the lecture materials.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence (AI) is partially permitted for the following purposes: Collecting data for assignments during classwork. Conducting preliminary research and preparing for presentations.

	Creating graphs. Compiling bibliographies. Submitting a complete text generated by AI is not permitted. Students are required to complete their assignments based on their own knowledge and independent professional understanding. In all cases, they must document their use of AI by identifying the tool used and specifying the prompt(s) entered. The use of AI tools is prohibited in all forms of examination, including written, oral, online, and in-person examinations, as well as other forms of assessment conducted under examination conditions.
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Advanced Project Management

Title of the subject		Hungarian		Haladó projektmenedzsment				Level	MSc		
		English		Advanced Project Management				Code	DUEN(L)-TGT-157		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Number of lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	0	weekly	2	E	5	English	
part time		Per semester	5	Per semester	0	Per semester	10				
Teacher responsible for the course				name		Dr. Saleh Saleh Mohamad Ali			position:	Assistant Professor	
Educational goals				Goals, development objectives							
				The aim of this course is to provide students with university-level knowledge, tools, and skills related to project cycle management, strategic project management, the organization of complex projects, project team leadership, and decision-making processes. The course emphasizes the analysis of real-life projects, strategic alignment, and practical application.							
				The course builds upon organizational foundations, including organizational structures, processes, and human resource management. It develops strategic thinking through project portfolio development and alignment with organizational objectives, while deepening students' understanding of project cycle planning (initiation, planning, execution, monitoring, and closure). Special emphasis is placed on team leadership (motivation, conflict management, communication), the independent management of complex projects in multiproject environments, risk management, and ethical decision-making (balancing stakeholder interests and sustainability considerations). The course promotes a systems-oriented approach and enhances problem-solving skills.							
Typical delivery methods				Lecture		The course is delivered through interactive lectures attended by the entire student cohort, supported by multimedia presentations and a projector. Lectures involve the analysis of case studies and the discussion of critical questions, actively engaging students in the learning process. Case study-based collaborative learning is applied through the analysis of real or simulated project situations, where students interpret information, evaluate alternatives, and develop decision-making recommendations. Continuous interactive discussions and question-and-answer sessions are integrated into lectures to encourage the exchange of viewpoints, critical thinking, and the comparison of different approaches. Digital learning tools, including presentations and projection technologies, provide visual support for project planning and project management concepts.					
						Seminar					
				Lab		Classes are conducted in a project-oriented learning environment equipped with flipcharts and whiteboards. Individual, group-based, and collaborative learning activities enable students to apply theoretical knowledge to real or simulated projects through project planning, process analysis, quality management problem-solving, and the preparation of project documentation. Digital tools, process mapping techniques, and PDCA cycle applications support the practical acquisition and presentation of contemporary project management methods.					
Requirements				Knowledge - Has knowledge of the fundamental concepts and theoretical frameworks of project management, as well as the phases of the project life cycle (initiation, planning, execution, monitoring and control, and closure) within their organizational context. - Has knowledge of strategic project management, the organizational principles of complex projects, and the rules and ethical standards governing project team leadership.							

	- Is familiar with project management methods and tools (WBS, CPM/PERT, and risk management), as well as the professional terminology used in decision preparation and support. Skills - Is able to plan project life cycles, manage time and resources, and independently manage complex projects. - Is able to collaborate within project teams, analyze decision-making situations, and develop proposals using an interdisciplinary approach. - Is able to review and synthesize professional literature and apply methods in practice. Attitude - Is sensitive to problems, takes a proactive approach, and is open to innovation and collaboration within project teams. - Strives for continuous self-development and respects ethical standards and organizational norms Autonomy and responsibility: - Takes responsibility for achieving project goals, ethical decision-making, and the improvement of organizational processes. - Actively participates in joint decision-making and handles conflicts responsibly.
Brief description of the subject content	The prerequisite for obtaining course completion (signature) is the timely submission of all practice assignments published in the Moodle system as part of continuous assessment and achieving at least 61% overall performance. Students who fail to meet these requirements will receive a denial of course completion (signature refused). Only students who have obtained course completion are eligible to take the written midterm/final assessment. Course achievement is assessed through a written in-class test, conducted in accordance with the current academic regulations and examination schedule of the academic year. Student attendance is monitored at all lectures and practical sessions through an official attendance register. Course components that require continuous work throughout the semester, according to the course requirements, cannot be completed or replaced during the examination period. In the case of an officially justified absence, students are granted one opportunity to retake the written assessment at a pre-arranged date.
Types of student activity	- Lecture-based learning, knowledge processing supported by note-taking: 30% - Guided information and literature processing: 20% - Case study-based and problem-centred learning: 20% - Project-based and group learning formats: 10% - Independent task solving and reflective learning: 20%
Required reading and resources	- Oguz, A. (2025). Project management: Navigating the complexity with a systematic approach (2nd ed.). MSL Academic Endeavors., ISBN: 9781936323999 - Blak Bernat, G., Qualharini, E. L., Castro, M. S., Barcaui, A. B., & Soares, R. R. (2023). Sustainability in project management and project success with virtual teams: A qu-antitative analysis considering stakeholder engagement and knowledge management. Sustainability, 15(12), 9834. https://doi.org/10.3390/su15129834
Recommended reading and its availability	Khahro, S. H., Tabbasum, S., & Khoso, M. A. (2022). Applicability-compatibility analysis of PMBOK seventh edition from the perspective of the construction industry distinctive peculiarities. Buildings, 12(2), 210. https://doi.org/10.3390/buildings12020210

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	• Morris, S, - Murtescu, K. (2021). Project management fundamentals. Seneca Polytechnic. Updated 2025. https://open.umn.edu/opentextbooks/%20textbooks/1914
Assignments	The prerequisite for obtaining course completion (signature) is the timely submission of all practice assignments published in the Moodle system as part of continuous assessment and achieving at least 61% overall performance. Students who fail to meet these requirements will receive a denial of course completion (signature refused). Only students who have obtained course completion are eligible to take the written midterm/final assessment.
Description of midterm tests	Course achievement is assessed through a written in-class test, conducted in accordance with the current academic regulations and examination schedule of the academic year. Student attendance is monitored at all lectures and practical sessions through an official attendance register. Course components that require continuous work throughout the semester, according to the course requirements, cannot be completed or replaced during the examination period. In the case of an officially justified absence, students are granted one opportunity to retake the written assessment at a pre-arranged date
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted: • during classroom work, for data collection related to assignments, • for information gathering when preparing for presentations. • for creating charts and graphs • for compiling bibliographies Submitting fully AI-generated text is not allowed. Students are required to complete their assignments based on their own knowledge and independent professional understanding, and in all cases to document the use of AI by naming the tool used and indicating the prompt(s) applied. The use of AI tools is prohibited in any form of examination activity – including written, oral, online or in-person exams, as well as exam-type assessments.

Special Materials and Technologies

Title of the subject		Hungarian		Különleges anyagok és technológiák						Level	MSc		
		English		Special Materials and Technologies						Code	DUEN(L)-MUA-115		
Responsible Academic Unit				Institute of Engineering, Department of Structural Integrity									
Compulsory prerequisite subject													
Type		Number of lessons						Requirement	Credits	Language of instruction			
		Lecture		Seminar		Lab							
Full time		weekly	2	Weekly	0	weekly	1	M	5	English			
part time		Per semester	10	Per semester	0	Per semester	5						
Teacher responsible for the course				Name		Dr. Pázmán Judit				position:	Associate Professor		
Educational goals				Goals, development objectives									
				Upon completion of the course, students should be able to adopt a modern approach to and solve materials science and technology problems arising in life-cycle management, as well as to apply the latest findings in materials science in a informed manner.									
Typical delivery methods				Lecture		Projector, PowerPoint presentations; course materials available on Moodle.							
				Seminar									
				Lab		Material testing carried out in groups of up to 20 students.							
Requirements				Knowledge									
				The course focuses on the application of modern knowledge in materials science and technology to complex engineering problems.									
				Skills									
				Students will become capable of recognizing and applying innovative technologies.									
				Attitude									
Brief description of the subject content				It develops analytical and problem-solving skills.									
				Autonomy and responsibility:									
				Fosters openness to innovation and professional development.									
Types of student activity				Technologies for repairing damaged (e.g. worn) surfaces. Conditions for the application of so-called cold metals. So-called cold metals, such as PMCs. The technique and technology of laser micro-cladding. The production of metal powders by gas and/or liquid atomisation. The technology of rapid prototyping. Requirements for components manufactured using rapid prototyping. Possible materials for prototyping. Laser hardening of worn surfaces on large components. Surface treatment of components subjected to intensive wear through a combination of laser cladding and nitriding. Directed crystallisation of alloys. Manufacturing technology for single-crystal turbine blades made from Ni-based superalloys. The metallurgical and thermodynamic aspects of ‘fibre-reinforced’ composites produced from eutectic alloys via directed crystallisation of ‘fibre-reinforced’ composites manufactured from eutectic alloys: metallurgical and thermodynamic aspects. Pro-duction technologies for ultra-fine-grained (UFG) or nano-grained (NG) metals and alloys. ECAP, HPT and MF technologies. Properties of particle-reinforced composites with a metal matrix exhibiting enhanced creep resistance; production of ODS materials using high-pressure sintering (HIP) technology. Production of amorphous alloys using rapid solidification (RS) techniques. Prerequisites for the formation of the amorphous state. The mechanical, corrosion and magnetic properties of amorphous strips. Composition variations in high-entropy alloys (HEAs). The deformation mechanism of amorphous HEAs. The phenomenon of shape memory, members of the NITINOL alloy family, and applications bipath shape memory. Silicon nitride as a wear-resistant structural material; engine valves made from silicon nitride. The various allot-rope of carbon, from diamond to graphene. Applications as functional and structural materials.									
				• Processing of listening materials with note-taking and consolidation using personal and electronic notes: 40% • Independent execution of laboratory practicals: 20% • Preparation of laboratory reports: 40%									

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Required reading and resources	• ASM International (Ed.): ASM Handbook, Volume 7: Powder Metal Technologies and Applications. ASM International, Materials Park, OH, 2015. • Davis, J. R. (Ed.): Advanced Materials and Processes. ASM International, Materials Park, OH • Yeh, J.W., Tsai, M.H., Huang, Y.L. et al.: High-Entropy Alloys: Fundamentals and Applications. Springer, Cham, 2016. • Callister, W.D., Rethwisch, D.G.: Materials Science and Engineering: An Introduction. 10th Edition, Wiley, Hoboken, 2018.
Recommended reading and its availability	• Materials Science, edited by Werner Schatt and Hartmut Woseli; Deutscher Verlag für Grundstoffindustrie, Stuttgart, 1996 • Yuqing Weng: Ultra-fine Grained Steels, Metallurgical Industry Press, Springer, 2003 • WENG Yu-qing, SUN Xin-jun, DONG Han: Overview on the Theory of Deformation-Induced Ferrite Transformation • ASM International (Ed.): ASM Handbook, Volume 21: Composites. ASM International, Materials Park, OH, 2001.
Assignments	Students prepare a measurement report on the measurements carried out.
Description of midterm tests	Written examinations covering the material from the lectures and laboratory sessions.
Framework and rules for the use of artificial intelligence	Artificial intelligence (AI) is partially permitted in this course. Students may use AI-based tools exclusively for understanding the curriculum, independently processing theoretical content, and practicing problem-solving techniques. This includes requesting explanations, illustrations, helpful examples, or alternative solution steps. Permitted uses of AI: • Supporting a better understanding of theoretical material (explanations, supplementary examples) • Checking practice exercises and searching for solution ideas • Facilitating the independent learning process (e.g., definitions of concepts, illustrations) Prohibited uses of AI: AI may not be used in any situation that affects the evaluation of semester performance. It is strictly prohibited to: • Use AI for mid-term exams, retakes, or makeup exams • Generate or rewrite homework, assignments, or any work submitted for evaluation using AI • Substitute classroom problem-solving with AI • Automatically generate solutions or solution plans using AI

Measurement Technology and Signal Processing

Title of the subject		Hungarian		Mérés te chnika és jelfeldolgozás				Level	MSc		
		English		Measurement Technology and Signal Processing				Code	DUEN(L)-MUG-116		
Responsible Academic Unit				Institute of Engineering, Department of Structural Integrity							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	0	weekly	2	M	5	English	
part time		Per semester	5	Per semester	0	Per semester	10				
Teacher responsible for the course				name		Dr. Pór Gábor			position:	Research Professor	
Educational goals				Goals, development objectives							
				Based on an understanding of the relationship between measurement and modelling, students will be able to plan their own measurements, including the application of up-to-date knowledge of signal processing and interpretation.							
Typical delivery methods				Lecture	Lectures using a blackboard in a large lecture theatre for all students. Use of a projector						
				Seminar							
				Lab	Blackboard-based calculation exercises and laboratory measurements in groups of up to 30 students.						
Requirements				Knowledge							
				The course develops measurement and data processing competencies, with particular emphasis on handling uncertainty and interpreting results.							
				Skills							
				Students will be able to plan and evaluate measurements independently.							
				Attitude							
Brief description of the subject content				It strengthens analytical thinking and a modeling mindset.							
				Autonomy and responsibility:							
				It contributes to the data management skills required for reliable decision support.							
				Measurement and modelling; the role of modelling in measurement; classification and properties of models. Types of measurement tasks and the development of the necessary models. Comparison, validation, verification and calibration of models. Measurement uncertainty and its evaluation. Expanded uncertainty. Determination of the resulting standard uncertainty based on independent input (measured) quantities and in the case of correlated quantities. Practical examples and their calculation methods. The system of concepts and requirements in metrology. Rules for reporting measurement results. Quality management system in the laboratory. Evaluation of measurement results using computerised methods. Cost-effective estimation procedures for the reliability of measurement results. Practical mastery of statistical tests. Null hypothesis and alternative hypothesis; one-tailed and two-tailed hypothesis testing; Type I and Type II errors. Testing whether two expected values are equal. Comparing experimental standard deviations; deciding on the adequacy of the measurement. Estimating the goodness of fit and measurement uncertainty of parameters obtained from function fitting, based on experimental data. Signals and signal systems: amplitude distribution and its measurement, correlation functions and their measurement, spectra, measurement of coherence and phase function, autoregressive modelling, sequential ratio test, fundamentals of fuzzy modelling, the principle and mathematics of wavelets. Serial measurement using software (LABView); Measurements using a laser probe, with data feedback for rapid prototyping and the redesign of the measured component (reverse engineering exercise); measurements using a Digimatic (Mitutoyo) instrument; 3D measurement and reconstruction using a measuring microscope. Measurements and their finite element modelling.							
Types of student activity				Processing listening materials through note-taking, utilizing Moodle resources and AI assistance for home assignments (50%). Independent writing and application of LABVIEW programs in laboratory experiments; autonomous processing of laboratory measurements, and preparing a comprehensive measurement report, including the professional determination and analysis of measurement uncertainty (50%).							

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Required reading and resources	- JCGM 200:2012 International vocabulary of metrology – Basic and general concepts and associated terms (VIM) 3rd edition 2008 version with minor corrections - JCGM 100:2008 GUM 1995 with minor corrections Evaluation of measurement data — Guide to the expression of Uncertainty in measurement - Digital Processing of Continuous-Time Signals, Download from course: CAU, Kiel
Recommended reading and its availability	- Mallat: A wavelet tour to signal processing, 3rd edition, Academic Press, 2008 - Gardner W.A. Introduction to random processes, McGrawHill, 1989
Assignments	During the term, students must complete and present—during a practical class—an assignment linked to the course syllabus. Depending on class size, this task may be performed individually or in groups and requires preparatory work and the gathering of materials by a specified deadline. After consulting with the instructor, the student selects a topic from the semester's curriculum, prepares the assignment independently, and presents it during the practical class. During the examination period, an oral exam is held based on a pre-announced list of topics.
Description of midterm tests	According to the instructions given in the first lecture: a midterm test will be held upon completion of the chapters on Fourier analysis, requiring a minimum score of 50% to pass.
Framework and rules for the use of artificial intelligence	The use of Artificial Intelligence (AI) is partially permitted, but only in accordance with standard academic citation guidelines: - Every submitted material must accurately specify which AI tool was used, for what purpose, and in which parts of the work. - If a text segment is generated word-for-word by AI, it must be enclosed in quotation marks. If only the knowledge or concept was utilized but rewritten in the student's own words, it must be cited according to the applicable citation and referencing rules (including the exact date and time the specific AI was accessed). - All figures, diagrams, and derivations are subject to mandatory citation; even if generated by AI, the tool must be indicated as the source. Only figures created entirely without AI assistance can be designated as original/own work. - During midterm tests, written exams, and oral exams, the use of AI is strictly prohibited unless explicitly authorized by the instructor.

Business Ethics for Managers

Title of the subject		Hungarian		Üzleti etika vezetőknék				Level	MSc		
		English		Business Ethics for Managers				Code	DUEN(L)-TGT-113		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	2	weekly	0	M	5	English	
part time		Per semester	5	Per semester	10	Per semester	0				
Teacher responsible for the course				name		Prof Dr. habil Rajcsányi-Molnár Mónika			position:	University Professor	
Educational goals				Goals, development objectives							
				Gaining an understanding of the role of business ethics in management from both theoretical and practical perspectives. The aim of the course is to illustrate the role of business and managerial ethics in the long-term operation of organisations, in responsible decision-making and in managerial accountability. The course addresses ethical issues not as prescriptive rules, but as managerial dilemmas and management problems.							
Typical delivery methods				Lecture	Mastering theoretical material under guidance and independently. Solving problems under guidance and independently.						
				Seminar	Independent professional work performed under supervision; supervised group work.						
				Lab							
Requirements				Knowledge							
				- The module contributes to the development of responsible and ethical leadership decision-making. - Students will be able to recognise and manage ethical dilemmas. It develops critical thinking and value-based decision-making. - It strengthens commitment to social responsibility and sustainability. - They are familiar with the methods for understanding and analysing the management and decision-making systems of organisations, as well as their ethical limitations and opportunities for development. - They understand and recognise the importance of corporate social responsibility. - They are aware of the ethical responsibilities of management and the role these play in the company's operation.							
				Skills							
				- Is able to carry out management tasks within workplace teams whilst taking ethical considerations into account. - Is able to recognise the relationship between ethics and governance. - Is able to manage risk, compliance and integrity. - Is able to apply the principles of both ethical and responsible corporate governance. - Is able to perform managerial functions. Distinguishes between leadership styles based on their advantages and disadvantages, and applies the appropriate style as required. - Is able to creatively analyse the objectives, processes and organisational structure of a work organisation, taking ethical considerations into account.							
				Attitude							
				- They are open-minded and able to accept views that differ from their own or are unfamiliar to them. - They are willing and able to work in a team and to share their knowledge with others. - Their curiosity and commitment foster their continuous professional development.							

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	• He or she endeavours to ensure that decisions are made with full regard to legislation and ethical standards.
	Autonomy and responsibility:
	• He or she takes responsibility for his or her own work and that of colleagues. • He or she recognises the ethical implications of his or her actions and ensures that these are applied appropriately and responsibly.
Brief description of the subject content	The course focuses on the leader as a moral agent, examining how leadership decisions impact employees, stakeholders, organizational culture, and society. It covers ethical corporate governance, the principles of responsible leadership, the stakeholder perspective, and the relationship between ethics, sustainability, and the ESG approach. Furthermore, the course aims to develop critical thinking, moral judgment, and an ethical leadership mindset through the analysis of real-world business situations. The course addresses the practical aspects of business ethics and responsible leadership principles, including: the practice of ethical leadership decision-making; the application of ethical decision-making models; the ethics of stakeholder management; the development of an ethical corporate culture; and ethics in the exercise of power—all explored through group work and case studies.
Types of student activity	Acquisition of theoretical material under guidance and independently. Task solving under guidance and independently. Independent professional work under supervision, guided group work
Required reading and resources	• Meinhold, R. (2022). Business Ethics and Sustainability. Routledge. ISBN: 9780367650605. • Crane, A., Matten, D., Glozer, S., & Spence, L. J. (2023). Business Ethics: Managing Corporate Citizenship and Sustainability in the Age of Globalization. Oxford University Press. ISBN: 9780191968860.
Recommended reading and its availability	• Stefanidis, A., & Sama, L. M. (Eds.). (2025). Global Business Ethics: The Quest for Sustainable Development. Routledge. ISBN: 9781032736341. • Hope, A., & Laasch, O. (2025). Responsible Business: Foundations of Ethical and Sustainable Management (3rd ed.). Routledge. ISBN: 9781032894508.
Assignments	During the term, students must complete and present—during a practical class—an assignment specified by the instructor and linked to the course syllabus; depending on class size, this task requires gathering materials and preparing, either individually or in groups. The student selects a topic from the semester's curriculum, prepares the assignment independently following consultation with the instructor, and presents it during the practical class.
Description of midterm tests	During the examination period, an oral exam is held based on a preannounced list of exam topics.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted: • during classroom work, for data collection and information gathering related to tasks • for data collection for certain homework assignments • during preparation for assessments The use of any AI tool is prohibited during knowledge assessment and while writing tests/papers.

Communication in Leadership and Organization

Title of the subject		Hungarian		Vezetés és szervezés kommunikációja				Level	MSc		
		English		Communication in Leadership and Organization				Code	DUEN(L)-TGT-114		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Weekly teaching hours						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	2	weekly	0	M	5	English	
part time		Per semester	5	Per semester	10	Per semester	0				
Teacher responsible for the course				name		Prof Dr. habil Rajcsányi-Molnár Mónika			position:	University Professor	
Educational goals				Goals, development objectives							
				To acquire a theoretical and practical understanding of communication in management and organisation. The aim of the module is to demonstrate the role of communication in management and organisational processes, and to develop students' managerial and organisational communication skills. The course views communication not merely as the transfer of information, but as a managerial tool and a factor shaping organisational operations.							
Typical delivery methods				Lecture	For all students in a large lecture hall, via an interactive lecture using a projector.						
				Seminar	Problem-solving with guidance and independently. Analysis and group processing of case studies.						
				Lab							
Requirements				Knowledge							
				- Knows the concept, role, and significance of management communication in leadership and organizational processes. - Knows the basic forms and channels of managerial, organizational, and stakeholder communication. - Knows the role of communication in decision-making, change management, and shaping organizational culture. - Knows the principles of transparent, authentic, and responsible managerial communication. - Knows the relationships between communication and ethics, as well as between communication and corporate governance							
				Skills							
				- Is able to analyse and interpret leadership and organisational communication situations. - Is able to identify communication problems and conflicts and address them in a structured manner. - Is able to assess the communication implications of leadership decisions from the perspective of various stakeholder groups. - Is able to formulate clear, goal-oriented and comprehensible leadership messages. - Is able to critically evaluate organisational communication practices.							
				Attitude							
				- Is open to dialogue and to understanding differing interests and perspectives. - Is sensitive to the ethical, social and organisational implications of communication. - Has a commitment to authentic and responsible managerial communication. - Is characterised by a cooperative and empathetic approach in organisational and leadership situations. - Is aware of the role of communication in building trust. - Is able to independently consider communication decisions within a leadership and organisational context.							

	Autonomy and responsibility: • Takes responsibility for their own communication and its organisational implications. • Is able to represent the organisation's position responsibly in both internal and external communication situations. • Consciously strives for transparent, ethical and professionally sound communication.
Brief description of the subject content	As part of this module, students will learn about the specific characteristics of managerial communication, the forms of communication within an organisation (vertical and horizontal), and the fundamentals of stakeholder and external communication. Particular emphasis is placed on the role of communication in shaping organisational culture, change management, conflict resolution and supporting decision-making. The course also addresses the communication challenges faced by modern organisations, including issues such as transparency, trust-building, managerial credibility and digital communication. The aim of the module is to foster a practice-oriented approach: through the analysis of real-life organisational and leadership situations, students will master the principles of effective and responsible leadership communication. Leadership communication refers to the forms of communication within an organisation (vertical and horizontal). The role of communication in shaping organisational culture, change management, conflict resolution and supporting decision-making. Case studies, group tasks.
Types of student activity	• Acquisition of theoretical material under guidance and independently. • Task solving under guidance and independently. Independent professional work under supervision, guided group work.
Required reading and resources	• Eisenberg, E. M., Trethewey, A., LeGreco, M., & Goodall, H. L., Jr. (2023). Organizational Communication: Balancing Creativity and Constraint (9th ed.). Bedford/St. Martin's. ISBN: 9781319201487. • Kramer, M. W., & Bisel, R. S. (2025). Organizational Communication: A Lifespan Approach (3rd ed.). Oxford University Press. ISBN: 9780197770009.
Recommended reading and its availability	• Modaff, D. P., & Butler, J. A. (2021). Organizational Communication: Foundations, Challenges, and Misunderstandings (5th ed.). Cognella Academic Publishing. ISBN 9781793515902. • Johannessen, J.-A. (2023). Leadership and communication: Concepts, contexts, and tools. Palgrave Macmillan. ISBN: 9783031408489
Assignments	During the term, students must complete and present—during a practical class—an assignment specified by the instructor and linked to the course syllabus; depending on class size, this task requires gathering materials and preparing, either individually or in groups. The student selects a topic from the semester's curriculum, prepares the assignment independently following consultation with the instructor, and presents it during the practical class.
Description of midterm tests	During the examination period, an oral exam is held based on a pre-announced list of exam topics.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted: - during classroom work for data collection and information gathering related to tasks; - for data collection for certain homework assignments; - during preparation for assessments. The use of any AI tool is prohibited during knowledge assessment and while writing tests/papers.

Logistics

Title of the subject		Hungarian		Logisztika				Level	MSc		
		English		Logistics				Code	DUEN(L)-TGT-254		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Weekly teaching hours						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	2	weekly	1	weekly	0	E	5	English	
part time		Per semester	10	Per semester	5	Per semester	0				
Teacher responsible for the course				name		Dr. Veres Lajos			position:	Professor Emeritus	
Educational goals				Goals, development objectives							
				The aim of the course is to prepare students to design, optimize, and manage complex logistics and supply chain systems, with particular emphasis on decisions related to technical systems, digitalization, and sustainable operations.							
				The course builds upon the logistics-related knowledge acquired in the BSc program in Engineering Management, including Fundamentals of Logistics, Corporate Logistics, Logistics Management, and Warehousing and Material Handling. Within the MSc program in Engineering Management, the course is designed to develop advanced competencies required for the strategic management of technical and logistics systems.							
Typical delivery methods				Lecture	The course is delivered through interactive lectures supported by industrial examples and case studies. Students are actively involved in the discussion and evaluation of contemporary logistics and supply chain management challenges, with particular emphasis on the application of advanced analytical methods and decision-making frameworks.						
				Seminar	Practical learning activities include group work, logistics simulations, case study analyses, optimization exercises, and modelling tasks such as network design and scenario analysis. Students work collaboratively to develop solutions to complex logistics problems, evaluate alternative strategies, and present their findings through professional presentations and reports.						
				Lab							
Requirements				Knowledge							
				- Knows advanced logistics and supply chain management theories. - Knows strategic logistics decision-making frameworks and models. - Knows digital logistics systems (IoT, AI, ERP, data-driven solutions). - Knows the principles and tools of sustainable and green logistics. - Knows optimisation and performance measurement methods							
				Skills							
				- Able to analyse and optimise logistics systems. - Able to apply supply chain models (e.g. SCOR). - Able to develop logistics simulations and simple optimisation models. - Able to evaluate and apply digital logistics solutions. - Able to develop and present logistics strategy proposals. - Able to handle technical and logistics systems with an integrated approach.							
				Attitude							
				- Open to the application of innovative logistics technologies and methods. - Strives to design efficient and sustainable systems. - Interested in the logistics impacts of technological development.							
				Autonomy and responsibility:							
				- Able to independently analyse logistics problems and develop solution proposals. - Takes responsibility for activities carried out individually and in group work.							

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	• Takes into account the economic, environmental and social impacts of logistics decisions
Brief description of the subject content	Advanced supply chain management (SCM) strategies and models. Global and international logistics, risk management and resilient chains. Digital logistics: IoT, AI, big data, blockchain in the supply chain. Sustainable and green logistics (circular economy, carbon neutrality, ESG integration). Advanced technologies in warehousing and materials handling (automated systems, robotics). Logistics information systems and ERP integration. Performance measurement, KPIs and application of the SCOR model. Logistics simulations and optimisation (operations research, network models). Corporate logistics from a technical management perspective: production-logistics integration, advanced just-in-time and lean logistics. Domestic and international case studies (automotive industry, energy, manufacturing). Tasks related to sustainable logistics, green supply chains and digital transformation
Types of student activity	Acquisition of theoretical material under guidance and independently. • Task solving under guidance and independently. • Learning of theoretical material under guidance: 10% • Independent learning of theoretical material: 30% • Task solving under guidance: 30% - Independent task solving: 30%
Required reading and resources	• Sunil Chopra (2025): Supply Chain Management, Strategy, Planning and Operation, Pearson, 8. edition • C. John Langley Jr., Robert Novack, Brian Gibson, John Coyle (2021): Supply Chain Management: A Logistics Perspective (11th edition, 2021) 672.pp.
Recommended reading and its availability	• David Simchi-Levi, Philip Kaminsky, Edith Simchi – Levi (2021): Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies (4th edition, 2021), https://me-l.co/ip4vv8so
Assignments	As part of the course requirements, students complete a group project involving the analysis of a logistics system and the development of improvement proposals. The project is submitted in written form and presented orally to the class.
Description and schedule of the in-class test	The final assessment is conducted through an oral examination during the examination period, based on predefined topics covering the theoretical and practical content of the course.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted! The use of AI is supported for: assisting self-reflection, modelling situations, and practising communication patterns. Prohibited: manipulation of assessment situations.

Quality assurance and reliability

Title of the subject		Hungarian		Minőségbiztosítás és megbízhatóság				Level	MSc		
		English		Quality assurance and reliability				Code	DUEN(L)-MGT-263		
Responsible Academic Unit				Institute of Engineering, Department of Mechanical and Energy Engineering							
Compulsory prerequisite subject											
Type		Seminar						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	2	weekly	1	weekly	0	E	5	English	
part time		Per semester	10	Per semester	5	Per semester	0				
Teacher responsible for the course				name		Dr. Hári László Róbert			position:	Assistant Professor	
Educational goals				Goals, development objectives							
				The aim of the course is for students to gain a practical understanding of the principles of quality assurance and reliability, and to be able to apply them in technical and organizational settings. The focus is on decision support and methods applicable in industrial practice.							
				The course builds on fundamental technical knowledge and a basic statistical mindset but does not require an advanced mathematical background. It complements subjects such as production management, process improvement, and systems design. Students will be able to identify quality and reliability issues and apply analytical and decision-support tools. Their systems-level thinking and practical problem-solving skills within an industrial context will be enhanced.							
Typical delivery methods				Lecture	Presentation using a projector and whiteboard						
				Seminar	Classroom exercise, prepared student contribution, presentation, analysis of case studies						
				Lab							
Requirements				Knowledge							
				The course contributes to the integration of technical and management perspectives, with particular emphasis on the application of quality assurance and reliability methods.							
				Skills							
				It makes students to be able to complete tasks related to the subject matter.							
				Attitude							
Brief description of the subject content				It develops students' problem-solving and decision-support skills through the use of structured analysis tools.							
				Autonomy and responsibility:							
				Competencies are primarily developed through the practice of selecting tools and interpreting results.							
Brief description of the subject content				The course provides an overview of the fundamental concepts, methods, and applications of quality assurance and reliability within technical and organizational contexts. It introduces the principles of quality management systems (e.g., ISO 9001), process behavior and variability management, as well as essential statistical concepts and tools. The course covers the application of process control, failure analysis, and risk assessment methods, and provides an introduction to the fundamentals and simple models of reliability. Students will master the practical application of basic quality assurance and reliability tools, particularly within an Excel environment (e.g., descriptive statistics, simple control charts). They will be able to conduct structured analyses of typical quality-related problems (e.g., Pareto analysis, cause-and-effect diagrams, FMEA) and interpret the results. They will gain experience in selecting appropriate methods and utilizing analyses to support decision-making.							
Types of student activity				In-class and independent processing of listening and reading materials.							
Required reading and resources				- Dumitrescu, C. D., Țișcă, I. A., & Kis, K. (2019). <i>Quality management for engineers</i>. Szegedi Tudományegyetem. https://dtk.tankonyvtar.hu/handle/123456789/13188 - Chorafas, D. N. (2013). <i>Quality control applications</i>. Springer London. https://doi.org/10.1007/978-1-4471-2966-0							

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Recommended reading and its availability	• Qamar, S. Z., Al-Hinai, N., & Márquez, F. P. G. (Eds.). (2024). Quality control and quality assurance: Techniques and applications. IntechOpen. https://doi.org/10.5772/intechopen.111297 • Mitra, A. (2021). Fundamentals of quality control and improvement (5th ed.). John Wiley & Sons. https://doi.org/10.1002/9781119692379 • Timmerman, J. G., Gardner, M. J., & Ravenscroft, J. E. (1996). Quality assurance (Vol. 4; RIZA Report No. 95.067). UN/ECE Task Force on Monitoring and Assessment, RIZA. https://unece.org/DAM/env/water/publications/documents/quality_assurance.pdf
Assignments	The assessment evaluates the student's methodological proficiency and decision-supportive thinking, using the form of assessment selected by the instructor.
Description of midterm tests	Full-time program: • Mid-term test: in the week of the penultimate lecture, • Retake mid-term test: in the week of the final lecture. Part-time program: • Mid-term test: in the penultimate week of the study period, • Retake mid-term test: in the final week of the study period.
Framework and rules for the use of artificial intelligence	Students are free to use artificial intelligence, with the exception of assessments.

Operations Research M

Title of the subject		Hungarian		Operációkutatás M						Level		MSc	
		English		Operations Research M						Code		DUEN(L)-IMA-253	
Responsible Academic Unit				Institute of Informatics, Department of Mathematics and Computer Science									
Compulsory prerequisite subject													
Type		Number of Lessons						Requirement	Credits	Language of instruction			
		Lecture		Seminar		Lab							
Full time		weekly	1	weekly	0	weekly	2	E	5	English			
part time		Per semester	5	Per semester	0	Per semester	10						
Teacher responsible for the course				name		Dr. Papp Zoltán				position:	Associate Professor		
Educational goals				Goals, development objectives									
				The aim of the course is to familiarize students with the methods of scientific analysis and optimization of decision-making problems arising in complex economic, engineering, logistics, and information systems. The course focuses on the formulation of mathematical models supporting rational decision-making, the fundamentals of linear and integer programming, and the application of network planning and capacity optimization techniques. Students will develop the ability to formalize real-world decision problems, construct mathematical models, solve them using manual and computer-based methods, and interpret optimization results for decision support purposes.									
				Students will acquire knowledge of the theoretical foundations of operations research, mathematical modelling of decision-making problems, and optimization methods supporting rational decisions. They will understand: principles of mathematical modelling and optimization; linear programming models, objective functions, constraints, and feasible regions; graphical solution methods and the fundamentals of the simplex method; basics of sensitivity analysis;									
				integer and binary programming models; assignment problems and the Travelling Salesman Problem; network planning techniques, including Critical Path Method (CPM); capacity planning, resource allocation, logistics optimization, and cost minimization;									
				principles and application areas of computer-based optimization tools and solvers.									
Typical delivery methods				Lecture	Presentation using a projector and whiteboard								
				Seminar									
				Lab	Classroom exercise, prepared student contribution, presentation, analysis of case studies								
Requirements				Knowledge									
				The course contributes to the development of competencies expected from graduates of the Engineering Management MSc program by enabling students to: analyze and formalize complex economic, engineering, logistics, and information-system problems									
				Skills									
				apply qualitative methods and mathematical models to support decision-making; use optimization techniques for planning, scheduling, resource allocation, and process improvement									
				Attitude									
				develop systematic and model-based problem-solving skills; use professional optimization software tools; critically interpret analytical results and formulate evidence-based recommendations;									
				Autonomy and responsibility:									
				work independently and collaboratively on complex decision-support tasks; demonstrate responsibility in model development, evaluation, and professional decision-making.									
Brief description of the subject content				Modeling and problem-solving—manual and computational (formulating linear programming models based on practical examples; graphical solution method for two									

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	variable problems; manual execution of simplex algorithm steps). Use of computer applications (solving linear and integer programming models using software; practical modeling and optimization of transportation problems). Project and network planning exercises (drawing and analyzing networks; determining the critical path; lead times and slack times; activity scheduling). Integer programming exercises (modeling binary optimization problems; solving assignment problems using the Hungarian method; handling small-scale instances of the traveling salesman problem).												
Types of student activity	Mastering theoretical material under guidance and independently. Solving problems under guidance and independently. Studying theoretical material under guidance: 10% Studying theoretical material independently: 30% Solving problems under guidance: 30% Solving problems independently: 30%												
Required reading and resources	H. A. Eiselt, Carl-Louis Sandblom: Operations Research – A Model-Based Approach, 2022, Springer Cham, ISBN: 978-3-030-97161-8												
Recommended reading and its availability	A. Ravi Ravindran, Donald P. Warsing, Jr., Paul M Griffin: Supply Chain Engineering – Models and Applications, (2. Edition), 2023, CRC Press Taylor & Francis Group, ISBN: 978-1-032-25475 - Lee Elkin, Richard Pettigrew: Opinion Pooling, 2025, Cambridge University Press, ISBN: 9781009315203												
Assignments	The final grade is determined based on the combined results of the mid-term tests and the exam paper, as follows: To achieve a passing grade ("Sufficient"), a student must obtain at least 51% of the total possible points (51 points). Students who fail to complete all mid-term tests during the semester will receive a "Not Completed" status. Grades may be obtained during the exam period in accordance with the provisions of the Academic and Examination Regulations. During the exam period, a retake/improvement exam covering the entire course material may be taken. Grades are determined according to the following table: <table border="1"> <thead> <tr> <th>Score</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>0 – 50</td> <td>Fail (Insufficient)</td> </tr> <tr> <td>51 – 60</td> <td>Pass (Sufficient)</td> </tr> <tr> <td>61 – 80</td> <td>Satisfactory (Average)</td> </tr> <tr> <td>81 – 90</td> <td>Good</td> </tr> <tr> <td>91 – 100</td> <td>Excellent (Outstanding)</td> </tr> </tbody> </table>	Score	Grade	0 – 50	Fail (Insufficient)	51 – 60	Pass (Sufficient)	61 – 80	Satisfactory (Average)	81 – 90	Good	91 – 100	Excellent (Outstanding)
Score	Grade												
0 – 50	Fail (Insufficient)												
51 – 60	Pass (Sufficient)												
61 – 80	Satisfactory (Average)												
81 – 90	Good												
91 – 100	Excellent (Outstanding)												
Description of midterm tests	Full-time students must complete two in-class tests (in weeks 6 and 11). A maximum of 30 points can be earned on each test. During the exam period, students take a 40-point (40%) exam. For each test, students must achieve at least 50% of the available points, and the combined score of the two tests must reach at least 51%. Part-time students must complete one in-class test. A maximum of 40 points can be earned on this test. During the exam period, students take a 60-point (60%) exam. For each test, students must achieve at least 50% of the available points, and the test score must reach at least 51%.												
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted. Artificial intelligence is permitted for checking homework, accelerating the learning process, and generating sample examples to facilitate the understanding of concepts, but its use is prohibited during exams.												

Applied Mechanics and Modelling

Title of the subject		Hungarian		Alkalmazott mechanika és modellezés						Level		MSc	
		English		Applied Mechanics and Modelling						Code		DUEN(L)-MGT-264	
Responsible Academic Unit				Institute of Engineering, Department of Energy and Mechanical Engineering									
Compulsory prerequisite subject													
Type		Number of Lessons						Requirement	Credits	Language of instruction			
		Lecture		Seminar		Lab							
Full time		weekly	1	weekly	2	weekly	0	E	5	English			
part time		Per semester	5	Per semester	10	Per semester	0						
Teacher responsible for the course				name		Ladányi Gábor				position:	Master instructor		
Educational goals				Goals, development objectives									
				The aim of the course is to develop the modelling and optimisation skills necessary for the mathematical underpinning of engineering decisions.									
				The course builds on the fundamental knowledge of mechanics acquired during the BSc programme.									
				The course aims to strengthen students' abilities to mathematically formalise engineering phenomena, critically interpret the models used, and independently apply numerical methods in engineering decision-making situations. The course promotes the development of model-based thinking, optimisation skills and risk-aware decision-making.									
Typical delivery methods				Lecture	Lectures are designed to present theoretical concepts, models and methods.								
				Seminar	Classroom exercises, student contributions, presentations and the analysis of case studies. The practical sessions support application and understanding through business examples and exercises.								
				Lab									
Requirements				Knowledge									
				By mastering the subject, the student gains an overview of the general method of technical problem-solving.									
				Skills									
				With its help, you will be able to analyze problems and select physical and mathematical models of appropriate accuracy and efficiency.									
				Attitude									
				The student will become familiar with and learn to apply the mathematical methods suitable for solving these models. They will be able to analyze and interpret the results, determine the correctness and validity of the findings, and refine the model.									
Brief description of the subject content				Autonomy and responsibility:									
				Based on the model's results, the student will be able to draw conclusions and prepare for or make decisions regarding the technical problem.									
				The course enables the student to solve complex technical problems in collaboration with experts from other fields. They will be able to summarize and share their modeling-related reasoning and results with others.									
				The process of modeling; the relationship between the model and reality.									
				Classification of physical models for engineering problems:									
				• By physical phenomenon: thermal, mechanical, and fluid-flow models, etc.									
				• By temporal behavior.									
				• By spatial description.									
				Classification of mathematical models:									
				• linear and nonlinear systems of equations,									
				• initial-value and boundary-value problems,									
				• variational problems,									
				• eigenvalue problems.									
				Solution methods for mathematical models:									
				• Nature of the solution: analytical and numerical methods.									

	- Qualitative characteristics of the solution: existence, uniqueness, convergence, stability. Interpretation of measurement results from physical (engineering) processes; selection of physical model parameters. Checking the validity of the physical model (validation). Formulation and solution of the mathematical model. Errors in the mathematical model. Checking the model solution (verification). Model refinement. Checking the correctness of the model (validation). Practical examples: - Average temperature of a cooling solid body, 1D model of heat conduction; temperature distribution in a heated solid rod, - Model of oblique projectile motion without and with air resistance, - Modeling fluid outflow from a tank, - Modeling mass transfer between two tanks, - Single- and two-species population models, - Modeling the deformation of elastic bodies, - Modeling structural vibrations, - Modeling the flow of liquids and gases.
Types of student activity	Guided theoretical study: 10% Independent theoretical study: 30% Guided problem-solving: 30% Independent problem-solving: 30%
Required reading and resources	- Dean C. Karnopp, Donald L. Margolis and Ronald C. Rosenberg: System Dynamics: Modeling, Simulation, and Control of Mechatronic Systems, Fifth Edition, 2012 John Wiley & Sons, Inc. - Osama Gad: System Dynamics Modeling, Simulation, and Response, Taylor and Francis, 2025 - William J. Palm: System Dynamics, McGraw-Hill, 2021
Recommended reading and its availability	- W.H. Press, S.A. Teukolsky, W.T. Vetterling, B.P. Flannery: Numerical Recipes, Cambridge University Press - Setevn C. Chapra, Raymond P. Canale: Numerical Methods for Engineers, McGraw-Hill, 2025 - Singiresu S. Rao: Applied Numerical Methods for Engineers and Scientists, Prentice Hall, 2002
Assignments	The course requires 5 compulsory and 5 optional homework assignments. To receive a pass, students must submit the 5 compulsory homework assignments to an assessable standard by the deadline. The final mark is determined on the basis of the optional homework assignments.
Description of midterm tests	There are no mid-term tests for this course.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence tools is partially permitted during the course: - The use of artificial intelligence tools is allowed during the preparation of homework assignments. Students are responsible for the content and format of the solutions; if it does not meet the requirements, the homework is invalid. - The use of artificial intelligence tools is strictly prohibited in any form during the assessment of student knowledge (mid-term tests, exams).

Business Statistics and Data Mining

Title of the subject		Hungarian		Üzleti statisztika és adatbányászat				Level	MSc		
		English		Business Statistics and Data Mining				Code	DUEN(L)-TGT-255		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject				DUEN-IMA-156							
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	2	weekly	0	E	5	English	
part time		Per semester	5	Per semester	10	Per semester	0				
Teacher responsible for the course				name		Dr. Saleh Saleh Mohamad Ali			position:	Assistant Professor	
Educational goals				Goals, development objectives							
				The aim of the course is to provide students with knowledge of statistical and data mining methods applicable to business decision support and to develop their ability to prepare, model, and interpret data-driven decisions in complex business and engineering environments.							
				The course builds upon the statistical, mathematical, and information technology foundations acquired at the BSc level, including the use of software tools such as Microsoft Excel and SPSS. Within both the MSc in Management and Leadership and the MSc in Engineering Management programs, the course is designed to develop competencies related to data-driven decision-making.							
				The relevance of the course is based on the increasing importance of data analysis and predictive modelling in modern organizations, where evidence-based insights play a critical role in both strategic and operational decision-making.							
Typical delivery methods				Lecture	The course is delivered through classroom-based or online lectures, including instructor-led knowledge transfer, presentations, case study discussions, and interactive question-and-answer sessions.						
				Seminar	Practical classes are conducted in either classroom or online formats and involve student presentations, structured contributions, discussion of analytical findings, and the solution of practical data analysis tasks.						
				Lab							
Requirements				Knowledge							
				- Knows the theoretical foundations and application possibilities of statistical and data mining methods. - Knows the full process of data analysis from data collection to interpretation. - Knows multivariate statistical methods and basic machine learning procedures. - Knows the methodology of data-driven decision-making. - Knows the ethical and data protection issues of data management.							
				Skills							
				- Able to prepare, clean and structure data. - Able to perform and interpret statistical analyses. - Able to apply regression and multivariate models. - Able to use basic data mining and machine learning methods. - Able to provide business interpretation and presentation of data analysis results. - Able to develop decision support models.							
				Attitude							
				- Open to learning about and embracing applied development and innovation related to their qualification and field of expertise that is based on statistics and data mining. - Interested in new methods and tools related to the field. - Strives for well-founded, objective decision-making							

	Autonomy and responsibility: • Able to independently plan and carry out data analysis tasks. • Takes responsibility for the correct interpretation and use of data. • Takes into account the ethical and legal requirements of data management.
Brief description of the subject content	- Introduction to data analysis and decision support: the role of data in understanding business and economic processes. - Data types and data sources: primary and secondary data, survey-based and administrative databases. - Data preparation and data quality management: data cleaning, handling missing values, and data transformation techniques. - Descriptive statistics: measures of central tendency, measures of dispersion, and interpretation of statistical distributions. - Data visualization: graphical tools and dashboard fundamentals in a business context. - Fundamentals of probability theory and the management of uncertainty in decision-making. - Statistical inference: estimation and hypothesis testing. - Relationship analysis: correlation and regression analysis (linear and multiple regression). - Multivariate statistical methods: factor analysis, cluster analysis, and discriminant analysis. - Fundamentals of data mining: pattern recognition, prediction, and classification techniques. - Introduction to machine learning concepts: supervised and unsupervised learning through business applications. - Fundamentals of time series analysis: trend analysis, seasonality, and forecasting methods. - Interpretation of results: economic and managerial interpretation of statistical findings. - Ethical and data protection issues: data governance, bias, and responsible data usage. - Software applications: practical statistical and data analysis techniques using Microsoft Excel and the R programming environment. - Identifying data sources and collecting, structuring, and preparing business and economic data for analytical purposes. - Performing data cleaning procedures, handling missing values, conducting data transformations, and identifying data quality issues. - Calculating and interpreting descriptive statistical measures using real business datasets. - Applying data visualization techniques through the creation of charts, reports, and basic management dashboards. - Applying probability and statistical inference methods in practice, including estimation procedures and hypothesis testing. - Conducting correlation and regression analyses, interpreting model outputs, and applying findings to business decision-support situations. - Using multivariate statistical methods, including factor analysis, cluster analysis, and discriminant analysis, to address business problems. - Performing basic data mining procedures and developing simple predictive and classification models. - Applying supervised and unsupervised machine learning techniques in practical examples. - Analyzing time-series data, identifying trends and seasonal effects, and preparing simple forecasts. - Interpreting analytical results, drawing business conclusions, and developing decision-support recommendations. - Applying ethical, legal, and data protection principles in analytical work. - Independently conducting basic statistical and data mining analyses in Microsoft Excel and R, documenting findings, and presenting results in a professional manner.
Types of student activity	Acquisition of theoretical material under guidance and independently. Task solving under guidance and independently. Learning of theoretical material under guidance: 10% Independent learning of theoretical material: 30%

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	Task solving under guidance: 30% Independent task solving: 30%
Required reading and resources	• Sunil Chopra (2025): Supply Chain Management, Strategy, Planning and Operation, Pearson , 8 edition • C. John Langley Jr., Robert Novack, Brian Gibson, John Coyle (2021): <i>Supply Chain Management: A Logistics Perspective</i> (11th edition, 2021) 672.pp.
Recommended reading and its availability	• David Simchi-Levi, Philip Kaminsky, Edith Simchi – Levi (2021): Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies (4th edition, 2021), https://me-l.co/ip4vv8so
Assignments	An individual or group data analysis project serving as an assignment; completion is a prerequisite for obtaining the semester signature, and the result determines the final grade.
Description and schedule of the in-class test	Taking a midterm test during the exam period
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted. Artificial intelligence is allowed for checking homework assignments, accelerating the learning process, and generating sample examples to facilitate easier understanding of concepts, but its use is prohibited in closed-book tests/midterm exams.

Computer modeling and simulation

Title of the subject		Hungarian		Számítógépes modellezés és szimuláció				Level		MSc	
		English		Computer modeling and simulation				Code		DUEN(L)-MUG-220	
Responsible Academic Unit				Institute of Engineering, Department of Energy and Mechanical Engineering							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	0	weekly	2	M	5	English	
part time		Per semester	5	Per semester	0	Per semester	10				
Teacher responsible for the course				name		Ladányi Gábor			position:	Master instructor	
Educational goals				Goals, development objectives To familiarise students with the most important numerical modelling methods, and to provide a brief introduction to the mathematical and numerical modelling of complex technical and physical processes encountered in engineering practice. With this knowledge, students will be able to analyse processes occurring across a broad spectrum of mechanical engineering, as well as perform finite element strength calculations (FEM) for mechanical equipment and computer-aided modelling of thermal and fluid flow processes using ANSYS CFX.							
				Typical delivery methods				Lecture			
Seminar											
Lab								Whiteboard-based calculation exercises in groups of up to 30 students.			
Requirements				Knowledge The course develops competencies in numerical modeling and simulation for the analysis of complex engineering systems.							
				Skills							
				Students will be able to construct models and interpret results.							
				Attitude							
				It strengthens problem-solving thinking.							
Brief description of the subject content				Autonomy and responsibility: It contributes to the use of modern engineering tools.							
				Numerical solution methods for mathematical models describing structural, thermal and fluid flow processes. The most commonly used numerical methods, discretisation techniques, and the fundamentals of the finite volume method. Fundamental iterative solution methods for systems of linear equations with specific coefficient matrices obtained during discretisation (Gauss-Seidel, Conjugate Gradient, Multi-Grid). The advantages, disadvantages and applicability of these methods. The structure of the ANSYS and ANSYS-CFX software systems; INPUT/OUTPUT data; specification and interpretation of boundary conditions; the mathematical form of individual boundary conditions. Applications in solid mechanics using finite element software; shape optimisation. Solving key thermal and flow problems using finite volume software.							
Types of student activity				Listening comprehension with note-taking and consolidating the material using one's own notes and electronically available resources: 40% Independent execution of measurement practices: 20% Guided and independent processing of tasks: 20% Solving test questions: 20%							
Required reading and resources				- Daryl L. Logan (2023): <u>A First Course in the Finite Element Method</u>, Cengage Learning (earlier: CL Engineering) ISBN-13: 978-0357676424 - Saeed Moaveni (2021): Finite Element Analysis: Theory and Application with ANSYS, Pearson ISBN-13: 978-0135212103 (E-textbook: 978-0135213537, printed book: 978-0136681632) [1, 2, 3, 4]							

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	Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt (2001): Concepts and Applications of Finite Element Analysis, John Wiley & Sons ISBN-13: 978-0471356059 [1, 2, 3]
Recommended reading and its availability	O. C. Zienkiewicz, R. L. Taylor, S. Govindjee (2024): The Finite Element Method, Butterworth-Heinemann (Elsevier) ISBN-13: 978-0443160448 - Klaus-Jürgen Bathe (2014): Finite Element Procedures, Klaus-Jürgen Bathe (earlier: Prentice Hall), (2. edition) ISBN-13: 978-0979004339 - Thomas J. R. Hughes (2000): The Finite Element Method: Linear Static and Dynamic Finite Element Analysis, Dover Publications, ISBN-13: 978-0486411811
Assignments	-
Description of midterm tests	Writing 2 mid-term exams at the times specified during the first lecture. To obtain the final course credit, a minimum score of 51% must be achieved on each mid-term test.
Framework and rules for the use of artificial intelligence	Partial permission: the use of artificial intelligence is allowed for certain task types (e.g., in-class work, assignments), but prohibited in other cases (e.g., mid-term tests). Within the framework of this course, artificial intelligence may be used for gathering information and writing the theoretical section of laboratory reports.

Maintenance strategies

Title of the subject		Hungarian		Karbantartási stratégiák						Level	MSc
		English		Maintenance strategies						Code	DUEN(L)-MUG-255
Responsible Academic Unit				Institute of Engineering, Department of Energy and Mechanical Engineering							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	2	weekly	1	weekly	0	M	5	English	
part time		Per semester	10	Per semester	5	Per semester	0				
Teacher responsible for the course				name		Dr. Szabó Attila			position:	Associate Professor	
Educational goals				Goals, development objectives							
				By mastering the latest trends in maintenance strategies, students will be able to plan and optimise maintenance activities, identify and eliminate equipment weaknesses, select technologies to enhance durability, and design bespoke maintenance technologies.							
Typical delivery methods				Lecture	For all students in a large lecture hall, using a blackboard and a projector.						
				Seminar	. Board-based calculation exercises in groups of up to 30 people.						
				Lab							
Requirements				Knowledge							
				The course contributes to the integrated development of students' technical and economic perspectives by fostering complex, system-level thinking through the planning and optimization of maintenance strategies.							
				Skills							
				The knowledge and methods acquired during the course support decision preparation and efficient resource management, in alignment with the problem-solving and decision-making competencies expected in the training.							
				Attitude							
Brief description of the subject content				The practical tasks develop students' collaboration, analytical, and innovation skills, and reinforce a quality- and reliability-oriented mindset.							
				Autonomy and responsibility:							
				In addition, the course fosters the sense of responsibility and the drive for continuous professional development required for independent professional work.							
Types of student activity				Maintenance systems and strategies. The relationship between maintenance and production. General maintenance philosophies/strategies: run-to-failure (FBCM), scheduled preventive maintenance (PM), condition-based maintenance systems (CBM, CCM, CM); reliability-centred maintenance (RCM), total productive maintenance (TPM), risk-based maintenance (RBM, RBIM), parameter-condition-based maintenance (PCBM), automated maintenance (AM). The RCM toolkit. Methods for analysing reliability. The TPM toolkit. Applications of maintenance strategies. Strategies with a fixed cycle structure. Strategies with a flexible cycle structure. Strategies based on economic and reliability criteria. Replacement (substitution) measures. Restoration (repair) processes. Restoration methods. Issues relating to service life (durability). Technologies for extending service life. The interrelationship between properties, usage and technologies. The role and significance of traditional sur-face modification technologies, modern thin-film coatings, plasma beam processes, laser beam processes and surface layer characterisation in the development of maintenance strategies.							
				Listening comprehension with note-taking and consolidating the material using both personal and electronically available notes: 40%							
				Independent performance of measurement exercises: 20%							
				Guided and independent processing of tasks: 20%							
Required reading and resources				Solving test tasks: 20%							
Required reading and resources				Terry Wireman, Maintenance Strategy Series - Six Book Bundle Hardcover, August 26, 2014, ISBN-13 978-1941872277							
				Terry Wireman, Total Productive Maintenance (Volume 1) Second Edition, ISBN-13 978-083113172, 2005.							

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Recommended reading and its availability	Anthony Kelly, Strategic Maintenance Planning, 1st Edition - May 10, 2006, Paperback ISBN: 9780750669924, eBook ISBN: 9780080478999
Assignments	Based on instructions ocmpletion of 2 homework assignments during the semester
Description and schedule of the in-class test	2 tests during the semester in the 6 th and 13 th week
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is permitted in the preparation of the homework assignment; however, its exclusive use is not allowed. A review of relevant literature is essential and will be verified as part of the assessment. The use of AI in other cases (e.g., exams or mid-term tests) is strictly prohibited.

Business Competency Development Training

Title of the subject		Hungarian		Üzleti kompetencia fejlesztő tréning				Level	MSc		
		English		Business Competency Development Training				Code	DUEN(L)-TGT-216		
Responsible Academic Unit				Institute of Social Sciences, Department of Organisational Development and Communication Science							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	0	weekly	3	weekly	0	M	5	English	
part time		Per semester	0	Per semester	15	Per semester	0				
Teacher responsible for the course				name		Dr. habil Balázs László			position:	Associate Professor	
Educational goals				Goals, development objectives							
				The aim of the course is to develop the key competencies required for effective business performance through training-based learning methods, with particular emphasis on communication, decision-making, cooperation, and problem-solving skills. The course builds upon students’ general communication skills and foundational business knowledge. It complements the economic and management-related core curriculum and provides a foundation for subsequent courses in leadership and project management.							
				The course adopts a competency-based, experiential learning approach. Through realistic business situations, simulations, and role-playing exercises, students develop practical skills that are reinforced through structured feedback and self-reflection processes.							
				This methodological approach directly supports the objectives of the degree programme by fostering practice-oriented thinking, collaboration, and reflective professional behavior, all of which are essential for effective participation in complex business and organizational environments.							
Typical delivery methods				Lecture	The course is delivered through classroom-based practical sessions that emphasize active student participation. Teaching methods include structured student contributions, individual and group training exercises, situational exercises and role-playing activities, case study analysis, collaborative problem-solving, structured feedback sessions, and self-reflection assignments.						
				Seminar	The training-oriented approach is based on experiential learning principles, enabling students to develop and practice key business and managerial competencies through realistic organizational situations and interactive exercises.						
				Lab							
Requirements				Knowledge							
				Knows the basic models of business communication, decision-making and cooperation.							
				Skills							
				• Able to communicate effectively in business situations. • Able to engage in structured problem-solving. • Able to evaluate decision alternatives. • Able to handle conflicts. • Able to cooperate and take on roles within a group.							
				Attitude							
				• Open to feedback. • Characterised by a developmental mindset. • Takes responsibility for their own development. • Consciously develops their competencies. • Aware of their own functioning/behaviour.							

	Autonomy and responsibility: • Takes responsibility for their own development. • Consciously develops their competencies.
Brief description of the subject content	The course is organized around a series of interconnected competency development modules that guide students from self-awareness and competency awareness toward the development of business communication, assertiveness, feedback culture, decision-making, and problem-solving skills. These are followed by practical applications in teamwork, collaboration, and conflict management, culminating in leadership exercises and an integrated business simulation. The main thematic areas include: 1. Self-awareness and competency awareness 2. Fundamentals of business communication 3. Assertiveness and feedback 4. Decision-making and problem-solving 5. Teamwork and collaboration 6. Conflict management 7. Leadership roles and situational exercises 8. Integrated simulation (complex business environment) Within the framework of the course, students acquire the following practical knowledge: • Structured planning and delivery of business communication situations (negotiation, presentation, feedback) • Application of assertive communication techniques in various organisational situations • Practical use of decision-making models (identifying alternatives, risk analysis, prioritisation) • Application of structured problem-solving methods (e.g. root cause analysis, decision matrices) • Recognition and conscious management of roles in group work • Practical application of conflict management strategies • Establishment of effective cooperation in multidisciplinary teams • Practising communication and decision-making in managerial situations • Application of reflection techniques (self-assessment, processing peer feedback) • Participation in complex business simulations and performance evaluation
Types of student activity	Task solving under guidance: 40% Independent task solving: 60%
Required reading and resources	• University of Minnesota Libraries Publishing. (2015). Business communication for success (Open textbook ed.). https://open.lib.umn.edu/businesscommunication/ • Black, J. S., Bright, D. S., Gardner, D. G., Hartmann, E., Lambert, J., Leduc, L. M., Leopold, J., O'Rourke, J. S., Pierce, J. L., Steers, R. M., Terjesen, S., & Weiss, J. (2019). Organizational behavior. OpenStax. https://openstax.org/details/books/organizational-behavior • Piercy, C. W. (2019). Problem solving in teams and groups. University of Kansas Libraries. https://opentext.ku.edu/teams
Recommended reading and its availability	• Kolb, A. Y., & Kolb, D. A. (2017). Experiential learning theory as a guide for experiential educators in higher education. <i>Experiential Learning and Teaching in Higher Education</i>, 1(1), 7–44. https://nsuworks.nova.edu/elthe/vol1/iss1/7 • Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. <i>Psychological Science in the Public Interest</i>, 13(2), 74–101. https://doi.org/10.1177/1529100612436661 • Smith, J. (2019). Communication at work: A college-to-career guide to success. eCampusOntario. https://ecampusontario.pressbooks.pub/communicationatwork/
Assignments	Throughout the semester, students complete a series of interconnected competency development assignments. As part of the assessment process, students prepare an individual reflective journal in which they analyze their experiences, developmental progress, and learning outcomes gained during the training exercises. In addition, students complete a group project

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	involving the analysis and resolution of a complex business situation, during which they apply communication, decision-making, and collaboration competencies. At the end of the semester, students participate in an integrated situational exercise in which they demonstrate the practical application of the competencies acquired throughout the course in a realistic business environment.
Description and schedule of the in-class test	None
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted! The use of AI is supported for: assisting self-reflection, modelling situations, and practising communication patterns. Prohibited: manipulation of assessment situations.

Innovative Decision Models

Title of the subject		Hungarian		Innovatív döntési modellek				Level	MSc	
		English		Innovative Decision Models				Code	DUEN(L)-TGT-219	
Responsible Academic Unit				Institute of Social Sciences, Department of Economics						
Compulsory prerequisite subject										
Type		Number of Lessons						Requirement	Credits	Language of instruction
		Lecture		Seminar		Lab				
Full time		weekly	1	weekly	2	weekly	0	M	5	English
part time		Per semester	5	Per semester	10	Per semester	0			
Teacher responsible for the course				name		Dr. Czinkóczy Sándor			position:	Assistant Professor
Educational goals				Goals, development objectives						
				The aim of the course is to prepare students to design, validate, and develop innovative business models, with particular emphasis on the challenges arising from the digital economy, platform-based business operations, and sustainable business solutions.						
				The course builds upon the management and economic foundations acquired at the BSc level. Within the MSc in Engineering Management and the MSc in Management and Leadership programs, the course supports the development of strategic thinking, innovation management, and business model design competencies.						
				The relevance of the course lies in the fact that, in a rapidly changing technological and economic environment, corporate competitiveness increasingly depends on the ability to create, adapt, and continuously improve innovative business models.						
Typical delivery methods				Lecture	The course is delivered through interactive lectures supported by PowerPoint presentations. Practical sessions involve collaborative student work, the development of Business Model Canvases, prototype development activities, case study analyses, presentations, and business pitch exercises.					
				Seminar	Through project-based learning and experiential activities, students apply theoretical concepts in realistic business contexts, develop innovation-oriented thinking, and strengthen their entrepreneurial and strategic competencies.					
				Lab						
Requirements				Knowledge						
				- Knows the structure and main types of business models. - Knows the methods of developing innovative business models (e.g. Business Model Canvas, Lean Canvas). - Knows the theoretical foundations of disruptive innovation, the platform economy and ecosystem-based operation. - Knows the business impacts of digital transformation and data-driven operation. - Knows the characteristics of sustainable and circular business models.						
				Skills						
				- Able to structurally analyse and compare business models. - Able to develop a new business model concept and visualise it (e.g. using canvas-based tools). - Able to test and validate innovative business models (MVP, Lean Startup methods). - Able to present business ideas and defend them in professional discussion. - Able to solve complex business problems by collaborating in a team.						
				Attitude						
				- Open to innovation and the adoption of new business solutions. - Strives to apply creative and critical thinking. - Interested in technological and sustainability trends.						

	Autonomy and responsibility: • Able to independently develop business model proposals. • Takes responsibility for activities carried out individually and in group work. • Takes into account the economic, social and environmental consequences of business decisions.
Brief description of the subject content	The course examines the role and application of innovative business models in the modern economy. The main topics of the course are: the concept and components of business models, the application of the Business Model Canvas, Value Proposition Canvas and Lean Canvas, disruptive innovation and Blue Ocean strategy, platform- and ecosystem-based models, network effects, digital business models and data-driven operation, the sharing economy and subscription models, and the circular economy and sustainable business models. The course also covers the practical steps of developing business models, including testing (MVP), validation, iteration and scaling, as well as issues of organisational implementation. Case studies and project assignments support practical application.
Types of student activity	Acquisition of theoretical material under guidance and independently. Task solving under guidance and independently. • Learning of theoretical material under guidance: 10% • Independent learning of theoretical material: 30% • Task solving under guidance: 30% • Independent task solving: 30%
Required reading and resources	• Aagaard, A. (Ed.). (2024). Business Model Innovation: Game Changers and Contemporary Issues. Palgrave Macmillan. ISBN 978-3-031-57511-2. https://doi.org/10.1007/978-3-031-57511-2 • Glückler, J., & Panitz, R. (Eds.). (2024). Knowledge and digital technology. Springer. ISBN: 978-3-031-39101-9 https://doi.org/10.1007/978-3-031-39101-9 • Huang, L., & Peissl, W. (2023). Artificial intelligence—A new knowledge and decision-making paradigm? In L. Hennen, J. Hahn, M. Ladikas, R. Lindner, W. Peissl, & R. van Est (Eds.), Technology assessment in a globalized world (pp. 175–201). Springer. https://doi.org/10.1007/978-3-031-10617-0_9 • Leewis, S., Smit, K., & Versendaal, J. (2024). Discovering operational decisions from data—a framework supporting decision discovery from data. Decision, 51, 417–436. https://doi.org/10.1007/s40622-024-00402-2
Recommended reading and its availability	• Bork, D., Ali, S. J., & Dinev, G. M. (2023). AI-enhanced hybrid decision management. Business & Information Systems Engineering, 65, 179–199. https://doi.org/10.1007/s12599-023-00790-2 • Swanepoel, D., & Corks, D. (2024). Artificial intelligence and agency: Tie-breaking in AI decision-making. Science and Engineering Ethics, 30, Article 11. https://doi.org/10.1007/s11948-024-00476-2
Assignments	-During the semester, students work in groups to develop an innovative business model, including its design, validation, and presentation. Successful completion of the project assignment is a prerequisite for obtaining course completion.
Description of midterm tests	- -Assessment is based on both a written examination and the evaluation of the project work completed during the semester. The final grade is determined by a combination of classroom participation and performance, the quality of the project assignment, and the results of the written assessment.

Thesis 1.

Title of the subject		Hungarian		Diplomamunka 1.				Level	MSc	
		English		Thesis 1				Code	DUEN(L)-MUG-096	
Responsible Academic Unit				Institute of Engineering, Department of Mechanical and Energy Engineering						
Compulsory prerequisite subject										
Type		Weekly teaching hours						Requirement	Credits	Language of instruction
		Lecture		Seminar		Lab				
Full time		weekly	0	weekly	4	weekly	0	E	5	English
part time		Per semester	0	Per semester	20	Per semester	0			
Teacher responsible for the course				name		Prof. Dr. habil Sánta Róbert			position:	University Professor
Educational goals				Goals, development objectives						
				The aim of the course is to enable technical management students to acquire the essential research skills required for thesis writing, which is a compulsory component for graduation.						
				The course allows students to develop comprehensive and practical solutions to real-world problems, as well as to present the research findings of their thesis clearly and convincingly, both in writing and orally. Students will become familiar with various research methods, including the design and implementation of surveys and qualitative interviews. During the course, students will also learn how to record and organize their research results in descriptive or numerical form.						
Typical delivery methods				Lecture	In a classroom suitable for lectures using a projector, or via the Microsoft Teams platform					
				Seminar	.					
				Lab						
Requirements				Knowledge						
				The course provides an opportunity for independent professional problem analysis and research activity. designing and preparing surveys and questionnaires - analyzing, critically evaluating, and organizing secondary literature - understanding the key terminology and concepts necessary for successful thesis writing - comprehending scientific systems, processes, and interconnections - recording and analyzing research results in descriptive and numerical form - This training ensures that students are capable of conducting independent research, identifying relevant problems, and proposing scientifically grounded, practical solutions in their theses.						
				Skills						
				Upon completion of the course, students will be able to: - analyze and critically evaluate the knowledge systems that characterize research in their field - locate, understand, and effectively use library resources and the scientific literature relevant to their discipline - synthesize information from multiple sources to form well-founded, independent judgments - apply acquired knowledge in a structured and methodical way to practical and research problems - present research findings clearly and convincingly, both in writing and orally, in accordance						

	Attitude • Successful researchers maintain an open-minded and impartial attitude toward the latest scientific findings while being attentive listeners and analytical thinkers. • They can form informed opinions on current trends and critically evaluate earlier research in the field of economics. • They are aware of the ethical and methodological standards of scientific work, capable of drawing objective conclusions, and able to integrate new knowledge into their existing understanding in a structured and independent manner. • They strive for continuous development of professional competencies and for presenting research results clearly and convincingly, both in writing and orally Autonomy and responsibility: It contributes to responsible decision-making. • Students demonstrate the ability to independently analyze complex professional issues, critically reflect upon and rigorously evaluate scientific findings, and integrate these insights into their own research. • Within professional contexts, they exhibit collaborative engagement, accountability, and respectful interaction with members of the academic and professional community. • They are capable of systematically identifying and resolving problems that arise throughout the research process, evaluating alternative approaches, and formulating decisions based on sound scientific reasoning. • Furthermore, they are committed to the continuous enhancement of their professional competencies and to the clear, structured, and academically rigorous presentation of research outcomes, both in written and oral formats.
Brief description of the subject content	The course familiarizes students with news trends of research methodology. The course presents the available thesis writing regulations, norms and criteria in compliance with University requirements. The course contains a thorough description and explanation of sampling, research question types, open ended questions and research scales. The planning and structuring of qualitative interview research. Data analysis, research evaluation.
Types of student activity	Research data analysis Frontal work Individual or group work Weekly consultations
Required reading and resources	• Babbie, E. R. (2021). The practice of social research (15th ed.). Cengage Learning. ISBN-13: 9780357360767 • Pearce, J. M. (2018). How to perform a literature review with free and open source software. Practical Assessment, Research & Evaluation, 23(1), Article 8. https://doi.org/10.7275/jjhz-sz75 Recommenden by the consultant, the topic is processed by literature
Recommended reading and its availability	• Dr. Pál Majoros: Research methodology or how to write a good diploma thesis easily and quickly. National Textbook Publisher, Budapest 1997. • Thomas, C. G. (2021). Research methodology and scientific writing. Springer. ISBN 9783030648657. • Zhang, Y. (2025). Research on application and innovation in civil engineering construction management. Open Access Library Journal, 12, 1–10. https://doi.org/10.4236/oalib.1112843 • Frichi, Y., Jawab, F., - Boutahari, S. (2019). An exploratory qualitative study of the influence of hospital logistics factors on quality of care and patient

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	satisfaction at public hospitals in Morocco. <i>Advances in Science, Technology and Engineering Systems Journal</i> , 4(6), 414–422. https://doi.org/10.25046/aj040652
Assignments	During the semester, students develop an innovative business model as part of a group project (planning, validation, and presentation). Completion of the assignment is a prerequisite for obtaining the course signature.
Description of midterm tests	During week 13 a presentation about a chosen topic.
Framework and rules for the use of artificial intelligence	Partial Permission: Artificial intelligence is permitted only with proper citation (APA) for the following purposes: Data collection, e.g., about the selected organization (e.g., ChatGPT, Gemini)

Energy and Environmental Policy

Title of the subject		Hungarian		Energetika és környezetpolitika				Level	MSc		
		English		Energy and Environmental Policy				Code	DUEN(L)-MGT-250		
Responsible Academic Unit				Institute of Engineering, Department of Mechanical and Energy Engineering							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	2	weekly	1	weekly	0	E	5	English	
part time		Per semester	10	Per semester	5	Per semester	0				
Teacher responsible for the course				name		Petrovickijné Dr. Angerer Ildikó			position:	Associate Professor	
Educational goals				Goals, development objectives							
				Understanding the fundamental issues of energy, its impact on the environment, and clarifying how corporate environmental policy objectives can be aligned to help address global environmental problems.							
Typical delivery methods				Lecture	Lectures using a projector for all students. Student seminar presentations.						
				Seminar							
				Lab							
Requirements				Knowledge							
				The course provides an opportunity for independent professional problem analysis and research activity. A comprehensive knowledge of the basic facts, trends and limits of the subject area of engineering and economics. Knowledge of the general and specific rules, contexts and procedures necessary for the operation of the field of engineering. Comprehensive knowledge of the main theories and problem-solving methods in the field. Has an applied knowledge of the measurement procedures used, their tools, instruments and measuring equipment. Understand, characterise and model the structure and function of the structural units and elements of systems, the design and interrelationship of the system elements used. The student will learn about energetics, environmental management systems and environmental policy. The student will understand what it means to balance needs and environmental opportunities; The student will recognise the links between natural resources and the economy-society.							
				Skills							
				Students will be able to analyse complex problems and develop proposed solutions. Ability The student can to consider environmental or social, economic energy choices and their consequences through examples; The student can explore the systemic relationships between nature, his/her own life and the environment. The student is able to analyse at a basic level the disciplines that make up the knowledge base of technical and economic disciplines, to synthesise interrelationships and to make appropriate evaluations. The student is able to apply the most important terminologies, theories and procedures of the technical discipline in the performance of related tasks. The student is able to plan, organise and conduct independent learning. The student is able to identify routine technical problems and to identify, formulate and solve (by the practical application of standard operations) the theoretical and practical background required to solve them. The student is able to understand and use literature, computer and library resources specific to the field. The student is able to apply the acquired IT knowledge to the solution of problems in the field. The student is able to construct basic models of systems and processes. The student is able to communicate orally and in writing in his/her mother tongue in a professionally appropriate manner in his/her field of specialisation.							
				Attitude							
It develops independent work skills and professional communication. By the end of the course, students should be committed to the preservation of											

	environmental values and the environmentally responsible use of energy. The student will take responsibility for the preservation of his/her own activities and the natural environment, and for cooperation with the social environment. The student assumes and authentically represents the social role of its profession and its fundamental relationship with the world. Open to learning about, accepting and authentically communicating professional and technological developments and innovations in the field of engineering. Seeks to solve problems, preferably in cooperation with others. Have the stamina and tolerance of monotony to carry out practical activities. Applies his/her acquired technical knowledge to gain a thorough understanding of observable phenomena, to describe and explain their laws. complies with and observes the relevant safety, health, environmental, quality assurance and control requirements. Autonomy and responsibility: Contributes to responsible decision-making. The student can make independent decisions; take responsibility. Independently thinks through and develops comprehensive, well-founded professional questions based on given sources, even in unexpected decision-making situations. In the performance of his/her professional duties, he/she will also cooperate with qualified professionals from other disciplines (primarily technical, economic and legal). He/she will share his/her experience with his/her colleagues, thus contributing to their development. He/she is responsible for the consequences of his/her technical analyses, the proposals he/she makes and the decisions he/she takes.
Brief description of the subject content	Basic energy production processes and their environmental impact. Introduction to and comparison of fossil, renewable and nuclear energy production. Introduction to environmental management. Introduction to the basic principles of environmental policy. The relationship between environmental audits and environmental policy. Life cycle analysis and its use.
Types of student activity	Presentation: Processing of heard text with notes 40%, independent processing of theoretical material 20%, Exercise: 40%. Listen to lectures, give small presentations, discuss. Preparation at home.
Required reading and resources	• Endre Kiss: Environmental protection and energy management (electronic note) • Petrovickijné, Ildikó Angerer (2026): Energetics and Environmental Policy Handbook and lecture notes: Moodle system • RA Ristinen, JJ Kraushaar, JT Brack (2022): Energy and the Environment, 4th Edition, John Wiley & Sons, Inc. 2022
Recommended reading and its availability	• Teaching materials Energetics and Environmental Policy lectures, Moodle system, • Jefferson W. Tester, Elizabeth M. Drake, Michael J Driscoll, Michael W. GolY, William A. Peters (2012) Sustainable energy, Choosing among options, The MIT Press, Cambridge Massachusetts, London, England, 2012 • RA Ristinen, JJ Kraushaar, JT Brack (2022): Energy and the Environment, 4th Edition, John Wiley & Sons, Inc. 2022 • David E. Reichle (2020): The Global Carbon Cycle and Climate Change - Scaling Ecological Energetics from Organism to the Biosphere, Elsevier, 2020, ISBN: 978-0-12-820244-9, DOI: 10.1016/C2019-0-01382-9
Assignments	As stated in the first lesson. During the semester 2 essays and 2 PowerPoint presentations to be submitted on a topic of your choice.
Description of midterm tests	Midterm tests: In the 6th and 13th weeks for full-time students; during the 2nd and 4th consultation sessions for correspondence students. Featuring open-ended questions and design tasks.
Framework and rules for the use of artificial intelligence	b) Partial permission In this course, the use of artificial intelligence tools is partially permitted for mid-year assignments, project work, papers, and presentations, primarily as a supplement to and verification of independent work, with appropriate citation and source identification. Students may employ AI-based tools (e.g. literature synthesis, concept generation, data interpretation) in the context of in-class activities,

	assignments, and project work, provided that the use is explicitly documented and complemented by the student's own professional analysis and critical reflection. The use of AI is not permitted in assessments intended to evaluate individual performance (e.g. quizzes, examinations, calculation-based tasks), where the objective is to assess independent engineering reasoning and analytical competence. In project-based tasks, AI may be applied as a design-support tool (e.g. comparison of energy alternatives, exploration of conceptual solutions). However, all final technical calculations, evaluations, and conclusions must be produced and defended independently by the student.
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Advanced strategic management

Title of the subject		Hungarian		Haladó stratégiai menedzsment						Level	MSc
		English		Advanced strategic management						Code	DUEN(L)-TGT-158
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	2	weekly	0	E	5	English	
part time		Per semester	5	Per semester	10	Per semester	0				
Teacher responsible for the course				name		Prof. Dr. habil Rajcsányi-Molnár Mónika			position:	University professor	
Educational goals				Goals, development objectives							
				The aim of the course is to provide students with comprehensive theoretical and practical knowledge of strategic management, with particular emphasis on complex long-term planning and the effective application of strategic decision-making. Students will develop the ability to independently evaluate strategic analyses, portfolios, and decision-making processes, as well as to professionally manage organizational development and change management initiatives. The course focuses on advancing strategic thinking, particularly in the areas of innovation, competitiveness, and the global business environment.							
				The Advanced Strategic Management course builds upon organizational and management foundations previously acquired by students, extending their knowledge of strategic planning and management. The course aims to enable students to conduct complex analyses of organizational environments, resources, and stakeholders and to participate independently in strategic decision-making processes. It develops strategic thinking skills, with particular emphasis on aligning corporate-level and business-level strategies with organizational objectives.							
				During the course, students learn how to strategically design and manage project portfolios, identify and evaluate growth opportunities, and effectively plan, implement, monitor, and close strategic initiatives and programs. They also develop the ability to make independent decisions and appropriately prioritize activities in multi-project environments in support of organizational strategic goals.							
Typical delivery methods				Lecture		Classes are conducted in an interactive format with the active participation of all students, supported by the use of multimedia presentations and projection equipment. Lectures incorporate the analysis of strategic project management case studies, encouraging student engagement in discussions of alternative approaches, solutions, and decision-making processes. Through collaborative learning activities, students work on real-life or simulated strategic projects, interpreting information, developing strategic recommendations, and establishing portfolio-level priorities.					
				Seminar		Practical sessions take place in a project-oriented learning environment equipped with whiteboards and flipcharts. Students work individually and in groups, applying theoretical concepts to real or simulated strategic projects. Practical activities include project planning, process analysis, strategic problem-solving, project documentation development, risk assessment, stakeholder analysis, and project control exercises.					
				Lab							
Requirements				Knowledge • Possesses comprehensive knowledge of the theoretical frameworks of strategic management, strategic planning and decision-making processes, and their role in organisational functioning. • Understands the interrelationships involved in the development of corporate- and business-unit-level strategies, as well as the strategic significance of the organisational environment, resources and competitive position.							

	- Knows and is able to interpret advanced methods and tools of strategic analysis and planning (for example SWOT, PESTEL, competitor analysis, portfolio analysis models), and their application possibilities in supporting strategic decisions. Skills - Able to analyse the organisational environment and resources, and to develop decision alternatives aligned with strategic goals. - Able to interpret complex strategic problems, apply various analytical methods, and formulate conclusions drawn from them. - Able to collaborate during group problem-solving, develop strategic proposals taking different viewpoints into account, and argue in favour of the chosen solutions. - Able to independently process professional literature and apply strategic management methods in practice based on organisational examples or case studies. Attitude - Open to new approaches and innovative solutions, responds sensitively to organisational problems, and participates cooperatively in the joint solution of strategic tasks. - Strives for the continuous development of professional knowledge and, in their work, takes into account ethical principles as well as the norms and values of organisational functioning. Autonomy and responsibility: - Takes responsibility for tasks related to the achievement of strategic goals, makes decisions taking ethical considerations into account, and strives to improve organisational processes. - Actively participates in the formation of joint professional decisions and handles emerging conflicts in a responsible and constructive manner.
Brief description of the subject content	The course provides an overview of the fundamental processes and tools of strategic management, with particular emphasis on strategic analysis, strategic decision-making and organisation-level strategy formulation. It covers the development of corporate and business-unit strategies, the planning of strategic initiatives and programmes, as well as the organisational conditions for strategy implementation. Through practical case studies, students become familiar with the methods of analysing complex organisational situations and preparing strategic decisions. Preparation of complex strategic analyses (e.g. industry, competitor and resource-based analysis) through case studies. Development of corporate and business-unit strategies, evaluation of strategic alternatives. Planning and prioritisation of project portfolios, scheduling and monitoring of strategic programmes. Application of decision-support tools in complex, uncertain environments. Development of change management and organisational development proposals.
Types of student activity	Lecture-based learning, knowledge processing supported by note-taking: 30% Guided information and literature processing: 20% Case study-based and problem-centred learning: 20% Project-based and group learning formats: 10% Independent task solving and reflective learning: 20%
Required reading and resources	- Robert M. Grant & Judith Jordan (2012) Foundations of Strategy, John Wiley & Sons, Inc. DUE Library - Grant, R. M. (2021). Contemporary strategy analysis (11th ed.). Wiley. - Johnson, G., Whittington, R., Regnér, P., Angwin, D., & Scholes, K. (2020). Exploring strategy: Text and cases (12th ed.). Pearson. - Rothaermel, F. T. (2023). Strategic management (6th ed.). McGraw-Hill Education

Recommended reading and its availability	• Organization development interventions: excunting effective organizational change / ed. William J. Rothwell, Sohel M. Imroz, Behnam Bakhshandeh, DUE Library • Schilling, M. A. (2022). Strategic management of technological innovation (7th ed.). McGraw-Hill Education. • Porter, M. E. (2000): Location, clusters, and company strategy. In Clark, G. L.–Feldman, M. P.–Gertler, M.S. (szerk.) The Oxford handbook of economic geography. Oxford University Press, Oxford, 253–274. o. • Porter, M. E. (2003): The economic performance of regions. Regional Studies, 37(6–7): 549–578. o. • Porter, M. E (2007): Competitiveness: implications for Central Europe and the Czech Republic. Prague, 22 October. • Porter, M. E (2008): On competiton. Updated and expanded edition. Harvard Business Review Book, Boston.
Assignments	The condition for obtaining the signature is the submission of the practice assignments published in the Moodle system by the deadline.
Description of midterm tests	The prerequisite for obtaining course completion (signature) is the timely submission of all practice assignments published in the Moodle system as part of continuous assessment and achieving at least 61% overall performance across these assignments. Failure to meet these requirements will result in the denial of course completion. Only students who have obtained course completion (signature) are eligible to take the written in-course test. The course is assessed through a written in-course examination, in accordance with the current academic year's study and examination regulations. Student attendance is monitored at all lectures and practical sessions through official attendance records. Course requirements involving continuous work throughout the semester cannot be compensated for during the examination period. In the case of documented absence, students are allowed one opportunity to make up the written test at a pre-arranged date.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted: • during classroom work, for data collection related to tasks, • for information gathering when preparing for presentations. • for creating charts and graphs • for compiling bibliographies, • Submitting fully AI-generated text is not allowed. Students are required to complete their assignments based on their own knowledge and independent professional understanding, and in all cases to document the use of AI by naming the tool used and indicating the prompt(s) applied. The use of AI tools is prohibited in any form of examination activity – including written, oral, online or in-person exams, as well as exam-type assessments.

Sustainable Human Resource Management

Title of the subject		Hungarian		Fenntartható emberi erőforrás menedzsment				Level	MSc		
		English		Sustainable Human Resource Management				Code	DUEN(L)-TGT-159		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	2	weekly	0	E	5	English	
part time		Per semester	5	Per semester	10	Per semester	0				
Teacher responsible for the course				name		Dr. Kókuti Tamás Ph.D.			position:	Associate Professor	
Educational goals				Goals, development objectives The aim of the course is to provide students with both theoretical and practical knowledge of sustainable human resource management (HRM). The course introduces contemporary approaches to human resource management and the integrated system of HR activities, with particular emphasis on the principles of sustainability and Green Human Resource Management (Green HRM). Students become familiar with the tools and methods of HR practice while also exploring emerging trends and new forms of employment and work organization, including remote work and e-HRM solutions. The course further aims to prepare students for professional responsibilities related to human resource management by developing the competencies necessary for managing people effectively, ethically, and sustainably in contemporary organizations.							
Typical delivery methods				Lecture	The course is delivered through interactive lectures held in a large lecture hall, supported by multimedia presentations and projector-based instruction. Students participate in guided and independent problem-solving activities, while case studies are analyzed and discussed individually and in groups						
				Seminar	The teaching approach encourages active participation, critical reflection, and the application of theoretical concepts to real-world human resource management challenges, particularly those related to sustainability and Green HRM.						
				Lab							
Requirements				Knowledge Students: - Understand the fundamental concepts, relationships, limitations, and boundaries of human resource management, with particular emphasis on sustainability-related aspects. - Understand the processes and methodologies of HR activities and functions. - Know the human and social dimensions of organizational production and service processes and their impact on human resources. - Recognize that people are the key drivers of business success and organizational adaptability. - Understand that meaningful work, opportunities for personal development, and the fulfillment of material and professional needs are essential factors in individual well-being and success.							
				Skills - Students are able to: - Manage workplace teams and perform HR management tasks while incorporating sustainability principles. - Design objective employee performance evaluation systems and assess employee performance while integrating sustainability-related criteria.							

	• Communicate and present HR-related issues professionally and effectively. • Lead and manage people while considering legal, human resource, ethical, and sustainability-related requirements. • Apply strategic HR approaches to support organizational effectiveness and long-term sustainability. • Develop recommendations related to employee well-being, retention, and workplace responsibility Attitude Students: • Adhere to the legal, ethical, and professional standards governing employment relationships and HR activities while considering Green HRM principles. • Are open to new information and to tasks requiring cooperation and collaboration. • Consider individual career planning an important element of professional development. • Strive for lifelong learning and encourage colleagues to engage in continuous development. • Demonstrate openness and respect toward the opinions and perspectives of others. • Value sustainable, responsible, and people-centered organizational practices. Autonomy and responsibility: Students: • Take responsibility for their own work and for their contribution to group activities. • Demonstrate accountability in HR-related decision-making and professional conduct. • Act responsibly toward colleagues and organizational stakeholders. • Apply sustainability, ethical considerations, and professional standards in independent and collaborative work. • Contribute to creating responsible, inclusive, and sustainable workplace environments through their managerial and professional actions.
Brief description of the subject content	The course develops a sustainable HR mindset and responsible leadership thinking. Students will be able to manage human systems strategically. It strengthens ethical decision-making and social responsibility. It contributes to supporting organisational sustainability. The role of human resource management in ensuring the long-term economic, social and organisational sustainability of organisations. The course provides an overview of the theoretical foundations of sustainable and responsible HRM, as well as related practical solutions, with particular emphasis on the strategic HR approach, employee well-being, social responsibility and ESG expectations. Students become familiar with the possibilities of integrating sustainability into HR functions (recruitment, selection, performance management, development, retention), as well as the sustainability dilemmas arising from global and domestic labour market challenges. The course places emphasis on the development of analytical thinking, ethical decision-making and a responsible leadership mindset. The practical steps of implementing sustainable and responsible HRM. Strategic HR approach. Case studies of the realisation of employee well-being. Possibilities of integrating sustainability into HR functions (recruitment, selection, performance management, development, retention). Steps of implementing “green HRM”.
Types of student activity	Acquisition of theoretical material under guidance and independently. Task solving under guidance and independently. Independent professional work under supervision, guided group work.

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Required reading and resources	• Sitko, R. (2023). Sustainable Human Resource Management: Using HRM to Achieve Long-Term Social, Environmental and Business Goals. Kogan Page. ISBN: 9781398606494. • Mariappanadar, S. (2024). Sustainable Human Resource Management Strategies and Practices: Human Capital for Corporate ESG Sustainability (2nd ed.). Springer. ISBN: 9789819786886.
Recommended reading and its availability	• Sołtysik, M., Tyrańska, M., Piwowar-Sulej, K., & Agustina, T. S. (2024). Sustainable Human Resource Management: Strategy, Organizational Innovation and Leadership in Industry 5.0. Routledge. ISBN: 9781032598949. • Ragazou, K., Garefalakis, A., Papademetriou, C., & Samara, A. (2025). Sustainability Through Green HRM and Performance Integration. IGI Global. ISBN: 9798369359815.
Assignments	During the study period, completion by the deadline and presentation in the practical class of a task determined by the instructor, related to the syllabus, requiring individual and/or group material collection and preparation depending on the number of participants. The student selects a topic from the possibilities of the semester's course material, prepares it as independent work after consultation with the instructor, and presents it in the practical class.
Description and schedule of the in-class test	Oral exam during the examination period based on the previously provided exam topics.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted: - during classroom work, for data collection and information gathering related to tasks - for data collection for certain homework assignments - during preparation for assessments. The use of any AI tool is prohibited during knowledge assessment and while writing tests/papers.

Thesis 2.

Title of the subject		Hungarian		Diplomamunka 2						Level	MSc
		English		Thesis 2						Code	DUEN(L)-MUG-097
Responsible Academic Unit				Institute of Engineering, Department of Mechanical and Energy Engineering							
Compulsory prerequisite subject				DUEN(L)-MUG-096							
Type		Weekly teaching hours						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	0	weekly	4	weekly	0	E	5	English	
part time		Per semester	0	Per semester	20	Per semester	0				
Teacher responsible for the course				name		Prof. Dr. habil Sánta Róbert			position:	University Professor	
Educational goals				Goals, development objectives							
				The aim of the course is to familiarise students with the tools and methods of teamwork, whilst enabling them to tackle current technical management tasks independently or, primarily, in small groups. Upon successful completion of the course, students will be able to identify a management problem and solve it through group work, as well as document, interpret and evaluate the work and its results.							
Typical delivery methods				Lecture	In a classroom suitable for lectures using a projector, or via the Microsoft Teams platform						
				Seminar							
				Lab							
Requirements				Knowledge							
				- During the course, students independently apply the knowledge they have acquired to solve complex technical-economic problems. - Students as future managers know by the end of course: - how to describe a firm from managerial aspect - how to analyse complex situation and problem - the most important manager tools for analyses - how to present their results and ideas so as to convince their future bosses							
				Skills							
				- They will be able to present and defend their results in a professional manner. Students will be able: - to plan their work, - to take the necessary steps, - to evaluate their results, - to finish their tasks by deadline - to identify and solve the problems of organizations - to apply the learning materials in practice - to communicate effectively with their supervisors - to work individually - to report their work both verbally and orally with presentations as well							
				Attitude							
				- It develops analytical and problem-solving skills. It contributes to independent, responsible professional practice. - The student is open to the active interpretation and application of situations presented during classes in a practical environment. - They respond sensitively to problems generated by real market challenges and are motivated to seek their solutions.							
Brief description of the subject content				Autonomy and responsibility:							
				- Students feel responsibility for both their development and environment. - They cooperate with each other. - They have sensibility to find possible resolving opportunities for problems							
				The purpose of the thesis is to enable the candidate for the degree in Technical							

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	Management to demonstrate adequate familiarity with relevant national and international literature in the given topic, as well as their analytical and evaluative skills. The candidate must prove that, through independent work, they are capable of conducting observations, collecting, processing and evaluating data, and drawing correct conclusions from them. The thesis should certify that the candidate possesses the knowledge, general education, and intellectual capacity necessary for practicing the profession, and is able to apply the acquired professional knowledge in practice and use it in a creative manner. It is a fundamental requirement for all students to solve the chosen topic and task, relying on their studies, at a level expected from candidates of Technical Management. A basic objective is that the thesis should be based on independent work. The completion of the thesis is a prerequisite for admission to the final examination. A student whose thesis is not accepted may not be admitted to the final examination
Types of student activity	Individual learning activities
Required reading and resources	• Guide to the preparation of the thesis and diploma design. Extended version 2. UNIVERSITY PUBLISHER • Babbie, E. R. (2021). The practice of social research (15th ed.). Cengage Learning. ISBN-13: 9780357360767 • Pearce, J. M. (2018). How to perform a literature review with free and open source software. Practical Assessment, Research & Evaluation, 23(1), Article 8. https://doi.org/10.7275/jjhz-sz75 • Recommenden by the consultant, the topic is processed by literature
Recommended reading and its availability	• Dr. Pál Majoros: Research methodology or how to write a good diploma thesis easily and quickly. National Textbook Publisher, Budapest 1997. • Thomas, C. G. (2021). Research methodology and scientific writing. Springer. ISBN 9783030648657. • Zhang, Y. (2025). Research on application and innovation in civil engineering construction management. Open Access Library Journal, 12, 1–10. https://doi.org/10.4236/oalib.1112843
Assignments	-
Description of midterm tests	-
Framework and rules for the use of artificial intelligence	Partial Permission: Artificial intelligence is permitted only with proper citation (APA) for the following purposes: Data collection, e.g., about the selected organization (e.g., ChatGPT, Gemini) Literature gathering (e.g., Scopus AI, Perplexity, Consensus) Translation of texts in foreign languages (e.g., DeepL) Grammar and stylistic text formatting (e.g., Grammarly, Paperpal) In all other cases, AI use is prohibited.

Applications of Artificial Intelligence in Industry

Title of the subject		Hungarian		Mesterséges intelligencia az iparban				Level	MSc		
		English		Applications of Artificial Intelligence in Industry				Code	DUEN(L)-ISR-220		
Responsible Academic Unit				Institute of Informatics, Department of Computer Systems and Control Engineering							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	0	weekly	2	M	5	English	
part time		Per semester	5	Per semester	0	Per semester	10				
Teacher responsible for the course				name		Dr. Burkus Ervin			position:	College Assistant Lecturer	
Educational goals				Goals, development objectives							
				To familiarise students with the topics, fundamental task types, concepts and methods of artificial intelligence. To study models and algorithms designed to solve problems arising in the fields of application of AI. To recognise AI problems and master the use of state-of-the-art software packages for solving them, thereby enabling students to develop and implement basic AI models and algorithms. To acquire the foundations for further study in various areas of AI – such as expert systems, data science, data mining, deep learning and robotics.							
				The course builds on students' previously acquired basic knowledge of mathematics, computer science and engineering, particularly in the areas of probability and statistics, linear algebra, algorithm theory and programming. Knowledge of data handling, data visualisation and basic software development also serves as a prerequisite.							
				The aim of the course is to provide students with a comprehensive overview of the fundamental methods and potential applications of artificial intelligence, and to enable them to recognise, formally formulate and solve various AI-based problems. The course also aims to develop data-driven thinking, modelling skills and algorithmic problem-solving through the use of state-of-the-art computational tools.							
Typical delivery methods				Lecture	Lectures for the entire student body are held in a large lecture hall, utilizing the blackboard. A projector and instructor's computer are used during every theory class. In addition, students have access to online video-based course materials, notes, and lecture slides. Opportunities for further consultation are also provided during contact hours.						
				Seminar							
				Lab	Laboratory tasks are performed on computers during scheduled contact hours. The online laboratory guides are supplemented by laboratory consultation sessions.						
Requirements				Knowledge							
				- is familiar with the main areas of artificial intelligence - is familiar with methods of intelligent behaviour and knowledge representation - is familiar with the fundamentals of applying artificial intelligence methods.							
				Skills							
				- is able to develop effective methods for solving computational problems - is able to recognise the applicability of artificial intelligence methods and tools to tasks arising in their work - is able to contribute to the implementation of artificial intelligence methods - able to apply artificial intelligence methods to solve specific problems - utilises the artificial intelligence methods necessary for their field of IT in engineering work aimed at the design of IT systems - is able, building on the basic knowledge acquired, to independently acquire more in-depth knowledge in a specific technical or IT field, to analyse the relevant literature, and subsequently to solve IT problems related to that field							

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	- is able to collaborate with IT specialists and electrical engineers during group work, and with representatives from other disciplines when analysing the requirements of a given problem and devising a solution - continuously develops their skills and keeps pace with developments in the IT profession Attitude is open to acquiring new knowledge - Strives to gain an understanding of the entire technical system beyond their own area of work. - Is open to learning about new methods and procedures and to mastering them to a high standard. - Is open to learning about other specialist fields that utilise IT tools and to developing IT solutions for them in collaboration with experts in those fields. Autonomy and responsibility: - Feels a sense of responsibility for their work as an IT systems analyst, developer and operator, whether carried out independently or as part of a team. - Identifies shortcomings in the technologies used and risks in processes, and initiates measures to mitigate these.
Brief description of the subject content	The aim of the course is for students to gain experience in the design and implementation of artificial intelligence-based solutions applicable in an industrial environment. As part of the course, students will become familiar with AI-based tools and systems designed to support, optimise and automate industrial processes.
Types of student activity	Mastering theoretical material under guidance and independently. Solving problems under guidance and independently. Studying theoretical material under guidance: 10% Studying theoretical material independently: 30% Solving problems under guidance: 30% Solving problems independently: 30%
Required reading and resources	• Yann Le Cun, The Revolution in Artificial Intelligence and Deep Learning, Typotex, 2025, ISBN: 978-963-4933-35-9 • Russell Stuart, Peter Norvig, Artificial Intelligence: A Modern Approach, Panem Publishing, 2005, ISBN: 0137903952
Recommended reading and its availability	• Ross, T.J.: Fuzzy Logic with Engineering Applications, 4th Edition, Wiley 2016, ISBN: 9781119235866 • Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson, 2020, ISBN: 978-0134610993 • Richard E. Neapolitan, Xia Jiang, Artificial Intelligence • With an Introduction to Machine Learning, Chapman & Hall, 2018, ISBN: 978-0367571641 • Albert Chun-Chen Liu, Oscar Ming Kin Law, Iain Law, Understanding Artificial Intelligence: Fundamentals and Applications, Wiley-IEEE Press, 2022, ISBN: 978-1119858331
Assignments	Two midterms during the term time and an exam during the exam period.
Description of midterm tests	Based on mid-term tests and the exam.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted. Artificial intelligence is permitted for checking homework, accelerating the learning process, and generating sample examples to facilitate the understanding of concepts, but its use is prohibited during exams.

Advanced Corporate Finance

Title of the subject		Hungarian		Haladó vállalati pénzügyek				Level	MSc		
		English		Advanced Corporate Finance				Code	DUEN(L)-TGT-217		
Responsible Academic Unit				Institute of Social Sciences, Department of Economics							
Compulsory prerequisite subject											
Type		Number of Lessons						Requirement	Credits	Language of instruction	
		Lecture		Seminar		Lab					
Full time		weekly	1	weekly	2	weekly	0	M	5	English	
part time		Per semester	5	Per semester	10	Per semester	0				
Teacher responsible for the course				name		Dr. Novoszák Péter Károly			position:	Associate Professor	
Educational goals				Goals, development objectives							
				The aim of the course is to develop students' advanced competencies in corporate financial decision-making, with particular emphasis on value creation, risk management, and sustainable finance. The course builds upon the fundamental knowledge acquired at the BSc level in Corporate Finance, Principles of Accounting, and Economics I–II.							
				Within the MSc in Engineering Management and MSc in Management and Leadership programs, the course provides the financial foundation for strategic and economic decision-making. Its objective is to develop a comprehensive financial perspective that enables students to understand, interpret, and apply advanced financial models and decision-support tools in real corporate environments.							
				The course contributes to the development of competencies related to strategic decision support, corporate value creation, and the establishment of sustainable and responsible financial management practices.							
Typical delivery methods				Lecture	The course is delivered through interactive lectures supported by PowerPoint presentations.						
				Seminar							
				Lab	Practical sessions include classroom-based group work, case study analysis, student presentations, and financial modelling exercises (e.g., Excel-based analyses). The teaching approach emphasizes the practical application of financial theories and models through problem-solving activities and real-world business cases.						
Requirements				Knowledge							
				- Knows the advanced theoretical models of corporate financial decisions and the conditions of their application. - Knows the main directions of capital structure theories and their practical significance. - Knows the operation and limitations of company valuation methods (DCF, relative valuation, real options). - Knows the tools of risk management, especially the application of derivative transactions. - Knows the role of sustainable finance and ESG considerations in corporate decisions.							
				Skills							
				- Able to build and apply complex company valuation models. - Able to perform comparative analysis and evaluation of different financing alternatives. - Able to prepare financial models and interpret their results. - Able to carry out risk analysis and sensitivity testing. - Able to prepare structured financial analyses and presentations and defend them in professional discussion.							
				Attitude							
				- Open to learning about modern financial solutions and innovative methods. - Strives for well-founded, responsible and ethical financial decision-making.							

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	Interested in sustainability and ESG aspects in corporate operations.
	Autonomy and responsibility: - Able to independently prepare financial analyses and formulate decision proposals. - Takes responsibility for activities carried out individually and in group work. - Takes into account the economic and social consequences of financial decisions.
Brief description of the subject content	Within the framework of the course, students become familiar with advanced issues of corporate finance. The main topics of the course are: capital structure theories (trade-off, pecking order), methods of company valuation (discounted cash flow, relative valuation, real options), dividend policy and share buybacks, investment decisions in an uncertain environment, project financing, mergers and acquisitions (M&A), risk management and hedging strategies, international financial risks, as well as sustainable finance and ESG-based decision-making. Financial modelling and a case study-based approach play a prominent role during the course.
Types of student activity	Acquisition of theoretical material under guidance and independently. Task solving under guidance and independently. - Learning of theoretical material under guidance: 10% - Independent learning of theoretical material: 30% - Task solving under guidance: 30% - Independent task solving: 30%
Required reading and resources	- Principles of Corporate Finance by Richard A. Brealey, Stewart C. Myers, Franklin Allen and Alex Edmans McGraw Hill's Evergreen delivery, 2025. ISBN10: 1266586156 ISBN13: 9781266586156 - Corporate Finance For Dummies Michael Tailard For Dummies 2nd Edition 2021. Print ISBN 9781119850311 eBook ISBN 9781119850335 - Deep Finance: Corporate Finance in the Information Age Glenn Hopper Leaders Press 2021 ISBN-13 978-1637351246 - Lessons in Corporate Finance: A Case Studies Approach to Financial Policies and Valuation (Wiley Finance), by Paul Asquith and Lawrence A. Weiss Wiley 2. Edition 2019. ISBN-13 978-1119537892 - Materials uploaded to Moodle
Recommended reading and its availability	- The Essays of Warren Buffett - 8th ed: Lessons for Corporate America Warren Buffett and Lawrence A. Cunningham The Cunningham Group 2024 ISBN-13 : 978-0966446142 - Project Finance in Theory and Practice: Designing, Structuring, and Financing Private and Public Projects Stefano Gatti Academic Press 2023 ISBN-13 978-0323983600
Assignments	During the semester, students are required to complete a comprehensive corporate valuation or financial analysis project. Successful completion of the assignment is a prerequisite for obtaining course completion.
Description of midterm tests	Assessment during the examination period is conducted through an oral examination based on predefined topics covering the course material
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted: - during classroom work, for data collection and information gathering related to tasks - for data collection for certain homework assignments - during home preparation for the oral exam. The use of any AI tool is prohibited during knowledge assessment and the oral exam.

ESG-oriented management

Title of the subject		Hungarian		ESG szemléletű menedzsment						Level		MSc	
		English		ESG-oriented management						Code		DUEN(L)-TGT-218	
Responsible Academic Unit				Institute of Social Sciences, Department of Economics									
Compulsory prerequisite subject													
Type		Number of lessons						Requirement	Credits	Language of instruction			
		Lecture		Seminar		Lab							
Full time		weekly	1	weekly	2	weekly	0	M	5	English			
part time		Per semester	5	Per semester	10	Per semester	0						
Teacher responsible for the course				name		Prof. Dr. habil Rajcsányi-Molnár Mónika Ph.D.				position:	University Professor		
Educational goals				Goals, development objectives The course provides a comprehensive introduction to the theoretical foundations and practical applications of ESG (Environmental, Social, and Governance)-oriented corporate governance. Particular emphasis is placed on the integration of environmental, social, and governance considerations into corporate strategy, organisational governance, and managerial decision-making. The course examines the role of ESG in fostering long-term corporate competitiveness, strengthening risk management, ensuring regulatory and legal compliance, and creating sustainable value for stakeholders									
Typical delivery methods				Lecture	All students attend lectures in a large lecture theatre, with interactive lectures using a projector. Problem-solving, both guided and independent. Analysis of case studies and group discussion.								
				Seminar									
				Lab									
Requirements				Knowledge - Knows the fundamental factors, most important concepts, requirements, relationships and procedures of management and organisation science. - Knows how to apply them while ensuring the priority of ESG aspects. - Acquires the theoretical and methodological foundations of performing leadership tasks and exercising functions. - Knows the frequently applicable procedures and methods of planning, organising and directing. - Knows leadership style models and understands their role in terms of the leader’s effective behaviour and ESG preferences.									
				Skills - Able to perform the management tasks of workplace groups, also taking the ESG approach into account. - Able to exercise managerial functions. - Distinguishes between leadership styles on the basis of advantages and disadvantages and applies the appropriate style as needed. - Distinguishes between long-term and short-term tasks and consequences. - Able to creatively analyse the goal, process and organisational system of a work organisation. - Able to organise their own and others’ work with an ESG approach and to lead work groups. - Able to direct, organise and control the material and information processes of an enterprise and to coordinate their development, with particular regard to ESG.									
				Attitude - Open to and capable of accepting differing, foreign opinions. - Willing and able to engage in group work and share their knowledge with others. - Their interest and commitment promote continuous professional development.									

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	Strives to ensure that their decisions are made with full consideration of legal regulations and ethical norms.
	Autonomy and responsibility: - Taking responsibility for one's own work and that of one's colleagues. - Feeling a sense of responsibility for sustainable development
Brief description of the subject content	Through the processing of the knowledge acquired in theoretical classes and the tasks and case studies completed in group work in practical classes, the course develops students' professional competencies. The subject contributes to the integration of business and sustainability corporate governance perspectives, with particular regard to the application of sustainability strategic management methods. It develops students' problem-solving and decision-support skills through the use of structured analytical tools. The competencies are primarily fulfilled/achievable through active participation in practical sessions, as well as through submitted assignments and the presentations based on them. The practical tasks develop students' cooperation, analytical and planning skills and strengthen a sustainability-oriented mindset. In addition, the course promotes the development of responsibility required for independent professional work and the need for continuous professional development.
Types of student activity	Acquisition of theoretical material under guidance and independently. Task solving under guidance and independently. Independent professional work under supervision, guided group work.
Required reading and resources	- Muradov, A., Ahmadov, F., Hajiyeva, N., Sood, K., & Grima, S. (Eds.). (2025). Sustainable development and green innovation: Managing risk through interdisciplinary approaches and policy strategies. Emerald Publishing. ISBN: 978-1-83608-463-1. https://doi.org/10.1108/978-1-83608-462-4 - Samans, R., & Nelson, J. (2022). Sustainable Enterprise Value Creation: Implementing Stakeholder Capitalism through Full ESG Integration. Palgrave Macmillan. ISBN: 978-3-030-93559-7 https://doi.org/10.1007/978-3-030-93560-3 - Martiny, A., Taghialatela, J., Testa, F., & Iraldo, F. (2024). Determinants of environmental social and governance (ESG) performance: A systematic literature review. Journal of Cleaner Production, 456, 142213. https://doi.org/10.1016/j.jclepro.2024.142213 - Busch, T., Barnett, M. L., Burritt, R. L., Cashore, B. W., Freeman, R. E., Henriques, I., Husted, B. W., Panwar, R., Pinkse, J., Schaltegger, S., & York, J. (2024). Moving beyond "the" business case: How to make corporate sustainability work. Business Strategy and the Environment, 33(2), 776–787. https://doi.org/10.1002/bse.3514
Recommended reading and its availability	- Tamasiga, P., Onyeaka, H., Bakwena, M., et al. (2024). Beyond compliance: evaluating the role of environmental, social and governance disclosures in enhancing firm value and performance. SN Business & Economics, 4, 118. https://doi.org/10.1007/s43546-024-00714-6. - Mohanasundaram, S., & Mathivanan, P. (2026). The changing landscape of corporate governance and firm performance research from agency to ESG. Discover Sustainability, 7, 984. https://doi.org/10.1007/s43621-026-03344-0
Assignments	During the term, students must complete by the deadline a task set by the lecturer – which is related to the course content and, depending on the number of students, may involve individual and/or group research and preparation – and present it during the practical session.
Description of midterm tests	The student selects a topic from the possibilities of the semester's course material, prepares it as independent work after consultation with the instructor, and presents it in the practical class. Midterm tests in weeks 7 and 12. Make-up test in week 13.
Framework and rules for the use of artificial intelligence	The use of artificial intelligence is partially permitted: during classroom work, for data collection and information gathering related to tasks; for data collection for certain homework assignments; during preparation for assessments. The use of any AI tool is prohibited during knowledge assessment and while writing tests/papers.