



MECHANICAL ENGINEERING BSC

UNIVERSITY OF DUNAÚJVÁROS

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DESCIPTION OF THE DEGREE STUDY PROGRAM

Mec	hanical Engineering BSc
	Aechanical Engineering)
The higher educational institution responsible for	University of Dunaújváros
the study program:	
Identification number of higher educational	FI60345
institution:	
Address of higher educational institution:	Táncsics Mihály utca 1/A, 2400 Dunaújváros
Authorized head of the institution	Dr. István András, Rector
Responsible persons for the study program	
Responsible institute:	Institute of Engineering Sciences
Director of institute:	Dr. habil. Róbert Sánta, PhD
Responsible person for the study program:	Dr. Szabó Attila, PhD, college associate professor
Specializations (majors) and responsible	
persons:	
Machine Maintenance and Technical Diagnostic	Dr. Szabó Attila, PhD, college associate professor
Green Transformation	Dr. Kovács-Bokor Éva, PhD, college associate professor
Nuclear Energy	Dr. Wizner Krisztián, PhD, college associate professor
Main aspects of the study program:	
Precondition of student application acceptance:	General Certificate of Education or a certificate of secondary school
	final exam, that certificate, which is required to start a higher
	educational study program in the home country of the student, the level
	of the required English language knowledge to start bachelor studies:
	IELTS 5.5
Level of educational program:	undergraduate
Level of qualification:	bachelor (BSc)
Description of qualification in the	gépészmérnök
diploma in Hungarian	
Description of qualification in	Mechanical Engineer
the diploma in English	
Scheme of Study:	7 semesters
Credit points to be acquired:	210
The objectives of the training and the professional	The aim of the training is to train mechanical engineers who are capable
competencies to be acquired	of operate machinery and mechanical equipment and
	and maintenance of machinery and equipment, the introduction of
	engineering technologies, and the organisation and management of
	work, the technical and technical the tasks of technical development, research and design of average
	complexity the requirements of the labour market; and
	a sufficient depth of theoretical knowledge for the second stage of
	training a second cycle of training.
Criteria for choosing a specialisation	Completion of 90 credits
enteria for choosing a specialisation	In the semester specified in the curriculum, at least one specialization is
	started, which most students choose. Starting more than one
	specialization is only possible if at least 15 people have chosen it.
Practical training	In the 7th (last) semester, at least 6 weeks of organized practice at a
	professional practice location
Final certificate (diploma)	Nftv. § 108.47. paragraph 47: "The successful completion of the
as a condition for the issue of	examinations prescribed in the curriculum and - with the exception of the
	preparation of the thesis (diploma thesis) - the fulfilment of other study
	requirements and the acquisition of the credits prescribed in the training
	and outcome requirements, which certifies that the student has fully met
	the study and examination requirements prescribed in the curriculum
	without grading and assessment."
	The University makes the award of the diploma (diploma) conditional on
	the completion of the foreign language requirement, which is the

	completion of a professional subject in a foreign language, as required by
	the institution responsible for the course.
Diploma work	The diploma work consists in the solution of a mechanical engineering task or elaboration of a research task arising in a specific professional field that, relying on the knowledge acquired by the student during his/her studies, can be completed during a semester by means of
	studying additional special literature and under the management of internal and industrial consultants. By means of the diploma work, the candidate certifies that he/she obtained adequate skill in the practical application of the knowledge acquired, is capable of performing
	mechanical engineering tasks and, in addition to the curriculum, is also familiar with and capable of applying other professional literature in a value crating way. Formal requirements: the size of diploma work shall be 50 to 70 pages.
Final examination	the final examination is a test and assessment of the knowledge, skills and abilities required to obtain a diploma, during which the student must also demonstrate that he or she can apply the knowledge acquired.
	The final examination consists of the defence of a thesis and an oral examination in the subjects specified in the curriculum.
Nuclear Energy specialisation final examination	ZV1:
subjects	Fluid machinery DUEN (L)-MGT-212 Heat engines DUEN(L)-MGT-151
	Basics of Atomenergetics DUEN(L)-MGT-118.
	ZV2: Basics of nuclear safety DUEN(L)-MGT-117;
	Equipments of Nuclear Power Plants DUEN(L)-MGT-152;
	Ensuring the integrity of equipment DUEN(L)-MGT-119;
Machine Maintenance and Technical Diagnostic	ZV1:
specialisation final examination subjects	Maintenance strategy DUEN(L)-MGT-254,
	Maintenance technologies 2.DUEN(L)-MGT-253
	Tribology DUEN(L)-MUG-118
	ZV2:
	Industrial drive technology DUEN(L)-MGT-251;
	Technical Diagnostics 1. DUEN(L)-MUG-157 Technical Diagnostics 2. DUEN(L)-MUG-219
Green Transformation specialisation final	ZV1:
examination subjects	Fluid machinery DUEN (L)-MGT-212;
5	Heat engines DUEN(L)-MGT-151
	Basics of energy saving and conservation DUEN(L)-MGT-153
	ZV2: Energy management DUEN(L)-MGT-114;
	Renewable energy DUEN(L)-MGT-115
	Novel techniques of environmental protection DUEN(L)-MGT-216
Diploma average	The result of diploma shall be calculated as follows: $(SE + D + TA)/3$. Arithmetical mean of marks for final examination subjects (SE), Mark
	for diploma work (D) awarded by the Final Examination Committee,
	weighted study average (TA) related to the total number of credits
	acquired during the full study period except the preparation of diploma
	work
Qualification of diploma	excellent 4.51 – 5.00;
	good 3.51 – 4.50;
	average 2.51 – 3.50;
Conditions for the award of a diploma	average 2.51 – 3.50; acceptable 2.00 – 2.50
Conditions for the award of a diploma	average $2.51 - 3.50$; acceptable $2.00 - 2.50$ Successful completion of the final examination is a prerequisite for the
Conditions for the award of a diploma	average 2.51 – 3.50; acceptable 2.00 – 2.50

Study order:

Full-time course

Expected engineering competencies

a) knowledge

- Has a comprehensive knowledge of the basic facts, directions and boundaries of the subject of the technical field.

- Knows the general and specific mathematical, natural and social science principles, rules,
- connections and procedures necessary for the operation of the technical field.
- Knows the conceptual system, the most important contexts and theories related to his / her field.
- Comprehensive knowledge of knowledge acquisition and problem solving methods of the main theories of his / her field.
- Comprehensive knowledge of basic economic, business and legal rules and tools.
- Has an in-depth knowledge of the structural materials used in the field of mechanical engineering, the methods of their production and the conditions of their application.
- Basic knowledge of machine design principles and methods, machine building technology, control engineering procedures and operational processes.
- Has a comprehensive knowledge of the operating principles and structural units of the applied work and power machines, mechanical equipment and devices.
- Comprehensively knows the measurement procedures used in mechanical engineering, their tools, instruments and measuring equipment.
- Familiar with the expectations and requirements of the fields of work and fire protection, safety technology and occupational health required for his / her field of expertise, as well as the relevant regulations of environmental protection.
- Comprehensive knowledge of the basics of logistics, management, environmental protection, quality assurance, information technology, law, economics, their boundaries and requirements, which are integral to the field of mechanical engineering.
- Has an in-depth knowledge of the learning, knowledge acquisition and data collection methods of the field of mechanical engineering, their ethical limitations and problem-solving techniques.
- Knowledge of methods and tools for cost-benefit analysis in the corporate economy and on a technical basis.
- Can interpret, characterize and model the structural units of mechanical systems, the structure and operation of their elements, the design and connection of the applied system elements.
- Can apply the number of objectives, modeling principles and methods of mechanical product, process and technological design.

b) skills

- Is able to perform a basic analysis of the disciplines that make up the knowledge system of the technical field, to formulate the connections synthetically and to perform adequate evaluation activities.
- Is able to apply the most important terminologies, theories and procedures of the given technical field when performing the tasks related to them.
- Ability to plan, organize and perform independent learning.
- Ability to identify routine professional problems, to explore, formulate and solve (using practical operations in practice) the theoretical and practical background needed to solve them.
- Is able to understand and use the typical literature, computer and library resources of his / her field.
- Is able to apply the acquired IT knowledge in solving the tasks arising in his / her field.
- Ability to create basic models of technical systems and processes.
- Able to use his knowledge in a creative way to effectively manage the resources of his workplace.
- Able to apply and comply with safety, fire protection and hygiene rules and regulations in the course of his work.
- Ability to communicate orally and in writing in his / her mother tongue and at least one foreign language in a professionally adequate manner, in accordance with his / her field of expertise.
- Able to apply technical regulations related to the operation of mechanical systems, the principles of setting up and operating machines and mechanical equipment, and economic contexts.
- Ability to manage and control technological production processes, keeping in mind the elements of quality assurance and quality control.
- Able to diagnose mechanical failures, select remedial operations, solve repair technology tasks

c) attitude

- Undertakes and authentically represents the social role of its profession, its fundamental relationship with the world.
- Open to getting to know and accept professional, technological development and innovation in the technical field, and to mediate it authentically.
- Strives to make self-education a means of achieving its professional goals.

Makes its decision in full compliance with legal and ethical standards, even in situations that require a complex approach or in unexpected decision-making situations.

- Strives to solve problems as much as possible in collaboration with others.
- Strives for its self-education in the field of mechanical engineering to be continuous and in line with its professional goals.
- Strives to solve its tasks and management decisions by getting to know the opinions of the supervised employees, preferably in cooperation.
- Has adequate endurance and monotony tolerance to perform practical activities.
- Open to the use of IT tools, seeks to learn and apply software belonging to the field of mechanical engineering, knows and manages at least one such program at a skill level.
- Open and receptive to the application of new, modern and innovative procedures and methods related to organic farming and health awareness.
- Applying the acquired technical knowledge, he strives to get to know the observable phenomena as thoroughly as possible, to describe and explain their laws.
- In the course of his work, observes and complies with the relevant safety, health protection, environmental protection and quality assurance and control requirements.

d) Autonomy and responsibility

- Even in unexpected decision-making situations, independently considers and develops comprehensive, fundamental professional issues on the basis of specific sources.
- Recognizes and represents the values of the engineering profession responsibly, openly accepts professionally grounded critical remarks.
- In the course of performing professional duties, he/she also cooperates with qualified specialists in other fields (primarily technical, as well as economic and legal).
- Identifies the shortcomings of the applied technologies, the risks of the processes and initiates the measures to reduce them.
- Monitors legislative, technical, technological and administrative changes in the field.
- On the basis of the instructions of his/her workplace manager, he/she manages the work of the assigned personnel, supervises the operation of the machines and equipment.
- Evaluates the efficiency, effectiveness and safety of the work of subordinates.
- Pays attention to the promotion of the professional development of its subordinates, to the management and assistance of their efforts in this direction, and to the application of the principle of equal access.
- Share your experiences with your co-workers, thus helping their development.
- Takes responsibility for the consequences of your technical analyzes, proposals based on them, and decisions made.

CURRICULUM TABLES

Full time			Mechani	cal	En	gin	eer	ing	BS	Sc															
			D							Se	eme	stei	:-0	las	ses	per	we	ek							
Subject code	Subject name	Credit	Requiremen		1			2			3			4			5			6			7		Prerequisite
Ū	,		t	Т	Р	L	Т	Р	L	Т	Р	L	Т	Р	L	Т	Р	L	Т	Р	L	Т	Р	L	-
DUEN-IMA-100	Tutorial mathematics	0	S	0	2	0																			-
DUEN-IMA-152	Engineering Mathematics 1.	5	Е	0		0																			-
DUEN-ISF-010	Informatics	5	М	0	0	3																			-
	Engineering representation	5	М	1	2	0																			-
DUEN-MUG-152	Mechanics 1.	5	Е	1	2	0																			-
DUEN-MUG-212	CAD	5	М	0	0	3																			-
DUEN-MUT-151	Engineering Physics	5	Е	1	1	1																			-
	Engineering Mathematics 2.	5	М				0	0	3																DUEN-IMA-152
DUEN-MST-210	Industrial materials	5	М				1	0	2																-
DUEN-MUG-222	Basics of machine design	5	М				2	1	0																DUEN-MUG-212, DUEN-MUG-152, DUEN-MGT-111
DUEN-MUG-257	Mechanics 2.	5	Е				1	2	0																DUEN-MUG-152
	Heat and Fluid Dynamics	5	Е				1																		DUEN-MUT-151
DUEN-TVV-122	Entrepreneurship	5	М				1	2	0																-
DUEN-IMA-110	Mathematics 3.	5	М							0	3	0													DUEN-IMA-152
DUEN-MGT-112	Engineering construction	5	М							1	2	0													DUEN-MGT-111
DUEN-MUA-116	Technology of Structural Materials	5	М							1	0	2													-
DUEN-MUG-153	Mechanics 3.	5	Е							1	2	0													DUEN-MUG-152
DUEN-TVV-111	Human Resource Managment	5	М							1	2	0													-
DUEN-TVV-114	Management	5	М							1	2	0													-
-	Optional course	5	-										-	-	-										-
DUEN-MGT-211	Basics of energetics	5	М										2	0	1										-
DUEN-MGT-212	Fluid machinery	5	М										2	0	1										DUEN-MUT-250
DUEN-MGT-251	Industrial drive technology	5	Е										2	1	0										DUEN-MUG-152, DUEN-MUG-222
DUEN-MGT-252	Industrial automatics	5	Е										1	2	0										DUEN-IMA-152
DUEN-MUG-252	Production Technology	5	E										2	1	0										DUEN-MUG-152
-	Specialisation	20	-													-	-	-							-
-	Optional course	5	-													-	-	-							-
DUEN-MGT-151	Heat engines	5	E													2	1	0							DUEN-MGT-212
-	Specialisation	20	-																-	-	-				-
-	Optional course	5	-																-	-	-				-
DUEN-MUG-213	Metrology	5	М																2	0	1				DUEN-MUG-257, DUEN-MUG-222
-	Optional course	5	-																			-	-	-	-
DUEN-MUG-091	Thesis project	15	S																			0	9	0	finishing all subject of the 1-6 semester
DUEN-MUG-093	Professional Practice	0	S		ľ					1		Ì										0	0	0	-
DUEN-MUG-117	Quality Management	5	М																			2	1	0	-
	Environmental protection and energy management	5	М		Ì					1		Ì										2	0	1	-
	Number of Theoretical/Practice/Lab classes per week			3	#	7	6	6	6	5	#	2	9	4	2	2	1	0	2	0	1	4	#	1	
	Total number of classes per week				20		1	18		1	18		1	15			3			3			15		
	Total credit points													210)										

	MACHINE M	AINTE	NANCE AND T	EC	HNI	CAJ	L D	IAG	NO	OSTI	CS												
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Subject code	Subject name	Credit	Requirement		1		1	2		3			4			5			6		7		Prerequisite
				Т	Р	L	r 1	PI	L	P	\mathbf{L}	Т	Р	L	Т	Ρ	L	T	Р	L	P	L	
DUEN-MGT-113	Maintenance technologies 1.	5	M												2	1	0						DUEN-MUG-222
DUEN-MUG-111	Production planning, CAM	5	M												2	0	1						DUEN-MUG-252
DUEN-MUG-118	Tribology	5	M												2	1	0						DUEN-MUG-222
DUEN MUC 167	Technical Diagnostics 1.	5	Е			Т	Т		Т						2		0			Т	Τ		DUEN-MUG-153,
DOEN-MOG-157	Technical Diagnostics 1.	2	Б												-	1	۷.						DUEN-IMA-110
DUEN-MGT-253	Maintenance technologies 2.	5	E															2	1	0			DUEN-MGT-113
DUEN-MGT-254	Maintenance strategy	5	E															2	1	0			DUEN-MGT-113
DUEN-MUG-216	Complex Machine Designing	5	M															0	0	2			-
DUEN-MUG-219	Technical Diagnostics 2.	5	M															2	0	1			DUEN-MUG-157
	Number of Theoretical/Practice/Lab classes per week			0	0	0	D	0 0	0 0	0	0	0	0	0	8	3	1	6	2	3 (0 0	0	
[Total number of classes per week]			0			0		0			0			12			11		0]
	Total credit points			40																			

		GRI	EEN TRANSFO	RM	AT	ON																	
									Se	emes	ter	- C	las	ses	per	we	ek						
Subject code	Subject name	Credit	Requirement		1		2	2		3			4			5			6			7	Prerequisite
				Т	Ρ	L 1	I I	P L	T	Р	L	Τ	P	L	Т	Р	L	T	Р	L	T	P I	
DUEN-MGT-114	Energy management	5	M												2	1	0						-
	Renewable energy	5	M												2	1	0						DUEN-MUT-250
DUEN-MGT-153	Basics of energy saving and conservation	5	E												2	1	0						-
DUEN-TGT-252	Sustainable Finance and Bigtech Companies in Finance	5	E												2	1	0						-
DUEN-MGT-215	Practical application of renewable energy sources	5	E															0	0	3			-
DUEN-MGT-216	Novel techniques of environmental protection	5	E			Т	Т	Т	Т								Т	2	0	1			-
DUEN-MGT-257	Basic Priciples of Hydrogen Technology	5	E															2	1	0			-
DUEN-MGT-258	Basics of the circular economy	5	E															2	1	0			-
	Number of Theoretical/Practice/Lab classes per week			0	0	0 0) () 0	0	0	0	0	0	0	8	4	0	6	2	4	0	0 0	1
	Total number of classes per week	1			0		()		0			0		1	12			12			0	7
	Total credit points			40]							

			NUCLEAR EN	ER	GY																		
									S	eme	stei	: - C	las	ses	per	we	ek						
Subject code	Subject name	Credit	Requirement		1			2		3			4			5			6		- 7		Prerequisite
				Τ	Ρ	L	T	P]	L 1	P 1	L	Т	Р	L	Т	P	L	T	Ρ	L	ΓΡ	L	
DUEN-MGT-117	Basics of nuclear safety	5	M												2	0	1						-
DUEN-MGT-118	Basics of Atomenergetics	5	M												2	1	0						-
DUEN-MGT-119	Ensuring the integrity of equipment	5	M												2	1	0						-
DUEN-MGT-152	Equipments of Nuclear Power Plants	5	E												2	1	0						-
DUEN-MGT-213	Industrial knowledge	5	M															2	0	1			-
DUEN-MGT-214	Operation and maintenance practice	5	M															0	0	3			-
DUEN-MGT-255	Radiation protection and environmental policy	5	E															2	1	0			-
DUEN-MGT-256	NPP measurements and NDT	5	E															2	1	0			-
	Number of Theoretical/Practice/Lab classes per week			0	0	0	0	0 (0 0	0 0	0	0	0	0	8	3	1	6	2	4	0 0	0	
	Total number of classes per week]			0			0		0			0]	12		1	12		(
	Total credit points	1											40										

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Subject code	Subject name	Credi	Requirement		1	L	T	2		T	3 P	T	T	4 D	T	Т	5	т	T	6		Т		PL	Prerequisite
DUEL IMA-100	Tutorial mathematics	0	S	0				P		1	P	L	1	P	L	1	P	L	1	P	+	1	+	· L	
	Engineering Mathematics 1.	5	E	0		5 0		+	-		-						-		-	-	+	+	+		-
DUEL-INF-010	<u> </u>	5	M	0		15		+	-		-				_	_			-	+	+	+	+	-	-
	Engineering representation	5	M	5				+	-		-				_		-		-	+	+	+	+	+	-
DUEL-MUG-152	<u> </u>	5	E	5				+	-		-								\vdash	+	+	+	+	+-	-
DUEL-MUG-132 DUEL-MUG-212		5	M	0		15		+	-		-				_	_	-		-	-	+	+	+	_	-
	Engineering Physics	5	E	5	5	5		\vdash	-		\vdash				_		-		\vdash	+	+	+	+	+	-
	Engineering Mathematics 2.	5	M	1	+			0	15		-						-		⊢	+	+	╈	+	+-	DUEL-IMA-15
	Industrial materials	5	M	⊢	+	+	5		10		-					_	-		-	+	+	+	+		DUEL-IMA-13
DUEL-MS1-210	industrial materials	>	M	⊢	+	+	1,	0	10		-						-		-	+	+	╋	+	+-	- DUEL-MUG-2
DUEL MUC 222	Basics of machine design	5	м				10	5	0																DUEL-MUG-2
DUEL-IVIUG-222	Basics of machine design	2	NI				10	1	0																DUEL-MOG-11
DUEL-MUG-257	Mathemian 2	5	E	⊢	+	+	5	10	0		-					_	-		-	+	+	+	+	+-	DUEL-MUG-1
	Heat and Fluid Dynamics	5	E	⊢	+	+	5	10	5		-						-		-	+	+	+	+	+	DUEL-MUG-1
	-	5	M	⊢	+	+	5	10	0		-					_	-		-	+	+	+	+	-	DUEL-MUI-I:
DUEL-TVV-122	· · ·	_		⊢	+	+	1,	10	0	0	1.0	-					-		-	+	+	╋	+	+-	-
DUEL-IMA-110		5	M	⊢	+	+	⊢	\vdash	-		15 10						-			+	+	╀	+		DUEL-IMA-15
	Engineering construction	5	M		+	+	⊢	-	-			0					_		-	-	+	+	+	_	DUEL-MGT-1
	Technology of Structural Materials	5	M	⊢	+	+	⊢	+	-								-			-	+	+	+	—	-
DUEL-MUG-153		5	E		+	+	⊢	+	-		10						-		-	-	+	+	+	_	DUEL-MUG-1
	Human Resource Managment	5	M	-	+	+	+	-	-		10								-	-	+	+	+		-
DUEL-TVV-114		5	М	⊢	+-	+	⊢	+	-	2	10	0					-			+	+	╇	+	_	-
	Optional course	5	-	⊢	+	+	⊢	+	-				-	-	-				-	-	+	+	+	_	-
	Basics of energetics	5	М	⊢	+	+	⊢							0	_						+	+	_	_	-
DUEL-MGT-212	Fluid machinery	5	М	⊢	-	+		-	<u> </u>				10	0	5				L_	-	+	+	+	_	DUEL-MUT-2
DUEL-MGT-251	Industrial drive technology	5	Е										10	5	0										DUEL-MUG-14 DUEL-MUG-22
DUEL-MGT-252	Industrial automatics	5	E										5	10	0										DUEL-IMA-15
DUEL-MUG-252	Production Technology	5	E										10	5	0										DUEL-MUG-1
-	Specialisation	20	-		Τ		Γ	Γ								-	-	-				Т			-
-	Optional course	5	-													-	-	-				Τ			-
DUEL-MGT-151	Heat engines	5	E	Γ												10	5	0							DUEL-MGT-2
-	Specialisation	20	-																-	-	-	Τ			-
-	Optional course	5	-																-	-	-				-
DUEL-MUG-213		5	м																10	0	5				DUEL-MUG-2 DUEL-MUG-2
-	Optional course	5	-	\vdash	+	+	\vdash	\vdash												+	+	-			-
DUEL-MUG-091	•	15	s																			0	4	5 0	finishing all subj of the 1-6 semes
DUEL-MUG.093	Professional Practice	0	S	\vdash	+	+	\vdash	+	-										-	+	+	0		0 0	
	Quality Management	5	M	\vdash	+	+	\vdash	+	-		-						-		-	+	+			5 0	-
	Environmental protection and energy management	5	M	\vdash	+	+	\vdash	+	-		-								-	+	+			0 5	-
	Number of Theoretical/Practice/Lab classes per se	_	191	1.5	50	1 35	30	30	20	25	55	10	45	20	10	10	5	0	10	0	-			0 5	-
	Number of Theoretical/Practice/Lab classes per se Total number of classes per semester	9		H	10		130	90		40	<u>90</u>	10		20 75	10	10	15	0	10	15		20	<u>כן ט</u> 7		1
	Total credit points	4	1		10		1	90			20			15			10			12	·			9	1

	MACH	INE M	AINTENANCE	ANI) TI	ECH	INI	CAL	DL	AGN	IOS	TIC	s												
										Nu	mbe	r of	clas	ses	per	sen	nest	ter							
Subject code	Subject name	Credi	Requirement		1			2			3			4			5			6			7		Prerequisite
				Т	Ρ	L	Т	Р	L	Т	Ρ	L	Т	Р	L	Т	Ρ	L	Т	Ρ	L	Т	Ρ	L	
DUEL-MGT-113	Maintenance technologies 1.	5	M													10	5	0							DUEL-MUG-222
DUEL-MUG-111	Production planning, CAM	5	M													10	0	5							DUEL-MUG-252
DUEL-MUG-118	Tribology	5	M													10	5	0							DUEL-MUG-222
DUEL MUC 157	Technical Diagnostics 1.		E													10	5	0							DUEL-MUG-153,
DUEL-MUG-157	Technical Diagnostics 1.	2	E													10	2	0							DUEL-IMA-110
DUEL-MGT-253	Maintenance technologies 2.	5	E																10	5	0				DUEL-MGT-113
DUEL-MGT-254	Maintenance strategy	5	E																10	5	0				DUEL-MGT-113
DUEL-MUG-216	Complex Machine Designing	5	M																0	0	10				-
DUEL-MUG-219	Technical Diagnostics 2.	5	M																10	0	5				DUEL-MUG-157
	Number of Theoretical/Practice/Lab classes per se			0	0	0	0	0	0	0	0	0	0	0	0	40	15	5	30	10	15	0	0	0	
	Total number of classes per semester]			0			0			0			0			60			55			0		
	Total credit points]												40											

			GREEN TR/	ANS	FO	RM	ATI	ON																	
										Nu	nbei	: of	clas	ses	per	sen	aest	er							
Subject code	Subject name	Credit	Requirement		1			2			3			4			5			6			7		Prerequisite
				Т	P	L	T	Р	L	Т	P	L	Т	P	L	Т	Р	L	Т	P	L	Τ	P	L	
DUEL-MGT-114	Energy management	5	M													10	5	0							-
DUEL-MGT-115	Renewable energy	5	М													10	5	0							DUEL-MUT-250
DUEL-MGT-153	Basics of energy saving and conservation	5	E													10	5	0							-
DUEL-TGT-252	Sustainable Finance and Bigtech Companies in Finance	5	E													10	5	0							-
DUEL-MGT-215	Practical application of renewable energy sources	5	E																0	0	15				-
DUEL-MGT-216	Novel techniques of environmental protection	5	E																10	0	5				-
DUEL-MGT-257	Basic Priciples of Hydrogen Technology	5	E																10	5	0				-
DUEL-MGT-258	Basics of the circular economy	5	E																10	5	0				-
	Number of Theoretical/Practice/Lab classes per se			0	0	0	0	0	0	0	0	0	0	0	0	40	20	0	30	10	20	0	0	0	
	Total number of classes per semester				0			0			0			0			60			60			0		
	Total credit points	1		40																					

			NUCLE	AR	EN	ERO	βY																		
										Nui	nbe	r of	cla	sses	per	' sen	nest	er							
Subject code	Subject name	Credit	Requirement		1			2			3			4			5			6			7		Prerequisite
				Т	P	L	Τ	Р	L	Т	Р	L	Т	Р	L	Т	Р	L	Т	P	L	Τ	Ρ	L	
DUEL-MGT-117	Basics of nuclear safety	5	Μ													10	0	5							-
DUEL-MGT-118	Basics of Atomenergetics	5	Μ													10	5	0							-
	Ensuring the integrity of equipment	5	Μ													10	5	0							-
DUEL-MGT-152	Equipments of Nuclear Power Plants	5	E													10	5	0							-
DUEL-MGT-213	Industrial knowledge	5	М																10	0	5				-
DUEL-MGT-214	Operation and maintenance practice	5	M																0	0	15				-
DUEL-MGT-255	Radiation protection and environmental policy	5	E																10	5	0				-
DUEL-MGT-256	NPP measurements and NDT	5	E																10	5	0				-
	Number of Theoretical/Practice/Lab classes per se			0	0	0	0	0	0	0	0	0	0	0	0	40	15	5	30	10	20	0	0	0	
	Total number of classes per semester]		0 0 0 0 60 60 0											0										
	Total credit points													40											

SUBJECT DESCRIPTIONS

Tutorial mathematics

Tutorial	mathem	natics											
Name of th	ne subiect	in Hungar	ian	Matematika					Level	BSc			
	-	in English		Tutorial ma	thematics				Code	DUEN(L)-IMA-100			
	le educatio												
Name of co DUEN(L)-	ompulsory -	prior learn	ing						1				
Туре		Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education			
Full time	150/26	per week	0	per week	2	per week	0	-	5	english			
Part time	150/10	per term	0	per term	10	per term	0		-				
Teacher re	sponsible f	for the subj	ect	Name									
Training objective and justification of the course (content, output, location in the curriculum)				Based on the students students students students students students and manage students' matrix students and manage students matrix students matrix students matrix students students matrix students matrix students studen	Coals, development objectives Based on the preliminary knowledge assessment, this course is recommended for tudents studying in the bachelor courses in economics and management, materials ngineering, mechanical engineering, business informatics, computer engineering, echnical management, and in the higher vocational courses in engineering, economics, nd management. The aim is to acquire basic mathematical knowledge, to raise tudents' mathematical knowledge, skills, and competences to a level appropriate for ne preparation of higher education studies and for the completion of mathematics								
				Presentation									
Typical de	livery meth	nods		Practice		om exercise	es, stude	ent-prepared pa	apers, pres	sentations, case			
51				Laboratory									
				Other									
				Knowledge									
Requirements (expressed in terms of learning outcomes)			ns of	Ability to a the problem their own so mathematic: effectively, Attitude Open to lea developmen Interested in Autonomy Taking resp	Ability Ability to apply the mathematical knowledge and activities learned. Ability to apply the problem-solving methods and procedures learned. Ability to develop and defend their own solution plans in discussions (argumentative debating skills) in relation to the mathematical concepts learnt. Ability to organise his/her own learning process effectively, to find and use different learning resources (print, electronic). Attitude Open to learning about and embracing mathematically based, applied mathematical developments and innovations related to your qualifications and area of expertise. Interested in new methods and tools related to the field. Autonomy and responsibility Taking responsibility for your own work and the work of others.								
content	ription of t	5		The material for the intermediate mathematics exam. Operations with complex numbers. Set theory, the concept of a function. Number sequences, powers, roots, order of operations. Logarithm, solutions of linear and quadratic equations. Solving problems in text. Exercise problems from the numeracy exercise in Engineering Mathematics 1.									
Types of s	tudent activ	vities						endent process					
-	iterature ar			 Lay, D. C.: Linear Algebra and its applications, 4th edition, Addison-Wesley, 2012. Stawart, L: Complex Numbers, Additional Topic to Essential Calculus, 2nd 									
details	nded literat		ntact		ectronic or stems.	content and	learning	g material in N	foodle and	d/or in Neptun			
	measureme												
	n and time			During the semester, full-time and correspondence students write 1 final examination in week 13. The final examination is assessed according to the Examination and Study Regulations									

Engineering Mathematics 1.

Engineering Ma	in Hungarian Márnöki matematika 1 Laval BSa										
Name of the subject	in English	1	Engineering Mathematics 1.						Code	DUEN(L)-IMA-152	
Responsible educatio	<u> </u>		Institute of Information Technology, Department of Mathematics and Computer Science								
Name of compulsory DUEN(L)-	prior lear	ning									
Туре	Presentati	on	Practice			Laboratory		Requirement	Credit	Language of education	
Full time150/39Part time150/15	per week per term	0	per week per term	3 15	p p	5	english				
Teacher responsible f		-	Name		-	ntal Joós,	PhD		schedule	Associate Professor	
Training objective an			Goals, deve	lopme							
he course (content, output, location ir he curriculum)			To acquire	the mathemati	ather	matical fo		ons necessary e study of the l		the subjects, and to	
Typical delivery meth		Practice Laboratory	Smal	ll tab	oles, comp	utationa	al exercises.				
			Other	_							
Requirements (expres learning outcomes)	Other Knowledge Knowledge of the general and specific mathematical, scientific and social principles, rules, contexts and procedures necessary for the operation of the technical field. Ability to plan, organise and carry out independent learning. Attitude Open to learning about and embracing mathematically based, applied mathematical developments and innovations related to their qualifications and areas of expertise. Interested in new methods and tools related to the field. Autonomy and responsibility Taking responsibility for your own work and the work of others										
Short description of t content		sequences 1 limit, contir relation bet differentiab functions. 1 coefficients conditions integral cal integral and integral. B calculation	imit, co nuity. I ween c le func Mean v , L'Hos for inte culus, I some asic p of extre	onve Interj differ ction value spita egrat New of it prope emal	ergence cr pretation of rentiability . General e theorem d's rule, f polity, pro- vton-Leibr ts properti- erties of values.	iteria. I of differ and c differe s of di unction perties niz forr tes, bas multiva	Basic properti- rential coeffici ontinuity, deri- entiation rules fferential calco disjunction. of definite in nula. The pri- ic integrals. In ariate real fu	es of univ ent of univ ivative fu , differen culus, hig Concept tegral, me mitive fu ntegration	f a function. Number variate real functions, variate real functions, nction, differential of tiation of elementary her order differential of Riemann integral, ean value theorem of nction, the indefinite methods. Improprius differential calculus,		
Types of student activ	vities		Processing theoretical material with guidance 10% Independent processing of theoretical material 30% Task solving with guidance 30 % Independent processing of tasks 30 %								
Required literature ar	id contact	details	 Kovács J Takács G Takács M.: Analysis. 16th edition. Takis, Analysis, 16th Edition. Budanest. National Taythook Publicher. 2004. 								
Recommended literat details		ontact	 P. Horváth: Multiple choice exercises for mathematics exercises. 2nd revised edition. Dunaújváros, Publishing Office of Dunaújváros College, 2008. Dr. M. Takács: Complex numbers example book. 3rd revised edition. Dunaújváros, Publishing Office of Dunaújváros College, 2009. 								
Description of tasks t submitted/measureme	ent reports										
Description and timet workshops	able of the	e									

Informa		in Hungar	ian	Informatika					Level	BSc		
Name of th	he subject	in English		Informatics Code DUEN(L)-ISF-010								
Responsib	le educatio	nal unit		Institute of Informatics, Department of Software Development and Applications								
	ompulsory		ning									
Туре		Presentati	on	Practice		Laboratory		Requirement		Language of education		
Full time	150/39	per week	0	per week	M 5 englis							
Part time	150/15 esponsible f	per term	0	per term Name	0	per term Nagy Bálin	15 + PhD		cohodulo	Associate professor		
Training objective and justification of the course (content, output, location in the curriculum) Typical delivery methods Requirements (expressed in terms of learning outcomes)				The students The students create spread The students	s should b s should b s should b dsheet by s should b l be able t l In class individu	e able to m be able to br e able to pro- using sprea be able to pr o prepare si rooms with al tasks on	owse the epare do dsheet p epare an mple pu the use the use	program. nd manage sim resentations as	send ema a word pr nple datab well. nd comput programs,	ils. ocessing program and ases. ter, students solve with teacher		
			technology. They have adequate expertise in the IT field specialist knowledge or specific tools for selecting tools and to carry out its tasks. Ability Students are able to perform partial activities independently during solving more complex system problems. They apply their studied problem solving methods and procedures efficiently in expertly tasks Attitude Students are interested in new methods and tools related to IT section. Student consider their own professional competences and activities on reflective way. Open to understand and accommodate professional, technological development and innovation area. Autonomy and responsibility Students strive for efficient and quality work. The responsible for the technica									
			operations carried out independently. Confident use of operating system: managing files and folders. Goal-oriented use of the Internet, knowledge of NETiquette. Targeted search on the Internet. Use of email programs. Word processing with MS Word word processor program: Basic text editing operations, creating tables, applying styles, creating a table of contents and other lists and creating mail merges. Spreadsheet management with MS Excel spreadsheet program: Creating, uploading and formatting tables, using cell references, formulas, functions, charts as data visualization, applying simple database operations, managing and visualizing data. Making a presentation with MS PowerPoint or Prezi: basic slide editing and formatting operations, using the slide master, slide templates, applying styles, slideshow settings and presentation techniques. Independent, creative use of any kind of innovative IT tools and applications									
Types of s	tudent activ	vities		Heard inform	mation pr	ocessing by	creatin	g notes, system	natization	of information has		
Required l	Required literature and contact details			 led by tasks (40%) Self-processing (individual) tasks (60%) WORD 2010 All-In-One for Dummies by Doug Lowe with Ryan Williams, Wiley Publishing Inc., 2010, Indianapolis, Indiana (free pdf on Internet) EXCEL 2010 All-In-One for Dummies by Greg Harvey, Wiley Publishing Inc., 2010, Indianapolis, Indiana (free pdf on Internet) ACCESS 2010 All-In-One for Dummies by Margaret Levine Young, Alison Barrows, and Joseph C. Stockman, Wiley Publishing Inc., 2010, Indianapolis, Indiana (free pdf on Internet) 								

	 POWER POINT 2010 All-In-One for Dummies by Doug Lowe, Wiley Publishing Inc., 2010, Indianapolis, Indiana (free pdf on Internet) The Internet for Dummies 12th edition by John R. Levine – Margaret Levine Young, Wiley Publishing Inc, Indiana (free pdf on Internet) OFFICE 2010 All-in-one for Dummies by Peter Weverka, Wiley Publishing, Inc. Indiana (free pdf on Internet)
Recommended literature and contact details	• Electronic literature in Moodle or in Neptun. Microsoft Office Tutorial and examples (Internet).
Description of tasks to be submitted/measurement reports	The student has the opportunity to solve a Word and Excel tasks on a topic of his or her own choice that match and are consistent with the learning materials of the semester. The extra point will be included in the final grade. It is necessary to discuss
Description and timetable of the workshops	At the end of each topic, students write closed papers, typically: - Week 5: Word processing computer-based test - Week 11: Spreadsheet management computer-based test In case of any computer-based tests, the opportunity for replacement and correction is

Enginee	ering rep	resentat	ion									
Name of t	he subiect	in Hungar		Műszaki áb		Level	BSc					
	ne subject	in English	1	Engineering					Code	DUEN(L)-MGT-111		
	le educatio			Institute of '	Technolo	gy, Departn	nent of M	Mechanical En	gineering	and Energy		
Name of c DUEN(L)	ompulsory -	prior learr	ning						1	1		
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time Part time	150/39 150/15	per week per term	1 5	per week per term	2 10	per week per term	0	М	5	english		
Teacher re	esponsible f	for the sub	ject	Name								
Training objective and justification of the course (content, output, location ir the curriculum)			descriptive ; complex pro the optimal ; should be fa sections. Th	should be geometry oblems at solution f amiliar w e student l tools, to drawing	e able to per . Recognise nd be able t or a given si ith the theo should be a o read technis s of machin	the eler o deterr tuation ry and p ble to e ical draw e parts.	nentary constr nine their corr from a range o practice of tec dit technical d wings. The stu	ructions n rect seque f possible chnical dra lrawings o dent shou	solutions. The student awing projections and of machine parts using ld be able to construct			
				Presentation	¹ projecto	or	0			r Point and overhead		
Typical delivery methods				Practice Laboratory	Small g	roup exerci	ses for u	up to 25 people	e, sketchi	ng and editing		
Requirements (expressed in terms of learning outcomes)			ns of	You have a methods in Basic know technology, Comprehen- machines, p Understand, and elemen components Ability Performs th Ability to pl Ability to pl Abil	he termin compref your field ledge of r control p sive know ower tool characte ts of mec used. e job acco an, organ lentify rou standard ming abo ifications e field. and resp onsibility	nensive kno nachine des rocedures a vledge of the s, mechanical system ording to histice and carri- atine profestions operations ut and embra and area of onsibility for your ov	wledge ign prin nd oper- he oper- cal equip del the tems, the s/her qua- y out in sional p in practi- racing de experti- wn work	ciples and met ating processe ating principle oment and tool structure and a design and alifications. dependent lea roblems, to ide ice) against a t evelopments in se. Interested i	theories a thods, may s. es and str ls used. operation interrelat rning. entify, for heoretica n machine in new me of others	ind problem-solving chine manufacturing ructural units of the of the structural units ionship of the system rmulate and solve l and practical e design related to ethods and tools		
Short description of the subject content				Image plane, coordinate system, projection. Representation of a point, real line and point image. Law of projection and of change of view. Mutual positions of spatial elements. Projections dependent on the positions of a straight line, lines of deviation and intersection. Transversals, notable lines of a plane. True magnitude of the plane, constructions with rotation. Intersection of two planes, angles of inclination, distances. Solving problems with basic constructions. Basic standards of technical drawing design. Theoretical overview of projection systems in engineering practice. Application of views, views. Use of sections and sections. Dimensioning on engineering drawings. Grids of dimensions.								
Types of s	tudent activ	vities		Theoretical processing with guidance 20 % Theoretical processing with guidance 20 % Problem solving with guidance 20 % Problem solving with guidance 40 % Laboratory measurements with guidance - Preparation of laboratory reports -								
Required 1	literature ar	nd contact	details	 Illustrative Geometry Basic Tasks (Guide and practical exercises, Tamás Zahola) László Tóth- Tamás Zahola: Mechanical Engineering. Zahra Zahola. Főiskolai Kiadó 								

Engineering representation

Recommended literature and contact details	 Károly Koffán: 15 lectures. 15 lectures. Főiskolai Kiadó. Koffán Károly: 15 exercises. College notes. College Publishing House.
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Mechanics 1.

Mechani		in Hungari	an	Mechanika	1.				Level	BSc			
Name of the	e subject	in English		Mechanics 1					Code	DUEN(L)-MUG- 152			
Responsible	e education	nal unit		Institute of 7	Institute of Technology, Department of Mechanical Engineering and Energy								
Name of co DUEN(L)-			ing										
Туре		Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education			
Full time	150/39	per week	1	per week	2	per week	0	Е	5	english			
Part time		per term	5	per term	10	per term	0	-					
Teacher responsible for the subject Training objective and justification of the course (content, output, location in the curriculum)			structures by	lopment ill learn y applying eparation of mater All stud projecto	the mecha g the concep . You will le ials. lents in a lar or.	nical pots and earn the ge lectu	contexts prese concepts and ure, using lectu	nted in the practical i ire, Power	relationships of statics				
Typical deli	ivery metr	lods		Laboratory Other		ible for up t	o 25 pe	ople, calculati	on exercis	es			
Requirements (expressed in terms of learning outcomes)			ns of	subject area Knowledge rules, contex You know t You have a methods in y Ability Ability to pl Ability to pl Ability to bu Ability to bu Attitude Open to lear qualification field. Autonomy Taking resp	aprehensiv of engine of the ger of the ger ts and pr he termin a compre- your field an, organ dentify ro s standard nild basic m about a as and are and responsibility	ering. heral and spo ocedures ne ology, key of hensive kno ise and carr utine profe- d operation models of t nd embrace a of experti- onsibility for your ow	ecific m cessary oncept: owledge y out in ssional s in pr echnica develo se. Inter yn work	athematical, s for the operat s and theories of the main dependent leas problems, to actice) agains l systems and pments in mec rested in new r	cientific a ion of the related to theories rning. identify, f t a theore processes. thanics rel nethods an of others.	and problem-solving formulate and solve etical and practical ated to his/her nd tools related to the			
Short description of the subject content				vectors. For Concept of Equilibrium and planar constraints, relationship subdivision, for structura derived from Concept and principal st	ce, force s momentu of rigid b force sy concepts s between methods al elemen n it. Deter d definition ress direct	system, equival m. Equival ody. Ideal c vstems. Sta and princip of stresses. For of strength its, the tenss mination of pon of stress ctions. Eler on of strain	librium ence of constrain tics of les of undame of mate ile diag mechan state. nents of state.	Statics of riginal force system of the strain state system of the strain state system of the system	id bodies: s, reduction pport ele of interna th of matte chanical p inder simp stress sta : specific	can be performed or concept of rigid body on. Concept of force rce systems for spatial ments, supports and al forces and stresses erials: basic concepts th tests, requirements roperties that can be be loading conditions te, principal stresses strains and angular train and stress state			
Types of stu	udent activ	vities		Theoretical	processin	g with guida	ance/ind	dependent: 15/ dent: 15/35 %	35 %				
Required lit	terature an	d contact	letails										
Recommended literature and contact details				 Dr. Sándor Vigh: Mechanics. College notes Engineering Mechanics I. Elementary Statics, Workbook, Departmental Working Group, Dunaújváros, ME DFK Publishing Office, 1994. Engineering Mechanics II/1. Elementary Strength, Workbook, Dunaújváros, DF Kiadó, 2000. 									

	 Dr Vigh S Engineering Mechanics IV. Cross-sectional Characteristics. college note, Dunaújváros, DF Kiadó, Dunaújváros, 1998.Engineering Mechanics I. Exemplar: part 1, Dunaújváros, DF Kiadói Hivatal, 2000. Technical Mechanics II. Manual: II/A, , Dunaújváros , DF Publishing Office, 2000.
Description of tasks to be	
submitted/measurement reports	
Description and timetable of the	
workshops	

CAD

CAD		1		1						1		
		in Hungai	rian	CAD					Level	BSc		
Name of th	ne subject	in Englisł	1	CAD Code DUEN(L)-MUG- 212								
	le educatio			Institute of Technology, Department of Mechanical Engineering and Energy								
Name of c DUEN(L)·	ompulsory -	prior learn	ning									
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time Part time	150/39 150/15	per week per term	0	per week per term	0	per week per term	5	english				
	sponsible f		iect	Name	÷	Gábor Vizi	15 . PhD		schedule	Assistant professor		
Training objective and justification of the course (content, output, location ir the curriculum)				able to build incorporate for the task able to build	should be d paramet design int at hand f d an assen ents and	e familiar w tric geometr tent. Be able from a varie ably from th	to selected to selected ty of portected ty of ports of	els of parts tha et the optimum ossible modeli created. Be abl	at "survive modeling ing sequent le to produ	pometric modelling. Be " design changes and sequence and method nces and methods. Be nce technical drawings nts of the applicable		
Typical de	livery meth	nods		Presentation Practice Laboratory Other	1	ter laborato	ry exerc	ise				
Requirements (expressed in terms of learning outcomes)			ms of	 Knowledge Apply the related computational and modelling principles and methods of engineering product, process and technology design. Ability Ability to plan, organise and carry out independent learning. Ability to build basic models of technical systems and processes. Attitude Open to learning about and embracing developments in CAD related to your qualifications and area of expertise. Interested in new methods and tools related to the field. Autonomy and responsibility Taking responsibility for your own work and the work of others. 								
Short desc content	ription of t	he subject		The student will learn the practice of computer geometric modelling through computer laboratory sessions using a modern parametric modelling system (SolidWorks). You will learn the use of commands to create machine parts. You will learn how to build assemblies. You will be able to create technical drawing documentation that best complies with current standards in your engineering work, based on the component and assembly models you have already built.								
Types of s	tudent activ	vities		Processing theoretical material with guidance 20 % Independent processing of theoretical material 20 % Task solving with guidance 20 % Independent processing of tasks 40 % Laboratory measurements under supervision								
Required 1	iterature an	d contact	details	Preparation of laboratory reports S • SolidWorks Online Help								
-	nded literat			Solid Works Online Help Specifications and documentation for the SolidWorks software system								
submitted/	n of tasks to measurement n and timet	ent reports										

Engineering Physics

Linginee	ering Phy			1					1				
Name of t	he subject	in Hungar		Mérnöki fiz		Level	BSc						
	5	in English	1	Engineering				<u> </u>	Code	DUEN(L)-MUT-151			
	ble education compulsory		in a	Institute of Technology, Department of Mechanical Engineering and Energy									
DUEN(L)		prior learn	iiiig					1	1				
Туре		Presentati	on	Practice		Laboratory	-	Requirement	Credit	Language of education			
Full time Part time		per week per term	1 5	per week per term	1 5	per week per term	1 5	Е	5	english			
	esponsible f	1	ject	Name Miklós Horváth, PhD schedule College profe									
	bjective and (content, o ulum)			The aim of t the statics an optics, quar subjects	Goals, development objectives The aim of the course is to learn the mechanics of the material point, electrodynamics, the statics and dynamics of liquids and gases, thermodynamics, as well as the basics of optics, quantum mechanics and semiconductors and modern physics, the following subjects								
Typical delivery methods			preparation Presentatior Practice Laboratory Other	Projecto Projecto	or, ppt prese or, ppt prese	entation entation	nd experiment	S					
Requirements (expressed in terms of learning outcomes)			ns of	including ki vibrations a know the pr application. expansion a knows the l networks, an concepts of physics and Ability The ability theme, to dr Attitude Collaborate Open to lean <u>Strives for a</u> Autonomy Solve tasks Independent measurement	knows the nematics, nd can solo operties of He/she H nd phase basics of nd can solo geometry quantum to recogn aw conclu- with class ning and ccuracy i and resp independently set up a nt errors nt results	dynamics, live problem f ideal fluid cnows the l transitions, electrostatic ve simple p y and physic mechanics. ise and und asions and t smates and applying m <u>n both num</u> onsibility ently using and carry ou and estima	momen s related s and th aws of the first cs, DC is roblems cal optic erstand o under the teac odern in erical ar the reso the reso the reso the reso	tum, work, en- tum, work, en- d to these theo e most import: state changes and second la networks, mag with these. Yo es, their applic physical phen stand and solv her to develop nvestigative te ad laboratory en- urces and mat rements in lab	ergy outpur rems at a p ant laws o of gases aws of the gnetism and ou will knowled chiques. exercises. erials pro- oratory ex- es. Can in	vided. tercises, can recognise ndependently process			
Short description of the subject content				Mechanics of material point, kinematics, dynamics. Uniformly accelerating motion, uniform and accelerating circular motion, momentum, work, energy, power, and related laws. Statics of ideal fluids, Pascal's law, Archimedes' law, buoyancy. Ideal gases, gas laws, 1st and 2nd laws of thermodynamics, entropy, thermal expansion, phase transitions. Electrostatics, DC networks, magnetism and electromagnetic induction. Calculation of alternating current networks. Geometric and physical optics, photometry. Fundamentals of atomic physics and quantum mechanics.									
Types of s	student activ	vities		laboratory e	xercises,	taking notes	5.			ive participation in			
Required	literature an	id contact	details	 Endre Kiss: Text-based learning material based on the engineering physics textbook in Moodle Physics working group; edited by Dr. Miklós Horváth: Exercises based on the physics textbook in the Moodle system Kelemen A. :Measurement descriptions based on Physics Laboratory Exercises I in Moodle Hartai J. Kiss E. Spissák L.: Measurement descriptions based on Physics Laboratory Exercises II in Moodle 									
Recomme details	nded literat	ure and co	ontact	• Á H	goston Bu ouse, Bud	ıdó: Experii lapest, 1997	mental I ')	Physics 1., 2.,		al Book Publishing , Budapest, 1986)			

Description of tasks to be submitted/measurement reports	Measurement reports from laboratory exercises
Description and timetable of the workshops	Examination papers in weeks 7 and 13: The papers contain 10 test questions, 2 theoretical questions to be explained and 2 problems to be solved, for which a total of 100 points can be awarded.

Engineering Mathematics 2.

Engineerin	<u> </u>			1						1		
Name of the su	ubiect	in Hungar		Mérnöki ma					Level	BSc		
		in English		Engineering					Code	DUEN(L)-IMA-212		
Responsible eo				Institute of Information Technology, Department of Mathematics and Computer Science								
Name of comp DUEN(L)-	oulsory	prior learn	ing	IMA-152								
Туре		Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education		
	0/39	per week	0	per week	0	per week	3	М	5	english		
		per term	0	per term	0	per term	15			-		
Teacher respon	nsible f	or the subj	ect		Name László Bognár, PhD schedule College profess							
Training objective and justification of the course (content, output, location i the curriculum)				The purpose statistical m objective of analysing da	bals, development objectives the purpose of the course is to make the students familiar with analysing data using atistical methods and tools. Having covered this course students understand the bijective of probability and statistics, they know the different ways of gathering data. alysing datasets with statistical software and they can make inferences for real orld situations based on samples of data. These formal lectures mostly aim at transferring information. Students are expected to take personal notes in addition to the course							
					text, sli	des or trans	parencie	es.				
m · · · ·		1		Practice			1. •		1 1 1 1 1			
Typical delivery methods				Laboratory	exercise	es, feedback s with softw	on an a		practicing	ether it is about statistical data always be		
				Other	^							
Requirements (expressed in terms of learning outcomes)			ns of	described by Students wil appropriate from their n Students wil resentation Students wil related to fu Ability Students wil the related f Attitude Collaborate Open to lean Strives for a Autonomy Taking resp	y quantita Il demons level and najor to re Il demons ting critic is. Il acquire ture caree Il be able ield. with clas ming and accuracy i and responsibility	tive data. trate their a demonstrat al world mo trate master ally reasone up-to-date : er choices. to read, inter smates and applying m n both nume onsibility for your ov	bility to e their a odels. y of dat d analy skills an erpret, a erpret, a the teac odern in erical an wn work	her to develop nvestigative tea nd laboratory e and the work	s in other knowled; statistica itten and ons of com nalyse jou knowled; chniques. exercises. of others.	fields at an ge acquired l concepts by oral nputer use rnal articles in ge.		
Short descripti content	on of t	he subject		introduction	, descript	ive statistic	s, proba	ed in the follo bility, random lear regression	variable,			
Types of stude	ent activ	vities		Frontal work 30% Individual or group work 50% Testing 20%								
Required literature and contact detail				 James T. McClave, P. George Benson, Terry Sincich : Statistics for Business and Economics. Ed 12th. Pearson Education, Inc. 2014. Douglas C. Montgomery George C. Runger : Applied Statistics and Probability for Engineers. Ed 5th. John Wiley & Sons Inc. 2011. Moodle textbook 								
Recommendec details	l literat	ure and co	ntact	• Ja	http://onlinestatbook.com/2/index.html							

Description of tasks to be	
submitted/measurement reports	
Description and timetable of the	
workshops	

Ind	lustrial	materials

Industrial mater		•	A (" 1 '	•				T 1	D.C.		
Name of the subject	in Hunga in English		Műszaki an Industrial m		et			Level BSc Code DUEN(L)-MST-210			
Responsible education		1			av Departm	ent of S	Structural Inte		DUEN(L)-WIST-210		
Name of compulsory DUEN(L)-		ning		Technolog	gy, Departir			giity			
Туре	Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time150/39Part time150/15	per week per term	1 5	per week0per week2per term0per term10				5	english			
Teacher responsible	for the sub	ject	Name		Zsolt Csepe	eli, PhD		schedule	College professor		
Training objective and justification of the course (content, output, location in the curriculum) Typical delivery methods			The aim of through wh shell structu determine analysis of c about the re	Goals, development objectives The aim of the course is to provide students with a basic knowledge of chemistry through which they will become familiar with the structure of materials, the electror shell structure that determines material properties, the types of chemical bonds tha determine macroscopic properties, and the microscopic structure and methods o analysis of different types of materials (metals, ceramics, polymers). Students will learn about the relationships between the structure and properties of materials, enabling then to select the most suitable materials for a given application in simple cases.							
			Presentation Practice Laboratory				ming materials		e in moodle.		
Requirements (expre learning outcomes)	ms of	Other Knowledge Have a com area of engi social princ of engineeri the methods Ability Ability to p Attitude Open to lea to their qua related to th Autonomy It takes its responsibili	prehensiv neering. K iples, rule ing. Thoro s of their r lan, organ rning and alification <u>e field.</u> and resp decisions ty for thei	e knowledge (nowledge of s, contexts a ough knowle nanufacture ise and carr absorbing s and areas onsibility independen n.	e of the f the ge und proc edge of and the y out in knowled of exp tly, in d	basic facts, din neral and spec sedures necess the materials conditions of dependent lea lge related to pertise. Interes	rections ar ific mathe ary for the used in the their use. rning. chemistry sted in ne	and materials related w methods and tools disciplines, and takes			
Short description of content	the subject		Atomic structure. The structure of the periodic table. Electron configuration. Types and characteristics of chemical bonding. Electron affinity, electronegativity, oxidation number. Strong bonds. Weak bonds. General characterisation of metals, reactivity. Basic knowledge of organic chemistry. Grouping of carbon compounds, nomenclature. Isomerism. Main reactions of organic substances. Interconnection of macromolecules as a basis for polymer production. Basic knowledge of silicate chemistry. Basic knowledge of colloid chemistry. State change in solid phase processes. Polymorphic transformation. Types of engineering materials. Structure - processing - properties interaction. Crystal structure, crystal systems. Crystal, crystallite. Crystal lattice defects. Movement of atoms in matter, diffusion. Phases and constituents of metallic materials. Significance, definition of equilibrium phase diagrams. Rules for reading two and three component equilibrium phase diagrams. Basic types of two-element equilibrium phase diagrams.								
Types of student act	ivities			material to f measur	tests 30%. ements, pre	paration	of report 20%				
Required literature a	nd contact	details	 Balázs Verő, Éva Dénes, Zsolt Csepeli:Introduction to the Engineering Materials Science, Főiskolai Kiadó, Dunaújváros Éva Dénes, Péter Farkas, Zsoltné Fülöp, Zoltán Szabó. 								
Recommended litera details		ontact	• D	r. Tamás '	Tóth: Mech	anical p		aterials ar	nd methods of their		
Description of tasks submitted/measurem Description and time	ent reports		The student shall draw up a measurement report on the measurements carried out.								
workshops			A final paper in weeks 6 and 12 from the lectures and laboratory classes.								

in Hungarian Géptervezés alapjai Level BSc Name of the subject DUEN(L)-MUGin English Basics of machine design Code 22 Institute of Technology, Department of Mechanical Engineering and Energy Responsible educational unit MUG-212 Name of compulsory prior learning MUG-152 DUEN(L)-MGT-111 Language of Credit Type Presentation Practice Laboratory Requirement education Full time 150/39 per week 2 per week per week М english Part time 150/15 per term 10 per term per term College associate Teacher responsible for the subject Name Szabó Attila, PhD schedule professor Goals, development objectives The student should know the construction and operation of typical machine parts, components, assemblies and sub-assemblies used in engineering practice. Be able to Training objective and justification of select standard parts for such units, determine the main dimensions, and design the the course (content, output, location in associated components. Be able to prepare drawing documentation of units using the curriculum) traditional and computer tools. The student will be able to apply the knowledge acquired in Mechanical Engineering I, CAD and Mechanics I to the construction of simple structures and assemblies. All students in a large lecture, using lecture, Power Point and overhead Presentation projector Small group of up to 25 people, sketching, drafting, calculation Practice Typical delivery methods exercises Laboratory Other Knowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. You know the terminology, key concepts and theories related to your field. You have a comprehensive knowledge of the main theories and problem-solving methods in your field. Basic knowledge of machine design principles and methods, machine manufacturing technology, control procedures and operating processes. Comprehensive knowledge of the operating principles and structural units of the machines, power tools, mechanical equipment and tools used. In-depth knowledge of learning, knowledge acquisition, data collection methods, their ethical limitations and problem-solving techniques in mechanical engineering. Understand, characterise and model the structure and operation of the structural units and elements of mechanical systems, the design and interrelationship of the system components used. Apply the related computational and modelling principles and methods of engineering Requirements (expressed in terms of product, process and technology design. learning outcomes) Ability Performs the job according to his/her qualifications. Ability to plan, organise and carry out independent learning. Ability to identify routine professional problems, to identify, formulate and solve them (using standard operations in practice) against a theoretical and practical background. Ability to build basic models of technical systems and processes. Routinely identifies professional problems, explores and formulates the theoretical and practical background necessary to solve them, and solves them by applying standard operations in practice. Attitude Open to learning and absorbing knowledge related to mechanical engineering related to his/her qualifications and area of expertise. Interested in new methods and tools related to the field. Autonomy and responsibility Taking responsibility for your own work and the work of others. Repetitive parts or units of machinery performing the same function and having a Short description of the subject similar design - machine components. Definition, grouping, description, description, representation, strength dimensioning, correct construction, operation and maintenance content of machinery parts. The main machine components or groups to be discussed in detail

Basics of machine design

	are: drive and connecting screws, shafts, shaft couplings, couplings, bearings, belt drives, gears. In the discussion of the subjects, the emphasis is on the illustration and overview of the parts/assemblies.
Types of student activities	Processing theoretical material with guidance 20 % Independent processing of theoretical material 20 % Task solving with guidance 20 % Independent processing of tasks 40 % Laboratory measurements under supervision Preparation of laboratory reports.
Required literature and contact details	 László Tóth- Tamás Zahola: Mechanical Engineering. Zahra Zahola. Főiskolai Kiadó Dr. Péter Szendrő and co-authors, Mechanical Engineering BSc. textbook, 2007. Mezőgazda Kiadó, Budapest, 758 p.
Recommended literature and contact details	 Dr. József Őze: Mechanical Elements I/2. I/3. I/4. I/5. I/6. I/7. I/8. manuscripts.1. Árpád Zsáry:Machine Elements II., Budapest, 1991. György Diószegi: Mechanical Engineering Handbook. Technical Book Publishing House, Budapest, 1988. István Majdán: Technical Pocketbook. Technical Book Publishing House, Budapest, 1995. Géza Nagy: Atlas of Mechanical Engineering. GTE ME Machine Elements Department, Budapest, 1991 4000 SKF Bearing Master Catalogue
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Mechanics 2.

Mechanics 2.	-	in Hungari	on	Mechanika)				Laval	BSc		
Name of the subject	ct [Level	DUEN(L)-MUG-		
]	in English		Mechanics 2				<u>()) IE</u>	Code	257		
Responsible educa			•	Institute of	Technolog	gy, Departm	ent of I	Mechanical En	gineering	and Energy		
Name of compulso DUEN(L)-	ory [prior learn	ing	MUG-152				T		1		
Туре]	Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time 150/39 Part time 150/15		per week	1 5	per week	$\frac{2}{10}$	per week	0	Е	5	english		
Teacher responsibl		per term	-	per term Name	10	per term Béla Palotá			schedule	Professor emeritus		
			ion of	Goals, deve The student applying the preparation.	Goals, development objectives The student will learn the mechanical principles of complex structure design by applying the concepts and contexts presented in the lectures to exercises and home preparation. You will learn about the statics of structures, limit states of use, the basics of the finite element method. Presentation All students in a large lecture, using Power Point and overhead							
				Presentation	projecto	or.	-	_				
Typical delivery m	neth	ods		Practice				ople, calculatio				
				Laboratory Other	Laboratory 12-person laboratory exercise in solid mechanics and finite elements							
				Sther Knowledge								
Requirements (expressed in terms of learning outcomes)			ns of	subject area Knowledge rules, contez You know t You have a methods in Ability Ability to pl Ability to pl Ability to bu Ability to bu Ability to bu Ability to bu Attitude Open to lean qualification field. Autonomy	of engine of the ger sts and pr he termin a compre- your field an, organ dentify ro g standard nild basic m about a ns and are and resp	erring. heral and sp ocedures ne ology, key of hensive kno ise and carr nutine profe d operation models of t nd embrace a of experti onsibility	ecific m cessary concept: owledge y out in ssional s in pr echnica develo se. Inter	athematical, so for the operat s and theories : e of the main dependent leau problems, to actice) agains <u>l systems and</u> pments in mec	cientific a ion of the related to theories rning. identify, f t a theore processes. hanics rel nethods an	and problem-solving formulate and solve etical and practical		
Short description o	e subject		Statics of structures: classification of supporting structures. Articulated multi-girder, triple-jointed frame, truss and additional support structures - strength analysis, determination of support forces and loads. Rope structures. Friction, slip connections and their application in engineering. Applied strength of materials: working principles of strength of materials. Their application to the determination of displacements of rod structures. Approximate methods for determining displacements. Basic concepts of the finite element method. Solution of statically indeterminate structures by force method. Stability problems of flexible bodies: in-plane and spatial rod deflection, buckling. Flexible-ductile deformations, dimensioning of rod structures using ductile principles. Fatigue phenomenon, control. Phenomenon of ridge fracture, checking.									
Types of student a	ctiv	ities		Task comple Laboratory	etion with work und	guidance/i er supervisi	ndepend on: 20 9					
Required literature	e and	d contact d	letails	St • D: K	ructures l r. Vigh S. iadó, Dun	/A, Budape ed.: Techni aújváros, 20	st, Nem ical mec 003.	zeti Tankönyv chanics II/B co	vkiadó 199 ollege note	es, Dunaújváros, DF		
Recommended lite details	eratu	are and con	ntact	 Departmental Working Group: Engineering Mechanics I. Elementary Sta Workbook, Dunaújváros, ME DFK Publishing Office, 1994. Departmental Working Group: Engineering Mechanics II/2. App Strength, Workbook. DF Publishing House, Dunaújváros, 2002. 								

	 Dr. Sándor Vigh - Béláné Szlávik - Dr. Gyula Izsák: Technical Mechanics I. Manual Part 2, Dunaújváros, DF Publishing Office, 2000. Dr. Vigh S.ed.: Engineering Mechanics II. Tutorial II/B, college notes. DF Kiadó, Dunaújváros, 1998.
Description of tasks to be	
submitted/measurement reports	
Description and timetable of the	
workshops	

Heat and Fluid Dynamics

Full time 150/39 per week 1	Heat an	d Fluid I	Dynamic	CS	-									
exponsible ductional unit Institute of Technology, Department of Mechanical Engineering, and Energy Same of compulsory prior learning MUT-151 Type Presentation Practice Laboratory Requirement Credit Language of education Same of compulsory prior learning MUT-151 E 5 english Sam time 150/15 per term 5 per week 1 per week 1 <td< td=""><td>Name of t</td><td>he subiect</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	Name of t	he subiect												
Same of compulsory prior learning ULTEN(L)- MUT-151 'ype Presentation Practice Laboratory Requirement Credit Language of education 'ult time 150/15 per term 5 per term 5 english 'art time 150/15 per term 5 per term 5 english 'art time 150/15 per term 5 per term 5 english 'eacher responsible for the subject Name Enddre Kiss, PhD chedule College professor 'raining objective and justification of Goals, development objectives The study of the practical problems solutions in heat and fluid dynamics. 'rypical delivery methods Presentation For alvy overhead projector Practice Practice Practice Practice Practice Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. 'spicial delivery methods Knowledge of the main theories in the fad of Nawledge acquisition and problem solving in small groups Laboratory Mawnow the measuring procedures in the fad of Nawledge acquisition and problem solving your methods. 'spicia		U		1										
DUENCL). The sentation Practice Laboratory Requirement Credit Larguage of stucction stull time 150/39 per week 1 per week 1 E 5 english stuttime 150/15 per term 5 per term 5 english rating objective and justification Goals, development objectives The study of the practical problems solutions in heat and fluid dynamics. the curriculum) Presentation For all students, using a large speaker, a board presentation, a projector "rain overhead projector" Practice For every students, problem solving in small groups Laboratory Measurements in pairs Other Vacional delivery methods Eaboratory Measurements in pairs Construct You know the terminology, key concepts and theories related to your field. Comprehensive knowledge of the same and a specific rules, contexts and procedures for the operation of the structural units and elements on on the structural units and elements on or the structural units and elements of mechanical field. You know the terminology, key concepts and theories related to your field. Comprehensive knowledge of the structure and operation of the structural units and elements of mechanical syste				•	Institute of	Technolo	gy, Departn	nent of I	Mechanical Er	igineering	and Energy			
Type presentation raticlice Calibratory Requirement Creat detocation and time 150/15 per term 5 extern 5 extern 5 english and time 150/15 per term 5 extern 5 extern 5 extern fraining objective and justification of Goals, development objectives External objectives External objectives the curriculum) Fraining objective and justification of For all students, using a large speaker, a board presentation, a projector are an overhead projector Presentation Fraining objectives Presentation Presentation For all students, using a large speaker, a board presentation, a projector are an overhead projector Presentation Frainice For all students, using a large speaker, a board presentation, a projector are an overhead projector typical delivery methods Presentation Mean comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Have an or engineering. typical delivery methods Knowledge of the general and specific rules, contexts and procedures for the operation of the technical field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and problem s		• •	prior learn	ning	MUT-151		1		ı — — — — — — — — — — — — — — — — — — —	1				
Part time 150/15 per term 5 per term 5 b 5 congetsion leacher responsible for the subject Name Eadre Kiss, PhD schedule College professor rinning objective and justification of Goals, development objectives The study of the practical problems solutions in heat and fluid dynamics. the curriculum) Presentation For all students, using a large speaker, a board presentation, a projector or an overhead projector Presentation For all students, using a large speaker, a board presentation, a projector or an overhead projector Practice For every students, problem solving in small groups Laboratory Measurements in pairs Other Nowledge The study of the terminology, key concepts and theories related to your field. Comprehensive knowledge of the general and specific rules, contexts and procedures for the operation of the technical field. You know the terminology, key concepts and theories related to your field. Comprehensive knowledge of the general and specific rules, contexts and procedures of the system components used. Heishe knowledge or the main theories in the field of knowledge acquisition and problem solving your methods. Heishe knows For all students and model the structure and operation of the structural units and elements of mechanical systems and interrelationship of the sy	Туре		Presentati	on	Practice		Laboratory		Requirement	Credit				
Carcher responsible for the subject Name Endre Kiss, PhD schedule College professor Training objective and justification of goals, development objectives The study of the practical problems solutions in heat and fluid dynamics. he course (content, output, location in the study of the practical problem solutions in heat and fluid dynamics. Presentation For all students, using a large speaker, a board presentation, a projector or an overhead projector lypical delivery methods Presentation For all students, using a large speaker, a board presentation, a projector or an overhead projector lypical delivery methods Presentation For all students, using a large speaker, a board presentation, a projector of an overhead projector lypical delivery methods Presentation For all students, using a large speaker, a board presentation, a projector or an overhead projector Van Kow Met Bernstein (Students) For every students, problem solving in small groups Laboratory Measurements (Students) Knowledge of the specific rules, contexts and proceedures for the operation of the technical field. You know the terminology, key concepts and theories in field of knowledge acquisition and problem solving your methods. He/she knows the measuring procedures used in mechanical engineering, their instruments, instruments and measuring equipment. Understand, characteris and model structural and procedures of the technical f	Full time Part time		-		1		•		Е	5	english			
Training objective and justification of Goals, development objectives the course (content, output, location in the course (content, output, location in the study of the practical problems solutions in heat and fluid dynamics. For all students, using a large speaker, a board presentation, a projector or an overhead projector Presentation of covery students, problem solving in small groups Laboratory Measurements in pairs Other Nowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific rules, contexts and procedures for the operation of the technical field. You know the terminology, key concepts and theories related to your field. Comprehensive, knowledge of the general and specific rules, contexts and procedures for the operation of the technical field. You know the terminology, key concepts and theories related to your field. Comprehensive knowledge of the general and specific rules, contexts and procedures for the operation of the technical field. You know the terminology, key concepts and theories related to your field. Comprehensive knowledge of the general and specific rules, contexts and procedures of the techsic knows the measuring procedures used in mechanical engineering, their instruments, instruments and measuring equipment. Understand, characterise and model the structure and operation of the structural units and elements of mechanical systems, the design and interrelationship of the system components used. Ability to analyse at a basic level the disciplines that make up the knowledge base of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to identify routine professional problems, and the principles and techniques reded to solve them to explore. formulate and (standard operations in practice). Ability to identify routine professional problems, and the principles and techniques reded in solve them to explore. formulate and proce			1				1			schedule	College professor			
he curriculum) If is study of the practical protoents solutions in heat and tuud appropriates. Presentation For all students, using a large speaker, a board presentation, a projector r an overhead projector Presentation For every students, problem solving in small groups Laboratory Measurements, problem solving in small groups Knowledge off the general and specific rules, contexts and procedures for the operation of the technical field. You know the terminology, key concepts and theories related to your field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and problems, and interrelationship of the structural units and elements of mechanical systems, the design and interrelationship of the system components used. Nullity The ability to analyse at a basic level the disciplines that make up the knowledge base of the technical field in the performance of related tasks. Ability to jolently routine professional problems, and the principles and techniques needed to solve them to explore, formulate and (standard operations in practice). Ability to jolently routine professionall professionally appropriate manner, orally and in wri					Goals, deve	elopment								
Practice For every students, problem solving in small groups Laboratory Measurements in pairs Other Excoveldge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge Have a comprehensive knowledge of the basic facts, directions and limits of the coperation of the technical field. You know the terminology, key concepts and theories related to your field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and problem solving your methods. He/she knows the measuring procedures used in mechanical engineering, their instruments, instruments and measuring equipment. Understand, characterise and model the structure and operation of the structural units and elements of mechanical systems, the design and interrelationship of the system components used. Ability The ability to analyse at a basic level the disciplines that make up the knowledge base of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to identify routine professional problems, and the principles and techniques needed to solve them to explore, formulate and (standard operations in practice). Ability to identify routine professional problems, and the principles and techniques needed to solve them to explore, formulate and (standard operations in practice). Ability to communicate in their mother tongue in a professionally appropriate manner, orally and in writing, according to their field of specialisation. Ability to communicate in their mother tongue in			output, loca	ation in	¹ The study o	f the prac	tical proble	ms solu	tions in heat a	nd fluid d	ynamics.			
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It takes responsibility for the consequences of its technical analyses, its proposals and														
its decisions.														
					its decision	5.								

Short description of the subject content	The basics of fluid dynamics and thermodynamics. Euler and Bernoully equations, Haagen-Poiseuille equations, viscosity, laminar and turbulent flow, pressure drag in turbulent flow. Pressure drop in fittings. Impulse theorem. Similarity. Solid body in viscous substance. Intensive and extensive quantities. Uneversal and unified gas law. The mechanical work and the heat, and the firstlaw of thermodynamics. Isochoric, isobaric, isotherm and adiabatic processes. The politropic process. Cycles. Otto and Diesel cycles. Enthalpy, entropy, the second law of thermodynamics. Real gases. Thermal energy transport, conductance. convection and radiation. Heat pump and refrigerator.
Types of student activities	Lecture: Written text processing with note-taking 40%, theoretical material self- processing 20%, task solution 40%. Labor: Heard text processing with note-taking 10%, home preparation for measurement 20%, measurement 40%, minutes preparation 30%.
Required literature and contact details	 Kiss E. Heat and Fluid Dynamics Electronic notes (Moodle) Kiss E. Heat and Fluid Dynamics Problem solving Electronic notes (Moodle) Kiss E. Laboratory syllabuses Electronic notes (Moodle)
Recommended literature and contact details	 Dr Gruber, Dr Blahó: Mechanics of Fluids, Tankönyvkiadó, Budapest, 1973 Grósz Gy. Thermodynamics, BME 1996
Description of tasks to be submitted/measurement reports	Full time: 5 measurement reports Part time: 3 measurement reports
Description and timetable of the workshops	There are two tests during the semester. the first is in the 6th, and the second in the 13th week. The test is consisting of 10 freechoise questions (max. 30 points), two assay questions (max 20 points), and two problems tos olve for 50 points. If the res

Name of the subject in Eng Responsible educational uni Name of compulsory prior I DUEN(L)- Type Full time 150/39 Part time 150/15 Teacher responsible for the Training objective and justifier	nit r learning entation week 1 term 5 e subject tification	Practice per week per term Name Goals, dev of The learnin in establishing issues. By entrepreneu Presentation	2 2 10 2 10 2 10 2 10 2 10 2 10 2 10 2	Laboratory per week per term Odorige Ca objectives al gives bo ig and tran	0 thérine	Requirement M	Code nt and Ent Credit 5	BSc DUEN(L)-TVV-122 trepreneurship Language of education	
In Eng Responsible educational uni Name of compulsory prior I DUEN(L)- Type Preser Full time 150/15 per we Part time 150/15 per ter Training objective and justif the course (content, output, the curriculum) Typical delivery methods Requirements (expressed in learning outcomes) Short description of the subj	nit r learning entation week 1 term 5 e subject tification	Institute of Practice Practice per week per term Name Goals, deve of The learnin n establishing issues. By entrepreneu Presentation	2 10 elopment ng materi g, operatir the end o rial and b	Laboratory per week per term Odorige Ca objectives al gives bo ig and tran	0 thérine	Requirement M	nt and Ent Credit 5	Language of education	
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Part time 150/15 per ter Teacher responsible for the Training objective and justified the course (content, output, the curriculum) Typical delivery methods Typical delivery methods Requirements (expressed in learning outcomes) Short description of the subject	term 5 te subject	5 per term Name Goals, deve of The learnin in establishing issues. By entrepreneu Presentation	10 elopment ng materi g, operatir the end o rial and b	per term Odorige Ca objectives al gives bo ng and tran	thérine				
Teacher responsible for the Training objective and justif the course (content, output, the curriculum) Typical delivery methods Requirements (expressed in learning outcomes)	e subject	Name Goals, deve of The learnin in establishing issues. By entrepreneu Presentation	elopment ng materi g, operatir the end o rial and b	Odorige Ca objectives al gives bo	thérine	Enorédia		english	
Training objective and justif the course (content, output, the curriculum) Typical delivery methods Requirements (expressed in learning outcomes)	tification	Goals, deve of The learnin in establishing issues. By entrepreneu Presentation	elopment ng materi g, operatir the end o rial and b	objectives al gives be ng and tran		Enoreura	schedule	-	
	in terms o	Laboratory Other Students w mechanism and externa Ability Students wi to identify a to understan relevant lite Attitude They are op opinion, bu their own co	Other Knowledge Students will know the basic terms of entrepreneurship, understand the effect mechanisms of operating firms, know the legal background of companies, their internal and external environments, know the economic systems, aims and strategies of firms. Ability Students will be able to use terms of this field professionally, to identify and determine the resources of companies, to understand the steps of company aims and strategies, to understand and use the relevant literature.						
Types of student activities Required literature and cont Recommended literature and details Description of tasks to be submitted/measurement rep Description and timetable o	ıbject	cooperate w opportunition The value c technical ar buyer satisf (network) o internet. Ev Strategic pr production Managemen wares). The Competitive Integration chain mana	vith each of es for prob hain and of ad econom action. The f business aluation of ocuremen logistics. I ant of custor importan eness and of supply gement. analysis, I villiam D. dition, Jol erome Kat	other. They l plems. creation of d nic connection ac customer s relationship of suppliers, tt. The methor Resource pla omer relation ice of service supply chain chain. Mease Presentation Bygrave - A hn Wiley & S z, Richard O	have ser louble v ons of v value as ps. The the crite ods and anning s aship (C es and i n manag suremen <u>s, Indiv</u> Andrew Sons, D Green (2	alue both for h alue chain. Th alue chain. Th nd the internet role of supplie eria of supplie importance of systems with b CRM). The crit ts logistic prob gement. at of supply ch idual work, Fr Zacharakis (2 <u>UE Library M</u> 2014) Entrepre	d possible ouyers and e custome . The suppers. Potent r evaluatio 5 demand a ouyer's co- eria of CF olems. Inte ains. Tenco ontal class 014): Entra aterials or neurial Sr	resolving d suppliers. The er value and logistic ply chain: system tial suppliers and the on in internet. anticipation in operation. RM systems (soft ernational transport. dencies in supply <u>s work, Essay writing</u> repreneurship, 3rd	

Mathematic		• • •		h.c					T 1	ba	
Name of the sul	oject	in Hungar								BSc	
	5	in English	1		Mathematics 3. Code DUEN(L)-IMA-110 Institute of Information Technology, Department of Mathematics and Computer						
Responsible edu	ıcatio	nal unit		Institute of Science	Informati	on Technolo	ogy, De	partment of M	athematic	s and Computer	
Name of compu DUEN(L)-	llsory	prior learn	ning	IMA-152							
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education	
Full time150Part time150		per week per term	0	per week per term	3 15	per week per term	0	М	5	english	
Teacher response				Name	15	Nagy Bálin	•		schedule	Associate professor	
Training objective and justification of the course (content, output, location ir the curriculum)				Azoknak a i elsajátításáł szakirodalo legfontosab Rendelkezil számítógép	Goals, development objectives Azoknak a matematikai, függvénytani alapoknak a megszerzése, melyek a szaktárgyak elsajátításához nélkülözhetetlenek, valamint matematikai ismeretek bővítése a szakirodalom tanulmányozásához. Ismeri és érti a szakterület műveléséhez szükséges egfontosabb matematikai összefüggéseket és az ezeket felépítő fogalomrendszert. Rendelkezik az alkalmazott matematikai fogalmak elsajátítását segítő valamely számítógép-algebrai rendszer ismeretével a feladatok elvégzéséhez.						
Typical delivery	v metł	nods		Presentation Practice		nak, módsze	rek ism	ertetése nagy e	előadóban	, táblás előadás.	
Typical delivery methods				Laboratory Other Knowledge Knows the		and procedu	ires requ	uired to solve	mathemat	tical tasks appropriate	
Requirements (expressed in terms of learning outcomes)			ns of	education required for his field of expertise. Ability Able to apply the learned mathematical knowledge and activity system. Uses learned problem-solving methods and procedures. Able to prepare own solution plan and to defend it in debates (argumentative debate skills) in relation to learned mathematical concepts. Able to effectively organize your own learning process, find and use a wide variety of learning resources (printed, electronic) Attitude They are open to learning about and accepting mathematical development and innovation related to their qualification and field of expertise. Interested in new methods and tools related to the field. Autonomy and responsibility They take responsibility for their own results, as well as those of their colleagues (working in the same project). Special differentiation rules. Geometric application of derivatives. Area. Volumes and							
Short descriptio content	n of t	he subject		Numerical Variable tra differential second orde	integratio ansformat equations er differen	n. Solving r tion: ax+by s. Second or tial equation	nonlinea +c. Var der line ns.	r equations. S iable transfor ear differential	eparable mation: y equation	Multiple integration differential equations /x. First order linea s. Missing variable in essing of theoretical	
Types of studen	t activ	vities		material. Ta interpretation opinions. L	ask solutio on. Proces e	on with cont ssing of info	rol. Ind rmation	ependent proc individually a	essing of t and in grou	asks. Text ups. Conflicting	
Required literat	ure ar	nd contact	details			A Guide to M Study Guide		atical Analysis	s, Dunaújv	város, 2007, pp. 1- 79	
Recommended details	literat	ure and co	ntact	• F	inney, R.	L.; Thomas	, G. B.:	Calculus, Add	lison-Wes	ley, New York, 1990	
Description of t submitted/meas											
Description and workshops			2	6th week in	the pract	ice session,	the seco	ond (maximun	n 50 points	num 50 points) on the s) on the 12th week in nd applied problems	

Mathematics 3.

Enginee	ering con	structio	n									
Name of the	he aubient	in Hungar	ian	Gépszerkes	ztés			Level	BSc			
Iname of u	ne subject	in English	l	Engineering	g construc	tion			Code	DUEN(L)-MGT-112		
Responsib	le educatio	nal unit		Institute of	Technolo	gy, Departn	nent of l	Mechanical Er	gineering	and Energy		
Name of c	ompulsory	prior learn	ing	MGT-111								
DUEN(L)	-	-		MG1-III								
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time	150/39	per week	1	per week	2	per week	0	м	5	analish		
Part time	150/15	per term	5	per term	10	per term	0	М	5	english		
Teacher re	sponsible f	or the subj	iect	Name		Róbert Sán	ta, PhD		schedule	Associate professor		
	bjective an											
the course	(content, o	utput, loca	tion in	and their interactions. In heating, cooling, ventilation and air conditioning, the systems,								
the curricu	ılum)			system com	system components, and							
				Presentation				lecture, preser MS Teams, us		a whiteboard, puter network.		
Typical de	Typical delivery methods			Practice		work presen						
			Laboratory									
				Other								
				Knowledge								
						ology, key o	concept	s and theories	related to	your field.		
				Comprehen	sive know	wledge of the	he meth	nods of knowl	ledge acqu	uisition and problem-		
				solving in th								
										nd methods, machine		
				technology, control procedures and operational processes.								
				Comprehensive knowledge of the operating principles and structural units of the								
					machinery and power tools, mechanical equipment and tools used.							
				Understand, characterise and model the structure and operation of the components and elements of mechanical engineering systems, and the design and interrelationship of								
				the system components used.								
					Apply the related computational and modelling principles and methods of mechanical							
D:									Jies and n	lethous of mechanical		
learning of	ents (expres	ssed in terr	ns oi	product, process and technological design. Ability								
	utcomes)			Perform the job according to your qualifications.								
				Ability to plan, organise and carry out independent learning.								
				Ability to plan, organise and carry out independent learning. Ability to identify, formulate and solve (through the practical application of standard								
				operations) routine professional problems, and to identify, formulate and solve (through the practical application of standard operations) the theoretical and practical								
				background necessary for their solution.								
				Attitude								
				Open to learning and absorbing knowledge related to mechanical engineering related								
				to his/her qualifications and area of expertise. Interested in new methods and tools								
				related to the field.								
				Autonomy	_	-						
								and the work				
										ection of plane bodies.		
Short desc	ription of t	he subject								sing of curved bodies.		
content	-	5								Fits. Surface quality and machined parts.		
								e engineering)		a and machined parts.		
										processing of		
Types of s	tudent activ	vities		theoretical material 20 % Problem solving with guidance 20 % Independent processing of tasks 40 % Laboratory measurements with guidance - Preparation of								
				laboratory reports -								
Required 1	iterature ar	nd contact	details									
				 Robert L. Norton: Machne Design - An Integrated Approach, 2006, Pearson 								
Recomme details	nded literat	ure and co	ntact	Prentice Hall Upper Saddle River NJ Franz Koenigsberger, Machine tool structure,ISBN 10: 008013405X								
Descriptio	n of tasks t	o be										
submitted/	measureme	ent reports										
Descriptio	n and time		e	A final nand	er in weel	rs 6 and 12	from the	e lectures and	laboratory	classes		
workshops	8			² x mai pape				c icetures and	aboratory	0100000.		

Engineering construction

Technol	logy of S										
		in Hungar	ian	Szerkezeti a	nyagok te	echnológiája	ı		Level	BSc	
Name of t	he subject	in English		Technology	of Struct	ural Materia	ıls		Code	DUEN(L)-MUA- 116	
Responsib	le educatio	nal unit		Institute of T	Technolo	gy, Departn	ent of S	Structural Integ	grity		
Name of c DUEN(L)	ompulsory -	prior learn	ing	MST-210							
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education	
Full time		per week	1	per week	0	per week	2	М	5	english	
Part time	150/15	per term	5	per term	0	per term	10	111	5	engnsn	
Teacher re	esponsible f	or the subj	ect	Name		Zsolt Csepe	eli, PhD		schedule	College professor	
Training objective and justification of the course (content, output, location in the curriculum)				The aim of technologies production, structural m forming, hea of these mat	Goals, development objectives The aim of the course is to enable students to select the materials and production technologies best suited to the purpose. To this end, they will learn about the production, properties and uses of the most important metallic and non-metallic structural materials, as well as the processes of modification (alloying, casting, plastic forming, heat treatment and surface treatment) and forming (casting, plastic forming) of these materials. technologies. Students will learn about the operation and application of the main bulk						
							ras laar	ning materials	available	in moodle	
				Presentation	riojecti	or, ppr lectu	ies, iedi	mig materials	available	m mooule.	
Typical de	Typical delivery methods			Laboratory	Tableto projecto		nd/or la	boratory meas	surement.	Use of overhead	
					project	51.					
Requirements (expressed in terms of learning outcomes) Short description of the subject content				limits. In-depth kno methods of n Ability Ability to pl Attitude Open to lear engineering. Autonomy a It takes its o responsibilit Metal produ production b and alumini Transformat equilibrium and mechan making pro- mechanical of base mate deep drawin Operation an	weledge of nanufact an, organ ning and Intereste and resp lecisions y for their ction: pig by electro um alloy ion diagi tissue ele- ical prop cesses. Mo propertie erials, ma g, stretch ad applic	of the structure and com- dise and carr absorbing k ed in new m onsibility independent m. g iron productor lysis. Fe-Fe vs, their char rams for isc ements. Prire erties of ho Metallurgical s of cold for tterial separa- n forming. F	y out in nowled ethods a tly, in a tly, in a tion, sta 3C equi racteris thermal nary an t worke pheno med alla ation by Full sect main b	dependent lea ge related to h and tools relate consultation w eel production librium phase tic properties and continue d secondary ti d alloys. Forg mena in cold oys. Plate form thermal or sh ion heat treat	engineerin rning. is/her qua ed to the f vith other , continuo diagram. . Germ fo ous coolin issue struct ing, stamp forming. ning techn isear stress ments. Su welding p	lifications and field of ield. disciplines, and takes us casting, aluminium Classification of steel ormation and growth. g. Formation of non- cture. Tissue structure ping, hot rolling, tube Fabric structure and nologies: straightening , forming by bending, rface heat treatments. processes. Preparation	
Types of s	tudent activ	vities		Processing of Conducting Evaluation of	material	tests 30%.		50%. 1 of report 20%	ó.		
Required I	literature an	id contact (details	Di H4 Di F6 Di Bi T4 pa	: József ouse, Buo : Éva Dé iskolai K : Tamás idapest. 2 ÁMOP e- nnon.hu	Verő - Dr. N lapest, 1977 nes, Dr. Pét Liadó, Duna Tóth: Ferros 2002.	lihály k er Farka újváros, alloys. 1	Káldor: Metall as, Mrs Zsolt F 2008 National Textb	urgy. Text Fülöp and book Publi	tbook Publishing Dr. Zoltán Szabó. ishing House, toodle.mk.uni-	

Technology of Structural Materials

Recommended literature and contact details	Tamás Tóth: Mechanical properties of materials and methods of their investigation, Főiskolai Kiadó, Dunaújváros, 2004
Description of tasks to be submitted/measurement reports	The student shall draw up a measurement report on the measurements carried out.
Description and timetable of the workshops	A final paper in weeks 6 and 12 from the lectures and laboratory classes.

Mechanics 3.

Mechani		• • • •		Mashanika 2						DC		
Name of the subject		in Hungari	an	Mechanika 3	3.				Level	BSc DUEN(L)-MUG-		
	in English			Mechanics 3			Code	153				
Responsible				Institute of T	Institute of Technology, Department of Mechanical Engineering and Energy							
Name of co DUEN(L)-	mpulsory	prior learni	ng	MUG-152		1			1	1		
Туре		Presentatio	n	Practice		Laboratory		Requirement	Credit	Language of education		
Full time		per week	1	per week	2	per week	0	Е	5	english		
Part time	150/15	per term	5	per term	10	per term	0			english		
Teacher res	ponsible f	or the subje	ect	Name		Miklós Hor	váth, Pl	hD	schedule			
Training ob the course (the curricul	content, o			and simple lectures to e operation of of collision	l learn the mechanis xercises a mechani and vibra All stud	e kinetic and ms by appl and home p sms commo tion phenon	ying the reparationly enconent	e concepts and on. Gain know countered in en elastic bodies.	d relations wledge of ngineering	al points, rigid bodies ships presented in the the classification and practice. Knowledge		
				Presentation	projecto	or		_				
Typical deli	ivery metł	nods		Practice	Small g exercise		o 25 pe	ople, sketchin	g, drafting	, calculation		
				Laboratory								
				Other Knowledge								
Requirements (expressed in terms of learning outcomes)			 Knowledge of the general and specific mathematical, scientific and social principles, rules, contexts and procedures necessary for the operation of the technical field. You know the terminology, key concepts and theories related to your field. You have a comprehensive knowledge of the main theories and problem-solving methods in your field. Ability Ability Ability to identify routine professional problems, to identify, formulate and solve them (using standard operations in practice) against a theoretical and practical background. Ability to build basic models of technical systems and processes. Attitude Open to learning and absorbing knowledge related to mechanical engineering related to his/her qualifications and area of expertise. Interested in new methods and tools related to the field. 									
				Autonomy and responsibility Taking responsibility for your own work and the work of others.								
Short description of the subject content			Amount of motion, permittivity, kinetic energy, work of force and torque, power of a point of matter. Kinetic theorems. Rigid body concept, types of motion, elementary motions. State of velocity of rigid body, velocity diagram. State of acceleration of rigid body, acceleration diagram. Amount of motion of rigid body, perpendicularity, kinetic energy. Kinetic theorems for a rigid body. Rolling of rigid body and catcher motion about stationary axis. Static and dynamic balancing. Kinetics of structures by classical and reduction method. Summary of material point rocking theory. One degree of freedom bending and torsional vibration. Multi-degree of freedom vibration systems. Collision of solid bodies. Concepts, characterisation and classification of mechanisms, structure, kinematic analysis. Kinematics of drives (gears, belt, friction and chain drives). Mechanisms commonly found in mechanical engineering.									
Types of stu	udent activ	vities		Theoretical	processin etion with	g with guidan guidance/in	ance/inc ndepend	dependent: 15/ dent: 20/29 %				
Required lit	terature an	nd contact d	etails	Csizmadia ed. Mechanika III/B főiskolai jegyzet, Budapest, Tankön								
Recommendetails	ded literat	ure and con	itact	 Dr. Vigh S. ed: Technical mechanics III. tutorial, college note, Budapest Tankönyvkiadó, 2000 Dr. Béla M. Csizmadia - Dr. Ernő Nádori: Mechanics for engineers Engineers for Mechanical Engineers. National Textbook Publisher, 1999. 								

	 Dr. István Sályi: Mechanisms: the basics of the kinematics and dynamics of machines, Budapest, Textbook Publishing House, 1973.
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Tuman		e Mana				F .	20				
Name of t	ame of the subject in Hungarian in English			Emberi erőf			Level	BSc			
			Human Resource Managment Code DUEN(L)-TVV-111 Institute of Social Sciences, Department of Management and Entrepreneurship Entrepreneurship								
	ompulsory		ning								
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education	
Full time Part time	150/39 150/15	per week per term	1 5	per week per term	2 10	per week per term	0	М	5	english	
Teacher re	esponsible f	or the sub	ject	Name			jcsányi-	Molnár, PhD	schedule	College professor	
Training objective and justification of the course (content, output, location ir the curriculum)				The goal of workplace a The course market insti of labor rel activities, c	Goals, development objectives The goal of the course is to develop the essential skills required of employees at the workplace and to expand students' HR management skills. The course broadens the students' knowledge and gives abilities to manage the labor market institutions and policies, workplace and labor market characteristics, the system of labor relations, competence and motivation management, personnel management activities, organizational behavior, organizational communication, human resource management case studies, occupational safety and health project management.						
Typical de	elivery meth	nods		Practice Laboratory						er in each lecture. er in each lecture.	
				Other							
Requirements (expressed in terms of learning outcomes)									e modalities of human processes, human and g successfully. ng, organizing, and grounds. rol and inspection. be of responsibility. required for e. and using analyzing uring-decision-making d utilize managerial lefend it. i.e. they can identify n. ustworthy and not nd professional rules. quire collaboration. ion-maker and are nsible persons, i.e. on to cooperate with riteria. esses.		
Short description of the subject content			Sense of responsibility for subordinates working fellow. Evolution of the human resource management. Environmentally determination of HRM. The HRM place in the organizational structure. The HRM's activities and tasks. Job planning, analysis, competency models. Career management, career planning alignment of individual and organizational career opportunities. The workforce training and development opportunities.								

Human Resource Managment

	Performance evaluation and feedback management. Compensation and incentive systems. Industrial relations system. Management of organizational changes. New trends in HRM practice.				
Types of student activities	Pair work presentation Group work (case study analysis)				
Required literature and contact details Recommended literature and contact details	 David Campbell & Tom Craig (2011): Organisation and the Business Environment, Second edition, Routledge Publishing, USA Materials on Moodle Handouts from the lecturer TORRINGTON, Derek – HALL, Laura – TAYLOR, Stephen (2005): Human Resource Management. Pearson Education Limited, Essex, England.810 p. ISBN 978-0-273-68713-9 ARMSTRONG, Michael (2009): A handbook of Human Resource Management Practice, 11th ed. London: Kogan Page 1062 p. ISBN 0-7494- 4631-5 http://www.academia.edu/1418840/ARMSTRONGS_HANDBOOK_OF_H UMAN_RESOURCE_MANAGEMENT_PRACTICE) 				
Description of tasks to be submitted/measurement reports	Students have to take a final test				
Description and timetable of the workshops	Multi-choice questions				

	in Hungarian			Menedzsment						BSc		
Name of th	Name of the subject in English			Management Code DUEN(L)-TV								
Responsibl	e educatio	nal unit		Institute of Social Sciences, Department of Management and Entrepreneurship								
Name of co DUEN(L)-	1 2	prior learn	ing			<u>.</u>		1	·			
Туре		Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time	150/39	per week	1	per week	2	per week	0	м	5	english		
Part time	150/15	per term	5	per term	10	per term	0		-	<u> </u>		
Teacher re	sponsible f	or the subj	ect	Name		Mónika Ra objectives	jcsányi	-Molnár	schedule	College teacher		
Training objective and justification of the course (content, output, location in the curriculum)				managemen of managen competence of the conce imparted, the develop ski	t of work hent and the expts and me course and the course and the course and me course and me course and me the course and the expts and me he course and the course and th	organisation he factors the coretical kno- najor models enables stu application help to inter er presentation ts' comment acher's sumr ojector and	ns, to pr at detern wledge of man dents to of the pret the on, with s on son nary. A presenta	ovide an overv mine them. In c of students, th agement organ o analyse and management t eoretical know explanations a ne topics, shar Il students pres ation technique	view of the order to de ne course tisation. The develop vechniques vledge and and praction ing their essent togethe.	experiences, followed her in a large lecture		
Typical de	ivery metl	nods		Practice	groups		nts and	individual wo		re methods, small tor, overhead		
				Laboratory	_							
				Other Knowledge								
Requirements (expressed in terms of learning outcomes)			 Knowledge Knowledge of the basic factors, key concepts, requirements, contexts and procedures of management and organisation science. You will acquire the theoretical and methodological basis for the performance of management tasks and the exercise of functions. You know the procedures and methods often used in planning, organising and managing. You know the leadership style models and understand their role in effective leadership behaviour. He/she knows the methods of understanding and analysing the management and decision-making systems of work organisations, their ethical limits and their possibilities for improvement. Understand and identify with the importance of corporate social responsibility Understands the ethical responsibilities of management and its role in the effective functioning of the company. Ability Ability Ability to demonstrate and exercise managerial functions. Distinguish between management styles on the basis of advantage and disadvantage and apply the appropriate style as necessary. It distinguishes between long-term and short-term tasks and consequences. Ability to organise his/her own and others' work effectively and humanely, and to lead working groups. The ability to manage, organise, control and coordinate the development of the company's financial and information processes. A sense of responsibility, assessment (self-assessment), analysis and synthesis skills are well developed. Attitude He is open and able to accept different opinions, which are not his own. Willing and able to work in a team and share knowledge with others. 									

	Automour out monour 11:116.
	Autonomy and responsibility It builds and initiates new areas of knowledge and new practices with creative autonomy. He/she can take a leading role and participate in a high level of cooperation in the formulation of practical issues affecting his/her work and the future of his/her organisation. Take responsibility for the consequences of your actions and decisions. The ability to independently perform management tasks related to the technical- economic processes of the enterprise, the management of operations. A sense of responsibility for sustainable development.
Short description of the subject content	The world of business, organisations, businesses and companies. Business and its environment. Business and management, organisational and management functions. Management, leadership, governance and how they relate to each other. Managerial roles and levels. A historical overview of leadership. Management trends, schools and concepts. Similarities and differences. Planning: hierarchy of organisational goals and levels of planning, long, short term and operational planning, methods of planning. Organisation: change of structure, processes, understanding of organisations, division of labour and arrangement of divisions, creation of process and organisational structures, structural characteristics of organisations, types of organisations and their characteristics. Management: enforcement of authority, setting standards, measurement, evaluation and correction, dealing with day-to-day problems, monitoring and controlling, strategic management tools. Personal leadership: leadership behaviour and leadership style, identities and differences in theories of leadership style and the conclusions to be drawn. Politics and ethics in organisational life. Understanding, areas and sources of business ethics. Characteristics of ethical behaviour and ethical business. The concept of a responsible company, an introduction to corporate social responsibility. Ethical responsibilities of management within the company.
Types of student activities	Guided and independent study of theoretical material, Problem solving with guidance and independently. Analysis of case studies, group work. Solving complex tasks, cooperation in team work. Collecting, processing and presenting information on a professional topic.
Required literature and contact details	 Teaching aids and ppt's to help you work through the different chapters of management. Compiled by Enikő Nagy, 2016, available in moodle Angyal Á: Corporate Social Responsibility, Corporate Governance, Kossuth, Bp. 2009.
Recommended literature and contact details	 Csaba Deák - Balázs Heidrich - Éva Heidrich: Management skills. Booklands 2000 Publisher, 2006, ISBN: 9789632025209 Miklós Dobák:Organizational forms and leadership. Akadémia Kiadó, Bp. 2008, ISBN: 9769630583406 Angyal Á: Corporate Social Responsibility, Corporate Governance, Kossuth, Bp. 2009. ISBN: 9789630959957 Csaba Deák: Management skills. Booklands, Békéscsaba. 2002. Miklós Dobák et.al.:Organizational forms and leadership. Budapest, KJK-Kerszöv, 2004. Antal Zs Kis N.: Organization administration and management. Management and Management of Management and Management. downloaded 05.08.2016. http://vtki.uni-nke.hu/uploads/media_items/antal-zsuzsannakiss-norbert-tamas-szervezetigazgatas-es-menedzsment.original.pdf Vígvári: The revaluation of the control function and the challenges of modern management. http://193.6.12.228/uigtk/uipz/hallgatoi/ellcikk.pdf Noémi Piricz: Fair behaviour in business networks.In: Budapest University of Technology and Economics, Department of Management and Business Economics (ed.) Paper of the XXI National Conference of the Association
Description of tasks to be	for Marketing Education and Research, Budapest, 27-28 August 2015.Conference place and time: Budapest, Hungary, 2015.08.27 - 2015.08.28. 517-525. (ISBN:978-963-313-189-3)

Description and timetable of the	
workshops	

Basics of energetics

Dasies	of energe	T		Enomatiles aloniai E aval DCa							
Name of the			Energetika a			Level	BSc				
Responsib	Responsible educational unit		Basics of en		w Danarta	ent of 1	Mechanical E-	Code	DUEN(L)-MGT-211		
	ompulsory		ning	Institute of Technology, Department of Mechanical Engineering and Energy							
Туре		Presentati	ion	Practice		Laboratory		Requirement	Credit	Language of education	
Full time Part time		per week per term	2 10	per week per term	0	per week per term	1 5	М	5	english	
	esponsible f			Name		Róbert Sán	ta, PhD		schedule	Associate professor	
	bjective an (content, o ilum)			Goals, deve interpret and	l apply th	e installatio		-		s of appliances.	
				Presentatior	Teams.					on-line using MS	
Typical de	livery meth	hods		Practice	Small g exercise		to 25 pe	ople, sketchin	g, drafting	g, calculation	
				Laboratory							
				Other Knowledge							
				Have a com area of engi Knowledge rules, conte	prehensiv neering. of the ge xts and pr	neral and sp ocedures ne	pecific 1 ecessary	mathematical, for the operat	scientific ion of the	nd limits of the subject and social principles, field of engineering. and theories related to	
				 the field. Comprehensive knowledge of the methods of knowledge acquisition and problem solving in the main theories of the field. Comprehensive knowledge of basic economic, business and legal rules and tools. Knowledge of the main structural materials used in the field of energy and their conditions of use. Comprehensive knowledge of the basic principles and methods of operation of energy systems and processes and of energy conversion machines and technologies. Ability Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific mathematical, scientific and social principles, rules, contexts and procedures necessary for the operation of the field of engineering. 							
Requirements (expressed in terms of learning outcomes)			Knowledge of the terminology, the most important relationships and theories related to the field. Comprehensive knowledge of the methods of knowledge acquisition and problem solving in the main theories of the field. Comprehensive knowledge of basic economic, business and legal rules and tools. Knowledge of the main structural materials used in the field of energy and their conditions of use. Comprehensive knowledge of the basic principles and methods of operation of energy systems and processes and of energy conversion machines and technologies. Attitude Open and receptive to energy, health and environmentally conscious design and operation principles and methods. He/she shall strive for continuous self-learning in the field of energy, in line with his/her professional goals. Carries out and makes management decisions by listening to the opinions of management and other staff. In his/her work, he/she shall apply the requirements of efficiency, sustainability and environmental and health awareness. Assume and authentically represent the role of the profession in society and its fundamental relationship with the world. He/she takes decisions in complex and unexpected decision-making situations, taking full account of legal and ethical standards. He/she is open to the use of information technology tools, and seeks to learn and use expert systems for planning and decision support in the field of energy. Autonomy and responsibility In unexpected decision situations, he/she independently thinks through and develops								
					upholds	and repres	ents the	values of the		asis of given sources. ring profession and is	

Short description of the subject content	The role and fields of energetics. The three subsystems of energy, - production, generation, - transport, distribution, storage, - end-use of energy. Energy indicators, energy efficiency. Energy aspects of sustainable development. Primary and secondary energy needs. Fossil, nuclear fuels and renewable energy sources, their use and environmental impact. Introduction to pressurised water nuclear power, combined heat and power and renewable energy sources. Energy conversion processes in pressurised water nuclear power plants, combined heat and power generation.
Types of student activities	Presentation: Processing of the text with notes 70%, independent processing of theoretical material 30%,
Required literature and contact details	 <u>https://energy.ec.europa.eu/system/files/2020-</u>01/hu_final_necp_main_hu_0.pdf Materials on MOODLE
Recommended literature and contact details	 Ősz J.: Energetika jegyzet .ppt formátumban a www.energia.bme.hu honlapon. Büki G.: Energetika, Műegyetemi kiadó, 2000. Büki G.: Erőművek. Műegyetemi Kiadó, 2004. Oktatási segédanyagok: www.energia.bme.hu
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Fluid m	achinery	r										
Name of t	ame of the subject in Hungarian			Áramlástec		bek	Level	BSc				
	in English			Fluid machi	-				Code	DUEN(L)-MGT-212		
	le education			Institute of Technology, Department of Mechanical Engineering and Energy								
	ompulsory	prior learn	ing	MUT-250								
DUEN(L)	-			101 250		1		1	1	1		
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time Part time	150/39 150/15	per week per term	2 10	per week per term	0	per week per term	1	М	5	english		
	esponsible f	A		Name	-	Miklós Hor	U	hD	schedule	College professor		
	-r			Goals, deve					P	8- F		
					-	•	e of the	basic facts, di	rections a	nd limits of the subject		
				area of engi				,,		, in the second s		
Training o the course	bjective an (content, o	d justificat utput, loca	tion of tion in	You know t Comprehen	he termin sive knov	ology, key o wledge of t	concepts the open	s and theories rating princip	related to les and s	your field. tructural units of the		
the curricu	ılum)							pment and too				
										of the structural units		
						hanical sys	tems, th	he design and	interrelat	ionship of the system		
				components			. 1		1 1			
					1 For all s	students in a	a large l	ecture hall wit	n a blackt	board presentation		
Typical de	livery meth	nods		Practice	Manual	aditing and	naisa in	anouna of un	to 20			
				Laboratory Other	Manual	eating exe	rcise in	groups of up	10 30			
				Knowledge								
						e knowlede	e of the	basic facts to	onds and	limits of the subject		
				area of engi		C KHOWICUE	c or the	basic facts, ti	citus anu	mints of the subject		
				0	0	ology, key (concept	s and theories	related to	vour field.		
				You know the terminology, key concepts and theories related to your field. You have a comprehensive knowledge of the main theories and problem-solving								
				methods in your field.								
				Comprehensive knowledge of the operating principles and structural units of the								
				machinery, power tools, mechanical equipment and tools used.								
				Understand, characterise and model the structure and operation of the structural units								
				and elements of mechanical systems, the design and interrelationship of the system								
ъ.			c	components used.								
Requirements learning of	ents (expres	ssed in terr	ns of	Ability Students should have a basic understanding of mechanical engineering after listening								
learning o	utcomes)			to this course. They should be familiar with the basic operation and energy processes								
				of machines and be able to apply them in practice.								
				After completing the course, students should be able to draw hydraulic circuit								
				diagrams.								
				Students will gain skills in pneumatic actuation, PLC applications and programming								
				Attitude								
				He is open to learning about and accepting technical engineering problems related to								
				his qualifications and area of expertise. Interested in new methods and tools in								
				mechanical pneumatics and hydraulics.								
				Autonomy and responsibility Taking responsibility for your own work and the work of others								
				Taking responsibility for your own work and the work of others.								
				General machine learning. Types of physical quantities used in mechanical engineering, their definition, application, conversions. Systems of measurement.								
				Conversion between different measurement systems. Characteristics of constant speed operation of machines. Loss of energy transfer,								
Short desc	ription of t	he subject						tion, starting,				
content				Pumps and motors, hydraulic power cylinders. Proportional pressure limiters,								
		pressure reducers, flow regulators. Pipes, pipe fittings, batteries, filters. Switching										
			technology. Pneumatics Characteristics and applications of pneumatic actuators.									
				Pneumatic components. Basic connections. Introduction and identification of elements. Operation of pneumatic elements, examples of applications.								
										g theoretical material		
				independen		a material	wini gu	idanee 50 70	1 100035111	5 incorcucar material		
						0 % Indepe	endent ta	ask processing	12 %			
Types of s	tudent activ	vities		2 papers fro				1				
					-			vision 10% Pr	eparation	of laboratory reports		
				13%								
				13%								

Fluid machinery

Required literature and contact details	 Attila Kovács: General Mechanical Engineering (university note) Műegyetemi Kiadó, Bp. 1999 Zobory I Szabó A.: General Mechanical Engineering (university note) Műegyetemi Kiadó, Bp. 1998. Kjell Evensen-Jul Ruud : Basics of pneumatics, MECMAN EGER Ltd. Budapest 1994, FESTO: Introduction to pneumatics P111. Festo Ltd. 2001. FluidSIM simulation software on the institutional network Hydraulics Mannesmann-Rexroth Gmbh: What you need to know about hydraulics Volume 1 Number: RU 00301/4.82
Recommended literature and contact details	 Imre Dolgos:Operation of machinery I. National Textbook Publishing House, 1998. Budapest Pattantyús Á. Géza:Operation of machinery, Műszaki Könyvkiadó, 1983. Budapest
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Industrial drive technology

mausui	al drive	technolo	ogy							•
Name of t	he subject	in Hunga		Gépészeti h					Level	BSc
	ne subject	in Englisł	1	Industrial d			Code	DUEN(L)-MGT-251		
	ble educatio compulsory		ning	Institute of ' MUG-152 MUG-222	Technolo	gy, Departn	ent of M	Mechanical Er	ngineering	and Energy
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education
Full time Part time	150/39 150/15	per week per term	2 10	per week per term	1 5	per week per term	0	Е	5	english
	esponsible f	1	ject	Name	_	Tamás Zah	ola		schedule	Master instructor
Training objective and justification of the course (content, output, location in the curriculum)				components design such using comp	t should , assemb units. Be uter tool	know the c lies and sub e able to pre s. The stude	-assemb pare the ent will	blies used in e e drawing doc be able to ap	engineerin umentatio ply the k	ypical machine parts g practice. Be able to n of the units, mainly nowledge acquired in l design of complex
Typical delivery methods				Presentation	¹ project	or				Point and overhead
			Practice Laboratory Other	Compu	ter-aided de	sign exe	ercise for up to	o 20 stude	nts.	
Requirements (expressed in terms of learning outcomes)			ms of	 Knowledge Knowledge of the general and specific rules, contexts and procedures for the operation of the technical field. Familiarity with the terminology, the main contexts and theories related to the field. Comprehensive knowledge of the main theories of the field in terms of knowledge acquisition and problem solving methods of problem solving. Basic knowledge of machine design principles and methods, control procedures and operational processes. Has an applied knowledge of measurement procedures, their tools, instruments and measuring equipment used in mechanical engineering. Understand, characterise and model the structure and operation of the structural units and elements of mechanical systems, the design and interrelationship of the system components used. Ability Performs the job according to his/her qualifications. Ability to plan, organise and carry out independent learning. The ability to manage and control the production processes of specialised technology, with a view to quality assurance and quality control. Attitude He/she is open to learning and absorbing knowledge related to engineering technology related to his/her qualification and area of expertise. Interested in new methods and tools related to the field. Autonomy and responsibility Taking responsibility for your own work and the work of others. 						
Short desc content	cription of t	he subject		operation a technology engineering and fittings,	nd maint in addit practice. seals.	enance. The ion to oth Flexible (be	subjec er topic elt) drive	t matter of th cs not previo es, clutches, ge	e course ously cove	rect structural design concentrates on driv ered but relevant to springs, brakes, pipe
Processing theoretical material with guidance 20 %Types of student activitiesProblem solving with guidance 20 %Independent processing of tasks 40 %Laboratory measurements with guidancePreparation of laboratory reports										
Required literature and contact details				 B.N Sarkar, Fundamentals of Industrial Drives Paperback, Publisher : Phi Learning pvt Ltd; 1st edition (February 17, 2011), ISBN-13 : 978- 8120344334 Materials on MOODLE 						

Recommended literature and contact details	 Imre Dolgos: Operation of machinery I. National Textbook Publishing House, 1998. Budapest Pattantyús Á. Géza: Operation of machinery, Műszaki Könyvkiadó, 1983. Budapest
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Industrial automatics

-		1					-	
in Hungar		Ipari automatizálás						BSc
				av Departur	ont of S	Structural Inte		DUEN(L)-MGT-252
	ing		reciliolog	gy, Departin			giity	
F	8	IMA-152						
Presentatio	on	Practice Laboratory Requirement		Credit	Language of education			
per week per term	1 5	per week 2 per week 0 per term 10 per term 0				5	english	
for the subj	ect	Name		András Nag	gy, PhD		schedule	Associate professor
Training objective and justification of the course (content, output, location in the curriculum)			udents to tant parts ng autom	the essentia of process ation. Deve	control, loping F	with particular PLC programm	ar emphas ning skills	sis on process control, s in students
			each leo	cture				•
hods		Practice						
ssed in tern	ns of	contexts and Comprehensisolving of the Basic knowlic control engine Comprehensic control, meet Can interpre- and elements Ability He performs Ability to ple Abile to ider and practica operations i Attitude Strives to le qualification field Autonomy Responsibil	I theories sive know he main the ledge of in neering p sive know chanical e et, charact s of auto s a work t an, organ htify rout a backgr n practice arning ab h and field and resp ity for on	wledge of the neories of hindustrial con- procedures. wledge of the equipment an inerize and m mated syste hat matches ize and perfi- ine profession round needed by. out and acco- d of expertise onsibility e's own wor	he met s/her fie atrol sys e operati nd devic odel the ms, the his qua orm ind oral pro- ed to so epting a se. Inter-	hods of acqueld. tems and mething principles ses. e structure and design and conditional design and conditional dependent lear poblems, explosional polve them, ar	nods, man and struct operation onnection ning. re and for ad solve sign devel methods a ers	owledge and problem ufacturing technology, tural units of industrial of the structural units of the applied system mulate the theoretical them (using practical opments related to his and tools related to the
he subject		Fundamentals of control engineering, control and regulation technology basic Characteristics, goodness, and types of control and regulation. Signals and system descriptive characteristics, block diagrams. Methodology of system descriptio Mappings, modeling, simulation. Structural and block diagrams. Deterministic te signals. Static and dynamic optimization. Fourier and Laplace transformatio Frequency response. Characteristics of fuzzy control. Basic steps of PLC programmin step and ladder programming, SCADA systems. Basics of sensors and actuator connections. Industrial field bus systems, protocols.						Signals and systems, f system description. ms. Deterministic test place transformation. of PLC programming, tensors and actuators,
		theoretical r of tasks 40%	naterial 2	0% Problem	n solutio			
						•		
ture and co	ntact	 Conner Gareth: Scenic Automation Handbook, ISBN9781138850279, 2018 Fabrizio Frigeni: Industrial Robotics Control, EAN9781484289884, 2022 						
		• 10		igem. maus	unai Ko	boues control	1, EAN970	01404209004, 2022
to be ent reports etable of the		Project worl		igeni. maus	unai Ko	bolles Control	I, LAN976	81484289884, 2022
	in English mal unit prior learn per week per term for the subj nd justificat botput, loca hods ssed in terr the subject vities nd contact of	in English prior learning Presentation per week 1 per term 5 for the subject ad justification of butput, location in hods essed in terms of the subject	in English Industrial au onal unit Institute of T prior learning IMA-152 Presentation Practice per week 1 per week per term 5 per term for the subject Name ad justification of output, location in hods Practice Laboratory Other Name Ability He performs Ability to pl Able to ider and practice comprehens solving of th Basic knowl control engi Comprehens solving of the solving	in English Industrial automatics mal unit Institute of Technolo prior learning IMA-152 Presentation Practice per week 1 per week 1 dijustification of output, location in Goals, development Introduce students to most important parts manufacturing autom In a cla each lea hods Practice Flipcha seminat Laboratory Other Seminat Laboratory Other Seminat knows the conceptua contexts and theories Comprehensive know solving of the main th Basic knowledge of in control engineering p Comprehensive know control, mechanical e can interpret, charact and elements of auto elements Ability He performs a work to Ability to plan, organ Able to identify rout and practical backgr operations in practice Attitude Strives to learning ab qualification and fielfield Autonomy and resp Autonomy and resp Responsibility for on Signals. Static and Frequency response. U step and ladder programed contact details made contact details Materials of theoret theoretical material 2 of tasks 40%	in English Industrial automatics onal unit Institute of Technology, Departm prior learning IMA-152 Presentation Practice Laboratory per week 1 per week 2 per week 1 per week 2 per term 5 per term 10 per term for the subject Name András Nag ad justification of putput, location in Goals, development objectives Introduce students to the essentia most important parts of process of manufacturing automation. Deve Presentation hods Presentation In a classroom with each lecture Practice Flipchart, blackboa seminar rooms suit Laboratory Other Other Stows the conceptual system relecontexts and theories. Comprehensive knowledge of industrial cor control engineering procedures. Comprehensive knowledge of the control, mechanical equipment at Can interpret, characterize and mand elements of automated systee ssed in terms of elements Ability He performs a work that matches Ability to plan, organize and perf Able to identify routine professia and practical background neede operations in practice). Attitude Strives to learning about and	in English Industrial automatics onal unit Institute of Technology, Department of S prior learning IMA-152 Presentation Practice Laboratory per week 1 per week 2 per week 1 per week 2 per term 5 per term 10 of the subject Name András Nagy, PhD Goals, development objectives Introduce students to the essential eleme most important parts of process control, manufacturing automation. Developing I hods Presentation In a classroom with the use each lecture Practice Flipchart, blackboard and o seminar rooms suitable for Laboratory Other Intoduce students is the origon of the met solving of the main theories of his/her fit Basic knowledge of industrial control sys control engineering procedures. Comprehensive knowledge of the operati control, mechanical equipment and devic Can interpret, characterize and model the and elements of automated systems, the elements Ability He performs a work that matches his qua Ability to plan, organize and perform ind Able to identify routine professional pro- and practical background needed to so operations in practice). Attitude Strives to learning abo	In English Industrial automatics onal unit Institute of Technology, Department of Structural Integration prior learning IMA-152 Presentation Practice Laboratory Requirement per week 1 per week 2 per week 0 E per term 5 per term 10 per term 0 E of or the subject Name András Nagy, PhD Coals, development objectives Introduce students to the essential elements of control most important parts of process control, with particul manufacturing automation. Developing PLC programm hods Presentation In a classroom with the use of projector, each lecture Practice Flipchart, blackboard and other multime seminar rooms suitable for group work n Laboratory Other Comprehensive knowledge of the methods of acquisolving of the main theories. Comprehensive knowledge of the operating principles control, mechanical equipment and devices. Can interpret, characterize and model the structure and and elements of automated systems, the design and control egineering, control and relements Ability He performs a work that matches his qualifications. Ability to plan, organize and perform independent lear Able to identify routine professional probl	In English Industrial automatics Code nnal unit Institute of Technology, Department of Structural Integrity , prior learning IMA-152 Presentation Practice Laboratory Requirement Credit per term 5 per term 10 per term 0 E 5 of the subject Name András Nagy, PhD schedule schedule ad justification of solas, development objectives Introduce students to the essential elements of control and regumaticaturing automation. Developing PLC programming skill most important parts of process control, with particular empha-manufacturing automation. Developing PLC programming skill most important parts of process control, with particular empha-manufacturing automation. Developing PLC programming skill is achieved to the conceptual system related to his/her field of experti contexts and theories. hods Practice Flipchart, blackboard and other multimedia equip schedule of the operating principles and struct controls stand theories. Comprehensive knowledge of the operating principles and struct control, mechanical equipment and devices. Can interpret, characterize and model the structure and operation and elements of automated systems, the design and connection edelements sted in terms of Ability He performs a work that matches his qualifications. Ability

Production Technology

FIOUUCU	on Tech								r			
		in Hungari	an	Gyártástech	nológia		Level	BSc				
Name of th	e subject	in English		Production Technology Code DUEN(L)-MUG- 252								
Responsibl				Institute of Technology, Department of Mechanical Engineering and Energy								
Name of co DUEN(L)-		prior learn	ing	MUG-152								
Туре		Presentatio	on	Practice					Credit	Language of education		
Full time		per week	2	per week 1 per week 0 E					5	english		
Part time	150/15	per term	10	per term	er term 5 per term 0							
Teacher res	sponsible f	or the subj	ect	Name	-	Gábor Vizi	, PhD		schedule	Associate professor		
Training objective and justification of the course (content, output, location in the curriculum)				Understand technologie principles processes -	ing the ba ing the th s, produc and impli Calculation ne and cos	sics of man eoretical ba ction equip ications of on and selec st - Understa	sis of p ment a machin tion of p unding of	lastic forming nd tools. CU ning - Under process data - O other machinin	. Knowled JTTING standing Calculatio ag process	the basic machining n of machine time and es		
				Presentatior	¹ overhea	d projector	_			ard, projector or		
Typical de	livery meth	nods		Practice	Small ta	able top exe	rcises fo	or up to 20 peo	ople			
				Laboratory								
				Other Knowledge								
Requirements (expressed in terms of learning outcomes)			ns of	Basic knowledge of machine design principles and methods, machine manufacturing technology, control procedures and operating processes. Apply the related computational and modelling principles and methods of engineering product, process and technology design. Ability Performs the job according to his/her qualifications. Ability to plan, organise and carry out independent learning. The ability to manage and control the production processes of specialised technology, with a view to quality assurance and quality control. Attitude He/she is open to learning and absorbing knowledge related to engineering technology related to his/her qualification and area of expertise. Interested in new methods and tools related to the field. Autonomy and responsibility Taking responsibility for your own work and the work of others.								
Short description of the subject content				THE FORMAL FORMATION PROCEDURES The theoretical basis of metal formation. Classification of non-ferrous forming processes. Forging, stamping, rolling technologies, production equipment and tools. Seamless tube manufacturing technologies, equipment and tools. Bending theory, technology, machines and tools. Theory, technology and tools for deep drawing. Techniques, tools and machinery for cold heading and cold flow. Casting technology, processes and tools. CHIPPING PROCEDURES Chipping methods and characteristics of chipping. Turning, planing, drilling, milling, grinding. Optimum determination of the number of passes, feeds and cycles for each type of machining. Calculation of the standard time. Cost analysis. Non-conventional procedures. Other machining processes (hobbing, sawing, serrations, etc.). Determination of the prefabrication.								
Types of st	udent activ	vities		Processing theoretical material with guidance 5 % Independent processing of theoretical material 40 % Task solving with guidance 15 %								
Required li	terature an	id contact o	letails	 Independent processing of tasks 40 % Dr. Stevan Firstner: Manufacturing technology (machining) note Dunaújváros College Publishing Office, 2007. Dr. Firstner Stevan: Manufacturing Technology (machining) study (TU1) - note. First Engineering Technology (TU TU). Zsoltné Fülöp, Metal technology (chipless forming processes) Dunaújváros College Publishing Office, 2008. 								

	• Zsoltné Fülöp, Study Guide for the subject "Metal Technology" (chipless forming processes) (TU2) Dunaújváros College Publishing Office, 2008.
Recommended literature and contact details	 Illés Dudás: Machine Manufacturing Technology I.(GM), Miskolc University Publishing House, 2000. Gál Gaszton-Kiss Antal-Sárvári József-Tisza Miklós: Plastic Cold Formation, Tankönyvkiadó, Budapest, 1981. p. 360. Ziaja György: Plastic Formation, Tankönyvkiadó, Budapest, 1978. p. 396
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Heat En	igines								-	
Name of the	he subiect	in Hungaı		Hőenergetikai gépek						BSc
		in English	1	Heat engines Code DUEN(L)-MGT-151 Institute of Technology, Department of Mechanical Engineering and Energy						
-	educatio			Institute of	Technolog	gy, Departn	ent of I	Mechanical En	gineering	and Energy
Name of c DUEN(L)	compulsory -	prior learn	ning	MGT-212		1		1	1	
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education
Full time Part time	150/39 150/15	per week per term	2 10	per week 1 per week 0 per term 5 per term 0				5	english	
Teacher re	esponsible f	or the sub	ject	Name		Róbert Sán	ta, PhD		schedule	Associate professor
				Goals, deve	elopment	objectives				
Training objective and justification of the course (content, output, location in the curriculum)			thermodyna knowledge so that som	mic cycl of combu le of the peration of	es and the stion techno problems in a domestic	real p plogy re everyd boiler, a	processes taki equired to und lay life can be air conditionin	ng place erstand th e easily u		
				Presentation	n In a cla	ssroom with	the use	e of projector o	or comput	er in each lecture
Typical de	elivery metl	nods		Practice	Group	work and pr	esentati	ons		
				Laboratory	_					
				Other Knowledge						
Requirements (expressed in terms of learning outcomes)			ns of	understand student kno student inte conversion. energy com purposes, th main feature about the of structure of them. The s combustion Ability The student able to des distinguishe represent th more compl between the his knowled The student control met	and uses k ws the preprets th The stud- version. The role of es of the copperation the comp tudent is a engines, is able to scribe real so between termodynal ex therma- operating log of the coperation the comp tudent is a engines.	snowledge of rocesses that e structure ent knows the The student his turbine, onstruction of the corr ression and aware of the their advant o identify co al systems a solutions f amic process odynamic p g, control an ermodynamic he type of eam turbine	f combut take p of the he struct underst compre- of a gas npresso spark ig possibi ages an mbustic with ab or diffe- isses in roblems d design cs, reco- chiller t s and th	ustion theory in place in dome special stear ture of the rea- tands the desi- gessor and fireb turbine used in r refrigerator. gnition engine, lities of increa- d disadvantage on processes in pstract thermo- rent abatement state diagrams in real equipm n solutions of do- pognize deviation	n environ stic and i n turbine ction stea gn of a g ox. The st n aviation The stu the proce sing the p es. n real equi dynamic methods s. The stu ment. The different r ons from peds. The nents. The	practice. The students mental protection. The ndustrial boilers. The , the way of energy um turbine, the way of gas turbine for energy tudent is aware of the . The student informed dent understands the esses that take place in erformance of internal ipment. The student is models. The student is models. The student . The student is able to ident applies to solve e student distinguishes nixing systems. Apply theoretical processes. student describes the e student describes the hkel).
			 Student strives to meet and enforce quality standards. Student strives to organise and carry out their tasks in accordance with environmental, health and sustainability standards. Using student's technical knowledge, Student will seek to gain a better understanding of observable phenomena and to describe and explain their laws. Autonomy and responsibility Student shares her acquired knowledge and experience through formal, non-formal and informal information transfer with those in her field. Student demonstrates responsibility for sustainability, health and safety culture and environmental awareness. In student's decisions, it takes account of the principles and application of environmental protection, quality, consumer protection, product liability, equal access, health and safety at work, technical, economic and legal regulation and engineering ethics. 							
Short desc content	cription of t	he subject		of energy e chillers are	quipment presented	t. According l. Using a sy	gly, mu /stems a	ltistage chiller approach, they	rs, heat p acquire 1	and design knowledge umps, and absorption nethods for designing miliar with the losses,

Heat Engines

	characteristic curves, and modeling of the combustion process and heat losses in internal combustion engines. Using a systems approach, they are familiar with the solutions used in gas engines, steam, and gas turbines. Students can master the methods used to reduce sustainability and environmental impact.
Types of student activities	Processing heard text with notes 60% Task-based organisation of information 10% Independent processing of tasks 30%.
Required literature and contact details	 Fundamentals of Heat Engines, Author(s):Jamil Ghojel PhD, First published:28 February 2020 Print ISBN:9781119548768 Online ISBN:9781119548829 DOI:10.1002/9781119548829 Materials on MOODLE
Recommended literature and contact details	 P.K.Nag-Basic and Applied Thermodynamics-Tata Mc Graw Hill Publishing Company, 2002 R.K.Rajput-Engineering Thermodynamics-Laxmi Publications S.C.Somasundaram-Thermal Engineering-New Age International (P) Ltd,1996 Ferziger, J.H., Peric, M.: Computational Methods for Fluid Dynamics, Springer, 1999
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Metrolog	y	•		•					•		
		in Hungai	rian	Gépészeti méréstechnika						BSc	
Name of the	e subject	in Englisł	1	Metrology Code DUEN(L)-MUG- 213							
Responsible				Institute of Technology, Department of Mechanical Engineering and Energy							
Name of con DUEN(L)-	mpulsory	prior learn	ning	MUG-257 MUG-222							
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education	
	150/39 150/15	per week per term	2 10	per week per term	0	per week per term	1 5	М	5	english	
Teacher resp				Name	Ť	Gábor Pór,	-	1	schedule	Professor emeritus	
Training objective and justification of the course (content, output, location in the curriculum)			The attend and load d tribologica have to pla They have	lants must lata, have al propertie an and run e to learn th , thermal	to be able to es. The life ti tribological ne different f	identify me and t systems ields of	y the mayor w third body mos s on the basis o the applied tri	earing pro at be detern of properti bology (p	etermine the structural presses in the wave of mined generally. They es of lubrication state. rocessing, mechanical blier systems run and		
Typical delivery methods					on In a cla Flipcha semina	art, blackboa	rd and o			er in each lecture. nent in smaller	
Requirements (expressed in terms of learning outcomes)				understand student kr student in conversion energy co purposes, main featu about the structure of them. The combustion Ability Performs the Ability to The ability with a view Attitude Student stu Student stu health and Using stuco of observa Autonom	d and uses nows the p neterprets the n. The student student in the role of the role of the composition of the composition student is on engines, the job acce plan, orga y to manage w to qualite rives to me rives to me student's technologies to ble pheno y and resp	knowledge of processes that the structure lent knows to The student is turbine, construction of the con- pression and aware of the their advant ording to his nise and contro- y assurance eet and enfor ganise and ci- cility standard nical knowle mena and to ponsibility	of combut take p of the he struc underst compre- of a gas npresso spark ig possibi ages and /her qua y out in l the pro- and qua ce quali arry out ls. dge, Stu describe	ustion theory in place in dome special stear (ture of the rea tands the desi, essor and fireb turbine used in r refrigerator. gnition engine, lities of increa d disadvantage alifications. dependent lean oduction proce lity control.	n environ stic and i n turbine ction stea gn of a g ox. The s n aviation. The stu the proce sing the proce sing the proce ses.		
Short descri content		-		The mechanical tools of the direct linear dimensioning. The mechanical tools of the relative linear dimensioning. Optical linear dimensioning instruments. Gauge blocks. Coordinate measuring instrument. Angular measurement. Extension and strength measuring. The operation principle, the main sources of errors and the application techniques of the dynamometer, extensometer and the dislocation-meter. Mechanical examinations, the application possibilities of the stressing examinations. Processing of measuring results with statistical methods. The estimation of measuring results.							
Types of stu				Independe	ent process	ing of tasks	30%.	isk-based olga		n mormation 1070	
Required lit	erature ar	nd contact	details					f Measuremen	t		
Recommend details	led literat	ure and co	ontact	•	Jay L. Buc		trology	Handbook Ha		April 1, 2004,	

	• Heather A. Wade, The ASQ Metrology Handbook, Third Edition (eBook), Published 2023, ISBN: 9781636940205, Item Number: E1596
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Thesis project

in Hungarian		an	Szakdolgoza	at - GEPE	BSC		Level	BSc			
Name of th	ne subject	in English		Thesis project Code DUEN(L)-MUG- 091							
	le education			Institute of 7	Fechnolog	gy, Departm	ent of M	Mechanical En	gineering	and Energy	
Name of co DUEN(L)-	ompulsory -	prior learn	ing	1-6 félév minden tárgyának teljesítése							
Туре		Presentatio	on	Practice Laboratory Requirement			Credit	Language of education			
Full time		per week	0	per week	9	per week	0	S	15	english	
Part time		per term	0	per term Name	45	per term Tamás Zah	0		schedule	Mater instructor	
Teacher responsible for the subject Training objective and justification of the course (content, output, location in the curriculum)				Goals, deve Work based	on indep	objectives endent litera	ature rev		collection	, as well as individual d collected during the	
Typical delivery methods				Presentation Practice Laboratory Other	The stu	dent prepare ations in 100		er thesis indep ne practice.	endently i	n individual	
Requirements (expressed in terms of learning outcomes)				Knowledge The student, summarising the knowledge acquired during the course and the results of the work placement, prepares a thesis on the chosen topic in the field of computer science and electronics integrated engineering as a synthesis of his/her studies. The thesis is an independent work requiring the creative use of the knowledge acquired. The thesis shall be supervised and assisted by a supervisor and shall be at least 50 pages long and no longer than 80 pages. Ability The student should be able to solve problems in mechanical engineering design work based on what has been learned. Recognise the elementary structures required to solve various complex problems and be able to determine their correct sequence. You can choose the optimal solution for the situation from a range of possible solutions. Be able to train and represent complex shapes in engineering practice. The student should be familiar with the conceptual structure of the ISO tolerance and fitment system for the correct specification of tolerances, tolerances and fits. Be able to specify accuracy specifications for machine parts. Mow, be able to define and prescribe the surface finish metrics of machine parts. Be able to understand and analyse problems in industrial processes (e.g. maintenance problems) and make recommendations for their improvement. Be able to present and document problems in industrial processes (e.g. maintenance problems) and absorbing engineering knowledge related to your qualifications and area of expertise. Interested in new methods and tools related to the field. And able to incorporate them into the thesis.							
Short descr content	ription of tl	he subject		The student, summarising the knowledge acquired during the course and the results the professional practice, prepares a thesis on the chosen topic in the field of mechanic engineering integrated with computer science and electronics. The thesis is independent work requiring the creative use of the knowledge acquired. The thesis prepared under the regular guidance and guidance of a supervisor Regular consultation with industry and academic consultants. Incorporation of							
Types of st	tudent activ	vities		suggestions at the approp	into the the the the the the the the test of t	hesis. Conti el.	nuous d	levelopment a	nd docume	entation of the thesis	
Required li	iterature an	d contact d	letails	pu	ıblisher	the thesis. 2 n MOODLH		unded and revis	sed edition	n. University	

Recommended literature and contact details	
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Professional Practice

Professi	onal Pra	ictice		_								
in Hungarian				Szakmai gy	Szakmai gyakorlat - GEPBSC Level BSc							
Name of th	ne subject	in English	ı	Professional Practice Code DUEN(L)-MUG- 093								
Responsib	le educatio	nal unit		Institute of '	Technology, Department of Mechanical Engineering and Energy							
Name of co DUEN(L)-	ompulsory		ning			~			<u> </u>			
Type Presentation				Practice		Laboratory		Requirement	ent Credit Language of education			
Full time Part time	150/0 150/0	per week	0	per week 0 per week 0 S				5	english			
		per term		1	0	1	Ŷ		a a ba du la	Motorinstructor		
Teacher responsible for the subject				Name Tamás Zahola schedule Mater instructor Goals, development objectives Schedule Mater instructor								
							monform		- antiviti	a undan mechanicanal		
	the course (content, output, location in the curriculum)			supervision	snould	be able to	perior	m engineering	g activitie	es under professional		
the curricu	luiii)				.							
				Presentation	1							
Typical de	livery met	hods		Practice	_							
51	2			Laboratory								
				Other								
				Knowledge								
							of the b	asic facts, tren	ds and bo	undaries of the subject		
				area of the t								
					Knows the conceptual system, the most important relationships and theories related to							
				his field of expertise.								
				He has a comprehensive knowledge of the main theories of his field of knowledge								
				acquisition and problem solving methods. He has a thorough knowledge of the learning, knowledge acquisition and data								
				collection methods of the field of mechanical engineering, their ethical limitations and								
				problem-solving techniques.								
				Ability								
Requireme	ents (expres	ssed in terr	ns of	Performs a job corresponding to his qualifications.								
learning ou	utcomes)			Able to apply the most important terminologies, theories and procedures of the given								
Ũ				technical field when performing related tasks.								
				Ability to plan, organize and carry out independent study.								
				In the cours	e of his v	work, he is	able to a	apply and con	nply with	safety, fire protection		
				and hygiene								
				Able to communicate in a professionally adequate manner, orally and in writing, in his								
				native language and at least one foreign language, according to his field of expertise.								
				Able to ap	ply the	technical re	egulatio	ns related to	the ope	ration of mechanical		
				engineering	systems,	the princip	les and	economic cor	relations	of the adjustment and		
				operation of	machine	s and mecha	anical ed	quipment.				
				Attitude								
				Autonomy and responsibility								
					r	-						
Short desc	rintion of t	ha subject										
	ription of t	ne subject										
content												
TT C												
Types of s			1 / 11									
Required 1				•								
Recommen details			ontact	•								
Description of tasks to be												
submitted/	measurem	ent reports										
Description	n and time	table of the	9									
workshops	5											
				•								

Quality.	Manage	ment								
in Hungarian				Minőségirá	nyítás	Level	BSc			
Name of the subject in English			Quality Ma	nagement		Code	DUEN(L)-MUG- 117			
Responsible educational unit			Institute of Technology, Department of Mechanical Engineering and Energy							
	ompulsory	prior learn	ing						0 0	
Туре		Presentatio	n	Practice		Laboratory		Requirement	Credit	Language of education
Full time	150/39	per week	2	per week	1	per week	0	М	5	english
Part time	150/15	per term	10	per term	5	per term	0		5	english
Teacher re	sponsible f	or the subj	ect	Name		Mrs. Ildikó PhD	Angere	er Petrovickij,	schedule	Associate professor
Training objective and justification of the course (content, output, location in the curriculum)				main areas of quality, between th formulate th structure of national qu employees requiremen role in EU c of the struc managemer of quality	t should b of quality, its differe e actors of the role and the "qual tality sys and the en ts, the rol- quality pol ture of a s at standard and envin	e able to un to analyse ence from t of production d structure of ity house". tem, the T vironment, e of standar icy, the met ystem to m ds (MIR, KI ronmental n	the diffe he concorn and of quali The stu QM pl the purp rds, thei hod of i eet the pr R /EM/ nanage	erent approach cept of confor service proces ty managemer dent will be fa hilosophy and bose of quality in national and nterpretation of requirements of AS, ISO 1400 ment systems	these and even mity, to it sees in the amiliar will its imp awards and internation of standard of a system 1/, MEBIF	quality, to review the olution of the concept nterpret the relations e light of quality, to prises, to describe the th the structure of the act on management ad the essence of their onal system and their ls and textual analysis n standard, the use of \$) and the application and techniques, the
Typical delivery methods				Presentation Practice Laboratory Other	For all s projecto Group v		a large l using N	lecture, presen		a whiteboard, outer network.
Requirements (expressed in terms of learning outcomes)				Basic know quality and Understand and elemen interrelation Ability Ability to p control tec elements of Attitude Open to le managemer in new mett Autonomy Taking resp	t knows the velocities of of d environ , character ts of qual hiship of the blan, organ hinologica <u>c</u> quality as earning an at systems hods and t and resp ponsibility	quality and mental ma rise and mo ity and envi e system ele nise and can lly speciali- ssurance and d absorbin, related to h <u>ools related</u> onsibility for your ow	environ nageme del the ronmen ements ry out sed pro l quality g know iis/her c to the f	independent le structure and o atal manageme used. independent le sduction proce y control. 'ledge related jualifications a ield. and the work	eement print s and opperation of ent system earning. A esses, taking to quality and area of of others.	
Short description of the subject content				The course provides a general overview of the technical aspects of building and operating a quality management system and the process approach to building management systems. It takes into account the legal background, the requirements of the documentation system and the techniques that facilitate quality improvement. In presents the main elements of the ISO 9000 system and the different quality awards and, in addition, briefly covers the Environmental Management Systems (ISO 14001, EMAS) and MEBIR.						
Types of st			1 4 11	Independen	t processi	ng of tasks (30%.			
Required li	iterature an	id contact d	letails	Note on quality and environmental management systems, Moodlem Dr. Géza Gremsperger. Note DF, downloadable help files from Moodle.						
Recommer details	nded literat	ure and cor	ntact	• A		- I.J.DeTor				Fechnical Publishers.
		-								

Quality Management

Description of tasks to be submitted/measurement reports	2 essays to be submitted on a topic of your choice
Description and timetable of the workshops	In the semester period, in weeks 7 and 13, a total of 2 independent project papers/case studies of your choice on topics related to quality management, environmental management systems (ISO 14001, EMAS) and MEBIR systems, 8-15 pages in length, illustrated

Environmental protection and											
Name of t	he subject	in Hunga				<u> </u>	Level	BSc			
	,	in English	1	Environmental protection and energy management Code DUEN(L)-MUT-110							
Responsible educational unit Name of compulsory prior learning			Institute of Technology, Department of Mechanical Engineering and Energy								
DUEN(L)-											
Type Presentation			Practice		Laboratory		Requirement	Credit	Language of education		
Full time Part time	150/39 150/15	per week per term	2 10	per week per term	0	per week per term	1 5	М	5	english	
	esponsible f	•	-	Name	Ū	Endre Kiss	-		schedule	College professor	
	bjective an			Goals, deve	lopment		/				
the course	(content, o	output, loca	ation in							lems of environmental	
the curricu	ulum)			protection,				t and eliminat			
				Presentation	Present projecto		cture ro	om for everyo	ne using o	computer driven	
Typical de	elivery metl	hods		Practice							
				Laboratory	Measur	ement in lab	ooratory	in pairs (max	11 pairs)		
				Other Veroenlodes							
				Knowledge		ric facts dir	actions	and limits of t	ha subias	t area of engineering.	
				Knowledge	of the ge onships	neral and sp	pecific 1	mathematical,	scientific	and social principles, ation of the field of	
						minology, t	he most	important cor	ntexts and	theories related to the	
				Comprehen solving in the				ods of knowl	edge acqu	uisition and problem-	
								nomic, busines	s and lega	al rules and tools.	
				Comprehensive knowledge of basic economic, business and legal rules and tools. Knowledge of measurement procedures at an applied level.							
				Has an applied knowledge of the requirements and standards of health and safety at							
				work, fire protection, safety and health at work, and environmental protection in the field of his/her specialisation.							
				field of his/her specialisation. Comprehensive knowledge of the management, environmental protection and quality							
				assurance principles, their limits and requirements, which are intrinsically linked to the							
				field.							
				Ability							
				The ability to analyse at a basic level the disciplines that make up the knowledge base of the technical field, to synthesise relationships and to make appropriate evaluations.							
				Ability to plan, organise and conduct independent learning. Ability to identify routine professional problems, to identify, formulate and solve							
-	ents (expres	ssed in ter	ms of				practice) the theoret	ical and	practical background	
learning o	utcomes)						erature,	computer and	library re	sources specific to the	
				field. Ability to a	oply the a	cquired IT l	cnowled	lge to the solu	tion of pro	oblems in the field.	
				Ability to apply the acquired IT knowledge to the solution of problems in the field. Ability to apply and enforce safety, fire safety and hygiene rules and regulations.							
										tongue and in at least ccordance with his/her	
				field of spec			onany a	appropriate ma	inner, ma	ccordance with his/her	
				Attitude	Julibulion	•					
					learning	about, embi	racing a	nd authentical	ly commu	inicating professional,	
				It is open to learning about, embracing and authentically communicating professional, technological development and innovation in engineering.							
				It strives to make self-learning a means to achieve its professional goals.							
				He/she takes decisions in complex and unexpected decision-making situations in full respect of legal and ethical standards.							
			Seek to solve problems, preferably in cooperation with others.								
			Strive to maintain self-development in the field on an ongoing basis and in line with								
			professional goals. He/she strives to solve problems and make management decisions by listening to the								
										ons by listening to the	
								ly in cooperati		ut practical activities	
				Have the stamina and tolerance of monotony required to carry out practical activities. Open to the use of IT tools.							
			Open and receptive to the application of new, modern and innovative practices and								
				methods related to organic farming and health awareness.							

Environmental protection and energy management

	In the course of his/her work, he/she observes and complies with the relevant safety, health, environmental protection, quality assurance and control requirements. Autonomy and responsibility Responsibly upholds and represents the values of the engineering profession, and is open to professionally informed critical comment. In the performance of his/her professional duties, he/she will cooperate with qualified professionals from other disciplines (primarily technical, economic and legal). Identify shortcomings in the technologies used, process risks and take the initiative to mitigate them. Monitor legislative, technical, technological and administrative changes in the field. Under the direction of the line manager, manages the work of the staff assigned to him/her and supervises the operation of machinery and equipment. Assesses the efficiency, effectiveness and safety of the work of subordinates. Supervises the professional development of his/her subordinates.
	Sharing his/her experience with his/her colleagues in order to support their development. Takes responsibility for the consequences of his/her technical analyses, the proposals he/she makes and the decisions he/she takes. Translated with www.DeepL.com/Translator (free version)
Short description of the subject content	Basics of ecology. The subject, the questions, and purpose of environmental protection. The biological and geological environment. Cycles. The gas cover of Earth. The most important pollutants of air. The properties of dust pollution in the air. The general properties dust collection. Settling chambers and collectors with flow direction transformation. Cyclones. Basics of bag filters. Operating and cleaning of bag filters. Introduction of electrostatic precipitators. Powders with low and high electric resistance. The parts of electrostatic precipitators. Bag filter with electrostatic charging and their applications. Electrostatic precipitation with pulse energisation, abatement and decomposition of gases. Adsorption and absorption processes. Scrabbers. Oxidation methods. Burning technologies. Odor abatement. The measurement of air pollution. The properties of the natural waters, and their pollution, self cleaning. Water treatment technologies and their equipments. The pollution of soil. Waste and their treatment. Noise and vibration as environmental protection. Radioactive pollution.
Types of student activities	Lecture: the making notes: studiing the text independently, labor: studying the information, making reports
Required literature and contact details	 Kiss E,: Environmental Protection and Economical usage of Energy (on Moodle drive) 2. Environmental Science Toward a Sustainable Future Richard T. Write, Bernard J. Nebel, Prentice Hall
Recommended literature and contact details	 . The Biosphere, Ian Bradbury, Belhaven Press 4. Air Pollution, Its Origin and Control, Kenneth Wark and Cecil F. Warner, Harper and Row 5. Hazardous Waste Management Michael D. LaGrega, McGraw Hill 6. Drinking Water Quality, N.F. Gray, Wiley
Description of tasks to be submitted/measurement reports	Laboratory report according to schedule
Description and timetable of the workshops	Assay type test at the 6th week and at the last week

MACHINE MAINTENANCE AND TECHNICAL DIAGNOSTICS

chnologi								1	
					Level	BSc			
in English									
Responsible educational unit			Institute of Technology, Department of Mechanical Engineering and Energy						
y prior learn	ing	MUG-222	MUG-222						
Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education	
per week	2	per week	1	per week	5	english			
per term	10	per term	5	per term	0		-	_	
for the subj	ect	Name			a, PhD		schedule	College associate professor	
		Be able to a restoration to disassembly operations, a	analyze o echnolog and ass malyze a	damage pro ies based of embly tech nd solve ass	n the ki nologie embly c	nowledge of the s, as well as the state of the second seco	he damage the prece	e. Be able to plan the	
thods			projecto	or, ppt prese	ntations	8			
Requirements (expressed in terms of learning outcomes) Short description of the subject content				pors and prof sponding to be e and carry of chanical fail g about and fation and fi onsibility for your ow s occuring of fication of the nalysis of dates affecting ing the machine ining and asset	fessiona his qual out inde ures, se receivir eld of e wn work on the so he breal amages. g the s hines. I sembly	Illy eliminate t iffications. ependent study elect remedial a ng knowledge xpertise. Inter and the work urface of mach kdowns. The s The connection surface quality Dismounting a technologies.	hem. actions, so related to ested in n of your p hine parts surface qua- on betwee y. The s and assem	olve repair technology machine maintenance ew methods and tools eers. and volume and their ality; factors affecting n the damages and the election of recovery	
Types of student activities				Processing theoretical course material with guidance: 60 % Independent processing of theoretical course material: 40 % Task solution with guidance 15 % Processing tasks independently 85%					
 Lech Pawlowski, The Science and Engineering of Thermal Spray (John Wiley & Sons, 2008 Machine Maintenance I. Edited by Dr. Janik József. Jan Janik J. Ja Főiskolai Kiadó, Dunaújváros, 2001. Materials on MOODLE 									
	ntact							owditch, Welding	
nent reports		Completion of 2 homework assignments during the semester							
etable of the	•	2 tests durin	g the sem	nester					
	in Hungar in English onal unit y prior learn Presentation per week per term if or the subj and justificat output, loca thods ithods	in Hungarian in English onal unit y prior learning Presentation per week 2 per term 10 for the subject and justification of output, location in thods essed in terms of	in Hungarian Gépüzemfer in English Maintenance onal unit Institute of T y prior learning MUG-222 Presentation Practice per week 2 per week per term 10 per term 10 per term 10 and justification of output, location in Be able to restoration t disassembly operations, a Presentation Presentation Presentation Presentation thods Presentation Able to ana uncover cau Able to ana uncover cau Ability Performs a j Able to plan Able to ana uncover cau Ability Performs a j Able to diag tasks Attitude He is open trelated to hir related to hir related to thir Processing t itivities The damagin consequence tivities Processing t ind contact details M and contact details M fo M ature and contact • to be Completion	in Hungarian Gépüzemfenntartási ti in English Maintenance technolo onal unit Institute of Technolo y prior learning MUG-222 Presentation Practice per week 2 per term 10 per term 10 output, location in Be able to analyze a output, location in restoration technolog disassembly and ass operations, analyze a Presentation projecte thods Presentation Presentation projecte Laboratory Other Able to analytically uncover causes of err Able to analytically uncover causes of err Able to analytically Performs a job corres Able to analytically Consequences. Classi Attitude He is open to learning related to this qualific related to the field. Autonomy and resp Taking responsibility The damaging effect </td <td>in Hungarian Gépüzemfenntartási technológiál in English Maintenance technologies 1. onal unit Institute of Technology, Departm y prior learning MUG-222 Presentation Practice Laboratory per week 2 per week 1 for the subject Name Szabó Attil diassembly and assembly tech operations, analyze and solve assembly and assembly tech operations, analyze and solve assembly and assembly tech operations, analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyte and solve assembly and assembly tech onalytically e</td> <td>in Hungarian Gépüzemfenntartási technológiák 1. in English Maintenance technologies 1. onal unit Institute of Technology, Department of I y prior learning MUG-222 Presentation Practice Laboratory per week 2 per week 1 of the subject Name Szabó Attila, PhD Goals, development objectives onal yustification of Be able to analyze damage processes output, location in restoration technologies based on the k disassembly and assembly and solve assembly operations, analyze and solve assembly operations, analyze and solve assembly of those assembly of the sector, ppt presentation thods Presentation precice, ppt presentation Practice projector, ppt presentation Procession and professiona Able to analytically examine the dam uncover causes of errors and professiona Able to dia</td> <td>In Hungarian Gépüzemfenntartási technológiák 1. in English Maintenance technologis 1. onal unit Institute of Technology, Department of Mechanical Er y prior learning MUG-222 Presentation Practice Laboratory Requirement per week 2 per week 1 per week 0 M for the subject Name Szabó Attila, PhD M Goals, development objectives M nd justification of Be able to analyze damage processes and reduce th disassembly and assembly technologies, as well as operations, analyze and solve assembly dimension cha Presentation Projector, ppt presentations Practice projector, ppt presentations Presentation Projector, ppt presentations. Able to analytically examine the damage processes uncover causes of errors and professionally eliminate the Ability Ability Performs a job corresponding to his qualifications. Able to diagnose mechanical failures, select remedial tasks Attitude He is open to learning about and receiving knowledge related to his qualification and field of expertise. Interrelated to the field. Autitude He is open to learning about and receiving knowledge related to his qualification and field of expertise. T</td> <td>In Hungarian Gépüzemfenntartási technológiák I. Level In English Maintenance technology. Department of Mechanical Engineering y prior learning MUG-222 Presentation Practice Laboratory Requirement Credit per week 2 per week 0 M 5 for the subject Name Szabó Attila, PhD schedule output, location in Goals, development objectives on the knowledge of the damage processes and reduce their impac output, location in restoration technologies based on the knowledge of the damage processes and reduce their impac output, location in restoration technologies based on the knowledge of the damage processes of mach uncover causes of errors and professionally eliminate them. Able to analytically examine the damage processes of mach uncover causes of errors and professionally eliminate them. Ablity Performs a job corresponding to his qualifications. Able to diagnose mechanical failures, select remedial actions, sc tasks Attitude He is open to learning about and receiving knowledge related to related to this qualification and field of expertise. Interested in n related to the field. Attitude He is open to learning about and receiving knowledge related to related to this qualification of the breakdowns. The surface quality. The s technologies. Cleanning the machines. Dis</td>	in Hungarian Gépüzemfenntartási technológiál in English Maintenance technologies 1. onal unit Institute of Technology, Departm y prior learning MUG-222 Presentation Practice Laboratory per week 2 per week 1 for the subject Name Szabó Attil diassembly and assembly tech operations, analyze and solve assembly and assembly tech operations, analyze and solve assembly and assembly tech operations, analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyze and solve assembly and assembly tech operations analyze and solve assembly tech operations analyte and solve assembly and assembly tech onalytically e	in Hungarian Gépüzemfenntartási technológiák 1. in English Maintenance technologies 1. onal unit Institute of Technology, Department of I y prior learning MUG-222 Presentation Practice Laboratory per week 2 per week 1 of the subject Name Szabó Attila, PhD Goals, development objectives onal yustification of Be able to analyze damage processes output, location in restoration technologies based on the k disassembly and assembly and solve assembly operations, analyze and solve assembly operations, analyze and solve assembly of those assembly of the sector, ppt presentation thods Presentation precice, ppt presentation Practice projector, ppt presentation Procession and professiona Able to analytically examine the dam uncover causes of errors and professiona Able to dia	In Hungarian Gépüzemfenntartási technológiák 1. in English Maintenance technologis 1. onal unit Institute of Technology, Department of Mechanical Er y prior learning MUG-222 Presentation Practice Laboratory Requirement per week 2 per week 1 per week 0 M for the subject Name Szabó Attila, PhD M Goals, development objectives M nd justification of Be able to analyze damage processes and reduce th disassembly and assembly technologies, as well as operations, analyze and solve assembly dimension cha Presentation Projector, ppt presentations Practice projector, ppt presentations Presentation Projector, ppt presentations. Able to analytically examine the damage processes uncover causes of errors and professionally eliminate the Ability Ability Performs a job corresponding to his qualifications. Able to diagnose mechanical failures, select remedial tasks Attitude He is open to learning about and receiving knowledge related to his qualification and field of expertise. Interrelated to the field. Autitude He is open to learning about and receiving knowledge related to his qualification and field of expertise. T	In Hungarian Gépüzemfenntartási technológiák I. Level In English Maintenance technology. Department of Mechanical Engineering y prior learning MUG-222 Presentation Practice Laboratory Requirement Credit per week 2 per week 0 M 5 for the subject Name Szabó Attila, PhD schedule output, location in Goals, development objectives on the knowledge of the damage processes and reduce their impac output, location in restoration technologies based on the knowledge of the damage processes and reduce their impac output, location in restoration technologies based on the knowledge of the damage processes of mach uncover causes of errors and professionally eliminate them. Able to analytically examine the damage processes of mach uncover causes of errors and professionally eliminate them. Ablity Performs a job corresponding to his qualifications. Able to diagnose mechanical failures, select remedial actions, sc tasks Attitude He is open to learning about and receiving knowledge related to related to this qualification and field of expertise. Interested in n related to the field. Attitude He is open to learning about and receiving knowledge related to related to this qualification of the breakdowns. The surface quality. The s technologies. Cleanning the machines. Dis	

Maintenance technologies 1.

in Hungarian Gyártástervezés, CAM Level BSc Name of the subject DUEN(L)-MUGin English Production planning, CAM Code 111 Institute of Technology, Department of Mechanical Engineering and Energy Responsible educational unit Name of compulsory prior learning MUG-252 DUEN(L)-Language of Requirement Credit Type Presentation Practice Laboratory education Full time 150/39 0 per week 2 per week per week 1 Μ 5 english Part time 150/15 per term 10 per term 0 per term College associate Gábor Vizi, PhD Teacher responsible for the subject Name schedule professor Goals, development objectives Familiarisation with micro-design documentation in manufacturing technology. Familiarity with and use of the operations plan, operations instructions and Training objective and justification of accompanying documentation. the course (content, output, location in Understand the technological role and design of appliances and participate in the design the curriculum) of a simple appliance. To learn about the construction and operation of NC-controlled machining machines, the function and application of machine components. Gain CNC programming experience. Gain CAM programming experience. For all students, in class, on whiteboard or computer. Use of projector Presentation 50% of all lessons). Practice Typical delivery methods For all students in class. Using computer and CNC machines (25% of Laboratory all lessons) Other Knowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific mathematical, scientific and social principles, rules, contexts and procedures necessary for the operation of the technical field. You know the terminology, key concepts and theories related to your field. You have a comprehensive knowledge of the main theories and problem-solving methods in your field. Requirements (expressed in terms of Ability learning outcomes) Ability to plan, organise and carry out independent learning. Ability to identify routine professional problems, to identify, formulate and solve them (using standard operations in practice) against a theoretical and practical background. Ability to build basic models of technical systems and processes. Attitude Taking responsibility for your own work and the work of others. Autonomy and responsibility Choice of prefabricated products. Determining the grid tolerances of the prefabricated parts and calculating the final dimensions. Presentation of a numerical example. Concept of operation and preparation of the sequence of operations. Development of operation instructions. Forms of execution of the operation plan. Presentation of an example. Implementation of technological documentation. Organisation of documentation. Bases, base selection error, size chains. The process of designing Short description of the subject apparatus. Static, kinematic and dynamic calculations. Sizing of components of content apparatus. Drilling, milling and turning devices and their main functions and characteristics. Demonstration of the appliances manufactured. Design of CNC lathes and machining centres. Basics of programming CNC machines through a simulation system. Standards for CNC machines. NCT control instructions. Tooling of CNC machines. Solving a concrete technical problem (programming). Understanding the CNC programming process for lathes and milling machines. Understanding CAM formal processes. Demonstration of the development of a concrete example. Processing theoretical material with guidance 20 % Independent processing of theoretical material 20 % Types of student activities Task solving with guidance 20 % Independent processing of tasks 40 % Dr. Stevan Firstner, Production Planning, CAM, Practical (P) (manuscript), Required literature and contact details Dunaújváros College 2007.

Production planning, CAM

	 Hiram E. Grant, Example of workpiece grippers, Technical Book Publishing, Budapest 1970 Description of EdgeCAM software, NCT simulator software description Egon Lechner: Elements of the construction of turning devices.
Recommended literature and contact details	 Manufacturing technology, BME note NCT 2000 programming manual, machine manual Illés Dudás: Mechanical Engineering I. ME note
Description of tasks to be submitted/measurement reports	 Solving a complex production planning problem. Participation in exercises at least 70 % Submission and satisfactory completion of the mid-term assignment Positive assessment of the final knowledge assessment. 1. Written exam (Developing an engineering design for a given component) 25 ÷ 50 points. 2. ZH (Writing NC program, Solving a complex milling and turning problem with EdgeCAM) 25 ÷ 50 points These are used to determine the grade: 51 - 60 points: sufficient, 61 - 70 points: medium, 71 - 80 points: good, 81 - 100 points: excellent
Description and timetable of the workshops	

Tribology

Tribolog	<i>v</i>	in Hungar	ian	Tribológia					Level	BSc
Name of the	a subject	in English		Tribology					Code	DUEN(L)-MUG-
5			6,						118	
Responsible educational unit Name of compulsory prior learning			Institute of Technology, Department of Mechanical Engineering and Energy							
Name of co DUEN(L)-	mpulsory	prior learn	ing	MUG-222				T	T	
Туре		Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education
	150/39 150/15	per week per term	2 10	per week per term	1 5	per week per term	0	М	5	english
Teacher res	ponsible f	or the subj	ect	Name		Szabó Attil	a, PhD		schedule	College associate professor
Training objective and justification of the course (content, output, location in the curriculum)				and load dat tribological j have to plan They have to structures, t configuratio Presentation	nts must a, have t propertie and run t b learn th hermal p n. projecto	be able to an o be able to s. The life tin rribological e different f rrime movement.	identif me and systems ields of r), as w ntations	y the mayor w third body most s on the basis of the applied tri vell as the rel	earing prost be deter of properti bology (p	etermine the structural pocesses in the wiev of mined generally. They se of lubrication state. rocessing, mechanical blier systems run and
Typical deli	ivery meth	nods		Practice Laboratory Other	projecto	or, ppt prese	ntation	S		
Requirements (expressed in terms of learning outcomes)			ns of	technology He has a con work and po Ability Performs a j Able to plan Able to diag tasks. Attitude He is open to qualification field. Autonomy a Taking respo	orocedure nprehens wer mac ob corres , organiz nose mea) learning and fiele and resp onsibility	es based on t sive knowled hines and m ponding to b e and carry of chanical fail g about and n d of expertis onsibility for your ow	tribolog dge of t echanic his qual out inde ures, se receivin se. Inter	ical aspects. the tribologica cal equipment. lifications. ependent study elect remedial ag knowledge r rested in new r	l processe , actions, so related to t nethods a of your p	
Short description of the subject content				Definition of tribology. Description of tribological systems. Friction processes. Analysation of tribological processes. Surface quality of mechanical parts. The propertiese of surface layers. The relation between tribological duty and wearing mechanisms. Type of wearings. The practical methods of wearing measurement. The analytical method of wearing determination. Introduction of lubricants. Lubricants propertiese. Investigation of lubricants. Selection of lubricants. Selections of structural materials. Grading of lubrication states: Hydrodynamic lubrication (HD, EHD), Boundary lubrication, Extreme pressure lubrication, Process tribology: cutting, hot and cool deformation. Lubrication of mechanical parts and structures.						
Types of student activities				Processing theoretical course material with guidance: 60 % Independent processing of theoretical course material: 40 % Task solution with guidance 15 % Processing tasks independently 85%						
Required literature and contact details				Un • M • Jen • Va • Va Tr • Va	niversity, achine M nő Szánto Ilasek I. 7 Ilasek I. ibotechn Ilasek I. 1	ÚK): FUNI laintenance 5:Tribology, fóth I.: Mac Auer J.: I ik Kft. 2003	DAME I. Edite , Budap hining Lubricar : Lubric	NTALS OF TI d by Dr. Janik best 1991. tribology,Bud nts and their	RIBOLOC József, D apest, Trib viscous	at (Loughborough GY unaújváros, 2001. potechnik Kft. 2003. substances, Budapest, onents, Budapest,

Recommended literature and contact details	Gwidon Stachowiak and Andrew W Batchelor : Engineering Tribology, Third Edition Prasanta Sahoo
Description of tasks to be submitted/measurement reports	Completion of 2 homework assignments during the semester
Description and timetable of the workshops	2 tests during the semester

Technical Diag										
	in Hunga	rian	Műszaki dia	gnosztika	ı 1.			Level	BSc	
Name of the subjec	^t in Englisl	n	Technical Diagnostics 1.						DUEN(L)-MUG- 157	
· ·			Institute of Technology, Department of Mechanical Engineering and Energy							
Name of compulso DUEN(L)-	ry prior lear	ning	MUG-153 IMA-110					•		
Туре	Presentat	ion	Practice		Laboratory		Requirement	Credit	Language of education	
Full time 150/39		2	per week	1	per week	0	Е	5	english	
Part time 150/15		10	per term	5	per term	0	2		<u> </u>	
Teacher responsibl Training objective the course (content the curriculum)	and justifica	tion of		the train heoretica	ing is to ac l and praction	quire th			Professor emeritus iagnostics of rotating surement, which is the	
			Presentation				lecture, using a ter network	a whitebo	ard, projector or	
Typical delivery m	ethods		Practice Laboratory Other				projector or o	verhead p	rojector	
Requirements (expressed in terms of learning outcomes)			and element components Ability Performs the Ability to pl Ability to di repair tasks Attitude He/she is op technology 1 methods and Autonomy 3	character s of mec used. e job acco an, organ agnose m en to lear related to l tools rel and resp	hanical sys ording to his ise and carr techanical fa ming and ab his/her qua ated to the f onsibility	tems, th /her qua y out in ailures, psorbing lificatio field.	alifications. dependent lear select troubles	interrelation rning. hooting o elated to en expertise.	Interested in new	
Short description o content	:	(operation u concepts of vibration wi the additivit vibration, th Fourier trans signals, the l the theoretic the phenome familiar with orbit curve, addition to th frequency vi velocities. In will learn the will also lea	ntil failur vibration thout and y of vibra e phase, t sform. Stu aws and p al and pra enon of a n the use the use o he study o ibrations, n additior e basics o rn the the	re, TMK, cc theory, the with damp ation, comp he relations udents will I problems of actical know diasing, to of methods f Orbit, the of forced vilt the study on to the study of one of the coretical and	ondition descrip ing. In t lex vibr hip between the analog- vledge to use the of vibra time sy prations, f resona y of fail e most e l practic	a-based, predict option of single he course of the ations, the arm ween the time a basics of mea- to-digital sign or use a correct windowing te ation measurer nchronous sar , time will be d ance phenomer lure frequencies	tive). The freedom his subjec plitude an and freque asuring an al convers vibration chnique. ment such npling, th levoted to ha, and the es to detect ods, cepstr s for the a	naintenance strategies by will learn the basic harmonics and forced t, you will learn about d frequency scales of ency domains, and the d processing vibration tion. They will acquire analyser, to deal with Students will become as the use of the axis e Crest Factor test. In the analysis of natural e study of critical axis ct bearing failures, we um analysis. Students pplication of state-of-		
Types of student ac	ctivities		Processing a information.	text you Indepen	have heard dent process	by takin sing of t	ng notes. Task asks	-guided o	rganisation of	
Required literature	and contact	details	 Dr. István Nagy: Technical Diagnostics I. Főiskolai Kiadó, Dunaújváros, 2010. 							
 Materials on MOODLE Dr. István Nagy: Condition Based Maintenance, Technical Diag Vibration Diagnostics, ISBN 963 06 0807 3, Publisher: Delta-3 2006. Dr. Tibor Kégl- Zoltán József Szabó: T. Tolgi, T. Vibration, T. György, T. György, Dunaújváros, 1995. 						:: Delta-3N Kft.,				

Technical Diagnostics 1.

Description of tasks to be	
submitted/measurement reports	
Description and timetable of the	
workshops	

Maintenance technologies 2.

Mainten	ance tec	hnologi	es 2.									
Name of th	ne subject	in Hungari		Gépüzemfenntartási technológiák 2.						BSc		
	Ũ	in English		Maintenanc	e technolo	ogies 2.			Code	DUEN(L)-MGT-253		
Responsible educational unit			Institute of Technology, Department of Mechanical Engineering and Energy									
Name of co DUEN(L)-		prior learn	ing	MGT-113	MGT-113							
Туре		Presentatio	on	Practice	Practice Laboratory Requirement					Language of education		
Full time		per week	2	per week	1	per week	0	Е	5	english		
Part time	150/15	per term	10	per term	5	per term	0	Ľ	5			
Teacher re	sponsible f	for the subj	ect	Name		Szabó Attil	la, PhD		schedule	College associate professor		
Training ol the course the curricu	(content, o			implementa the recover	ts should tion of the y expense le appropr	be able to e recovery t es. He shou iate in acco	echnolo ld be a ordance	gies. The stud ble to select t	ents shou he recove	ies and to control the ld be able to calculate ery technology, which he goal on the basis of		
				Presentation				3				
Typical de	livory moth	anda		Practice	projecto	or, ppt prese	entations	8				
i ypicai ue	iivery meu	1005		Laboratory								
				Other								
				Knowledge								
				Able to analytically examine the damage processes of machines and equipment,								
					ises of err	ors and pro	fessiona	lly eliminate t	hem.			
				Ability								
				Performs a job corresponding to his qualifications. Able to plan, organize and carry out independent study.								
л ·		1.	c	Able to diagnose mechanical failures, select remedial actions, solve repair technology								
		ssed in tern	15 01	tasks								
learning ou	itcomes)			Attitude								
				He is open to learning about and receiving knowledge related to machine maintenance related to his qualification and field of expertise. Interested in new methods and tools related to the field.								
				Autonomy and responsibility								
				Taking responsibility for your own work and the work of your peers.								
Short desc content	ription of t	he subject		The technological methods of recovery. Recovery: - with mechanical methods; - by welding; -with soft and hard soldering; - with thermal scattering; - gluing and plasticizing. High energy density technologies and surface strengthening processes modifying surface integrity. Economy and organization of machine maintenance. Indicators of the economy of machine maintenance.								
Types of student activities				Processing theoretical course material with guidance: 60 % Independent processing of theoretical course material: 40 % Task solution with guidance 15 % Processing tasks independently 85%								
Required literature and contact details				 Lech Pawlowski, The Science and Engineering of Thermal Spray Coatings, John Wiley & Sons, 2008 Maintenance manual methods and tools for managing maintenance 								
Recommer details	nded literat	ure and con	ntact	• W	/illiam A.	Bowditch;	Kevin I			owditch, Welding		
Description of tasks to be submitted/measurement reports				Technology Fundamentals Goodheart-Willcox, 2009 Completion of 2 homework assignments during the semester								
	n and time	table of the		2 tests durin	ng the sem	lester						

Maintenance strategy

	nance str	in Hungar	ian	Karbantartás	smenedzs	ment			Level	BSc		
Name of t	he subject	in English		Maintenance					Code	DUEN(L)-MGT-254		
	le educatio			Institute of Technology, Department of Mechanical Engineering and Energy								
Name of c DUEN(L)	compulsory -	prior learn	ing	MGT-113		1		1	1			
Туре		Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time Part time	150/39 150/15	per week per term	2 10	per week per term	1 5	per week per term	0	Е	5	english		
Teacher re	esponsible f	for the subj	ect	Name		Szabó Attil	a, PhD		schedule	College associate professor		
the course	bjective an (content, o			Goals, development objectives								
the curricu	ulum)			Presentation		or, ppt prese			65	r i i i i i i i i i i i i i i i i i i i		
Typical de	elivery meth	ode		Practice	projecto	or, ppt prese	entation	S				
i ypicai u	Invery men	1003		Laboratory								
				Other								
				Knowledge					.1.:1. 1.:			
										es in companies. Able d modernize it.		
				Ability	Joinpany	s mannendi	ice pini	osopity, identi	ry gaps an			
				Performs a j	ob corres	ponding to	his aual	lifications.				
ъ.			c						<i>.</i>			
Requirem learning o	ents (expres	ssed in tern	ns of	Able to plan, organize and carry out independent study. Able to design a maintenance strategy that meets the needs of companies.								
learning 0	utcomes)			Attitude								
				He is open to learning about and receiving knowledge related to machine maintenance related to his qualification and field of expertise. Interested in new methods and tools								
				related to his qualification and field of expertise. Interested in new methods and tools related to the field.								
				Autonomy a		oncihility						
							vn work	and the work	of your n	eers		
				The moder	internr	etation of	the def	inition of m	aintenanc	e". Maintenance and		
				terotechnology. The connection between production and maintenance. The double-								
				circled model of the machine life-time. Effects that can damage the machine parts.								
				Appearance forms of damages. Deterioration reserve and its wearing out. Breakdowns								
C1 (1	·	1 1		and operational errors. Weak-point analysis. The probabilistic examination of								
Snort desc	cription of t	ne subject		operational processes. The calculation method of maintenance cycle-time. Risk analysis in maintenance. The process of root-reason-analysis. Fault-tree analysis.								
content				Maintenance strategies and philosophies. The development of maintenance. Falure								
				Based Corective Maintenance (FBCM). Planned Preventive Maintenance. Parameter								
				Condition Based Maintenance (PCBM). Reliability Centred Maintenance (RCM). Risk								
				Based Maintenance (RBM); Risk Based Inspection and Maintenance (RBIM). Total Broductive Meintenance (TBM). Automatic Meintenance (AM)								
				Productive Maintenance (TPM). Automatic Maintenance (AM).								
				Processing theoretical course material with guidance: 60 % Independent processing of theoretical course material: 40 %								
Types of s	student activ	vities						urse materiar.	+0 /0			
				Task solution with guidance 15 % Processing tasks independently 85%								
				 David J Smith: Reliability, Maintainability and Risk, Elsevier, 2013. 								
				• Machine Maintenance I. Edited by Dr. Janik József, Dunaújváros, 2001.								
Required	literature ar	id contact of	details									
Recomme details	nded literat	ture and co	ntact	• M			II. Edit	ed by Dr. Janil	k József, F	őiskolai Kiadó,		
submitted	on of tasks t /measureme	ent reports			Completion of 1 homework assignments during the semester							
	on and time		•	2 tests during the semester								
r												

Complex Machine Designing

Comple	x Macm	ne Desig	, <u> </u>							1		
		in Hungari	an	Komplex g	épészeti t	ervezés			Level	BSc		
Name of t	he subject	in English		Complex M	Iachine D	esigning			Code	DUEN(L)-MUG- 216		
Responsib	le educatio	nal unit		Institute of Technology, Department of Mechanical Engineering and Energy								
	ompulsory	prior learni	ing									
Туре		Presentatio	on	Practice		Laboratory	Laboratory		Credit	Language of education		
Full time Part time	150/26 150/10	per week per term	0	per week 0 per week 2 M 5 English								
			*	#	0	1	-		schadula	Associate professor		
Teacher responsible for the subject Training objective and justification of the course (content, output, location in the curriculum)				The studen design (C. engineering design prob able to doc	Name Gábor Vizi, PhD schedule Associate professor Goals, development objectives The student should be able to perform tasks in mechanical engineering, computer aided design (CAD), finite element strength calculation (VEM) and manufacturing engineering (CAM). Be able to explore and sketch solution variations of mechanical design problems, establish selection criteria, select and develop the optimal variant. Be able to document the design process and present design results.							
				Presentatio	n							
Typical delivery methods				Practice Laboratory Other				m, blackboard f all lessons).	l class, lab).		
Requirements (expressed in terms of learning outcomes)			ns of	Get to know and apply the most common maintenance philosophies in companies. Able to review a company's maintenance philosophy, identify gaps and modernize it. Ability Performs a job corresponding to his qualifications. Able to plan, organize and carry out independent study. Able to design a maintenance strategy that meets the needs of companies. Attitude He is open to learning about and receiving knowledge related to machine maintenance related to his qualification and field of expertise. Interested in new methods and tools related to the field. Taking responsibility for your own work and the work of your peers.								
Short desc content	ription of t	he subject		Practise parametric 3D modelling and drawing on simple machine parts, then assemblies, part pick-up. Development of model variants. Basics of finite element method. Structure of program systems, interpretation of INPUT / OUTPUT data. Solid state applications, shape optimisation. Preparation of technical documentation. Development of component manufacturing technology. Selection of machining cycles. Generation of CNC program.								
Types of s	tudent activ	vities		Task solving with guidance 15 %								
Types of student activities Required literature and contact details				Independent processing of tasks 85 % • SolidWorks design system description • Béla Csizmadia - Ernő Nándori:Mechanics for engineers. Nándor M. • Mechanical engineers. National Textbook Publishing House, 1998. 435-480 p. • Materials on MOODLE								
Recomme details	nded literat	ture and cor	ntact	• S	olidWork	s VEM mod	ule soft	ware descripti e description	on			
	n of tasks t measureme			Continuously produce 3D models and improved parts drawings from parts and assembly drawings issued during the semester. VEM testing of a simple machine part for a specific load case.								
submitted/measurement reports Description and timetable of the workshops												

Technica	echnical Diagnostics 2.											
		in Hungar	rian	Műszaki diagnosztika 2.						BSc		
Name of th	e subject	in English	1	Technical D	iagnostic	s 2.			Code	DUEN(L)-MUG- 219		
Responsible	e educatio	nal unit		Institute of Technology, Department of Mechanical Engineering and Energy								
Name of co DUEN(L)-		prior learr	ning	MUG-157								
Туре		Presentati	on	Practice	education							
Full time		per week	2	per week	0	per week	1	М	5	english		
Part time		per term	10	per term	0		-					
Teacher res	sponsible f	or the sub	ject	Name		Gábor Pór,	PhD		schedule	Professor emeritus		
Training objective and justification of the course (content, output, location in the curriculum)				processing i derivations of frequency d from signals diagnostic p and their use and practica infrared ther a deeper und	ng the ma n modern of the fu omain tr s by sign rocedure sfulness f al basics mograph lerstandir	athematical a diagnostic nctions and ansformatic al processin s based on or diagnost of diagnos y, ferrograp ng of the mo	system proced ns, inten ng and them, n cs. The tic tech hy, ultra pre comp	as. Thorough I ures taught. C repretation of quantitative k hathematical for aim of the train uniques and n asonic fault and	cnowledge Confident signals ar nowledge oundation ning is to a nethods (d leakage so of vibra	e of signals and signal e of the mathematical handling of time and ad functions obtained of measurement and s of modern methods acquire the theoretical vibration diagnostics, detection), and to gain tion measurement and		
				Presentation	For all	students, in	a large l	lecture, using		ard, projector or		
T	:				overhea	d projector.	, compu	ter network				
Typical del	ivery metr	loas		Practice Laboratory	Measur	ements with	lahora	tory instrumen	te			
				Laboratory Measurements with laboratory instruments. Other								
Requirements (expressed in terms of learning outcomes)			ms of	and elements of mechanical systems, the design and interrelationship of the system components used. Ability Performs the job according to his/her qualifications. Ability to plan, organise and carry out independent learning. Ability to diagnose mechanical failures, select troubleshooting operations, solve repair tasks Attitude He/she is open to learning and absorbing knowledge related to engineering technology related to his/her qualification and area of expertise. Interested in new methods and tools related to the field.								
Short description of the subject content				In the field of and practice learn the step and knowled using the exp operation us for the orga design and fi and orbit tes basics of inf and the comp location of insulation de	onsibility of balance balancin ps of mo lge base oert syste ing the v nisation unctions ting will rared im puter pro electrical efects in	for your ov ing rotating m dern laser s building, m m. Students ibration dia of conditio of machine be discusse age analysis cessing of the equipment buildings. S	machir achiner haft alig easuren will be gnostics n-based vibratio d in the s, the us nermal i and co tudents	y in a state-of- ment. Studen able to carry of expert system maintenance n protection sy course. The st as of infrared of mages in mach ntrol cabinet will learn abo	will learn the-art lab nts will m on and me out full sys n, which v in produce /stems, sh udents wi cameras in hine condi joints and out the app	the theoretical basics poratory. Students will aster the steps of data easurement evaluation stem development and vill lay the foundation ction companies. The aft motion monitoring Il learn the theoretical n laboratory exercises ition diagnostics, fault I the identification of plication of ultrasonic		
Types of st	udent activ	vities		leak detection and the wide variety of ultrasonic flaw detection techniques. Processing a text you have heard by taking notes. Task-guided organisation of information. Independent processing of tasks.								
Required li	terature an	id contact	details	 information. Independent processing of tasks. Dr. István Nagy: Technical Diagnostics I. Note, Főiskolai Kiadó, Dunaújváros, 2010. Dr. István Nagy: Technical Diagnostics II. Note, Főiskolai Kiadó, Dunaújváros, 2010. 								

Technical Diagnostics 2.

Recommended literature and contact details	 Dr. István Nagy: Condition-based Maintenance, Technical Diagnostics I., Vibration Diagnostics,ISBN96306 0807 3, Publisher: Delta-3N Kft., 2006. Dr. István Nagy, Gábor Baksai and Károly Sólyomvári: Condition-based Maintenance, Technical Diagnostics II. Edited by Dr. Ferenc Dömötör College Publishing House. Dunaújváros, 2003.
Description of tasks to be	
submitted/measurement reports	
Description and timetable of the	
workshops	

GREEN TRANSFORMATION

Energy management

Energy manager	T		– •					. .	2.0		
Name of the subject	in Hungar in English		Energiamen		t			Level Code	BSc DUEN(L)-MGT-114		
Responsible education	0	1	Energy management Code DUEN(L)-MGT-114 Institute of Technology, Department of Mechanical Engineering and Energy								
Name of compulsory		ning		Technolo	gy, Departi			ignicering	and Energy		
DUEN(L)-	prior iour										
Туре	Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time150/39Part time150/15	per week per term	$\frac{2}{10}$	per week per term	- M		М	5	english			
Teacher responsible	м — — — — — — — — — — — — — — — — — — —	ject	Name		Éva Kovác	s-Boko	r, PhD	schedule	College assosiate professor		
Training objective and justification of the course (content, output, location in the curriculum)			economic k with the ba and method will acquire context of s on basic en evaluating t	the cour nowledge sic econo s across the a comb ustainabil avironmer he extern For all	se is to far of the energy mic process he entire en ined techni ity and resp tal manage alities of en	rgy sect ses, man ergy sec cal and consibilities ement p ergy on	tor. According nagement and ctor. By applyi economic op ity for future go	ly, studen economic ng a syste timisation enerations ole metho- pasis	methodology. In the , the course will focu ds for describing and		
Typical delivery met	hods		Presentation Practice	¹ project		e using	MS Teams, usi				
rypical derivery met	lious		Laboratory	Group	work preser	itations					
Requirements (expressed in terms of learning outcomes)			their classif project and practical im the context advantages their appli managemen Knows the possible for risks that ca Ability Explores th the role of t the theoretic knowledge strategies a different fi different fo scheduling = permitting a possible for identification Attitude Constantly energy man information needed for a to provide accuracy. A	mprehens ication. E the possi plementa of design and disad cation. I the has permittin ms and m e differer hose invo cal backg areas. F re develo nancial s rms of p managem and furthe orms and pon of pote monitors agement a technolo energy ma accurate pplies the in solvin and politi	Ie has an ac ble organiz tion criteria ing and mai vantages of t distingui s comprehen g and addit anagement tified and a tf forms of lved in the round and p Prioritizes t ped and ma ettlement s roject scope ent and the r phases of managem ntial risks a his work, r and sustaina ogy tools. If anagement a and error principles of g energy m cal system.	curate l ational of proo naging p f differe shes b nsive kritional p options ddressed project ractical the circa anaged. solutions e manage operation projects and treat results, si ability th t strives and eco -free p of energy	cnowledge of t forms. Knows cess groups and procurement cc nt financial ac- etween differ nowledge of p hases of project fin d. management a and the possibl implementatic cumstances in Selects the ac- gement. Evalue on of the imple s as well as ma assibilities of ment options. and conclusion rrough continu s to get to kno nomic problem roblem solvin sy efficiency, so nent tasks. M	he role of the theored d knowled ontract str- counting s ent form roject sch cts. It pro ancing. Is and their of de organiz- on criteria which p lvantages of their a ates the p mented so nagement project fi as. Expando ous learni ow and ro p-solving. g, engine ustainabili onitors clo	pject management an those involved in th etical background an lge areas. Informed i ategies. He knows th solutions, the limits of solutions, the limits of solutions, the limits of solutions, the limits of aware of the potentia classification. Define ational forms. Applie of process groups an procurement contract and disadvantages of pplication. Evaluate ossibilities of project obutions. Evaluates th options. Evaluates th options. Explores th mancing. Solves th ds your knowledge of putinely use the tool Develops your abilit ering precision, an ity, and environmenta hanges in the social wing his profession		

	Collaborates with the instructor and fellow students to expand knowledge. Accepts well-founded professional and other critical remarks. In some situations, as part of a team, he/she works with his/her fellow students to solve tasks. With his/her knowledge, he/she makes a responsible, informed decision based on his/her analysis. He/She feels responsible for energy, energy management problems, the sustainable use of the environment, and present and future generations. He/She is committed to the principles and methods of systems thinking and problem-solving.
Short description of the subject content	Energy market situation. Changes in the energy mix; Energy use and the energy intensity - sectoral comparison between Hungary and EU countries. Liberalisation in the energy sector. Pro and con of liberalisation; Political, economic, social, environmental and corporate challenges of the global energy crisis. Process and resource requirements of corporate management. Concept of corporate resources, main categories; Key challenges and problem areas of corporate energy management; Investment. The main methods of calculating investment economics; Methodological specificities of evaluating energy investments; Cost and capital efficiency of resources. Cost management. Classification of costs, cost functions; Calculation of margins - the turning point of profitability and profitability.
Types of student activities	Processing heard text with notes 60% Task-based organisation of information 10% Independent processing of tasks 30%.
Required literature and contact details	 Materials on MOODLE Guide to Energy Management, Eighth Edition 8th Edition by Barney L. Capehart Ph.D. CEM, Wayne C. Turner Ph.D. PE CEM, River Publishers, 2016, ISBN-13 978-1498759335
Recommended literature and contact details	 Wayne C. Turner, Steve Doty, Energy management, handbook, sixth edition, Distributed by Taylor & Francis Ltd., 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487, USA Craig B. Smith, Kelly E. Parmenter, Energy Management Principles - Applications, Benefits, Savings, Published 2016 Elsevier, ISBN 978-0-12-802506-2
Description of tasks to be submitted/measurement reports Description and timetable of the workshops	1 essay to be submitted on a topic of your choice

Name of the su	biect	in Hungar	ian	Megújuló energiaforrások Level BSc								
	-	in English	1	Renewable energy Code DUEN(L)-MGT-115								
Responsible ec				Institute of Technology, Department of Mechanical Engineering and Energy								
Name of comp DUEN(L)-	ulsory	prior learr	ning	MUT-250								
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education		
	0/39	per week	2	per week	1	per week	0	М	5	English		
	0/15	per term	10	per term	5	per term	0		5	English		
Feacher respor	sible f	or the sub	ject	Name	Name Róbert Sánta, PhD schedule Associate profes							
Training objective and justification of the course (content, output, location i the curriculum) Typical delivery methods				utilization indicators, of of the court	(passive operation rse is a tion of d For al projec	solar, solar n and system lso to descr lifferent energ l students, in	collect integrat be the gy utiliz a large using l	tor, PV, heat tion to the buil	pump, b dings' ene tem desig			
				Other	-							
Requirements learning outcor	· •	ssed in terr	ns of	renewable e of the releva of the operation different typ the operation based heat a licensing pri about the pup possibilities building's of necessary s renewable e renewable e renewable e Ability Able to eva Selects the bi to distingui develop a c system usin use the know solar energy into conside of different energy systef Attitude Constantly knowledge new profess criticism or accurate and apply the p building end Autonomy Collaborate well-founde team, work responsible, enriching th	t know nergy s ant mete tion of The stud bes of bi n of sol generation occss for sossibiliti and lime energy afety ec- nergy so- nergy b aluate the best renes sh betwonceptu g renew wledge g trutilizat ration the renewate ems. monitor into pra- ional ar opinior d error-f rinciples s with t d profes s with f inform e buildin	ources integr orological co each equipme ent knows the omass based ar collectors, on and geother r building lev es of passive itations of in system. Sun uipments an ources. Distin ased systems he possibilities wable energy al plan for the able energy seaned to enal ion possibilities characteriss ole based system s his work, and able to ree problem as s of energy e ply concepts. ponsibility he instructor ssional and o ellow studen ed decision has	ation in ndition: ent utili structu- heat ger PV sy rmal sy el PV s solar e egratin, marize d instal guishes es of th source stem the eappro- ources ole solar es. Abl tics of t ems. Ab roblem esults. make olving, fficience and fel- ther crit ts to so- og field v	buling energy s. The student zing renewabl re of solar col- neration and ge stems, heat pu- vstems. The str ystems in Hun- nergy utilizati g certain renew s the applica- lation required between the given for the given the aut uses renew opriate system from their ope e to propose the he building. A ble to perform column conclusion -solving techno- open to formu- decisions and engineering p y and environ flow students tical remarks. olve tasks. Win n his analyzes with new know	v systems. knows the e energy s lectors, PV eothermal imp, diffe- indent is av gary. The on. The st vable ener tion limit ments of efficiency of renew meteorolo vable ener to disting to design. A rational cle e to disting e optimal ble to dete energy ass ns. Strive: iques. Sus lating app to draw c recision a mental av to expand In some s th his knoss.	and possibilities of The student is awar physical backgroun- cources, the necessar V systems. Understand rent types of biomass ware of the distributor student was informe- tudent is aware of th gy equipment into the ts, selection criteria each system utilizin indicators of different vable energy sources gical conditions. Able rgy sources. Able to Able to evaluate each haracteristics. Able to guish between passiv system design, takin ermine the limitation essment of renewabl s to put the acquirer sceptible to the use of oropriate response for onclusions. Develop nd accuracy. Seeks to vareness in providin knowledge. Accept ituations, as part of owledge, he makes dent is committed to scientific results. Th thinking and probler		

Short description of the subject content	The aim of the course is to introduce the students to the technologies utilizing renewable energy sources (solar, water, wind, biomass, geothermal) and converting them into secondary energy carriers (fuel, heat, electricity), their possibilities and application limitations. In addition to the technical solutions, the students will get acquainted with the optimal selection and design process of renewable energy supply systems, as well as their operational aspects. In addition to energy production, the issues of integration into the system and energy storage will also be emphasized.
Types of student activities	Processing heard text with notes 60% Task-based organisation of information 10% Independent processing of tasks 30%.
Required literature and contact details	 Planning and Installing Solar Thermal Systems: A Guide for Installers, Architects and Engineers. Deutsche Gesellschaft für Sonnenenergie, Earthscan, 2008, ISBN-13: 978-1844077601 Planning and Installing Photovoltaic Systems: A Guide for Installers, Architects and Engineers, Deutsche Gesellschaft für Sonnenenergie, Earthscan, 2005, ISBN: 978-1-84407-442-6 Materials on MOODLE
Recommended literature and contact details	• Duffie- Beckman: Solar Engineering of Thermal Processes, 4th edition, John Whiley and Sons Inc., New Jersey, 2013, ISBN: 978-0-470-87366-3
Description of tasks to be submitted/measurement reports	2 essays to be submitted on a topic of your choice
Description and timetable of the workshops	

Basics of energy saving and conservation

Responsible educational unit Institute of Technology, Department of Mechanical Engineering and Energy Name of compulsory prior learning DUEN(L)- Type Presentation Full time 150/39 per week 2 Part time 150/15 per term 0 Endre Kiss, PhD schedule College professor Training objective and justification of the source (content output location in not content output location in not cono	Basics (of energy	/ saving	; and o	conservati									
responsible educational unit Institute of Technology, Department of Mechanical Engineering and Energy Name of compulsory prior learning DUEN(L)- Type Presentation Practice Laboratory Requirement Credit Language of education Full time 150/15 per week 2 per week 1 per week 0 E 5 English Teacher responsible for the subject Name Endre Kiss, PhD schedule College professor Training objective and justification of the course (content, output, location in the curriculum) For all students in a large lecture hall with a blackboard presentation. Typical delivery methods Presentation For all students in a large lecture hall with a blackboard presentation. Typical delivery methods Nowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subjec area of engineering. Knowledge Have a comprehensive knowledge of the main theories related to the field. Comprehensive knowledge of the ensite and toeries related to the field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and procedures in a diperiod design principles and methods, control procedures an operational processes. Have a comprehensive knowledge of the main theories in the field of knowledge cont generating.	Name of t	he subject												
Name of compulsory prior learning Presentation Practice Laboratory Requirement Credit Language of education Type Presentation Practice Laboratory Requirement Credit Language of education Part time 150/15 per term 10 per term 0 E 5 English Teacher responsible for the subject Name Findre Kiss, PhD schedule College professor Training objective and justification of the curriculum To introduce students to the field of energy management and to familiarise them with the course (content, output, location in the operation, use and development of the necessary high-efficiency and sat squipment. Typical delivery methods Presentation For all students in a large lecture hall with a blackboard presentation. Use of projector. Practice Supervised and independent solution of numerical examples and case studies in the form of small-scale exercises. Laboratory Use of projector. Practice Knowledge of the basic facts, directions and limits of the subjec area of engineering. Knowledge of measurement procedures, necessary for th operation of the field of engineering. Knowledge of measurement procedures, necessary for th operation of the field of engineering.		-	i e	1							DUEN(L)-MGT-153			
DUEN(L) Presentation Practice Laboratory Requirement Credit Language of education Full time 150/39 per week 2 per week 0 E 5 English Training objective and justification of the course (content, output, location the curriculum) Name Endre Kiss, PhD schedule College professor Typical delivery methods Or all students in a large lecture hall with a blackboard presentation. Use of projector. Presentation For all students in a large lecture hall with a blackboard presentation. Typical delivery methods Practice Supervised and independent solution of numerical examples and case studies in the form of small-scale exercises. Laboratory Other Nonwledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the machine design principles and methods, control procedures an operational processes. Has an applied knowledge of the structure and operation ship of the system components used. Basic knowledge of structure and operation ship of the system components used. Knowledge of the terminology, key most important terminologis, theories and procedures an operational p					Institute of [Fechnolo	gy, Departn	ent of I	Mechanical En	gineering	g and Energy			
17pc presentation Fractice Latoritity Requirement Creating education Full time 150/39 per week 2 per week 1 per week 0 E 5 English Part time 150/15 per term 10 per term 5 English Training objective and justification of the course (content, output, location in the curriculum) Goals, development objectives To introduce students to the field of energy management and to familiarise them with the operation, use and development of the necessary high-efficiency and saf equipment. Typical delivery methods Presentation For all students in a large lecture hall with a blackboard presentation. Vise of projector. Practice Supervised and independent solution of numerical examples and case studies in the form of small-scale exercises. Laboratory Other Nanoeldge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the main theories in the field of knowledge acquisitio and problem solving. Basic knowledge of machine design principles and methods, control procedures an operational processes. Has an applied knowledge of measurement procedures, their tools,			prior lear	nıng						1				
Part time 150/15 per term 10 per term 5 per term 0 E 5 Enditish Training objective and justification of the course (content, output, location in the curriculum) Goals, development objectives To introduce students to the field of energy management and to familiarise them with the operation, use and development of the necessary high-efficiency and saft quipment. Typical delivery methods For all students in a large lecture hall with a blackboard presentation. Practice Supervised and independent solution of numerical examples and case studies in the form of small-scale exercises. Laboratory Other Knowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the terminology, key concepts and theories related to the field. Comprehensive knowledge of measurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Knowledge of machine design principles and methods, control procedures an operational processes. Has an applied knowledge of measurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Understand, characterise and model the structure and operation of the structural unit and elements of mechanical systems, the design and interrelationship of the system components used. Ability to a	Туре		Presentati	ion	Practice		Laboratory		Requirement	Credit				
Training objective and justification of the course (content, output, location in the curriculum) Goals, development objectives To introduce students to the field of energy management and to familiarise them with the curriculum) Presentation Typical delivery methods For all students in a large lecture hall with a blackboard presentation. Use of projector. Typical delivery methods Presentation Biopervised and independent solution of numerical examples and case studies in the form of small-scale exercises. Laboratory Other Nowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subjec area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the terminology, key concepts and theories related to the field. Comprehensive knowledge of measurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Basic knowledge of machine design principles and methods, control procedures an operational processes. Has an applied knowledge of mechanical systems, the design and interrelationship of the system components used. Ability to applied when we have and experiment of the system components used. Ability to identify routine technical problems and to apply the principles and technique needed to solve them to independent learning. Ability to applicate and implement (standard operations in practice) (using standard procedures).			1				<u> </u>		Е	5	English			
Iraming objective and justification of To introduce students to the field of energy management and to familiarise them with the course (content, output, location in the curriculum) To introduce students to the field of energy management and to familiarise them with the operation, use and development of the necessary high-efficiency and saf equipment. Typical delivery methods Presentation Use of projector. Practice Supervised and independent solution of numerical examples and case studies in the form of small-scale exercises. Laboratory Other Itaboratory Other Itaboratory Itaboratory Other Itaboratory Itaboratory Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the terminology, key concepts and theories related to the field. Comprehensive knowledge of masurement procedures, their tools, instruments an operational processes. Has an applied knowledge of masurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Ability to analyse at a basic level the disciplines that make up the knowledge bas of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to talantify to utime technical profemation in practice) (using standard procedures). Ability to talantif protime technical problems and to apply the p	Teacher re	esponsible f	for the sub	ject										
Typical delivery methods Use of projector. Practice Supervised and independent solution of numerical examples and case studies in the form of small-scale exercises. Laboratory Other Other Nowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the terminology, key concepts and theories related to the field. Comprehensive knowledge of the main theories in the field of knowledge acquisitio and problem solving. Basic knowledge of machine design principles and methods, control procedures an operational processes. Has an applied knowledge of measurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Understand, characterise and model the structure and operation of the structural unit and elements of mechanical systems, the design and interrelationship of the system components used. Ability The ability to analyse at a basic level the disciplines that make up the knowledge bas of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to identify noruline technical problems and to apply the principles and technique needed to solve them to identify, formulate and implement (standard operations in practice) (using standard procedures).	the course	(content, c			To introduce the operation	Goals, development objectives To introduce students to the field of energy management and to familiarise them with the operation, use and development of the necessary high-efficiency and safe								
Typical derivery includes Fractice studies in the form of small-scale exercises. Laboratory Other Nowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the terminology, key concepts and theories related to the field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and problem solving. Basic knowledge of machine design principles and methods, control procedures and operational processes. Has an applied knowledge of measurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Understand, characterise and model the structure and operation of the structural unit and elements of mechanical systems, the design and interrelationship of the system components used. Ability The ability to analyse at a basic level the disciplines that make up the knowledge bas of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to jan, organise and conduct independent learning. Ability to identify routine technical problems and to apply the principles and technique needed to solve them to identify, formulate and implement (standard operations in practice) (using standard procedures). Attitude It assumes an anuthentically represents the social role of it					Presentation	Use of	projector.	_			-			
Other Knowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the terminology, key concepts and theories related to the field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and problem solving methods of problem solving. Basic knowledge of machine design principles and methods, control procedures and operational processes. Has an applied knowledge of measurement procedures, their tools, instruments and measuring equipment used in mechanical engineering. Understand, characterise and model the structure and operation of the structural unit and elements of mechanical systems, the design and interrelationship of the system components used. Ability The ability to analyse at a basic level the disciplines that make up the knowledge bas of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to apply the most important terminologies, theories and procedures of th technical discipline in the performance of related tasks. Requirements (expressed in terms of learning outcomes) Ability to identify routine technical problems and to apply the principles and technique needed to solve them to identify, formulate and implement (standard operations in practice) (using standard procedures). Attitude It assumes and authentically represents the social role of its profession and it fundamental relationship with the world. Open to learning about, accepting and authentically communicating profession and it fundamental relationship with the world. Open to learning about, accepting and interided o	Typical de	Гуріcal delivery methods			Practice						examples and case			
Knowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subjec area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Comprehensive knowledge of the main theories in the field of knowledge acquisitio and problem solving. Basic knowledge of machine design principles and methods, control procedures an operational processes. Has an applied knowledge of measurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Understand, characterise and model the structure and operation of the structural unit and elements of mechanical systems, the design and interrelationship of the system components used. Ability The ability to analyse at a basic level the disciplines that make up the knowledge bas of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to japply the most important terminologies, theories and procedures of the technical field, no synthesise relationships and to apply the principles and technique needed to solve them to identify, formulate and implement (standard operations in practice) (using standard procedures). Ability to identify routine technical problems and to apply the principles and technique needed to solve them to identify, formulate an														
Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific rules, contexts and procedures necessary for th operation of the field of engineering. Knowledge of the terminology, key concepts and theories related to the field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and problem solving methods of problem solving. Basic knowledge of machine design principles and methods, control procedures an operational processes. Has an applied knowledge of measurement procedures, their tools, instruments an measuring equipment used in mechanical engineering. Understand, characterise and model the structure and operation of the structural unit and elements of mechanical systems, the design and interrelationship of the system components used.Ability The ability to analyse at a basic level the disciplines that make up the knowledge bas of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to apply the most important terminologies, theories and procedures of th technical discipline in the performance of related tasks. Ability to identify routine technical problems and to apply the principles and technique needed to solve them to identify formulate and implement (standard operations in practice) (using standard procedures).Attitude It ansumental relationship with the world. Open to learning about, accepting and authentically communicating profession 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 or observable phenomena, to describe and explain their laws. In his/her work, he/she observes and complies with the relevant safety, health environmental, quality assurance and control requirements. Autonomy and responsibility In unexpected decision situations, he/she independently thinks through and develop comprehensive, substantiating professional questions on the basis of given sources.				ms of	Have a compare of engineric for the second of the second o	prehensiv neering. of the ger the field of the ter sive know a solving problem s ledge of processes ied know quipment characte ts of mec used. o analyse ical field, pply the scipline in an, organ entify rou olve them formulate ard proce and auth l relations rning abo al develop ve proble mina and ty to her acqu ohenomer work, he, tal, qualit and resp ed decisio	heral and spo of engineer minology, k vledge of th solving. machine de vledge of m t used in me rise and mo hanical sys e at a basic I to synthesis most impo to synthesis most impo to the perform ise and con- tine technic and implen dures). hentically re ship with the ut, acceptin pments and ms, preferal tolerance o ired technic a, to descri /she observ y assurance onsibility on situation	ecific ru ing. ey conce e main sign pri easuren chanica del the tems, th evel the se relati rtant te nance o duct ind al probl ment (sta epresent e world. g and a innovat oly in co f mono cal know be and co es and and con s, he/sh	thes, contexts a cepts and theor theories in the nciples and m nent procedur l engineering, structure and e design and e disciplines th onships and to minologies, th f related tasks lependent learn ems and to app andard operation ts the social uthentically c ions in the fiel poperation wit tony to carry c wledge to gai explain their la complies wi ntrol requirem e independent	and proceed ries relate a field of 1 bethods, c es, their r operation interrelat at make up theories a big the pri ons in pra role of i ommunic d of engin h others. out practice n a thorce ws. th the relents.	dures necessary for the d to the field. knowledge acquisition ontrol procedures and tools, instruments and of the structural units ionship of the system up the knowledge base propriate evaluations. and procedures of the nciples and techniques actice) its profession and its ating professional and neering. cal activities ugh understanding of devant safety, health, through and develops			

	He/she will share his/her experience with his/her colleagues in order to support their
	development.
	Assumes responsibility for the consequences of his/her technical analyses, the resulting
	proposals and the decisions taken.
	Introduction to energy management. Areas of energy and energy management. Overview of the world energy economy, main trends and macro-relationships.
	Overview of national energy management in Hungary. National energy structure and
	energy balance. Main energy needs of each economic sector. Energy demand and
	energy use of the population.
	Energy carriers and sources I:
	Energy carriers and energy sources of our planet. Exhaustible, renewable and
	renewable resources. Physical and chemical properties of different energy carriers.
	Extraction, transport and storage of energy carriers. Fossil fuels. Coal, oil, natural gas. Energy carriers and resources II:
	Exhaustible energy sources: nuclear energy.
	Renewable energy sources: solar, wind, hydro and geothermal, biomass, biogas. Waste-
	to-energy options. Conversion processes of energy carriers: combustion, combustion
	products.
	Energy conversion I. Thermal energy: stove, convector, hot water boiler, steam boiler.
	Electricity: thermal power plants, gas engines, gas and steam turbines, steam cycles,
	condensing power plants, combined cycle power plants.
Short description of the subject	Treatment, storage, disposal and use of pollutants. Remediation, maintenance. Energy
content	transport. Storage facilities. Water, gas, hot water, steam and electricity networks.
	Energy use I. Meeting heat demand, heating and hot water supply.
	Energy use in industrial processes. Electricity and heat consumption. Energy
	requirements of agriculture, transport and services. Ways of meeting demand. Legal
	environment, strategic approach. Legal environment of energy supply, laws and
	regulations. Corporate energy management. Tasks of the energy manager.
	Strategic approach. Energy management. Systematic description of energy use.
	Understanding of system and system boundary. Mass and energy balances.
	Effectiveness and efficiency. Energy use II . Nature of use, performance and duration diagram. Estimation of
	expected consumption. Optimal control, monitoring of consumption, equipment
	operating in parallel. Energy storage options, storage. Energy use in residential,
	government, industry and agriculture. The energy mix.
	Energy use III Transport of energy carriers. Transport planning. Optimal means and
	routes of transport. Recovery of losses. Safety considerations. Environmental
	constraints, emissions of pollutants during energy use
	Energy use IV . Description of energy conversion and consumption processes. Balance
	equations: mass, energy and waste balance. Identification of losses.
Types of student activities	Presentation: Processing of lectures with notes 40%, independent processing of
Types of student detivities	theoretical material 20%, preparation of a seminar presentation 40%
Required literature and contact details	Endre Kiss: The Basics of Economical Energy Use, Electronic handbook, 2023, Moodle system
Recommended literature and contact	• Y. Mizuta: Energy Saving Technology kézikönyv, JICA-DEED kiadásában,
details	2003
Description of tasks to be	Full-time: student seminar presentations
submitted/measurement reports	Part-time: student seminar presentations
Description and timetable of the	During the semester, for correspondence students in the 2nd and 4th consultation, and
workshops	for day students in the 6th and 13th week, five theoretical questions from the lectures.
workshops	The papers are 100-100 marks, with a maximum of 20 marks for each question. The

Sustama			U		1	n Financ			•	•		
		in Hungar	ian			vek és a Fin			Level	BSc		
Name of th	e subject	in English		Sustainable Finance and Bigtech Companies in Finance Code DUEN(L)-TGT-252								
Responsibl Name of co DUEN(L)-	ompulsory		ing	Institute of Social Sciences, Department of Economics								
Туре		Presentatio	on	Practice		Laboratory		Requirement	Credit	Language of education		
Full time		per week	2	per week	1	per week	0	Е	5	English		
Part time		per term	10	per term	5	per term	0	1	1 1 1	-		
Teacher responsible for the subject Training objective and justification of the course (content, output, location in the curriculum) Typical delivery methods			ion of	Goals, dev Through the financial in developme	Name Andrea Keszi-Szeremlei, PhD schedule College professor Goals, development objectives Through the development of financial instruments, the aim is to understand the financial instruments, options and solutions that support ESG goals for sustainable development. To learn about financial investments. To understand the importance of FinTech companies and their development path. Presentation For all students in a large lecture hall with a blackboard presentation.							
				Practice Laboratory Other	Practice Supervised and independent solution of numerical examples and case studies in the form of small-scale exercises.							
Requirements (expressed in terms of learning outcomes)				instrument Ability Ability to decisions. Ability to p Ability to p Ability to p Specialisati Attitude Open to innovation Interested i Applying understand Autonomy In the perf professiona assumes re based on th	e of susta s in private listinguish propose a olan, organ apply the on. learn abou s in the fin in new met his/her ac ing of obse y and resp ormance c als in other sponsibilit nem and the	e and workp between su and develo ise and carr knowledg ut, adopt a ancial field hods and to quired kno ervable phe onsibility of his/her pr fields (prir y for the con e decisions	and aut pols in the pols in the pols in the pols in the pols in the pols and aut pols and aut po	e financial ins atives for pr dependent lea red in solving hentically co ne field. of finance, 1 , to describe at nal duties, he/ conomic and lo	truments ivate and rning. g problem mmunicat he/she see nd explain (she collate egal)	borates with qualified		
Short description of the subject content				Types of financial instruments Financial aspects of sustainable development Characteristics of sustainable financial instruments in our country and abroad Possible future financial instruments Definition, characteristics and operation of FinTech companies								
Types of st	udent activ	vities		Presentation: Processing of heard text with notes 60%, independent processing of theoretical material 30%, independent research 10%. Lab.								
Required li				Dirk Schoonmaker William Schromade: Principles of Sustainable								
Recommendetails			ntact	Paiki -Sironi: FinTEch Innovation, Wiley Finance Series, Libristo, 2016.								
Description submitted/1	measureme	ent reports										
Description workshops		table of the		During the semester, 2 essays with five theoretical questions from the lectures.								

Sustainable Finance and Bigtech Companies in Finance

Practica	11			vable ener	<u> </u>				1	1		
Name of tl	he subject	in Hungarian Megújuló energiaforrások projektfeladat Level BSc										
	-	in English		Practical application of renewable energy sources Code DUEN(L)-MGT-215								
	le educatio			Institute of Technology, Department of Mechanical Engineering and Energy								
Name of c DUEN(L)	ompulsory -	prior learn	ing					1	1			
Туре		Presentatio	on	Practice		Laboratory	Credit	Language of education				
Full time Part time		per week per term	0	per week per term	0	per week per term	3 15	Е	5	English		
Teacher re	esponsible f	or the subj	ect	Name		Éva Kovác	s-Boko	r, PhD	schedule	College assosicate professor		
Training objective and justification of he course (content, output, location in he curriculum)				The objectiv	Goals, development objectives The objective of the course is to familiarise the student with the different types of renewable energy sources and the basic design and measurement procedures related to							
Typical de	livery meth	nods		Presentatior Practice Laboratory Other	Teams			renewable ene		on-line using MS		
Requirements (expressed in terms of learning outcomes)				 Knowledge The student will learn about fossil and renewable energy sources; 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. Ability The student is able to consider environmental or social, economic energy choices and their consequences through examples. The student will be able to explore the systemic links between nature, his/her own life and that of his/her environment. Attitude By the end of the course, the student will be committed to using greener energy sources, to preserving environmental values and to using energy in an environmentally responsible way. The student will take responsibility for the preservation of his/her own activities and the natural environment, and for cooperating with his/her social environment Autonomy and responsibility								
content	ription of t			 Decides independently. You take responsibility for. Grouping of energy sources, Hungary's and the EU's energy strategy, presentation of energy mixes. Solar energy - solar panels, Solar energy - solar collectors. Wind energy on land and at sea. Marine and river hydropower. Use of geothermal energy. Biomass - biofuels. Biomass fuels. Nuclear and fusion energy utilisation. Hydrogen as a new fuel, fuel cells. New propulsion methods in the automotive industry. Passive house design. Presentation: Processing of lectures with notes 40%, independent processing of theoretical material 20%, Practical: Preparation of laboratory measurements, 								
-	iterature an			 preparation of measurement report 40%. The Renewable Energy Sources in the Service of Green Energy note, Moodle, Dr. Éva Kovács-Bokor Kovács: Renewable Energy Sources note, Moodle, Károly Reményi: Renewable Energies, Akadémiai Kiadó, Budapest, 2007 								
details			ntact	Reményi Károly:Energetics, CO2 warming, - The carbon cycle is life, Akadémiai Kiadó, Budapest, 2010 Full-time students: there are 6 2-hour assessment exercises during the semester.								
Description of tasks to be submitted/measurement reports Students will take a report of each measurement exercise and will be graded on the basis of the measurement results. Part time students: During the semester, there is total During the semester period, in weeks 7 and 13, a total of 2 independent project									semester, there is a			
Descriptio workshops	n and timet	able of the		papers/ case	studies	on topics of	your ch		renewabl	e energy sources, 8-		

Practical application of renewable energy sources

Novel te	echnique			nental pro									
Name of the subject in Hungarian			Új környeze			Level	BSc						
	-	in English	1	Novel techn			Code	DUEN(L)-MGT-216					
	le educatio			Institute of Technology, Department of Mechanical Engineering and Energy									
	Name of compulsory prior learning DUEN(L)-		ning										
Туре	Type Presentation		on	Practice		Laboratory		Requirement	Credit	Language of education			
Full time Part time	150/39 150/15	per week per term	2 10	per week per term	0	per week per term	1 5	Е	5	English			
	sponsible f			Name		Endre Kiss	, PhD		schedule	College professor			
				Goals, deve									
					Introduce students to the latest environmental techniques and their application, recycling of used lithium batteries.								
the curriculum)				Presentation	For all	students in a		ecture hall wit	h a blackt	poard presentation.			
T . 1 1	1. 4				Use of	projector.							
I ypical de	livery metl	nous		Practice Laboratory	Measur	ements in la	horator	ies					
				Other	measu	ements m t	iooraior	103					
				Knowledge									
						neral and sp	ecific ru	iles, contexts a	and proced	lures for the operation			
				of the techn		-				· · · · · · · · · · · · · · · · · · ·			
										related to the field.			
							ne main	theories of the	ne field ir	terms of knowledge			
				acquisition a									
				methods of problem solving.									
					Basic knowledge of machine design principles and methods, control procedures and operational processes.								
				Has an applied knowledge of measurement procedures, their tools, instruments and									
				measuring equipment used in mechanical engineering.									
				Understand, characterise and model the structure and operation of the structural units and elements of mechanical systems, the design and interrelationship of the system									
						hanical sys	tems, th	ne design and	interrelat	ionship of the system			
				components used. Ability									
				Ability to apply the most important terminology, theories and procedures of the									
				technical field in the performance of related tasks.									
				Ability to plan, organise and conduct independent learning.									
Requireme	ents (expres	ssed in terr	ns of	Ability to identify routine technical problems and to apply the necessary principles and									
learning of		ssed in terr	115 01	techniques to solve them									
	,			to identify, formulate and implement (standard operations in practice)									
				(using standard procedures). Attitude									
				Attitude It is open to learning about, embracing and authentically communicating professional,									
				technological development and innovation in engineering.									
				Seeks to solve problems, preferably in cooperation with others.									
						l tolerance o	of mono	tony to carry o	out practic	al activities			
				has the abili		inad taabmi	al Ima	wladaa ta aai	n a thana	uch understanding of			
								explain their la		ugh understanding of			
										levant safety, health,			
								ntrol requirem		···· ,			
				Autonomy	and resp	onsibility							
										operate with qualified			
								echnical, econo					
				He/she shares 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 is responsible for the consequences of his/her technical analyses, the proposals he/she makes and the decisions he/she takes.									
									t in line w	vith Chinese emission			
				The expected construction of new types of equipment in line with Chinese emission reduction plans (aimed at developing emission reduction processes and equipment that									
Short desc	ription of t	he subiect		meet a tenth of the EU limit). Possibilities to improve the efficiency of conventional									
content	r			electrostatic precipitators in coal and other fossil-fired power plants. Electrostatic									
			precipitators with increased efficiency, Bag filters with improved electrostatic charge. Electrostatic cyclones. Venturi high efficiency filters. Design principles for separators										
				using a combination of the above options. Design guidelines. New trends in water									

Novel techniques of environmental protection

	treatment. Newer principles and options for biological water purification. Theory and practice of endocrine disruptor removal from water. New noise reduction techniques (interference, new types of attenuation. New methods of odour control, modern methods of odour measurement. Dioxin and PCB abatement. New radioactivity reduction techniques. Processing of red mud, extraction of rare earths and scandium.				
Types of student activities	Presentation: Processing of lectures with notes 40%, independent processing of theoretical material 20%, preparation of lab notes 40%				
Required literature and contact details	Endre Kiss: New environmental techniques, Electronic note, 2023, Moodle system				
Recommended literature and contact details	Y. Mizuta: Energy New Environmental Technologies Technology Handbook, JICA-DEED publication, 2003 Proceeding Publication of the Wroclaw International World Conference on Electrostatic Discharge Elimination				
Description of tasks to be submitted/measurement reports	Full-time: preparation of 5 measurement reports Part-time: 3 measurement reports				
Description and timetable of the workshops	During the semester, for correspondence students in the 2nd and 4th consultation, and for day students in the 6th and 13th week, five theoretical questions from the lectures. The papers are 100-100 marks, with a maximum of 20 marks for each question.				

Basic P	rinciples	~		Technol					Level	1	
Name of the subject in Hungarian				Hidrogéntechnológia kémiai alapjai						BSc	
	-	in English	1	Basic Princ			Code	DUEN(L)-MGT-257			
	ole educatio		· · · · ·	Institute of Technology, Department of Mechanical Engineering and Energy							
DUEN(L)	compulsory)-	prior learn	nng			1		1	1	1 .	
Туре		Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education	
Full time Part time	150/39 150/15	per week per term	2 10	per week per term	1 5	per week per term	0	Е	5	English	
Teacher re	esponsible f	for the sub	ject	Name		Imre Ková	cs, PhD		schedule	Associate professor	
Training objective and justification of the course (content, output, location in the curriculum)				Students w compounds production adsorption	Goals, development objectives Students will learn about the chemical and physical properties of hydrogen, its compounds, the production of hydrogen in laboratory and industrial settings, and the production of high-purity hydrogen. Students will also learn about elementary adsorption processes at the solid-gas interface, diffusion through solids (metals) and membranes, and electrochemical processes in materials containing active hydrogen.						
Typical d	elivery metl	hods		Practice Laboratory	For all s	projector. students in a projector.	a large l	ecture hall wit	th a black	board presentation.	
				Other							
Requirements (expressed in terms of learning outcomes)			ns of	The student material; The studen chemical an Ability The studen consequenc The student the environm Attitude At the end sources, ind environmen The student	will learr will under t will rec d the econ t is able es through will be al ment. of the cou- cluding hy tally resp t will as n of the t. and resp ependently	erstand the ognise the nomy-socie to conside h examples; ble to explo urse, the stu ydrogen, to onsible way ssume resp natural en onsibility	knowled links be ty. er socia ore the s dent wi protec 7. ionsibili	etween the result, economic ystemic links Il be committ t the environit ty for his/he	o work w sources a and ener between e ed to the ment and r own a	o hydrogen; ith this energy storage ssociated with such a gy choices and their energy, economics and use of greener energy to use energy in an ctivities and for the ting with the social	
Short desc content	cription of t	he subject		to hydrogen	. Its produ	uction, phys	sical and	l chemical pro	perties, a	al chemistry in relation ad future uses.	
Types of s	student acti	vities		theoretical 1	naterial 2	0%, prepara	ation of	lab notes 40%	_	nt processing of	
Required literature and contact details				 Csepeli-Kovács: Chemistry and Materials Science notebook Materials on MOODLE Viktor Hacker, Shigenori Mitsushima, Fuel Cells and Hydrogen: From Fundamentals to Applied Research 1st Edition, publisher Elsevier, ISBN-13 978-0128114599 Handbook of Hydrogen Energy 1st Edition,Edited By S.A. Sherif, D. Yogi Goswami, E.K. (Lee) Stefanakos, Aldo Steinfeld, ISBN 9781420054477, 1058 Pages 375 B/W Illustrations, Published September 3, 2014 by CRC Press. 							
details	ended literat		ntact	 Introductory Chapter: Hydrogen Energy, Written By Ahmed Albahnasawi and Murat Eyvaz, Published: 07 December 2022, DOI: 10.5772/intechopen.108635 							
Description of tasks to be submitted/measurement reports				Full-time: A total of 3 assignments to be submitted during the semester.							

Basic Principles of Hydrogen Technology

	By correspondence: A total of 2 papers to be written during the semester.
Description and timetable of the workshops	At the end of the semester, in the 13th week of the semester, a 100-point essay.

Basics of	of the cir	cular econo	my								
Name of t	ha aubiaat	in Hungarian	Körforgásos	gazdasá	g alapjai	Level	BSc				
Name of t	he subject	in English	Basics of the	e circular	economy	Code	DUEN(L)-MGT-258				
Responsib	le educatio	nal unit	Institute of 7	Institute of Technology, Department of Mechanical Engineering and Energy							
Name of c DUEN(L)		prior learning									
Туре	Type Presentation				Laboratory		Requirement	Credit	Language of education		
Full time Part time	150/39 150/15	per week 2 per term 10	per week per term	1 5	per week per term	0	Е	5	english		
		for the subject	Name	-	Éva Kovác	s-Bokor	. PhD	schedule	Senior lecturer		
Training objective and justification of the course (content, output, location in the curriculum)			in protection re and develop	he course elated to v ment opp	e is to famili waste manag ortunities; to	gement, o learn t	international a	and nation sign tasks	ems of environmental al solutions, technical of waste recovery and ar cells, batteries), by-		
Typical delivery methods			Presentation Practice Laboratory Other	Use of	projector or	overhea	ecture hall wit ad projector e room with pr		board presentation.		
Requirements (expressed in terms of learning outcomes)			The student understand student will Ability The student their conseq relationships Attitude By the end environment will take res environment Autonomy a The student	The student is able to consider environmental or social, economic energy choices and their consequences through examples; The student is able to explore the systemic relationships between nature, his/her own life and the environment. Attitude 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. Autonomy and responsibility							
Short desc content	cription of t	he subject	The current state of waste management in Hungary and Europe. Basic concepts of waste management. Waste management. Legislation on waste management. Waste Management Plans. Waste collection, treatment, transport, storage. Landfills: design, processes, monitoring, recultivation Energy recovery from waste. Methods and policies for waste prevention and minimisation (IPPC, LCA) Processes and technologies for industrial composting Recycling of spent solar cells and Li-batteries. Management of nuclear industrial waste. Radioactive waste disposal processes and methods.								
Types of s	student activ	vities	theoretical n	Presentation: Processing of heard text with notes 40%, independent processing of theoretical material 20%, Exercise: 40%							
		d contact detail					otes: Moodle s				
Recomme details	nded literat	ure and contact							ntroduction to the SBN 9781536192339		
-	on of tasks t /measureme										
submitted/measurement reports Description and timetable of the workshops			During the semester, in weeks 7 and 14, five theoretical questions from the lectures are presented. The tests are both 100-100 marks, with a maximum of 20 marks per 5 essay questions. The mark for the essay will be calculated according to the mark limits								

Basics of the circular economy

NUCLEAR ENERGY

Basics of nuclear safety

Dasies Of		r safety		1							
Name of the subject in Hungarian			Nukleáris biztonság alapjai						BSc		
	Ũ	in English	l	Basics of nuclear safety Code DUEN(L)-MGT-							
Responsible				Institute of Technology, Department of Mechanical Engineering and Energy							
Name of con DUEN(L)-	mpulsory	prior learn	ing								
Туре	SypePresentation		on	Practice		Laboratory	Laboratory		Credit	Language of education	
		per week	2 10	per week 0 per week 1 per term 0 per term 5 M				5	english		
		per term		per term Name	0	per term Miklós Hoi		 hD	schedule	College professor	
reacher res	Feacher responsible for the subject			Goals, deve	lonment		lvan, 1		seneulie	Conege professor	
Fraining objective and justification of			ion of				s to giv	ve the student	an overv	iew of the history of	
										peration and planned	
the curricul		1 /		for the futu	re, the jo	urney of ur	anium o	ore from minin	ng to buri	al, and trends, and to	
								etail in each su		ooard presentation.	
				Practice			<u> </u>	e room with pr		board presentation.	
Typical deli	very meth	nods		Laboratory	101 all	students in a		room with pr	ojector.		
				Other							
				Knowledge							
Requirements (expressed in terms of learning outcomes)				 Have a comprehensive knowledge of the basic facts, trends and limits of the subject area of engineering. Knowledge of the general and specific mathematical, scientific and social principles, rules, contexts and procedures necessary for the operation of the technical field. You know the terminology, key concepts and theories related to your field. You have a comprehensive knowledge of the main theories and problem-solving methods in your field. Comprehensive knowledge of basic economic, business and legal rules and tools. He has a thorough knowledge of the structural materials used in the field of mechanical engineering, the methods of their manufacture and the conditions of their application. Basic knowledge of machine design principles and methods, machine manufacturing technology, control procedures and operating processes. 							

Ability to understand and use literature, computer and library resources specific to their field. The acquired IT knowledge can be applied to the solution of tasks in the field. Ability to build basic models of technical systems and processes. The ability to use their knowledge in a creative way to manage their workplace resources effectively. In the course of his/her work, he/she is able to apply and enforce safety, fire safety						
and hygiene rules and regulations. Ability to communicate in a professionally appropriate manner, orally and in writing, in your mother tongue and at least one foreign language. Ability to apply the technical specifications related to the operation of mechanical						
systems, the principles and economic context of setting up and operating machinery and mechanical equipment. The ability to manage and control the production processes of specialised technology, with a view to quality assurance and quality control.						
Ability to diagnose mechanical failures, select troubleshooting operations, solve repair tasks Attitude						
It assumes and authentically represents the social role of its profession and its fundamental relationship with the world.						
It is open to learning about, embracing and authentically communicating professional, technological development and innovation in engineering. You strive to make your self-training a means to achieve your professional goals. Make decisions in complex or unexpected decision-making situations, taking full account of legal and ethical standards.						
It tries to solve problems in cooperation with others, where possible. Strive to keep their self-training in mechanical engineering continuous and in line with their professional goals.						
It strives to solve its tasks and make management decisions by listening to the opinions of the colleagues it manages, preferably in cooperation. You have the stamina and tolerance for monotony needed to carry out practical activities.						
You are open to the use of IT tools, you strive to learn and use software in the field of mechanical engineering, and you know and use at least one of these programs to a proficient level.						
Open and receptive to new, modern and innovative practices and methods related to organic farming and health awareness. Using his/her technical knowledge, he/she strives to understand the observable phenomena as thoroughly as possible, to describe and explain their laws.						
In the course of his/her work, he/she observes and complies with the relevant safety, health, environmental, quality assurance and control requirements. Autonomy and responsibility						
The evolution of security philosophy. The basics of modern security philosophy. Risk and security. Technical aspects of security philosophy, implementing defence in depth. International security requirements. IAEA and EU security standards. Domestic regulatory requirements, Nuclear Safety Regulations. Safety functions. Safe heat						
regulatory requirements, Nuclear Safety Regulations. Safety functions. Safe heat removal from the reactor active zone. Safe heat removal from the spent fuel pool. Safety systems. Reliability and safety. Verification of design safety, safety reports and safety analyses. Safety management during the operating period, Operating Conditions and Limits.						
Processing of heard text by note-taking and recording of material using own notes and electronically available notes 80% Development of test questions 20%						
 Fundamentals of Nuclear Safety (electronic note, rapporteur's note) Elter J., Gadó J., Holló E., Lux I. (eds.): Safety of Nuclear Reactors, ELTE Eötvös Kiadó, ISBN 978-963-312-180-1, Budapest, 2013 Materials on MOODLE 						
 Nuclear Safety Regulations Volumes 1-10 and Guides (OAH website) IAEA Safety Standards (Safety Fundamentals, Safety Standards, Safety Guides) (IAEA website) 						
Week 7: I final examination Week 12: II final examination Week 13: any paper can be substituted						

Basics of Atome								r		
Name of the subject in Hungarian		Atomenerge			Level	BSc				
	in English	1	Basics of A			Code	DUEN(L)-MGT-118			
Responsible educatio Name of compulsory		ning	Institute of Technology, Department of Mechanical Engineering and Energy							
DUEN(L)-		iiig					1	L		
Type Presentation		on	Practice		Laboratory		Requirement	Credit	Language of education	
Full time150/39Part time150/15	per week per term	2 10	per week per term	1 5	per week per term	0	М	5	english	
Teacher responsible f	•	ject	Name		Miklós Hoi	váth, Pl	hD	schedule	College professor	
			A series of nuclear ener for the futu	Goals, development objectives A series of introductory lectures to give the student an overview of the history of nuclear energy, the types of nuclear power plants currently in operation and planned for the future, the journey of uranium ore from mining to burial, and trends, and to anticipate what they will learn in more detail in each subject.						
			Presentation	For all	students in a	large l			board presentation.	
Typical delivery meth	nods		Practice Laboratory		e, example		1 5			
			Other							
Requirements (expressed in terms of learning outcomes)			Have a comprehensive knowledge of the basic facts, trends and limits of the subject area of engineering. Knowledge of the general and specific mathematical, scientific and social principles, rules, contexts and procedures necessary for the operation of the technical field. You know the terminology, key concepts and theories related to your field. You have a comprehensive knowledge of the main theories and problem-solving methods in your field. Ability The ability to analyse at a basic level the disciplines that make up the knowledge base of the technical field, to synthesise relationships and to make appropriate evaluations. Ability to apply the most important terminology, theories and procedures of the technical field in the performance of related tasks. Ability to jan, organise and carry out independent learning. Ability to identify routine professional problems, to identify, formulate and solve them (using standard operations in practice) against a theoretical and practical background. Ability to understand and use literature, computer and library resources specific to their field. The acquired IT knowledge can be applied to the solution of tasks in the field. Ability to build basic models of technical systems and processes. The ability to use their knowledge in a creative way to manage their workplace resources effectively. In the course of his/her work, he/she is able to apply and enforce safety, fire safety and hygiene rules and regulations. Attitude It assumes and authentically represents the social role of its profession and its fundamental relationship with the world. It is open to learning about, embracing and authentically communicating professional, technological development and innovation in engineering. You strive to make your self-training a means to achieve your professional goals. Make decisions in complex or unexpected decision-making situations, taking full account of legal and ethical standards. It tries to solve problems in cooperation with others, where possible. Strive to keep their s							

Basics of Atomenergetics

Short description of the subject content	Identify the shortcomings of the technologies used, the risks of the processes and initiate measures to reduce them. Monitor legislative, technical, technological and administrative changes in the field. Directs the work of the personnel assigned to him/her, supervises the operation of machinery and equipment, based on the instructions of the workplace manager. The history of nuclear reactors. The Bomb 1939-1945,-47; The first atomic bomb. Accidents Nuclear power plant generations. From the uranium vein to the graveyard. The safety principles. The entire uranium life cycle Uranium ore mining. Fuel cell production. Nuclear power plant use (source: npp.hu). Temporary storage. Reprocessing. Waste management. Final disposal. Reactor physics. Fundamentals of nuclear physics. Criticality (four and six factor formulae). Point kinetics. Building blocks of reactors. Reactor calculations. From transport equation to point kinetics backwards. Reactor kinetics equations with late neutrons Solutions to the transport equation, critical reactor state. Multiplication factor, concept of reactivity. Diffusion approximation. Space dependence
Types of student activities	calculations. Treatment of reactor ores in reactor physics. Mechanical engineering. The main components of the primary circuit. Other main equipment of the primary circuit. Elements of the primary circuit safety protection system. The secondary circuit heat cycle processes. Thermohydraulics of the reactor plant. Main factors to increase the safety of nuclear power plants. Fission nuclear power generation of the future. Fusion power generation Taking notes on what you have heard and recording the material using your own notes and those available electronically 80% Developing test questions 20%
Required literature and contact details	 Gábor Pór:Nuclear Energy Basics textbook Materials on MOODLE International Atomic Energy Agency textbook, <u>https://www-pub.iaea.org/MTCD/Publications/PDF/P082_scr.pdf</u> Gyula Csom:Nuclear Power Plant Operation I Fundamentals of Reactor Physics and Technology (Technical University of Budapest, 1997) Gyula Csom:Nuclear Power Plants Operation II/1 - Operation of Energetic Nuclear Reactors (Műegyetemi Kiadó, Budapest, 2005) By: Operational knowledge (University of Dunaújváros, university note, in progress)
Recommended literature and contact details	 Zoltán Szatmáry: Introduction to Reactor Physics, (Akadémiai Kiadó, Budapest, 2000) Duderstadt, J and Hamilton, L.: Nuclear Reactor Analyses (Wiley, New York, 1976) Bell, G. I., and Glasstone, S.: Nuclear Reactor Theory (American Nuclear Society, 1970) Dénes Bódizs:Measurement Techniques for Nuclear Radiation (Typotex, Budapest, 2009) G. F. Knoll, Radiation Detection and Measurement, 3rd Edition (John Wiley & Sons, Inc., 2000.)
Description of tasks to be submitted/measurement reports Description and timetable of the workshops	

Ensuring the int										
Name of the subject	in Hungar		Berendezések integritásának biztosítása						BSc	
-	in English	1	Ensuring the integrity of equipment Code DUEN(L)-MGT-119							
Responsible education Name of compulsory		ina	Institute of Technology, Department of Mechanical Engineering and Energy							
DUEN(L)-		mg			•		1	1		
Туре	Presentati	on	Practice		Laboratory		Requirement	Credit	Language of education	
Full time 150/39 Part time 150/15	per week per term	2 10	per week 1 per week 0 per term 5 per term 0 M				5	english		
Teacher responsible	for the sub	ject	Name		Péter Tram	pus, Ph	D	schedule	Professor emeritus	
Training objective and justification of the course (content, output, location ir the curriculum)			the goals of quality, asse prioritizing	Goals, development objectives the goals of ensuring equipment integrity encompass safety, reliability, compliance, quality, asset management, environmental protection, and risk management. By prioritizing equipment integrity, organizations can safeguard their people, assets, and reputation while enhancing operational performance and sustainability.						
			Presentation				ecture hall wit ad projector	h a black	board presentation.	
Typical delivery met	hods		Practice Laboratory	Measur	ements and	exampl	65			
			Other	wicasul	ements and	exampl				
Requirements (expre learning outcomes)	subject area Knowledge rules, conte You know t You have a methods in Comprehen He/she has mechanical application. Basic know technology, Comprehen machinery, He/she kno instruments Ability The ability to a technical fie Ability to a technical fie Ability to a technical fie Ability to a technical fie Ability to a technical fie Ability to a them (using background Ability to b The ability to b The ability to b The ability to b The ability resources ef Attitude It assun fundame It is op professi You strii Make da account It tries t	nprehensi of engine of the ger sts and pr he termina comprel your field sive know a thorou engineeri ledge of r control p sive know power too ws the r , instrume to analyse ical field, pply the eld in the lan, orgar dentify ro g standar nderstand d IT know uild basic to use th fectively. mes and a ental rela- ponal, tech ve to mal ecisions in of legal a o solve pro- o keep the	eering. neral and sp rocedures ne ology, key of nensive knoul. vledge of ba gh knowled ng, the meth nachine des procedures a wledge of th ols, mechani- neasuring p ents and mea- e at a basic let to synthesis most impor- performance ise and carr putine profe d operation l and use lift wledge can b models of the neir knowled carolise and carr putine profe d operation d and use lift wledge can b models of the in knowled carolise and carr putine profe d operation d and use lift models of the neir knowled carolise and carr putine profe d operation d and use lift models of the in complex o and ethical s roblems in complex o	ecific m accessary concepts wledge sic ecor ge of th add operation and opera- cal equi- procedur asuring evel the e relation tant ter e of rela- y out in ssional s in pr erature, be appli- echnica- dge in a represe- h the wo out, emi- evelopm training r unexp tandard ooperating	hathematical, si for the operation of the main the nomic, business the structural re- their manufact ciples and meta ating processes ating principle ipment and too res used in ne equipment. disciplines that onships and to minologies, the ted tasks. dependent leas problems, to actice) agains computer and a creative way ents the social orld. bracing and a means to ac ected decision s. ion with other	cientific a ion of the related to theories a as and lega naterials ure and the chods, may see and stri- bls used. nechanica t make up make app neories an rning. identify, t a theor d library n ion of tash processes y to mana role of in authentica vation in e hieve you -making s	al rules and tools. used in the field of the conditions of their chine manufacturing ructural units of the l engineering, their o the knowledge base ropriate evaluations. d procedures of the formulate and solve retical and practical resources specific to ks in the field. age their workplace ts profession and its ally communicating engineering. ur professional goals. situations, taking full			

Ensuring the integrity of equipment

[
	It strives to solve its tasks and make management decisions by listening to the opinions of the colleagues it manages, preferably in cooperation.							
	Autonomy and responsibility							
	In unexpected decision situations, he/she independently thinks through and							
	develops comprehensive, substantiating professional questions on the basis of							
	given sources.							
	Responsibly uphold and represent the values of the engineering profession, and be open to professionally informed critical comments.							
	In carrying out his/her professional duties, he/she will also cooperate with qualified professionals in other fields (primarily technical, economic and legal). Identify the shortcomings of the technologies used, the risks of the processes and initiate measures to reduce them.							
	Monitor legislative, technical, technological and administrative changes in the field.							
	Directs the work of the personnel assigned to him/her, supervises the operation of machinery and equipment, based on the instructions of the workplace manager. Assesses the efficiency, effectiveness and safety of the work of subordinates. He/she is attentive to promoting the professional development of his/her subordinates, to managing and supporting their efforts in this direction, and to applying the principle of equal access.							
	The concepts of functional and structural integrity and a coherent system for ensuring them. Their role in safety and availability. Tools: maintenance, monitoring, inspection							
	and testing. Ageing processes and effects, ageing management.							
Short description of the subject	Purpose and system of maintenance. Modern maintenance strategies and techniques							
content	(condition-based, reliability-centred, risk-based). Optimisation of maintenance.							
	Purpose and system of periodic inspection. Elements of an effective periodic inspection (performance, risk aspects). The role of non-destructive testing in periodic inspection. Qualification of inspection systems.							
Types of student activities	Processing of heard text by note-taking and recording of material using own notes and electronically available notes 80% Development of test questions 20%							
	Lecture notes in Moodle							
	• Safety of Nuclear Power Plants II (eds.: J. Elter, J. Gadó, E. Holló, I. Lux), ELTE Eötvös Kiadó, Budapest, 2013							
Required literature and contact details	Gyula Csom:Nuclear Power Plant Operation I Fundamentals of Reactor Physics and Technology (Technical University of Budapest, 1997)							
	 Gyula Csom:Nuclear Power Plants Operation II/1 - Operation of Energetic Nuclear Reactors (Műegyetemi Kiadó, Budapest, 2005) By: Operational knowledge (University of Dunaújváros, university note, in progress) 							
	Zoltán Szatmáry: Introduction to Reactor Physics, (Akadémiai Kiadó,							
	 Budapest, 2000) Duderstadt, J and Hamilton, L.: Nuclear Reactor Analyses (Wiley, New View 1076) 							
Recommended literature and contact	 York, 1976) Bell, G. I., and Glasstone, S.: Nuclear Reactor Theory (American Nuclear 							
details	 Society, 1970) Dénes Bódizs:Measurement Techniques for Nuclear Radiation (Typotex, 							
	Budapest, 2009)							
	 G. F. Knoll, Radiation Detection and Measurement, 3rd Edition (John Wiley & Sons, Inc., 2000.) 							
Description of tasks to be								
submitted/measurement reports								
Description and timetable of the workshops								
normonopo	1							

Equipm	ents of N	Nuclear	Powe	er Plants							
Name of t	he subject	in Hungar		Atomerőmű		Level	BSc				
	-	in English	1	Equipments			Code	DUEN(L)-MGT-152			
	ole educatio			Institute of Technology, Department of Mechanical Engineering and Energy							
Name of a DUEN(L)	compulsory	prior learn	ning								
Туре	Presentation			Practice		Laboratory	Laboratory		Credit	Language of education	
Full time Part time	150/39 150/15	per week per term	2 10	per week per term	1 5	per week per term	0	Е	5	english	
Teacher re	esponsible f		ject	Name		Péter Tram	pus, Ph	D	schedule	Professor emeritus	
Training objective and justification of the course (content, output, location ir the curriculum)				After comp systems and and operation able to perfo	Goals, development objectives After completing the subject, the student should know the engineering technology systems and equipment of the pressurized water nuclear power plant, the task, structure and operation of the main equipment. In possession of this knowledge, he should be able to perform independent engineering or management and coordination work in the design, operation, maintenance and inspection of equipment.						
Б · 1 1	1			Presentation Practice	Lecture	s with black	kboard a	and projector.			
Typical de	elivery met	hods		Laboratory	Carryin	g out experi	iments a	and calculation	1.		
				Other							
Requirements (expressed in terms of learning outcomes)				has extensive knowledge to user systems Ability In solving a o It can solv of-the-art kr It is able to technical pro- Prepared to native langu Attitude Constantly of energy man open to the use the tools your ability and accurate environmen power plant Publishes hi Autonomy Collaborates well-founde his/her fello a responsib energy, the environmen principles an	Other Image: Constraint of the provided state of						
Short description of the subject content				The main technological systems of the pressurized water nuclear power plant (primary and secondary circuits). Primary circuit equipment: reactor equipment (reactor tank, reactor cover, internal structures), reactor cooling circuit equipment (main circulation line, main circulation pump), pressure control system equipment (volume compensation tank), steam generator, zone failure cooling system equipment, other safety system equipment, primary circuit auxiliary system equipment. Secondary circuit equipment: feed water preheating system equipment, turbine, generator. Condensate system equipment (turbine condenser). Heating element transfer, spent heating element treatment equipment							
Types of student activities Understanding and assimilation of the topics of presentations 50% Testing of materials 30% Laboratory exercises 20%											
Required	literature ar	nd contact	details	Materials on MOODLE							

Equipments of Nuclear Power Plants

Recommended literature and contact details	 Atomerőművek üzemtana, II. kötet, Az energetikai reaktorok üzemtana, Budapest, 2012. Zoltán Szatmáry: Introduction to Reactor Physics, (Akadémiai Kiadó, Budapest, 2000) Duderstadt, J and Hamilton, L.: Nuclear Reactor Analyses (Wiley, New York, 1976) Bell, G. I., and Glasstone, S.: Nuclear Reactor Theory (American Nuclear Society, 1970) Csom Gyula, Atomerőművek üzemtana, Műegyetemi Kiadó, Budapest 2005
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	

Industrial knowledge

Industrial know	0		La					L .	
Name of the subject	in Hungar		Üzemtani ismeretek					Level	BSc DUEN(L)-MGT-213
	in English				Industrial knowledge Code DUEN(I Institute of Technology, Department of Mechanical Engineering and Ener				
Responsible education Name of compulsory DUEN(L)-	Institute of	l ecnnolo	gy, Departn	ient of r	viecnanical Er	igineering	and Energy		
Туре	Presentatio	on	Practice	Practice Laboratory Requirement		Credit	Language of education		
Full time 150/39 Part time 150/15	per week per term	2 10	per week per term					5	english
Teacher responsible	for the subj	ect	Name	_	Gábor Lada	ányi		schedule	Master instructor
Training objective ar the course (content, o the curriculum)		in the reactor the links be able to asso Understand	will under or active a tween the ess the ro how desi	erstand the l zone. Under technologi ble of an er gn and safet	stand th cal systengineeri ay analy	ne factors that ems and the b ng system in	influence ehaviour the safet	ohydraulics processes reactivity. Recognise of the active zone. Be y of the active zone. i iterative process.	
Typical delivery met	hods		Practice Laboratory				and calculation	1.	
Requirements (expre learning outcomes)	ssed in term	ns of	area of engi Knowledge engineering Knowledge the field. Comprehen and probler basic econo materials us Has a basic construction Comprehen machinery, measuring mechanical Has an work to his/her at protection r Comprehen managemen and econom In-depth kr managemen methods of problem-sol Knowledge cost-benefit Understand, elements of components methods of Ability Ability to c system of th Ability to un discipline in independent	prehensiv neering. of the ge , principle of the ter sive known solving mic, busi ed in eng knowled technolo sive know power t procedure engineerit ting know rea of spe equirement sive know t, environ ics, whic nowledge t of the m analysis. characte f engineerit arry out the technic nechanic arry out the technic nechanic arry out the technic nechanic and solve (l background inderstand	neral and sp es, rules, comminology, the veldge of the g and problemess and leg ineering, the dige of the popy, control weldge of the popy, control weldge of the popy, control weldge of the popy, control weldge of the set to cols, mech es, their too ng. Teledge of occession, ints in the file weldge of the lean integra of the lean integra of the lean integra of the lean integra intervention, res- niques. The the set and product, j a basic anal al field, to s the main te formance of the set of the pract ound require d and use	becific n ntexts an e most e main tern-solv gal rules eir produ- procedu he oper anical ols, inst cupation safety, eld of th the ba ection, c ally rela rning, del the s ns, the elated c process runiolo related identifi- ical app d to solv	nathematics re- nd procedures important rela- theories in the ing methods. The and tools. The uction method es and method res and opera- rating princip equipment ar- ruments and health and safe e activity. sics, limits a quality assuran- ted to the field knowledge ac- ing discipline. Ind data collect f business ecco- structure and co- design and i- computational and process d the disciplines ising and evalu- ogies, theories tasks. Ability y routine tech lication of star-	equired to of natural attonships e field of k Compreh- torough kr ls and con ds of mac ting proce les and s measurin eastery and fety at wo and requi- tice, inform d of engine equisition, their conomics a operation of neterrelatic and mod esign.	tructural units of the used. Knowledge of g equipment used in fire prevention related rk and environmental rements of logistics, nation technology, law eering. data collection and ethical limitations and nd engineering-based of the components and onship of the system lelling principles and ke up the knowledge

	Ability to apply the acquired knowledge in the field of information technology to the solution of problems in the field apply the knowledge and skills acquired in the field ability to construct basic models of technical systems and processes. Ability to use knowledge in a creative way, using the resources of the workplace effectively manage their workplace effectively. Ability to apply and comply with safety, fire safety and hygiene rules and regulations in the course of his/her work. Ability to apply, orally and in writing, in a professionally appropriate manner, in accordance with the area of competence communicate in his/her mother tongue and al least one foreign language. Ability to apply the technical specifications relating to the operation of mechanical systems, the the principles of setting up and operating machinery and mechanical equipment, and the principles of economic efficiency the economic context. Ability to manage and control technical production processes, taking into account the elements of quality assurance and quality control. Ability to diagnose mechanical breakdowns and to select remedial actions, solve repair technology problems. Attitude It assumes and authentically represents the social role of its profession and its fundamental relationship with the world. Open to professional, technological development and innovation in the field of engineering and innovation in the technical field. Strives to make self-learning a means of achieving professional goals. Takes decisions in complex or unexpected decision-making situations, taking full account of legal and ethical standards. Seek to solve problems, preferably in cooperation with others. He/she shall endeavour to pursue continuous and professional development in the field of mechanical engineering. In line with his professional goals. He/she strives to solve problems and make management decisions by listening to the opinion of his/her supervisor, preferably in cooperation. Possesses sufficient stamina and tolerance of monotony to carrr
	Open to the use of information technology tools and has a good knowledge and application of software in the field of engineering, with at least one such program at a proficiency level. Open and receptive to the application of new, modern and innovative practices and methods related to organic farming and health awareness. Applies his/her acquired technical knowledge to gain a better understanding of
	observable phenomena and to describe and explain their laws. In the course of his/her work, he/she shall apply the relevant safety, health, environmental and quality assurance and control requirements. Autonomy and responsibility
Short description of the subject content	Beam decay, NAA. Basic concepts in reactor physics: transport equation, diffusion approximation, cross section, neutron spectrum, reactivity coefficients. Moderation. Inherent safety. Reactor physics framework parameters and their derivation. Charge design. Zone thermohydraulics: heat conduction from fuel to moderator, DNBR. RIA analyses flow. Fuel behaviour. Relationship between framework parameters-safety analyses-technical design. Manoeuvring: reactor control modes, rod, boric acid, steam generator, Xe process. In-core, ex-core measurements.
Types of student activities	Laboratory and simulator exercises
Required literature and contact details	 Gábor Pór:Nuclear Energy Basics textbook Materials on MOODLE International Atomic Energy Agency textbook, <u>https://www-pub.iaea.org/MTCD/Publications/PDF/P082_scr.pdf</u> Gyula Csom:Nuclear Power Plant Operation I Fundamentals of Reactor Physics and Technology (Technical University of Budapest, 1997) Gyula Csom:Nuclear Power Plants Operation II/1 - Operation of Energetic Nuclear Reactors (Műegyetemi Kiadó, Budapest, 2005) By: Operational Incomplexed (Iniversity of Durgóiriónes university actor in progress)
Recommended literature and contact details	 knowledge (University of Dunaújváros, university note, in progress) Zoltán Szatmáry: Introduction to Reactor Physics, (Akadémiai Kiadó Budapest, 2000) Duderstadt, J and Hamilton, L.: Nuclear Reactor Analyses (Wiley, Nev York, 1976) Bell, G. I., and Glasstone, S.: Nuclear Reactor Theory (American Nuclea Society, 1970)

	 Dénes Bódizs:Measurement Techniques for Nuclear Radiation (Typotex, Budapest, 2009) G. F. Knoll, Radiation Detection and Measurement, 3rd Edition (John Wiley & Sons, Inc., 2000.)
Description of tasks to be submitted/measurement reports	
Description and timetable of the workshops	As announced in the first session

in Hungarian Üzemviteli és karbantartási gyakorlat Level BSc Name of the subject in English Operation and maintenance practice Code DUEN(L)-MGT-214 Responsible educational unit Institute of Technology, Department of Mechanical Engineering and Energy Name of compulsory prior learning DUEN(L)-Language of Requirement Credit Туре Presentation Practice Laboratory education 150/39 Full time per week 0 0 per week per week 3 5 Μ english 150/15 0 15 Part time 0 per term per term per term Teacher responsible for the subject János Kuti schedule Name Master instructor Goals, development objectives Training objective and justification of the course (content, output, location in After completing the exercise, the student will have a deeper and practical the curriculum) understanding of the structure, design and operation of a nuclear power plant. Presentation Lectures with blackboard and projector. Practice Typical delivery methods Laboratory Carrying out experiments and calculation. Other Knowledge Have a comprehensive knowledge of the basic facts, directions and limits of the subject area of engineering. Knowledge of the general and specific mathematics required to operate in the field of engineering, principles, rules, contexts and procedures of natural and social sciences. Knowledge of the terminology, the most important relationships and theories related to the field. Comprehensive knowledge of the main theories in the field of knowledge acquisition and problem solving and problem-solving methods. Comprehensive knowledge of basic economic, business and legal rules and tools. Thorough knowledge of structural materials used in engineering, their production methods and conditions of use. Has a basic knowledge of the principles and methods of machine design, machine construction technology, control procedures and operating processes. Comprehensive knowledge of the operating principles and structural units of the machinery, power tools, mechanical equipment and tools used. Knowledge of measuring procedures, their tools, instruments and measuring equipment used in mechanical engineering. Has an working knowledge of occupational health and safety and fire prevention related to his/her area of specialisation, safety, health and safety at work and environmental protection requirements in the field of the activity. Comprehensive knowledge of the basics, limits and requirements of logistics, management, environmental protection, quality assurance, information technology, law and economics, which are integrally related to the field of engineering. Requirements (expressed in terms of In-depth knowledge of the learning, knowledge acquisition, data collection and learning outcomes) management of the mechanical engineering discipline. methods of learning, learning, research and data collection, their ethical limitations and problem-solving techniques. Knowledge of the methods and tools of business economics and engineering-based cost-benefit analysis. Understand, characterise and model the structure and operation of the components and elements of engineering systems, the design and interrelationship of the system components used. Apply the related computational and modelling principles and methods of mechanical product, process and process design. Ability Ability to carry out a basic analysis of the disciplines that make up the knowledge system of the technical field, to synthesising and evaluating contexts. Ability to understand the main terminologies, theories and procedures of the technical discipline in the performance of related tasks. Ability to plan, organise and conduct independent learning. Ability 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. Ability to understand and use literature specific to his/her field of specialisation, computing, library resources.

Operation and maintenance practice

Ability to apply the acquired knowledge in the field of information technology to the solution of problems in the field apply the knowledge and skills acquired in the field Ability to construct basic models of technical systems and processes.

	Ability to use knowledge in a creative way, using the resources of the workplace
	effectively manage their workplace effectively. Ability to apply and comply with safety, fire safety and hygiene rules and regulations in the course of his/her work.
	Ability to apply, orally and in writing, in a professionally appropriate manner, in
	accordance with the area of competence communicate in his/her mother tongue and at
	least one foreign language.
	Ability to apply the technical specifications relating to the operation of mechanical
	systems, the the principles of setting up and operating machinery and mechanical
	equipment, and the principles of seconomic efficiency
	the economic context. Ability to manage and control technical production processes,
	taking into account the elements of quality assurance and quality control.
	Ability to diagnose mechanical breakdowns and to select remedial actions, solve repair
	technology problems.
	Attitude
	It assumes and authentically represents the social role of its profession and its
	fundamental relationship with the world.
	Open to professional, technological development and innovation in the field of
	engineering and innovation in the technical field.
	strives to make self-learning a means of achieving professional goals.
	Takes decisions in complex or unexpected decision-making situations, taking full
	account of legal and ethical standards.
	Seek to solve problems, preferably in cooperation with others.
	He/she shall endeavour to pursue continuous and professional development in the field
	of mechanical engineering.
	in line with his professional goals.
	He/she strives to solve problems and make management decisions by listening to the
	opinion of his/her supervisor, preferably in cooperation.
	Possesses sufficient stamina and tolerance of monotony to carry out practical activities have the ability to perform tasks with.
	Open to the use of information technology tools and has a good knowledge and
	application of software in the field of engineering, with at least one such program at a
	proficiency level.
	Open and receptive to the application of new, modern and innovative practices and
	methods related to organic farming and health awareness.
	Applies his/her acquired technical knowledge to gain a better understanding of
	observable phenomena and to describe and explain their laws.
	In the course of his/her work, he/she shall apply the relevant safety, health,
	environmental and quality assurance and control requirements.
	Autonomy and responsibility
	In unexpected decision-making situations, independently answer comprehensive,
	fundamental professional questions and develop them on the basis of given sources.
	Responsibly upholds and represents the values of the engineering profession, is open
	to open to professionally informed critical comment.
	In the performance of his/her professional duties, he/she collaborates with other
	professionals (primarily technical and economic and legal).
	Identify the shortcomings of the technologies used, the risks of the processes and the
	initiate mitigating measures.
	Monitors the development of legislation, technical, technological and regulatory
	developments in the field administrative changes.
	Under the guidance of his/her line manager, manages the assigned staff supervises the operation of machinery and equipment.
	Assesses the efficiency, effectiveness and effectiveness of the work of subordinates
	safety.
	He/she takes care to promote the professional development of his/her subordinates and
	to manage their efforts in this direction and assisting them in their efforts, and applying
	the principle of equal access.
	Sharing his/her experience with his/her colleagues in order to support their
	development.
	Taking responsibility for the technical analysis, proposals and results of his/her work
	the consequences of its decisions.
	Familiarisation with the normal operational and design basis processes at Paks.
	Nuclear Power Plant (Paks 1) full-scale simulator and exercise on the analytical
Short description of the subject	simulator.
content	Familiarisation with the main equipment of the VVER-440 pressurised water nuclear
	power plant and and study of the equipment at the Paks Maintenance Training Centre
	(Paks 1)
Types of student activities	Laboratory and simulator exercises

Required literature and contact details	 Gyula Csom:Nuclear Power Plant Operation I Fundamentals of Reactor Physics and Technology (Technical University of Budapest, 1997) Gyula Csom:Nuclear Power Plants Operation II/1 - Operation of Energetic Nuclear Reactors (Műegyetemi Kiadó, Budapest, 2005) By: Operational knowledge (University of Dunaújváros, university note, in progress)
Recommended literature and contact details	 Gyula Csom:Nuclear Power Plant Operation I Fundamentals of Reactor Physics and Technology (Technical University of Budapest, 1997) Gyula Csom:Nuclear Power Plants Operation II/1-3 - Operation of Energetic Nuclear Reactors (Műegyetemi Kiadó, Budapest, 2005) Gyula Csom:Operation of Nuclear Power Plants II/4 - Operation of Energetic Nuclear Reactors (Műegyetemi Kiadó, Budapest, 2012) Zoltán Szatmáry: Introduction to Reactor Physics, (Akadémiai Kiadó, Budapest, 2000) Duderstadt, J and Hamilton, L.: Nuclear Reactor Analyses (Wiley, New York, 1976) Bell, G. I., and Glasstone, S.: Nuclear Reactor Theory (American Nuclear Society, 1970) Dénes Bódizs:Measurement Techniques for Nuclear Radiation (Typotex, Budapest, 2009) G. F. Knoll, Radiation Detection and Measurement, 3rd Edition (John Wiley & Sons, Inc., 2000.)
Description of tasks to be submitted/measurement reports	As announced in the first session
Description and timetable of the workshops	As announced in the first session

Radiation protection and environmental policy

Radiatic	on protec			ironmenta						
Name of th	he subject	in Hungar		Sugárvédelem és környezetpolitika Radiation protection and environmental policy				Level	BSc	
	5	in English	l	*					Code	DUEN(L)-MGT-255
Responsible educational unit				Institute of Technology, Department of Mechanical Engineering and Energy						
Name of compulsory prior learning DUEN(L)-			1				1	1	L	
Туре		Presentati	on	Practice Laboratory Requirement C			Credit	Language of education		
Full time Part time	150/39 150/15	per week per term	2 10	per week per term					5	english
	sponsible	for the subj	ject	Name		Endre Kiss	, PhD		schedule	College professor
Training o	biective an	d iustificat	ion of		Coals, development objectives The goal of radiation protection and environmental policy is to achieve a balanc					
Training objective and justification of the course (content, output, location ir the curriculum)				between uti treatment, ir adverse imp	lizing rad ndustrial a pacts on h	diation for pplications,	benefici and end and the	al purposes, ergy generatio e environment	such as n n, while m	
				Presentation Practice	Lecture	s with black	board a	and projector.		
Typical de	livery met	hods		Laboratory	Carryin	g out experi	iments a	and calculation	1.	
				Other Knowledge						
Requirements (expressed in terms of learning outcomes)			ns of	rules, contex You know t You have a methods in Comprehens He/she has mechanical application. Basic know technology, Comprehens machinery, He/she kno protection, specialisatic Comprehens managemen law and eco In-depth kn their ethical Knowledge based on teco Ability	of the ger sts and pr he termin a comprehyour field sive know a thoroug engineeri ledge of m control p sive know power too ws the r , instrume ws the e: safety a on, as wel sive know t, enviror nomics, w owledge limitation of the me	occedures ne ology, key o nensive kno l vledge of ba gh knowled ng, the meth nachine desi rocedures av vledge of th ols, mechani neasuring p ents and mea xpectations nd occupat l as the relev wledge of mental pro- vhich are into of learning ns and probl thods and to inciples.	cessary concepts wledge sic ecor ge of th ods of th ods of th agn prin nd oper- cal equ procedur asuring and rectional h vant envithe bass tection, tegrally , knowl em-solv	for the operat s and theories of the main nomic, busines he structural of their manufact ciples and mer ating processe ating principle ipment and too res used in m equipment. quirements of health areas /ironmental pr ics, limits ar quality assura related to the ledge acquisit ving technique pusiness econo	tion of the related to theories a ss and lega materials ture and the thods, made s. es and str ols used. nechanical the occup related t rotection ru- nd require ance, infor field of er ion, data es in mech mics and of	nd problem-solving al rules and tools. used in the field of e conditions of their chine manufacturing uctural units of the engineering, their pational safety, fire o his/her field of egulations. ments of logistics, mation technology, agineering. collection methods, anical engineering. cost-benefit analysis
			the technica adequate ev Ability to a technical fie Ability to pl Ability to pl Ability to io them (using background Ability to u their field. The acquire	al field, t aluations. upply the eld in the lan, organ dentify ro g standard. nderstand d IT know	o formulate most impo performance ise and carr putine profe d operation I and use lit vledge can b	e synthe rtant te e of rela y out in ssional s in pr erature, pe appli	etically the in rminology, th ted tasks. dependent lea problems, to actice) agains computer and	terrelation eories and rning. identify, f st a theor d library r ion of task	e knowledge base of iships and to make I procedures of the formulate and solve etical and practical esources specific to as in the field.	

fundamental relationship with the world. I is open to learning about, embracing and authentically communicating professional, technological development and innovation in engineering. You strive to make your self-training a measure to achieve your professional goals. Make decisions in complex or unexpected decision-making situations, taking full account of legal and efficial stradards. It tries to solve problems in cooperation with others, where possible. Strive to keep their self-training a meachment decisions by listening to the opinions of the colleagues it manages, preferably in cooperation. You have the stamina and tolerance for monotony needed to carry out practical activities. You are open to the use of IT tools, you strive to learn and use software in the field of mechanical engineering, and you know and use at least one of these programs to a proficient level. Open and receptive to new, modern and innovative practices and methods related to organic farming and health awareness. Using his/her technical knowledge, he/s/he strives to understand the observable phenomena as thoroughly as possible, to describe and explain their laws. In the course of his/her work, he/s/he independently thinks through and develops comprehensive, substantiating professional questions on the basis of given sources. Autonomy and responsibility In unexpected decision situations, he/s/he independently thinks through and develops comprehensive, substantiating professional quescions on the basis of given sources. Autonomy and responsibility In unexpected decision situatic, technological and administrative changes in the field. Directs the work of the stotheres manag		
In carrying out his/her professional duties, he/she will also cooperate with qualified professionals from other fields (primarily technical, economic and legal). Identify the shortcomings of the technologies used, the risks of the processes and initiate measures to reduce them. Monitor legislative, technical, technological and administrative changes in the field. Directs the work of the staff assigned to him/her, supervises the operation of machinery and equipment, based on the instructions of the work of subordinates. He/she is attentive to promoting the professional development of his/her subordinates, to managing and supporting their efforts in this direction, and to applying the principle of equal access. He shares his experience with his colleagues, helping them to develop. It takes responsibility for the consequences of its technical analyses, its proposals and its decisions. The main environmental issues of the moment are global warming, carbon dioxid emissions and sequestration, the impact of human activity on global warming, carbon dioxid emissions and sequestration, the significance of their environmental emissions. Energy production options, combined fossil, nuclear feedstocks. Accounting for renewable energies yources and the significance of their environmental emissions environmental management, environmental policy. Radioactivity and the interaction o different materials, absorption of radiation. Reduction of radiation intensity by differen walls, thin film walls. Effects of radiation on the human body, decontamination procedures Processing of heard text by note-taking and recording of material using own notes an electronically available notes 80% Development of test questions 20% Sandor Bisz		It is open to learning about, embracing and authentically communicating professional, technological development and innovation in engineering. You strive to make your self-training a means to achieve your professional goals. Make decisions in complex or unexpected decision-making situations, taking full account of legal and ethical standards. It tries to solve problems in cooperation with others, where possible. Strive to keep their self-training in mechanical engineering continuous and in line with their professional goals. It strives to solve its tasks and make management decisions by listening to the opinions of the colleagues it manages, preferably in cooperation. You have the stamina and tolerance for monotony needed to carry out practical activities. You are open to the use of IT tools, you strive to learn and use software in the field of mechanical engineering, and you know and use at least one of these programs to a proficient level. Open and receptive to new, modern and innovative practices and methods related to organic farming and health awareness. Using his/her technical knowledge, he/she strives to understand the observable phenomena as thoroughly as possible, to describe and explain their laws. In the course of his/her work, he/she observes and complies with the relevant safety, health, environmental, quality assurance and control requirements. Autonomy and responsibility In unexpected decision situations, he/she independently thinks through and develops comprehensive, substantiating professional questions on the basis of given sources. Responsibly uphold and represent the values of the engineering profession, and be
Assesses the efficiency, effectiveness and safety of the work of subordinates. He/she is attentive to promoting the professional development of his/her subordinates, to managing and supporting their efforts in this direction, and to applying the principle of equal access. He shares his experience with his colleagues, helping them to develop. It takes responsibility for the consequences of its technical analyses, its proposals and its decisions.Short description of the subject contentThe main environmental issues of the moment are global warming, carbon dioxide emissions and sequestration, the impact of human activity on global warming, carbon dioxide emissions and sequestration, the significance of their environmental emissions for renewable energy sources and the significance of their environmental emissions Energy production options, combined fossil, nuclear and renewable energies, basics o environmental management, environmental policy. Radioactivity and the interaction o different materials, absorption of radiation on the human body, decontamination proceduresTypes of student activitiesProcessing of heard text by note-taking and recording of material using own notes and electronically available notes 80% Development of test questions 20%Required literature and contact details• Endre Kiss: Environmental protection and energy management (electroni note)Sándor Bisztray-Balku, László Bozóki, László Koblinger: The Developmen of Radiation Protection in Hungary, Akadémiai Kiadó, 1982Recommended literature and contact details• Martin James E: Physics for radioactivity, Wiley-VCM Verlag GMBH, 201: • Nikjoo Mooshang: Interaction of radiation with Matter , Taylor and Francis 2019Description of tasks to be submitted/measurement reportsWeek 7: I final examination 		open to professionally informed critical comments. In carrying out his/her professional duties, he/she will also cooperate with qualified professionals from other fields (primarily technical, economic and legal). Identify the shortcomings of the technologies used, the risks of the processes and initiate measures to reduce them. Monitor legislative, technical, technological and administrative changes in the field. Directs the work of the staff assigned to him/her, supervises the operation of
Short description of the subject contentemissions and sequestration, the impact of human activity on global warming, carbon dioxide emissions and ways to reduce global warming. The 3 E harmonisation. Life expectancy and polluting emissions of fossil fuels and nuclear feedstocks. Accounting for renewable energy sources and the significance of their environmental emissions Energy production options, combined fossil, nuclear and renewable energies, basics o environmental management, environmental policy. Radioactivity and the interaction o different materials, absorption of radiation. Reduction of radiation intensity by differen walls, thin film walls. Effects of radiation on the human body, decontamination proceduresTypes of student activitiesProcessing of heard text by note-taking and recording of material using own notes and electronically available notes 80% Development of test questions 20%Required literature and contact detailsEndre Kiss: Environmental protection and energy management (electronic note)Recommended literature and contact detailsMartin James E: Physics for radioactivity, Wiley-VCM Verlag GMBH, 2012 • Nikjoo Mooshang: Interaction of radiation with Matter , Taylor and Francis 2019Description and timetable of the workshoreWeek 7: I final examination Week 12: II final examination		Assesses the efficiency, effectiveness and safety of the work of subordinates. He/she is attentive to promoting the professional development of his/her subordinates, to managing and supporting their efforts in this direction, and to applying the principle of equal access. He shares his experience with his colleagues, helping them to develop. It takes responsibility for the consequences of its technical analyses, its proposals and
Types of student activities electronically available notes 80% Development of test questions 20% Required literature and contact details • Endre Kiss: Environmental protection and energy management (electronic note) • Sándor Bisztray-Balku, László Bozóki, László Koblinger: The Developmen of Radiation Protection in Hungary, Akadémiai Kiadó, 1982 • Martin James E: Physics for radioactivity, Wiley-VCM Verlag GMBH, 2013 • Mikjoo Mooshang: Interaction of radiation with Matter , Taylor and Francis 2019 Description of tasks to be submitted/measurement reports Description and timetable of the workshops Week 7: I final examination Week 12: II final examination	Short description of the subject content	The main environmental issues of the moment are global warming, carbon dioxide emissions and sequestration, the impact of human activity on global warming, carbon dioxide emissions and ways to reduce global warming. The 3 E harmonisation. Life expectancy and polluting emissions of fossil fuels and nuclear feedstocks. Accounting for renewable energy sources and the significance of their environmental emissions. Energy production options, combined fossil, nuclear and renewable energies, basics of environmental management, environmental policy. Radioactivity and the interaction of different materials, absorption of radiation. Reduction of radiation intensity by different walls, thin film walls. Effects of radiation on the human body, decontamination procedures
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 Nikjoo Mooshang: Interaction of radiation with Matter , Taylor and Francis 2019 Description of tasks to be submitted/measurement reports Description and timetable of the workshops Week 7: I final examination Week 12: II final examination Week 12:	Required literature and contact details	 Endre Kiss: Environmental protection and energy management (electronic note) Sándor Bisztray-Balku, László Bozóki, László Koblinger: The Development of Radiation Protection in Hungary, Akadémiai Kiadó, 1982
Description of tasks to be submitted/measurement reports Description and timetable of the workshops Week 7: I final examination Week 12: II final examination	Recommended literature and contact details	Nikjoo Mooshang: Interaction of radiation with Matter , Taylor and Francis
Description and timetable of the Week 7: I final examination Week 12: II final examination	Description of tasks to be submitted/measurement reports	
	Description and timetable of the workshops	Week 12: II final examination

Responsible education Name of compulsory DUEN(L)- Type Full time 150/39	prior learn Presentati per week per term	ning on 2	Practice	rements a Fechnolog	nd NDT		Structural Inter	Code	BSc DUEN(L)-MGT-256				
Responsible education Name of compulsory DUEN(L)- Type Full time 150/39 Part time 150/15 Teacher responsible f Training objective and the course (content, o	nal unit prior learn Presentati per week per term	ning on 2	Institute of 7	Fechnolog		ent of S	tructural Inter		DUEN(L)-MGT-256				
Name of compulsory DUEN(L)- Type Full time 150/39 Part time 150/15 Teacher responsible f Training objective and the course (content, o	prior learn Presentati per week per term	on 2	Practice		gy, Departm	ent of S	tructural Inter	•.					
Name of compulsory DUEN(L)- Type Full time 150/39 Part time 150/15 Teacher responsible f Training objective and the course (content, o	prior learn Presentati per week per term	on 2	Practice		<u> </u>		Institute of Technology, Department of Structural Integrity						
Full time 150/39 Part time 150/15 Teacher responsible f Training objective and the course (content, o	per week per term	2	ļ,		r	Institute of reenhology, Department of Structural Integrity							
Part time 150/15 Teacher responsible f Training objective and the course (content, o	per term			Practice		Laboratory		Credit	Language of education				
Teacher responsible f Training objective and the course (content, o	1	10	per week per term	1 per week 0 5 per term 0 E			5	english					
Training objective and the course (content, o	or the suc	- •	Name					schedule	Professor emeritus				
			Students lea measuremen most import chains, and	Goals, development objectives Students learn the modern model-based measurement philosophy, which enables the measurement of reactor parameters that cannot be measured directly, learn about the most important nuclear power plant-specific, primarily primary circuit measurement chains, and get an overview of material testing techniques used in destructive and non- destructive nuclear power plants.									
Typical delivery meth	nods		Presentation Practice Laboratory Other				materials						
Requirements (expressed in terms of learning outcomes)			collection ar tools and ma Ability Students ara environmen measuremer Attitude Forms coop knowledge. Autonomy Able to inder a study base	nd evalua ethods us e able to t, think nt procedu eration w and resp pendently d on inter	ttion system ed in the pri set up a s through its ire and mea ith his/her g onsibility y learn nucl- rnational lite	is of nu- mary cin uitable conseq suremer roup ma ear pow grature, j	clear power p rcuit of nuclea measuring de juences and p at evaluation ates and the in- er plant measu with risk analy	lants. He <u>ir power p</u> vice in a proper op structor du irement provingent visis	nuclear power plant peration, develop the uring the expansion of rocedures and prepare				
Short description of th		DPZ transm Vibration r Measuremen collection communicat (Advanced I	nitters (I neasurem nt philos systems. ion. Bui Loose Pau uctive an	KNI chains ients. Reac ophy mode Hungaria lt-in reacto rt. System) i d non-destr); Press tivity o l-based n data r physio s the m uctive t	sure measuren coefficients, i measuremen a collector cs calculation odern acoustic ests: the six 1	ments; Tr heating e ts. Nucles VERON is in the c system for	ne neutron detectors, raffic measurements; element temperature: ar power plant data A. Human-machine new Verona. ALPS or searching for loose ortant non-destructive					
Types of student activ	vities		Participation	n in lectur	es, preparat	ion of a	n independent	study bas	ed on literature				
Required literature an	d contact	details	• IA	EA relat	ing material	s from i	nternet or on l	Moodle					
Recommended literat details		ontact	York, Ny, 978-0-7923-7412-1Published: 31 July 2001, Number of PagesXIV, 277					, Number of					
Description of tasks to submitted/measureme Description and timet workshops	ent reports		Presentation and study of nuclear power plant systems based on pre-agreed literature: 1 ppt presentation approx. 20 slides and an essay describing it										

NPP measurements and NDT