University of Dunaújváros

Mechanical Engineering
Master's course

2021

Contents

Course description

Mechanical Engineering Master's Course (Mechanical Engineering)	
Institution responsible for education	University of Dunaújváros
ID of institution	FI60345
Address	2400 Dunaújváros, Táncsics Mihály utca 1/A
Responsible leader	István András, Dr., rector
Leaders responsible for education	
Institution responsible for course	Technical Institute
Director of institute	Miklós Horváth, Dr.
Responsible for course	Ferenc Szlivka, Dr, Prof, CSc, PhD
Branches and branch responsible	
Lifetime management branch	Ferenc Szlivka, Dr, Prof, CSc, PhD
Parameters of education	
Level of education	Master education
Educational level	Master's degree (MSc)
Qualification indicated in the diploma in Hungarian	okleveles gépészmérnök
Qualification indicated in the diploma in English	Mechanical Engineer
Time of education	4 semesters
Number of credit scores to be acquired 120	
Educational objective of line	
The education is aimed at training engineers capable of elaborating the concept of machines, machineries and processes, modeling them, then planning, operating and maintaining them; developing machine industry technologies, new materials, production technologies and using them in view of environmental aspects; performing leading, management and organization tasks, performing the tasks of technical development, research, planning and innovation, connecting to and coordinating engineering projects of domestic and/or international level, as well as continuing engineering studies even within the scope of doctor's education.	

Contents of the course

a) The mechanical engineering basic course can be taken into account with the full credit value included.
b) Based on considering the attainments that serve as a basis of determining the credit — as specified in the Act on higher education — at least 80 credits according to former studies shall be able to be recognized in the fields as follows:

- basic attainments in the field of natural science (30 credits): mathematics, physics, chemistry, mechanics, material science, thermodynamics and fluid mechanics;
- economic and human knowledge (10 credits): economics, company economics, environmental protection, quality assurance, labour safety, social science;
- professional knowledge (40 credits): general mechanics, electrotechnics, fundamentals of machine design, fundamentals of CAD/CAM, machine elements, fundamentals of mechanical engineering, metallography, material science and technology of of polymers, machine production technology, IT systems, program planning, measurement and signal processing, hydraulic and thermal machines, control engineering, material transport machines and systems, safety engineering, chemical engineering and energetics, quality assurance, mobile machines, agricultural machines, planning of machines and products, environmental industry. A condition of admission to master's course shall be that the student acquired at least 50 credits in the fields of knowledge listed above. The missing credits shall be acquired in parallel with the master's course within two semesters following the admission as specified in the study and examination regulations of the higher educational institution.

c) For the admission, the basic courses that can be primarily taken into account by obtaining the credits specified under b) are: material engineering, energetic engineering, industrial planning and design engineering, agricultural and food industry engineering, traffic engineering and mechatronic engineering .

d) By obtaining the credits specified under b), the basic courses granting basic degree or master's degree as well as college- or university level basic courses according to the Act CXXXIX of 2005 on the higher education that are accepted by the credit transfer committee of the higher educational institution based on adding the attainment that serve as a basis of determining the credit can also be taken into account.	
e) Professional practice	The professional practice shall take at least 4 weeks
Conditions of issuing the absolutorium	The absolutorium certifies that the student passed the examinations specified in the study program successfully, fulfilled other study requirements (e.g. physical training) except the preparation of the thesis as well as acquired the credits specified in the study- and outlet requirements except the credits associated with the thesis, and gives evidence without qualification and evaluation that the student fulfilled the study- and examination requirements specified in the study program in full.
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
Conditions of admission for final examination	The final examination serves for verification and evaluation of attainments, abilities and attitudes during which the student shall also give evidence that he/she is capable of applying the knowledge acquired. The final examination consists of the defense of diploma work and verbal ^examination in subjects specified in the study program

Lifetime management branch	**Compulsory:** **Lifetime management subjects** Lifetime management (DFMN(L)-MUG-018) Maintenance strategies (DFMN(L)-MUG-010) Machine state testing methods (DFMN(L)-MUG-012) Mounting and repair technologies (DFMN/L-MUA-008) **Optional:** Reliability models (DFMN(L) -MUG-014) Weldability (DFMN(L) -MUA-007) Special materials and technologies (DFMN(L) -MUA-004) Testing of materials and structures (DFMN/L-MUA-006)
Diploma average	The result of diploma shall be calculated as follows: (ZV + D + TA)/3. Arithmetical mean of marks for final examination subjects (ZV) , 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; acceptable 2,00 - 2,50
Conditions of issuing diploma	The precondition of issuing diploma to certify the completion of higher level studies shall be the passing of successful final examination and language examination specified. Obtaining the master's degree is subject to a state recognized complex type medium level (B2) language examination in any living foreign language in which the given trade has scientific literature or an equivalent secondary school-living certificate or diploma..
Work order	Full-time (regular), part-time (correspondent)

Engineering competences expected

a) knowledge

- Know the general and specific mathematics, natural and social sciences principles, rules, relationships and procedures for the technical field of agriculture.
- Comprehensive understanding of global social and economic developments. - Do you know the theories, and the relationship between them make up the terminology is essential in technical areas.
- Know and understand the technical field of activities for knowledge and basic facts, and the limits of the expected directions of progress and development.
- Knowledge and understanding related to the technical area and the occupation of a key importance in other areas (mainly in logistics, management, environmental protection, quality control, information technology, legal, economic, labor and fire protection, safety areas) terminology, the main specifications and criteria.
- In-depth knowledge and understanding of knowledge acquisition, data collection methods in the technical field, their ethical constraints and problem-solving techniques. - A comprehensive overview of important structural properties of materials used in mechanical and areas of application.
- Details of the rules of the technical documentation created. - Familiar productivity tools and methods necessary for the occupation specialty legislation related to driving.
- Provides a related engineering field measurement and test theoretical knowledge. - Do you know a related engineering field of information and communication technologies.
- Know and understand the related computer modeling and simulation engineering skill of the art tools and methods. - Wide range of theoretical and practical preparedness, methodological and practical knowledge of complex engineering systems and processes for the design, production, modeling, operation and management.
- Comprehensive knowledge of Mechanical design of machines, systems and process design methods.

b) skills

- Technical problems solving in field gained the ability to apply general and specific mathematics, natural and social sciences principles, rules, relationships and processes.
- Ability of the relevant technical field theories and related terminology when applied to solve problems in innovative ways.
- Ability to specific problems in the field of professional and versatile interdisciplinary approach to solve.
- The ability to organize in cooperation with experts from the related disciplines in problem solving.
- The use of modern methods of data acquisition to knowledge and innovative ways to be able to solve specific technical problems arising in the art.
- Can information and communication technologies and methods used to solve technical problems.
- Are you ready to trade territory, language and conduct at least one foreign language publications, presentations and business negotiations.
- After due practice is able to perform managerial tasks.
- Laboratory testing and analysis, evaluation and documentation of test results Able materials used in the engineering field.
- Are you ready to process and organize information gathered during the operation of engineering systems and processes to analyze, draw conclusions.
- Ability to original ideas to enrich the knowledge base of engineering sciences.
- Ability to apply integrated knowledge of machinery, mechanical equipment, systems and processes in engineering materials and technologies, and related areas of electronics and information technology professionals.
- Ability Based on a system-oriented, process-oriented way of thinking global design complex systems to learn.
- Ability to plan and manage complex technical, economic, environmental, and human resource utilization.
- Ability to design engineering systems and processes, used for organizing and operating procedures, models, their application and further development of information technologies.
- Ready for mechanical systems, technologies and processes, quality assurance, metrology, and process control for solving tasks you.
- Ability to deal with problems in creative and flexible to solve complex tasks, as well as lifelong learning and commitment to diversity and value-based side.

c) attitude

- An open and receptive to learn and adopt credible mediation of the technical field in a professional, technological development and innovation.
- It takes a professional and ethical values related to the technical area.
- Seek technical areas related to the development of new methods and tools to collaborate. Mind profound vocation.
- Striving to both its own staff and continuous self-knowledge and training to develop.
- Endeavor to respect the work and organizational culture of ethical principles are complied with.
- Strives to comply with the quality requirements are complied with.
- Strives for environmental awareness, according to health awareness and sustainability expectations organize and carry out tasks.
- Seek a broad, comprehensive literacy acquisition.
- Shall be guided by the requirements of sustainability and energy efficiency.
- Seek professional work individually or in groups to plan and execute the tasks at a high level.
- Striving to perform the work of a complex approach based on system-based and process-oriented way of thinking.
- Examining the possibility of setting the research, development and innovation objectives in its work and seek to implement them.
- Work towards the application of acquired technical knowledge of observable phenomena thorough knowledge of, the laws of the description, to explain.
- Committed to high standards, quality work toward, shows an example of staff for the purposes of this approach.
- Committed to the expansion of new areas of mechanical engineering knowledge with scientific evidence.
- Mechanical power turn-themed research and development projects, to achieve this goal, in cooperation with members of the development team will mobilize theoretical and practical knowledge and skills.
- Committed to the health and safety culture towards health promotion.

d) Autonomy and responsibility

- Knowledge and experience acquired in formal, non-formal and informal sharing of information reporting forms specializes in cultivating.
- Evaluate the work of his subordinates, critical comments of sharing promotes professional development.
- Independently be able to solve engineering problems.
- Assume a proactive role in solving technical problems.
- Take responsibility for part of the process taking place under his command.
- Working independently in the field to professional decisions.
- Responsible colleagues and subordinates and encourage ethical profession.
- Work in solving problems independently and proactively occurs.
- Bears responsibility for sustainability, occupational health and safety culture and awareness towards the environment.
- The decisions carefully, to other areas of expertise (mainly legal, economic, energy and environmental) in consultation with representatives be autonomous, assume any liability.
- In making its decision takes account of environmental protection, quality management, consumer protection, product liability, the principle and application of equal access, occupational health and safety, technical, economic and legal regulations, as well as engineering ethics basic specifications.

Curriculum

Mechanical Engineering Master's Course

8th May 2021

Curriculum

Mechanical Engineering Master's Course

Codes	Modules/Coupes	Semesters-classes per week																				Prerequisites	Responsible
		1					2					3					4						
		lec.	prac.	lab.	re	cr.	lec.	prac	lab.	re	cr.	lec.	prac	lab.	re	cr.	lec.	prac	lab.	re	cr.		
DUEN-IMA-150	Mathematics I.	2	1	0	E	5																	Dr. Györgyi Strauber
DUEN-MUA-152	Modern Material and Production Technologies	2	0	1	E	5																	Dr.Gábor Vizi
DUEN-MUG-154	Mechanics I.	2	1	0	E	5																	Dr..prof.András Zachár
DUEN-TVV-251	Product Management and Value Evaluation	2	1	0	E	5																	
DUEN-MUG-116	Measuring Technology and Signal Processing	1	0	2	P	5																	Dr. Gábor Pór
	Electives 1.	2	1	0	E	5																	
DUEN-MUT-150	Phisycs						1	1	1	E	5												Dr. Endre Kiss
DUEN-TVV-252	Management Knowledge						2	1	0	E	5												Dr. habil Mónika Rajcsányi-Molnár
DUEN-MUA-254	Degradation of Engineering Materials						2	0	1	E	5												Dr. Zsolt Csepeli
DUEN-IMA-250	Mathematics II.						2	1	0	E	5											DUEN-IMA-150	Dr. Györgyi Strauber
	Electives 2.						4	1	1	E	10												
DUEN-MUG-156	Reliability Theory and Structural Integrity Analysis											2	0	1	E	5						DUEN-MUG-154 DUEN-MUA-254	Dr. prof. eme. Péter Trampus
DUEN-MUT-152	Technical heat and flow theory											2	0	1	E	5							Dr. prof. Ferenc Szlivka
DUEN-MUG-095	Project Task											0	5	0	S	5							Dr. prof. Ferenc Szlivka
	Electives 3.											2	4	1	P	15							
DUEN-MUG-220	Computer- Modelling and Simulation																1	0	2	P	5	DUEN-IMA-250	Dr..prof.András Zachár
	Electives 4.																2	12	1	E/P	25		
	Weekly lec. ,tut., lab., credit	**11**	**4**	**3**		**30**	**11**	**4**	**3**		**30**	**6**	**9**	**3**	**0**	**30**	**3**	**12**	**3**		**30**		
	Total number of classes per week	18					18					18					18						
	Total number of credits	**120**																					

Specialization Lifetime Management

Codes	Modules/Coupes	Semesters-classes per week																				Prerequisites	Responsible
		1					2					3					4						
		lec.	prac.	lab.	re	cr.	lec.	prac	lab.	re	cr.	lec.	prac	lab.	re	cr.	lec.	prac	lab.	re	cr.		
DUEN-MUG-150	Lifetime Management	2	1	0	E	5																	Dr. prof. eme. Péter Trampus
DUEN-MUG-255	Maintenance Strategies						2	1	0	E	5												Dr. Attila Szabó
DUEN-MUA-256	Mounting and Repair Technologies						2	0	1	E	5												Dr. Róbert Sánta
	Professional Electives (Mech. Eng. Master)											2	0	1	P	5							
DUEN-MUG-096	Thesis Project I.											0	4	0	P	10							Dr. Péter Bajor
DUEN-MUG-250	Machine Condition Monitoring Methods																2	0	1	E	5		Dr. András Nagy
DUEN-MUG-097	Thesis Project II.																0	12	0	P	20		Gábor Ladányi
	Industrial practice (4 weeks)																0	0	0	S	0		
	Weekly lec. .tut., lab., credit	**2**	**1**	**0**		**5**	**4**	**1**	**1**		**10**	**2**	**4**	**1**		**15**	**2**	**12**	**1**		**25**		
	Total number of classes per week	3					6					7					15						
	Total number of credits	**55**																					

Professional Electives - Mechanical Engineering MSc

Codes	Modules/Coupes	Semesters-classes per week																				Prerequisites	
		1					2					3					4						
		lec.	prac.	lab.	re	cr.	lec.	prac	lab.	re	cr.	lec.	prac	lab.	re	cr.	lec.	prac	lab.	re	cr.		
												2	0	1	P	5							
DUEN-MUA-112	Weldability											2	0	1	P	5							Dr. prof. eme. Béla Palotás
DUEN-MUA-115	Special Materials and Technologies											2	0	1	P	5							Dr. Zsolt Csepeli
	Weekly lec. ,tut., lab., credit	**0**	**0**	**0**		**0**	**0**	**0**	**0**		**0**	**2**	**0**	**1**		**5**	**0**	**0**	**0**		**0**		
	Total number of classes per week	0					0					3					0						
	Total number of credits	**5**																					

Subject matter programs, descriptions of subject matters

Mathematics I.

<table>
<tr><td rowspan="2">subject name</td><td>HUNGARIAN</td><td colspan="4">Matematika I.</td><td>Level</td><td>Code:</td></tr>
<tr><td>English</td><td colspan="4">Mathematics I.</td><td>MSc 1. Semester</td><td>DUEN(L)-IMA-150</td></tr>
<tr><td colspan="2">Responsible Education Unit</td><td colspan="6">Institute of Informatics</td></tr>
<tr><td colspan="2">Mandatory pre-study name</td><td colspan="6">No</td></tr>
<tr><td rowspan="2">Type</td><td colspan="2" rowspan="2">Hours per week
Performance</td><td colspan="2">Practice</td><td colspan="2">Lab</td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td>Full time</td><td></td><td>2</td><td></td><td>1</td><td></td><td>0</td></tr>
<tr><td>Correspondence</td><td></td><td>Semester</td><td>10</td><td>Semester</td><td>5</td><td>Semester</td><td>0</td><td>Examination</td><td>5</td><td>English</td></tr>
<tr><td colspan="2">Subject Officer</td><td colspan="2">Name</td><td colspan="3">Dr. Györgyi Strauber</td><td>Position</td><td colspan="2">college teacher</td></tr>
<tr><td colspan="2">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="6">Goals, development objectives
Knowledge of calculation methods and algorithms serving for solving mathematical problems that occur in the technical life and, as a result of getting acquainted with the use of up-to-date mathematical program packages suitable to be used in solving technical problems, making the student capable of elaborating and implementing calculation procedures for everyday technical mathematical tasks by using mathematical software.
.</td></tr>
<tr><td colspan="2" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="5">For all students, using a large speaker, a board presentation, a projector or an overhead projector</td></tr>
<tr><td>Practice</td><td colspan="5">Small-room board exercises for up to 20 people</td></tr>
<tr><td>Lab</td><td colspan="5"></td></tr>
<tr><td>Other</td><td colspan="5"></td></tr>
<tr><td colspan="2" rowspan="4">Requirements (expressed in academic results)</td><td colspan="6">Knowledge
o You are familiar with the general and specific mathematical, natural and social science principles, rules, contexts and procedures necessary for the field of technical field.
o You have a comprehensive knowledge of global social and economic processes. - You are familiar with the fundamental theories, contexts and terminology that make up them.
o You know and understand the basic facts, boundaries and expected directions of development and development in the technical field.</td></tr>
<tr><td colspan="6">Ability
o Capable of designing, organising and performing self-study.
o It is capable of identifying routine professional problems, identifying, formulating and resolving the practical and practical background necessary to resolve them (using standard operations in practice).
o Capable of creating basic models of technical systems and processes.</td></tr>
<tr><td colspan="6">Attitude
o It shall endeavour to contribute to the development of new methods and tools related to the technical field. His sense of vocation deepened.
o Strive striving to develop both your own knowledge and your staff's knowledge through continuous self-training and training.
o Strive striving to acquire a wide range of comprehensive literacy.</td></tr>
<tr><td colspan="6">Autonomy and responsibility
Even in unexpected decision-making situations, it independently takes a look at the broad, underlying professional issues and development on the basis of specific</td></tr>
</table>

	sources. In carrying out his professional duties, he also cooperates with qualified professionals in other fields (primarily technical, economic and legal). Share your experiences with colleagues to help them grow. It takes responsibility for the consequences of its technical analyses, its proposals and the decisions that are taken.
A brief description of the content of a subject	Probability theory: notable distributions occurring in the technical practice. Elementary complex functions, limit value, continuity. Differentiability of complex functions. Cauchy-Riemann equations, harmonic functions, analytic functions, Taylor's series. Integration of complex functions. Cauchy's integral theorem, Cauchy's integral formulas, Liouville's theorem, meromorf functions, Laurent's series, residuum theorem and its applications, conform mappings, Laplace transform, convolution. Solving linear differential equations by using Laplace transform. Boundary-value problems for second order linear differential equations. Bessel's differential equation, Bessel's functions, Legendre's differential equation, Legendre's polynoms. Generalized Fourier series, orthogonality properties, Parseval's theorem.
Student activities	Lecture: Written text processing with note-taking 40%, theoretical material self-processing 20%, task solution 40%.
Mandatory literature and availability	[1] László Csernyák (ed.): Probability Calculation, Budapest, Nemzeti Tankönyvkiadó, 2007, 216 p. ISBN 978-963-19-5949-9 [2] Pál Szász: Elements of differential and integral calculus II. Budapest, Typotex, 2001, pp. 444-564, ISBN 963-932-605-4 [3] János Tóth, Péter Simon L.: Differential Equations, Budapest, Typotex, 2009, pp. 141-149, ISBN 978-963-279-057-2
Recommended literature and availability	[4] László Hanka, Miklós Zalay: Complex Function Exemplar, Budapest, Műszaki K., 2010, 416 p. ISBN 978-963-16-2816-6 [5] Pál Szász: Elements of differential and integral calculus II. Budapest, Typotex, 2001, 606 p. ISBN 963-932-605-4

Mathematics II.

<table>
<tr><td rowspan="2">subject name</td><td>HUNGARIAN</td><td colspan="4">Matematika II.</td><td>Level</td><td>Code:</td></tr>
<tr><td>English</td><td colspan="4">Mathematics II.</td><td>MSc 2 Semester</td><td>DUEN(L)-IMA-250</td></tr>
<tr><td colspan="2">Responsible Education Unit</td><td colspan="6">Institute of Informatics</td></tr>
<tr><td colspan="2">Mandatory pre-study name</td><td colspan="6">Mathematics I.</td></tr>
<tr><td rowspan="2">Type</td><td colspan="6">Hours per week</td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td colspan="2">Performance</td><td colspan="2">Practice</td><td colspan="2">Lab</td></tr>
<tr><td>Full-time</td><td></td><td>2</td><td></td><td>1</td><td></td><td>0</td><td rowspan="2">Examination</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Correspondence</td><td>Semester</td><td>10</td><td>Semester</td><td>5</td><td>Semester</td><td>0</td></tr>
<tr><td colspan="2">Subject Officer</td><td colspan="2">Name</td><td colspan="2">Dr. Györgyi Strauber</td><td>Status</td><td>college teacher</td></tr>
<tr><td colspan="2">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="6">Goals, development objectives
Knowledge of calculation methods and algorithms serving for solving mathematical problems that occur in the technical life and, as a result of getting acquainted with the use of up-to-date mathematical program packages suitable to be used in solving technical problems, making the student capable of elaborating and implementing calculation procedures for everyday technical mathematical tasks by using mathematical software..</td></tr>
<tr><td colspan="2" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="5">For all students, using a large speaker, a board presentation, a projector or an overhead projector</td></tr>
<tr><td>Practice</td><td colspan="5">Small-room board exercises for up to 20 people</td></tr>
<tr><td>Lab</td><td colspan="5"></td></tr>
<tr><td>Other</td><td colspan="5"></td></tr>
<tr><td colspan="2" rowspan="5">Requirements (expressed in academic results)</td><td colspan="6">Knowledge
o You are familiar with the general and specific mathematical, natural and social science principles, rules, contexts and procedures necessary for the field of technical field.
o You have a comprehensive knowledge of global social and economic processes. - You are familiar with the fundamental theories, contexts and terminology that make up them.
o You know and understand the basic facts, boundaries and expected directions of development and development in the technical field.</td></tr>
<tr><td colspan="6">Ability
o Capable of designing, organising and performing self-study.
o It is capable of identifying routine professional problems, identifying, formulating and resolving the practical and practical background necessary to resolve them (using standard operations in practice).
o Capable of creating basic models of technical systems and processes.</td></tr>
<tr><td colspan="6">Attitude
o It shall endeavour to contribute to the development of new methods and tools related to the technical field. His sense of vocation deepened.
o - Strives to develop both your own knowledge and your staff's knowledge through continuous self-training and training.
o - Strives to comply with and enforce the ethical principles of the culture of work and organisation.
o - Strives to comply with and enforce quality requirements.
o - Strives to acquire a wide range of comprehensive literacy.
O . .</td></tr>
<tr><td colspan="6">Autonomy and responsibility
Even in unexpected decision-making situations, it independently takes a look at the broad, underlying professional issues and development on the basis of specific sources.
In carrying out his professional duties, he also cooperates with qualified professionals in other fields (primarily technical, economic and legal).
Share your experiences with colleagues to help them grow.</td></tr>
</table>

	It takes responsibility for the consequences of its technical analyses, its proposals and the decisions that are taken.
A brief description of the content of a subject	Non-linear differential equations, phase portrait, classification of equilibrium conditions, stability, asymptotic stability. Ljapunov's theorems. Autonomous equations, dynamic systems. Important partial differential equations in the physics. First order partial differential equations. Classification of second order partial differential equations linear in their main part, canonic forms. Laplace's equation and Poisson's equation. Heat conduction equation, Fourier transform and its application. Wave equation, expansion into Fourier series. Numeric solutions important in the technical practice that can be connected to the theory learnt: iterative solutions of linear equation systems, initial- and boundary value problems of common linear differential equations, numeric methods for partial differential equations.
Student activities	Lecture: Written text processing with note-taking 40%, theoretical material self-processing 20%, task solution 40%.
Mandatory literature and availability	Stoyan Gisbert: Numerical Mathematics, Budapest, Typotex, 2007, pp. 181-205, ISBN 978-9-639664-41-8 Pál Szász: Elements of differential and integral calculus II. Budapest, Typotex, 2001, pp. 45-61, 70-77, ISBN 963-932-605-4 János Tóth, Péter Simon L.: Differential Equations, Budapest, Typotex, 2009, pp. 120-138, 153-293, ISBN 978-963-279-057-2 978-963-279-057-2
Recommended literature and availability	Stoyan Gisbert, Takina Galina: Numerical Methods I. Typotex, 1993, pp. 82-130, ISBN 963-7546-31-6 Stoyan Gisbert, Takó Galina: Numerical Methods II. Typotex, 1995, p. 11-60, pp. 155-229, p. 236-275, ISBN 963-7546-53-7 Stoyan Gisbert, Takó Galina: Numerical Methods III. Typotex, 1997, p. 13-43, ISBN 963-7546-77-4

Mechanics |

<table>
<tr><td rowspan="2">subject name</td><td>HUNGARIAN</td><td colspan="8">Mechanika</td><td>Level</td><td>Code:</td></tr>
<tr><td>English</td><td colspan="8">Mechanics.</td><td>MSc 1. Semester</td><td>DUEN(L)-MUG-154</td></tr>
<tr><td colspan="3">Responsible Education Unit</td><td colspan="9">Institute of Informatics</td></tr>
<tr><td colspan="3">Mandatory pre-study name</td><td colspan="9">No.</td></tr>
<tr><td rowspan="2">Type</td><td colspan="8">Hours per week</td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td colspan="2">Performance</td><td colspan="3">Practice</td><td colspan="3">Lab</td></tr>
<tr><td>Full-time</td><td></td><td></td><td>2</td><td></td><td>1</td><td></td><td>0</td><td rowspan="2">Examination</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Correspondence</td><td></td><td>Semester</td><td>10</td><td>Semester</td><td>5</td><td>Semester</td><td>0</td></tr>
<tr><td colspan="3">Subject Officer</td><td>Name</td><td colspan="5">Dr. András Zachár</td><td>Capacity</td><td>Professor</td></tr>
<tr><td colspan="3">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="9">Goals, development objectives
By completing the subject, the student should be able to identify and model major flexibility issues and, in simpler cases, solve them; in addition, the interpretation and modelling of basic mechanical vibration phenomena.</td></tr>
<tr><td colspan="3" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="8">For all students, using a large speaker, a board presentation, a projector or an overhead projector</td></tr>
<tr><td>Practice</td><td colspan="8">Small-room board exercises for up to 20 people</td></tr>
<tr><td>Lab</td><td colspan="8"></td></tr>
<tr><td>Other</td><td colspan="8"></td></tr>
<tr><td colspan="3" rowspan="4">Requirements (expressed in academic results)</td><td colspan="9">Knowledge
o He has knowledge of metrology and measurement theory related to the engineering field. - He is familiar with information and communication technologies related to the engineering field.
o You know and understand the tools and methods of computer modelling and simulation related to the field of mechanical engineering. - You have extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes..</td></tr>
<tr><td colspan="9">Ability
o In solving a problem, it is able to organise cooperation with experts in related fields.
o It can solve specific technical problems in its field in an innovative way using state-of-the-art knowledge acquisition and data collection methods.
o It is able to use information and communication technologies and methods to solve technical problems.
o Prepared to conduct publication, presentation and discussions in your field, in your native language and in at least one foreign language.</td></tr>
<tr><td colspan="9">Attitude
o It shall endeavour to contribute to the development of new methods and tools related to the technical field. His sense of vocation deepened.
o Strive striving to develop both your own knowledge and your staff's knowledge through continuous self-training and training.
o It strives to comply with and enforce the ethical principles of the culture of work and organisation.
o It strives to comply with and enforce quality requirements.</td></tr>
<tr><td colspan="9">Autonomy and responsibility
o It is self-sufficient to solve engineering tasks.
o Take the initiative to solve technical problems.
o Assume responsibility for the sub-processes under your control.
o It makes professional decisions on its own in its field of operation.
o Encourages your staff and subordinates to practise their professions in a responsible and ethical way.
o When solving professional problems, it acts independently and proactively</td></tr>
<tr><td colspan="3">A brief description of the content of a subject</td><td colspan="9">Determination of the stresses and displacement of statically indefinite structures. Use a power method, prescribe the connection condition</td></tr>
</table>

	(compatibility) equation system, and resolve it. Use of a power method for specially constructed structures, multi-support straight brackets, the Clapeyron equation. The basis for calculating voltages in curved shaft symmetric shells once and twice. Thick-walled pipes, shrink binding, pipe diagram. Sizing for load capacity, plastic load-bearing reserve for statically determined and statically indefinite structures. It is complex to reduce a degree of freedom of swinging systems. Prescribing a reduced swing system and its motion equation based on the items learned in classical dynamics. Prescribing a reduced swing system and its motion equation using an energy method, using lagrange motion equations, general coordinates. Vibrations of multi-freedom systems, matrix shape of motion equations. Examine and resolve your own value problem in simpler cases. Bending swings. Methods of vibration reduction, passive and active vibration reduction.
Student activities	Lecture: Written text processing with note-taking 40%, theoretical material self-processing 20%, task solution 40%.
Mandatory literature and availability	János Égert - Zoltán Nagy: Mechanics (Movement Studies), Győr, Széchenyi István University, 2006. Béla Csizmadia - Ernő Nándori: Mechanics for Engineers (Strength of Science), National Textbook Publisher, Budapest 1999. Béla Csizmadia - Ernő Nándori: Mechanics for Engineers (Movement Studies), National Textbook Publisher, Budapest 1997. Attila Hegedűs: Fundamentals of Technical Vibration Theory, Szent István University Press, Gödöllő, 2009.
Recommended literature and availability	István Nagy: Technical diagnostics I. Vibration diagnostics, 2006, ISBN: 9630608073 Ferenc Dömötör: Vibration Diagnostics I., 2008, DF Publisher Ferenc Dömötör: Vibration Diagnostics II., 2011, DF Publisher

Physics

Name of the subject	HUNGARIAN	**Fizika**							Level	Code:	
	English	**Physics**							MSc 2 Semester	DUEN(L)-MUT-250	
Responsible Education Unit		Institute of Technology, Department of Natural Sciences and Environment									
Mandatory pre-study name											
Type	Hours per week								Requirement	Credits	Language of education
	Lecture			Practice			Lab				
All-time			1		1			1	A	5	English
Correspondence		Semester	5	Semester	5		Semester	5			
Subject Officer				Name			Dr. Kiss Endre		Status	college teacher	
Training purpose and justification of the course (content, output, curriculum space)		**Goals, development objectives** To study thebasics of modern Physics with special emphases of the Physics of material testing, fracture mechanics, and surface phenomena									
Typical transfer methods		Performance	For all students, using a large speaker, a board presentation, a projector or an overhead projector								
		Practice	Small-room board exercises for up to 20 people								
		Lab	Measurement in measuring pairs in the Physics laboratory								
		Other									
Requirements (expressed in academic results)		**Knowledge** You are fully aware of the basic facts, directions and boundaries of the field of technical expertise. You are familiar with the general and specific rules, contexts and procedures necessary for the cultivation of the technical field. He knows the concept of his field, the most important contexts and theories. He is fully familiar with the main theories of his field of knowledge and problem solving Methods. At the employing level, he is familiar with the measurement procedures used in mechanical engineering, their tools, instruments and measuring equipment. It can interpret, characterize and model the structure, operation, design and relationship of the structural units and components of mechanical systems.									
		Ability It is capable of basic analysis of the disciplines that make up the technical field of knowledge, the synthetic formulation of correlations and the activity of evaluating the quality. It is able to apply the most important terminology, theories and procedures of the technical field in which they are performed. It is capable of planning, organising and performing independent learning. It is able to identify routine professional problems, to solve them in principle and to explore, formulate and provide practical background (standard operations (e.g., the application of this problem). It is able to understand and use the typical expertise, computer science and library resources of its field. The knowledge acquired is capable of carrying out tasks in its field solution of the application. It is capable of creating basic models of technical systems and processes. It is able to communicate in your mother tongue in a professional, professional lyande manner, orally and in writing.									
		Attitude He accepts and authentically represents the social role of his profession, his fundamental relationship with the world. It is open to the knowledge and acceptance and authentic transmission of									

	professional, technological development and innovation in the field of technology. It strives to resolve problems as much as possible in cooperation with others. With sufficient endurance and monotony tolerance to carry out practical activities Have. Using his acquired technical knowledge, he strives to learn more about observable phenomena, to describe and explain his legalities. In the course of its work, it complies with and enforces the relevant safety, health, environmental and quality assurance and control requirements.
	Autonomy and responsibility Even in unexpected decision-making situations, it independently takes a look at the broad, underlying professional issues and developthem on the basis of specific sources. In carrying out his professional duties, he also cooperates with qualified professionals in other fields (primarily technical, economic and legal). Share your experiences with colleagues to help them grow. It takes responsibility for the consequences of its technical analyses, its proposals and the decisions that are taken.
A brief description of the content of a subject	Overview and revival of BSC physics education. Properties of light, microscope, spectroscope, Schlieren equipment. Foundations of atomic physics and quantum mechanics. Properties of solid supheasians. Electron microscopes (SEM TEM, and their application in the material test. The crystal structure of solid shards. Amorphous structures. Structure of the surface of solid supheasi. Surface phenomena and their application in the material test. Surface plasmonos, quantum dots and other structures. Absorption, Auger spectroscopy. The basics of fracture mechanics.
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%.
Mandatory literature and availability	Gruber: Physics for Engineers Endre Kiss Engineering Physics/Engineering Physics, Electronic Note/Electronic book, Moodle.duf.hu/Mérnöki Physics Lab Exercises Guides/Syllabuses for laboratory practices, Moodle/duf/en Serway: Physics for Engineers
Recommended literature and availability	Ágoston Budó: Experimental Physics I, II, III. (National Textbook Publisher, Budapest, 1997) R. Feynmann: Modern Physics 1, 2, 3, 5, 7, 9 (Technical Publishing House, Budapest, 1986)-

Engineering Thermo- and Fluid Dynamics

<table>
<tr><td rowspan="2">Name of the subject</td><td>HUNGARIAN</td><td colspan="6">Műszaki hő- és áramlástan</td><td>Level</td><td>Code:</td></tr>
<tr><td>English</td><td colspan="6">Engineering Thermo- and Fluid Dynamics</td><td>MSc 3. Semester</td><td>DUEN(L)-MUT-152</td></tr>
<tr><td colspan="2">Responsible Education Unit</td><td colspan="8">Institute of Technology</td></tr>
<tr><td colspan="2">Mandatory pre-study name</td><td colspan="8">No</td></tr>
<tr><td rowspan="2">Type</td><td colspan="3">Hours per week</td><td colspan="4"></td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td colspan="2">Performance</td><td colspan="2">Practice</td><td colspan="2">Lab</td></tr>
<tr><td>Full-time</td><td></td><td></td><td>2</td><td></td><td>0</td><td></td><td>1</td><td rowspan="2">Examination</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Correspondence</td><td></td><td>Semester</td><td>10</td><td>Semester</td><td>0</td><td>Semester</td><td>5</td></tr>
<tr><td colspan="2">Subject Officer</td><td colspan="2">Name</td><td colspan="4">Dr. habil. Ferenc Szlivka</td><td>Status</td><td>Professor</td></tr>
<tr><td colspan="2">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="8">Goals, development objectives
O After completing the course, students will be able to play in mechanical measurement, modelling and planning of thermal and flow processes.</td></tr>
<tr><td colspan="2" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="7">For all the students in high-performance, board performance. Use a projector (66.66% of total hours)(26 hours)</td></tr>
<tr><td>Practice</td><td colspan="7"></td></tr>
<tr><td>Lab</td><td colspan="7">A table counting exercise in groups of up to 30 people. (33.33% of total hours) (1 p.m.)</td></tr>
<tr><td>Other</td><td colspan="7"></td></tr>
<tr><td colspan="2" rowspan="4">Requirements (expressed in academic results)</td><td colspan="8">Knowledge
o He is fully familiar with the basic facts, directions and boundaries of the field of technical expertise.
o You are familiar with the general and specific mathematical, natural and social science principles, rules, contexts and procedures necessary for the field of technical field.
o You are familiar with the concept system related to your field, the most important contexts and theories</td></tr>
<tr><td colspan="8">Ability
o In solving a problem, it is able to organise cooperation with experts in related fields.
o It can solve specific technical problems in its field in an innovative way using state-of-the-art knowledge acquisition and data collection methods.
o It is able to use information and communication technologies and methods to solve technical problems.
o Prepared to conduct publication, presentation and discussions in your field, in your native language and in at least one foreign language.</td></tr>
<tr><td colspan="8">Attitude
o Using his acquired technical knowledge, he strives to gain as much knowledge as possible about observable phenomena, to describe and explain his legalities.
o Committed to high-quality, quality work, he sets an example for his colleagues to apply this approach.</td></tr>
<tr><td colspan="8">Autonomy and responsibility
Taking responsibility for his own work and the work of his peers.</td></tr>
<tr><td colspan="2">A brief description of the content of a subject</td><td colspan="8">Deepen the heat and flow processes known in the BSc and learn more about the theoretical context. An overview of the basic flow equations and how they are applied, and an extension mainly of non-stationer and dynamic processes. Characteristics of turbulent flows, turbulence modelling. Boundary layers, free rays, multiphase flows.
Learn about heat transport and the basics of non-equilibrium thermodynamics. Exchangers. Laboratory exercises: state-of-the-art flow and thermal measurement methods, numerical simulation methods and their applications, in the framework of the solution of tasks, in particular in mechanical structures.</td></tr>
<tr><td colspan="2">Student activities</td><td colspan="8">Processing heard text with note-taking and recording of material using your own and electronically available note 40%
Self-carrying measurement exercises 20%</td></tr>
</table>

	Tasks managed and self-processing 20% Solve test tasks 20%
Mandatory literature and availability	- Dr. Ferenc Szlivka: Heat-and Flow Technology Dunaújváros. 2019 - Miklós Blahó: Selected Problems in Fluid Mechanics - MOODLE system
Recommended literature and availability	- Dr. Ferenc Szlivka : Thermo- and Fluid Dynamics ÓE-BGK-3074 Budapest 2019. - Szlivka Ferenc, Bencze Ferenc, Kristóf Gergely: Áramlástan példatár BME, 1998

Degradation of engineering materialsof engineering materials

<table>
<tr><td rowspan="2" colspan="2">Subject name</td><td>in Hungarian</td><td colspan="4">Mérnöki anyagok károsodása</td><td>Level</td><td>Code:</td></tr>
<tr><td>in English</td><td colspan="4">Degradation of engineering materials</td><td>MSc 2. semester</td><td>DUEN (L)-MUA-254</td></tr>
<tr><td colspan="2">Responsible educational unit</td><td colspan="6">Institute of Technology</td></tr>
<tr><td colspan="2">Name of mandatory preliminary Study</td><td colspan="6">-</td></tr>
<tr><td rowspan="2">Type</td><td colspan="5">Number of weekly lessons</td><td rowspan="2">Requirements</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td colspan="2">Lecture</td><td colspan="2">Seminar</td><td colspan="2">Laboratory</td></tr>
<tr><td>Full-time</td><td></td><td></td><td>2</td><td></td><td>0</td><td></td><td>1</td><td rowspan="2">Examination</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Correspondence</td><td></td><td>Semester</td><td>10</td><td>Semester</td><td>0</td><td>Semester</td><td>5</td></tr>
<tr><td colspan="2">Responsible teacher</td><td colspan="2">Name</td><td colspan="3">Dr. Zsolt Csepeli</td><td>Position</td><td>lecturer</td></tr>
<tr><td colspan="2">Educational goals</td><td colspan="6">Goals
○ The aim of this subject is to enable students to investigate material degradations based on their knowledge of materials science and material testing. Based on their former studies and the knowledge gained in this subject, students will be able to collect information and samples on the spot, to highlight the cause of the degradations and to prevent additional damages.</td></tr>
<tr><td colspan="2" rowspan="4">Typical delivery methods</td><td>Lecture</td><td colspan="5">Lectures with blackboard and projector.</td></tr>
<tr><td>Seminar</td><td colspan="5"></td></tr>
<tr><td>Laboratory</td><td colspan="5">Carrying out experiments and calculation.</td></tr>
<tr><td>Other</td><td colspan="5"></td></tr>
<tr><td colspan="2" rowspan="4">Requirements (expressed in learning outcomes/competencies to be acquired)</td><td colspan="6">Knowledge
○ Students have detailed knowledge of the theoretical background of the degradation of materials, and are familiar with material testing methods.</td></tr>
<tr><td colspan="6">Ability
○ Students are able to evaluate the information collected during investigation of the degradations, and are able to define the appropriate questions.</td></tr>
<tr><td colspan="6">Attitude
○ Try to apply state-of-the-art knowledge and methods to detect, analyse and prevent material failures.</td></tr>
<tr><td colspan="6">Autonomy and responsibility
○ Can work independently and takes responsibility. Cooperates with experts from other fields to solve the revealed problems but can make their own decisions.</td></tr>
<tr><td colspan="2">Brief description of the subject content</td><td colspan="6">Failure modes and effect analysis. Materials selection for failure prevention. Failure related to metalworking, casting, welding and heat treating operations. Structural life assessment methods. Failure analysis and life assessment of structural components and equipment. Conducting a failure investigation. Determination and classification of damage. Tools and techniques in failure analysis. Creep and stress rupture failures. Corrosion-related failures. Hydrogen damage and embrittlement. Fundamentals of wear failures. Failures of manufactured components and assemblies. Failures of shafts, sliding bearings, rolling-element bearings, tools and dies.</td></tr>
<tr><td colspan="2">Activity forms of students</td><td colspan="6">Understanding and assimilation of the topics of presentations 50%
Testing of materials 30%
Laboratory exercises 20%</td></tr>
<tr><td colspan="2">Compulsory reading and its availability</td><td colspan="6">[1] Failure Analysis and Prevention, ASM Handbook Volume 11, 2002

[2] Fatigue and Fracture, ASM Handbook Volume 19, 1996</td></tr>
<tr><td colspan="2">Recommended reading and its availability</td><td colspan="6">[3] Fractography, ASM Handbook Volume 12, 1987</td></tr>
</table>

Management knowledge

<table>
<tr><td colspan="2" rowspan="2">Title of subject:</td><td>Hungarian</td><td colspan="3">Vezetési ismeretek</td><td rowspan="2">Code:</td><td rowspan="2">DUEN(L)-TVV-25</td></tr>
<tr><td>English:</td><td colspan="3">Management Knowledge</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td colspan="3">Institute:</td><td colspan="5">University of Dunaújváros</td></tr>
<tr><td colspan="3">Compulsory pre-subject:</td><td colspan="3">-</td><td>Code:</td><td>-</td></tr>
<tr><td colspan="2" rowspan="2">Type</td><td colspan="2">Number of lessons per week</td><td rowspan="2">Requirements</td><td rowspan="2">Credit</td><td rowspan="2">Language of teaching</td></tr>
<tr><td>Lecture</td><td>Seminar</td><td>Practice/Laboratory</td></tr>
<tr><td>Full-time</td><td>39</td><td>Week</td><td>2</td><td>Week 1</td><td>Week 0</td><td>exam</td><td>5</td><td>English</td></tr>
<tr><td>Part-time</td><td>15</td><td>Term</td><td>10</td><td>Term 5</td><td>Term 0</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">Teacher responsible for the subject</td><td>name:</td><td colspan="2">Dr. habil Rajcsányi-Molnár Mónika</td><td>position:</td><td>college professor</td></tr>
<tr><td colspan="3">Purpose of the subject (content, outcome, place in the curriculum)</td><td colspan="5">The subject matter is aimed at making the students acquainted with the fundamentals of strategic thinking and planning, the project thinking management and the system thinking production management, while relying on the management-organization fundamental knowledge obtained during their BSc studies. Through the attainment of knowledge transferred, the students are capable of understanding the planning processes that take place in work organizations, allocating the resources in a successful way and solving the problems in an efficient way. The practical examples promote the students in utilizing their theoretical knowledge and recognizing the relevant relationships.</td></tr>
<tr><td colspan="3" rowspan="4">Typical lesson types</td><td>Lecture:</td><td colspan="4">Lecture using projector.</td></tr>
<tr><td>Seminar:</td><td colspan="4">Using projector and additional materials (max. 30 students).</td></tr>
<tr><td>Laboratory</td><td colspan="4">-</td></tr>
<tr><td>Other:</td><td colspan="4">-</td></tr>
<tr><td colspan="3">Requirements
(in learning outcomes)</td><td colspan="5">Knowledge
– Knows the fundamental aspects of his profession, the most important concepts, requirements, relationships and procedures.
– Has knowledge of the principles and methods for shaping and changing the organisational behaviour of organisations and institutions.
– Learns the fundamentals, theoretical and methodological foundations of strategic thinking and strategic management.
– Knows the methodological basics and techniques of managerial learning, information gathering, data processing and their ethical constraints and problem-solving methods.
– Recognises the importance of managerial efficacy and they know which factors, in which degree foster this.
– Knows the relationship between projects and corporate strategy, understands their and production management’s systematic interpretations.

Ability
– Able to master the global design of complex systems based on a systems-based, process-oriented mindset.</td></tr>
</table>

	– Ability to complexly plan and manage the use of technical, economic, environmental and human resources. – Able to manage the work of their own and for others effectively, able to manage workgroups. – Able to lead, plan, manage, check and develop the material and information processes of enterprises and work organizations. – Able to identify problems and to integrate their knowledge in order to solve the problems and able to use the techniques and methods of problem solving in regard to their application possibilities. – Has high sense of responsibility, (self)respect, analyzing and synthetizing ability. **Attitude** – Strives to develop the knowledge of both himself and his employees through continuous self- and further training. – Open to accommodate new innovative approaches. Open and willing to work in groups and to share knowledge with others. – Strives to make decisions in coherence with the relevant legal and ethical norms. – Strives to adhere to the ethical principles of work and organizational culture. – Strives to perform work with a complex approach applying systematic and process-oriented thinking. – Examines research, development and innovation possibilities and aims to effectuate them during work. **Autonomy and responsibility:** – Acts independently and proactively when solving professional problems and initiating new practices. – Able to manage, organise and supervise an organisational unit by taking responsibility for the organisation and their colleagues. – Take responsibility for keeping professional, legal and ethical norms and rules in connection with their work and behaviour. – Able to undertake the responsibilities in the management of an organization's technical and financial processes. – They are responsible for sustainability.
Short description of subject content	Characteristics of strategic thinking and planning, historical overview. Strategic planning processes and phases. Company environment, methodology of its analysis and evaluation. Development of company objectives, their levels and planning of implementation. Definition and regulation of competences, responsibilities and tasks. Characterization of organizational capabilities. Development of value chain. Relationships between the projects and company strategy. System of project management, methodological means of leading and organizing projects. Concept of production, management and production management and their interpretation in system theory respect. Production process and its structural types.
Forms of student activity	Processing of theoretical material with control and independently 40% Task solution with management and independently 40% Analysing case studies, group work. Processing complex exercises in teams 20%. Gathering professional information corresponding the subject matters, processing and presentation 20%.
Compulsory literature	- Balaton Károly - Hortoványi Lilla - Incze Emma - Laczkó Márk - Szabó Zsolt Roland - Tari Ernő: Stratégiai menedzsment, Budapest: Akadémiai Kiadó Zrt., 2017. 338 p. ISBN 9789630594745 - Csath Magdolna: Stratégiai tervezés és vezetés a 21. században, Budapest: Nemzeti Tankönyvkiadó, 2004. 356 p. ISBN 9789631952513

	- Eric Verzuh: Projektmenedzsment, Budapest: HVG Könyvek, 2006. 424 p. ISBN 9789637525773 - Koltai Tamás: Termelésmenedzsment, Budapest: Typotex, BME GT, 2006. 280 p. ISBN 9789632790350
Optional literature	- Pataki Béla: A technológia menedzselése, Budapest: Typotex, 2006. 180 p. ISBN 9789639548701

Product management and value analysis

<table>
<tr><td rowspan="2">Name of the subject</td><td>HUNGARIAN</td><td colspan="6">Termékmenedzsment és értékelemzés</td><td>Level</td><td>Code:</td></tr>
<tr><td>English</td><td colspan="6">Product management and value analysis</td><td>MSc 1. Semester</td><td>DUEN(L)-TVV-251</td></tr>
<tr><td colspan="3">Responsible Education Unit</td><td colspan="8">Institute of Social Sciences</td></tr>
<tr><td colspan="3">Mandatory pre-study name</td><td colspan="8">No</td></tr>
<tr><td rowspan="2">Type</td><td colspan="7">Hours per week</td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td colspan="2">Performance</td><td colspan="2">Practice</td><td colspan="3">Lab</td></tr>
<tr><td>All-time</td><td></td><td></td><td>2</td><td></td><td>1</td><td></td><td>0</td><td rowspan="2">Examination</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Correspondence</td><td></td><td>Semester</td><td>10</td><td>Semester</td><td>5</td><td>Semester l</td><td>0</td></tr>
<tr><td colspan="3">Subject Officer</td><td colspan="3">Name</td><td colspan="3"></td><td>Status</td><td></td></tr>
<tr><td colspan="3">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="8">Goals, development objectives
After meeting the requirements of the subject, the student is able to: assemble a value analysis team, determine the functions of the product, technology, service, determine function costs, manage the development of solutions, support the introduction of Total Product Management, support the introduction of life management, support the implementation of maintenance expectations, take environmental considerations into account.</td></tr>
<tr><td colspan="3" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="7">For all the students in high-performance, board performance. Use a projector (66.66% of total hours) (26 hours)</td></tr>
<tr><td>Practice</td><td colspan="7">Board exercise in groups of up to 30 people. (33.33% of total hours) (1 p.m.)</td></tr>
<tr><td>Lab</td><td colspan="7"></td></tr>
<tr><td>Other</td><td colspan="7"></td></tr>
<tr><td colspan="3" rowspan="3">Requirements (expressed in academic results)</td><td colspan="8">Knowledge
o You know and understand the tools and methods of computer modeling and simulation related to the field of mechanical engineering. - You have extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes.
o Have comprehensive knowledge of machine, system and process design methods in the engineering field.</td></tr>
<tr><td colspan="8">Ability
o It is capable of mastering the global design of complex systems based on a system-oriented, process-oriented mindset.
o Capable of complex planning and management of the use of technical, economic, environmental and human resources.
o Capable of using and further developing processes, models and information technologies used in the design, organisation and operation of mechanical systems and processes.
o Prepared to ensure the quality of mechanical systems, technologies and processes, to solve your metrology and process control tasks.</td></tr>
<tr><td colspan="8">Attitude
o Strive striving to develop both your own knowledge and your staff's knowledge through continuous self-training and training.
o It strives to comply with and enforce the ethical principles of the culture of work and organisation.
o It strives to comply with and enforce quality requirements.
o It strives to organise and carry out its tasks in accordance with the expectations of environmental awareness, health awareness and sustainability.
o Strive striving to acquire a wide range of comprehensive literacy.
o It strives to enforce the requirements of sustainability and energy efficiency.
o It shall endeavour to design and carry out its tasks at a professional ly high level either independently or in a working group.
o It strives to do its work in a complex approach based on a system-oriented and process-oriented mind-set.</td></tr>
</table>

	o Its work examines and seeks to achieve research, development and innovation goals. o Using his acquired technical knowledge, he strives to learn as thoroughly as possible about observable phenomena, to describe and explain his legalities.
	Autonomy and responsibility o It makes its decisions carefully and in consultation with representatives of other fields (mainly legal, economic, energy and the environment), for which it assumes responsibility. o Its decisions shall take into account the principles and application of environmental protection, quality, consumer protection, product liability, equal opportunity access, health and safety at work, technical, economic and legal regulations and the basic requirements of engineering.
A brief description of the content of a subject	The basic concept of value analysis, main criteria, tools, types of value analysis (Value Analysis, Value Engineering, Value Investition, Value Management), product selection methods, principles of team selection, key steps in the value analysis process, definition of product functions, steps to define function cost, methods for developing and testing variants, philosophy and implementation rules, environmental aspects, basic life cycle analysis, principles of management life , maintenance expectations. **Note:** Students meeting SAVE International certification requirements can obtain the Company's first-level international certification.
Student activities	Theoretical curriculum is managed and self-processing 40%. Task solving with control and independently 20%. Analysis and group processing of case studies. Solving complex tasks, working with team work 20%. The collection, processing and dissemination of professional-related information is 20%.
Mandatory literature and availability	Basics of value analysis. Edited by Ferenc Nádasdi. Dunaújváros, DF Publishing Office, 2006. Value Management Know-How Handbook. Edited by: Nádasdi F .: Dunaújváros, Jupiter- Venus Educator, Developer and Service BT. 1999th Tamás Koltai: Production Management, Budapest: Typotex, BME GT, 2006. 280 p. ISBN 9789632790350
Recommended literature and availability	Value analysis of investment processes. I.-II. Edited by: Nádasdi F .: University of Miskolc Dunaújváros College Faculty, 1999. Value analysis projects. Edited by Kornélia Vámosi. Budapest: Medic-Tour 2002. Kft., 2006. Ferenc Nádasdi: VALUE MANAGEMENT A XXI. Century. Monograph. Dunaújváros DF Publishing Office, 2004. ISBN 963 8633 10

Advanced materials and technologies

<table>
<tr><td rowspan="2">Name of the subject</td><td>HUNGARIAN</td><td colspan="3">Korszerű anyagok és technológiák</td><td>Level</td><td>Code</td></tr>
<tr><td>English</td><td colspan="3">Advanced materials and technologies</td><td>MSc 1. Semester</td><td>DUEN(L)-MUA-152</td></tr>
<tr><td colspan="2">Responsible Education Unit</td><td colspan="5">DUE Institute of Technology</td></tr>
<tr><td colspan="2">Mandatory pre-study name</td><td colspan="5">No</td></tr>
<tr><td rowspan="2">Type</td><td colspan="2">Hours per week</td><td colspan="3"></td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td>Performance</td><td>Practice</td><td>Lab</td></tr>
<tr><td>All-time</td><td>2</td><td>0</td><td>1</td><td rowspan="2">Examination</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Correspondence</td><td>Semester 10</td><td>Semester 0</td><td>Semester 5</td></tr>
<tr><td colspan="2">Subject Officer</td><td>Name</td><td colspan="2">Dr. Gábor Vizi</td><td>Status</td><td>Associate Professor of College</td></tr>
<tr><td colspan="2">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="5">Short objective

In the light of the components of the life management of industrial installations, the student should be able to plan, take measures, make decisions and make decisions to optimise the life of the plant and selected equipment, taking into account the reliability of operation and maintenance, the economics of the production process and additional aspects (quality, safety, environmental).

Training history, development goals
Students should be familiar with the most important material and manufacturing processes, their theoretical basis, and on this basis be able to put the procedures into practice and to understand the structural and other changes in materials and their causes. Students should be able to address the problems caused by technology</td></tr>
<tr><td colspan="2" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="4">It's a board lecture for all students. Use a projector, overhead projector.</td></tr>
<tr><td>Practice</td><td colspan="4"></td></tr>
<tr><td>Lab</td><td colspan="4">Up to 20-person computation lab exercises -</td></tr>
<tr><td>Other</td><td colspan="4">Doing homework, individual learning, reading literature</td></tr>
<tr><td colspan="2">Requirements (expressed in academic results)</td><td colspan="5">Knowledge (K)

o He has knowledge of metrology and measurement theory related to the engineering field. - Has extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes..

Ability (A)

o Capable of laboratory testing and analysis of materials used in the mechanical field, evaluation and documentation of test results.
o Prepared for processing and organizing, analysing and drawing conclusions of information collected during the operation of mechanical systems and processes.
o It is able to enrich the knowledge base of the mechanical field with original ideas.
o It is able to apply integrated knowledge of machinery, mechanical equipment, systems and processes, mechanical materials and technologies, and related electronics and information technology.
o It is capable of mastering the global design of complex systems based on a system-oriented, process-oriented mind-set.
o Capable of complex planning and management of the use of technical, economic, environmental and human resources.</td></tr>
</table>

	Attitude (A) o It strives to do its work in a complex approach based on a system-oriented and process-oriented mind-set. o Its work examines and seeks to achieve research, development and innovation goals.
	Autonomy and Responsibility (AR) o It makes its decisions carefully and in consultation with representatives of other fields (mainly legal, economic, energy and the environment), for which it assumes responsibility. o - - Its decisions take into account the principles and application of environmental protection, quality, consumer protection, product liability, equal opportunity access, health and safety at work, technical, economic and legal regulation and the basic requirements of engineering.
A brief description of the content of a subject	The materials technology, cutting and other materials demonstrated in the BSc deepening knowledge of manufacturing processes and a more detailed understanding of their theoretical background. The theoretical background of shape-point and dimensional production, NNS plastic forming processes, high-precision casting and powder processing processes and state-of-the-art surface treatment processes and the theoretical basis of these processes. Latest welding and thermal machining techniques and theoretical foundations. Theoretical foundations and application aspects of special high-precision cuttings and special machining. Relationship between maintenance and lifetime management. Spare parts strategies (inventory management, disappearance, replacement of manufacturers, suppliers). The human side of longevity management.
Student activities	All-time: Participation in lectures and taking notes (20%), conducting exercises (20%), developing an individual lab assignment (10%), presenting (10%), individual learning (40%). Correspondence: Participation in lectures and taking notes (12%), performing laboratory measurements (8%), developing individual tasks (15%), presenting (15%), individual learning (50%).
Mandatory literature and availability	Dr. Éva Dénes, dr. Péter Farkas, Zsoltné Fülöp and dr. Zoltán Szabó: Metal Technology, College Publishing House, Dunaújváros, 2008. Welding and related technologies, GTE. Budapest, 2007. Dr. Mátyás Horváth - Dr. Sándor Markos: Machine Manufacturing Technology, Műételemi Kiadó 2005. (45018).
Recommended literature and availability	Dr. György Ziaja: NNS technologies, BME, ATT, Departmental publication. ASM Metals Handbook, Vol.1. - 21. ASM International, Miami, Fl, USA.
Description of tasks/measurement reports to be submitted	Job specifications, laboratory measurement guides (DUE Moodle)
Description and schedule of closed locals	The instructor compiles the questions from the follow-up questions of the closed-area papers at the end of the lecture materials.

Computer modelling and simulation

Name of the subject	HUNGARIAN	Számítógépes modellezés és szimuláció						Level	Code		
	English	Computer modelling and simulation						MSc 4. semester	DUEN(L)-MUG-220		
Responsible Education Unit		DUE Institute of Technology									
Mandatory pre-study name		Mechanics; Mathematics II									
Type		Type						Type	Credit	Lenguage	
		Lecture		Practice		Laboratory					
Full-time			2		1		0	Examination	5	English	
Correspondence		Semester	10	Semester	5	Semester	0				
Subject Officer		Name		Dr. habil. András Zachár				status	professor		

Training purpose and justification of the course (content, output, curriculum space)	**Short objectives** To acquaint students with the most important numerical modelling procedures and a brief introduction to the mathematical and numerical modelling of complex technical-physical processes occurring in engineering practice. With this knowledge, students will be able to study processes occurring in the wider vertical of mechanical science, as well as finite element strength calculations (VEM) of mechanical equipment, computer modelling of thermal and flow processes using ANSYS CFX.	
Typical transfer methods	Lecture	Large lecture for all students, board lecture. Using a projector (66.66% of total hours) (26 hours)
	Practice	Board counting practice in groups of up to 30 people. (33.33% of total hours) (13 hours)
	Lab	
Requirements (expressed in learning outcomes)	**Short objective** o Knows and understands the tools and methods of computer modelling and simulation related to the field of mechanical engineering. - Has a wide range of theoretical and practical training, methodological and practical knowledge for the design, manufacture, modelling, operation and control of complex mechanical systems and processes. o o Has a comprehensive knowledge of machine, system and process design methods in the field of engineering ...	
	Ability o Prepared for the processing and systematization of information collected during the operation of mechanical systems and processes, for analysis and for drawing conclusions. o o Able to enrich the knowledge base of the mechanical engineering field with original ideas. o o Ability to apply integrated knowledge in the fields of machinery, mechanical equipment, systems and processes, mechanical materials and technologies, and related electronics and informatics. o o Able to master the global design of complex systems based on a systems-based, process-oriented mind-set.	
	Attitude o Strives to conduct its work in a complex approach based on a systems-based and process-oriented mind-set. o o In the course of its work, it examines the possibility of setting research, development and innovation goals and strives to achieve them. o o By applying the acquired technical knowledge, he strives to get to know the observable phenomena as thoroughly as possible, to describe and explain their laws.	
	Autonomy and responsibility	

	He (She) shares his (her) acquired knowledge and experience with formal, non-formal and informal forms of information transfer with practitioners in kis (her) field. o Evaluate the work of your subordinates by sharing critical comments promotes their professional development. Able to solve engineering tasks independently. o Takes the initiative in solving technical problems.
Short description of the course content	Numerical solution possibilities of mathematical models describing strength and heat and flow processes. The most commonly used numerical methods, discretization methods, the basics of the finite volumetric method. Basic iterative solution methods for systems of linear equations with a special coefficient matrix obtained during discretization (Gauss-Seidel, Conj. Grad, Multi Grid). Advantages, disadvantages and applicability of the methods. Structure of the ANSYS and ANSYS-CFX program system, INPUT / OUTPUT data, definition and interpretation of boundary conditions, mathematical form of each boundary condition. Strength applications using finite element program, shape optimization. Solving major heat and flow problems with a finite volume program.
Forms of student activity	Processing of heard text with notes and recording of the material using own and electronically available notes 40% Performing measurement exercises independently 20% Controlled and independent processing of tasks 20% Solving test tasks 20%
Required reading and contact information	- György Popper, Ferenc Csizmás: Numerical Methods for Engineers, Budapest, Akad. K. - Typotex, 1993. 166 p. ISBN 963-05-6454-8 - - Gábor Ladányi: Finite element calculation methods, E-learning curriculum, - Dunaújváros College, TAMOP 4.1.2 / A, 2011, moodle.duf.hu - - • ANSYS user manual
Recommended literature and contact information	• Stoyan Gisbert: Numerical Mathematics for Engineers and Programmers, Typotex ISBN • 978-963-9664-41-8 • • Stoyan Gisbert, Takó Galina: Numerical Methods 1., Typotex (2005) • • Stoyan Gisbert: MATLAB, Typotex, ISBN 9639548499, 9789639548497

Reliability theory and structural integrity analysis

<table>
<tr><td rowspan="2">Name of the subject</td><td>Hungarian</td><td colspan="4">Megbízhatóság elmélet és szerkezeti integritás elemzés</td><td>Level</td><td>Code::</td></tr>
<tr><td>English</td><td colspan="4">Reliability theory and structural integrity analysis</td><td>MSc 3. semester</td><td>DUEN(L)-MUG-136</td></tr>
<tr><td colspan="2">Responsible Education Unit</td><td colspan="6">DUE Institute of Technology</td></tr>
<tr><td colspan="2">Mandatory pre-study name</td><td colspan="6">Mechanics, Degradation of engineering materials</td></tr>
<tr><td rowspan="2">Type</td><td colspan="2">Hours per week</td><td colspan="3"></td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td>Lecture</td><td>Practice</td><td colspan="2">Lab.</td></tr>
<tr><td>Full-time</td><td>2</td><td>0</td><td>1</td><td rowspan="2">Examination</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Correspondence</td><td>Semester 10</td><td>Semester 0</td><td>Semester 5</td></tr>
<tr><td colspan="2">Subject Officer</td><td>Name</td><td colspan="3">Dr. Péter Trampus</td><td>status</td><td>Professor emeritus</td></tr>
<tr><td colspan="2">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="6">Short objective

Understand the elements and modeling of reliability. Having the knowledge, the student should be able to understand the most important concepts of technical life (security, reliability and
risk) and their practical interpretation and application. Knowledge of the basics of fracture mechanics should be able to contain the crack
to determine the parameters needed to analyze the integrity of structures.</td></tr>
<tr><td colspan="2" rowspan="4">Typical transfer methods</td><td>Lecture</td><td colspan="5">Large lecture for all students, board lecture. Using a projector (66.66% of total hours) (26 hours)</td></tr>
<tr><td>Practice</td><td colspan="5"></td></tr>
<tr><td>Laboratory</td><td colspan="5">Board counting practice in groups of up to 30 people. (33.33% of total hours) (13 hours)</td></tr>
<tr><td>Other</td><td colspan="5"></td></tr>
<tr><td colspan="2" rowspan="4">Requirements (expressed in learning outcomes)</td><td colspan="6">Knowledge
o Has a wide range of theoretical and practical training, methodological and practical knowledge for the design, manufacture, modeling, operation and management of complex mechanical systems and processes.
o Has a comprehensive knowledge of machine, system and process design methods in the mechanical field.</td></tr>
<tr><td colspan="6">Ability
o Ability to apply and further develop procedures, models, information technologies used in the design, organization and operation of mechanical systems and processes.
o Prepared for quality assurance of mechanical systems, technologies and processes, solving measurement and process control tasks.
o Ability to deal creatively with problems, solve complex tasks flexibly, and with lifelong learning and commitment to diversity and value.</td></tr>
<tr><td colspan="6">Attitude
It strives to adhere to and adhere to quality requirements.
Strives to organize and perform its tasks in accordance with the expectations of environmental awareness, health awareness and sustainability.
to describe and explain its laws.</td></tr>
<tr><td colspan="6">Autonomy and responsibility
o Shares the acquired knowledge and experience with the practitioners of his / her field in formal, non-formal and informal forms of information transfer.
o Evaluates the work of his subordinates, promotes their professional development by sharing critical remarks.
o In making its decisions, it takes into account the principles and application of environmental protection, quality management, consumer protection, product liability, equal access, occupational health and safety, technical, economic and legal regulations, and basic ethical standards.</td></tr>
</table>

Short description of the course content	Basic concepts and parameters of reliability. Impact of environment an load. Measurement and extrapolation of reliability characteristics of systems and equipment. Modeling the reliability of systems. Classification of models, modeling procedures. Determination of characteristics on an analytical and simulation basis. Characterization c performance and fault tolerance. Development of the system of tools used to assess reliability. Fundamentals of fracture mechanics. Linearly elastic fracture mechanics: stress intensity factor; energy theory; deformation theory. Linearly elastic fracture mechanism with a small plastic range. Plastic fracture mechanics. Fracture criteria. Factors influencing the structural integrity (safe operation) of engineering structures: operating loads and conditions, material properties and their changes (damage processes) and various discontinuities. Dual criterion method (R6). Probabilistic fracture mechanics analysis. The concept of crack sensitivity of structures, its significance in the selection of non-destructive tests and in the evaluation of the reliability of fracture mechanical tests.
Forms of student activity	Processing of heard text with notes and recording of the material using own and electronically available notes 40% Performing measurement exercises independently 20% Controlled and independent processing of tasks 20% Solving test tasks 20%
Required reading and contact information	- Birolini, A.: Reliability Engineering, Springer Verlag GmbH, 2007.. ***http://mek.oszk.hu/01100/01190/***
Recommended literature and contact information	Rausand, M., Hoyland, A.: System Reliability Theory: Models, Statistical Methods and Applications, 2nd edition, Wiley, Hobolen, 2004. Broek, D.: The Practical Use of Fracture Mechanics Klujwer Academic Publishers, London, ISBN 0-7923-0223-0, 1988. p.1-522.

Measurement technology and signal processing

<table>
<tr><td rowspan="2">Name of the subject</td><td>HUNGARIAN</td><td colspan="6">Méréstechnika és jelfeldolgozás</td><td>Level</td><td>Code:</td></tr>
<tr><td>English</td><td colspan="6">Measurement technology and signal processing</td><td>MSc 1. Semester</td><td>DUEN(L)-MUG-116</td></tr>
<tr><td colspan="2">Responsible Education Unit</td><td colspan="8">Institute of Technology</td></tr>
<tr><td colspan="2">Mandatory pre-study name</td><td colspan="8"></td></tr>
<tr><td rowspan="2">Type</td><td colspan="3">Hours per week</td><td colspan="4"></td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr><td colspan="2">Performance</td><td colspan="2">Practice</td><td colspan="2">Lab</td></tr>
<tr><td>All-time</td><td></td><td></td><td>1</td><td></td><td>0</td><td></td><td>2</td><td rowspan="2">Practice note</td><td rowspan="2">5</td><td rowspan="2">Hungarian</td></tr>
<tr><td>Correspondence</td><td></td><td>Semester</td><td>5</td><td>Semester</td><td>0</td><td>Semester</td><td>10</td></tr>
<tr><td colspan="3">Subject Officer</td><td colspan="2">Name</td><td colspan="4">Dr. Gábor Pór</td><td>Status</td><td>Professor emeritus</td></tr>
<tr><td colspan="3">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="8">Goals, development objectives
Based on an understanding of the relationships between measurement and modelling, the student should be able to design individual measurements, including the use of advanced signal processing and interpretation skills.</td></tr>
<tr><td colspan="3" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="7">For all the students in high-performance, board performance. Using a projector (33.33% of total hours)(13 hours)</td></tr>
<tr><td>Practice</td><td colspan="7"></td></tr>
<tr><td>Lab</td><td colspan="7">Up to 30 people in groups of table counting exercises and lab measurements. (66.66% of total hours) (26 hours)</td></tr>
<tr><td>Other</td><td colspan="7"></td></tr>
<tr><td colspan="3" rowspan="4">Requirements (expressed in academic results)</td><td colspan="8">Knowledge
o You are familiar with and understand in detail the methods of knowledge, data collection, their ethical limitations and problem-solving techniques in the technical field.
o Have knowledge of metrology and measurement theory related to the engineering field. You are familiar with information and communication technologies related to the engineering field.
o You know and understand the tools and methods of computer modeling and simulation related to the field of mechanical engineering. - You have extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes.</td></tr>
<tr><td colspan="8">Ability
o It is able to apply the theories and related terminology in a given technical field in an innovative way when solving problems.
o It is capable of a versatile interdisciplinary approach and resolution of specific problems within its field.
o In solving a problem, it is able to organise cooperation with experts in related fields.
o It can solve specific technical problems in its field in an innovative way using state-of-the-art knowledge acquisition and data collection methods.
o It is able to use information and communication technologies and methods to solve technical problems..</td></tr>
<tr><td colspan="8">Attitude
o Using his acquired technical knowledge, he strives to gain as much knowledge as possible about observable phenomena, to describe and explain his legalities.
o Committed to high-quality, quality work, sets an example for your colleagues to apply this approach. -</td></tr>
<tr><td colspan="8">Autonomy and responsibility
o Its decisions shall take into account the principles and application of environmental protection, quality, consumer protection, product liability, equal opportunity access, health and safety at work, technical,</td></tr>
</table>

	economic and legal regulations and the basic requirements of engineering.
A brief description of the content of a subject	Measurement and modelling, the role of modelling in measurement, classification and properties of models. Types of measurement tasks, the development of the necessary models. Cross-check, validation, verification and calibration of models. Measurement uncertainty and evaluation. Extended uncertainty. Determination of resulting standard uncertainty on the basis of independent input (measured) quantities and correlated quantities. Practical examples and methods of calculation. Metrology concept and requirement system. Rules for the communication of measurement results. Quality management system in the laboratory. Evaluation of the measurement results by computerised methods. Economical estimation procedures for the reliability of measurement results. Practical mastery of statistical tests. Zero hypothesis and counterhypothesis, one-sided and two-sided hypothesis test, first- and second-species errors. Test the match of two expected values. Comparison of experiential standard deviations, decision on the adequacy of the measurement. Estimate the goodness and measurement uncertainty of the parameters obtained from the function join from the empirical data. Signals and signal systems: amplitude distribution and measurement, correlation functions and measurement, spectrum, coherence and phase function measurement, autoregession modelling, sequential quotation test, basics of fuzzy modelling, wavelet principle and mathematics. Series measurement with programs (LABView); Measurement with a laser measuring arm, data recirculation for the preparation of a rapid prototype and for the redesign of the measured element (reverse engineering practice); Measurement with Digimatic (Mitutoyo); 3D measurement and reconstruction with measuring microscope. Measurements and finite battery modeling.
Student activities	Processing heard text with note-taking and recording of material using your own and electronically available note 40% Self-carrying measurement exercises 20% Tasks managed and self-processing 20% Solve test tasks 20%
Mandatory literature and availability	Mallat: A wavelet tour to signal processing, 3rd edition, Academic Press, 2008 , moodle.duf.hu International metrological interpretive dictionary, OMH, Budapest, MTA MMSZ ltd kft, 1998 49p. ISBN 963-03-5779-8-
Recommended literature and availability	• Péter Bölöni, György Pataki, Introduction to General Metrology, OMH, Budapest, 1988, 582p. István Zoltán: Measurement Technology, University Textbook, Technical University Publishing House, 1997 (55029) • Textbook, University Publishing House, 1997 (55029)

Project task

<table>
<tr><td rowspan="2">Name of the subject</td><td>HUNGARIAN</td><td colspan="3">Projekt feladat</td><td>Level</td><td>Code:</td></tr>
<tr><td>English</td><td colspan="3">Project task</td><td>MSc 3. Semester</td><td>DUEN(L)-MUG-095</td></tr>
<tr><td colspan="2">Responsible Education Unit</td><td colspan="5">Institute of Technology</td></tr>
<tr><td colspan="2">Mandatory pre-study name</td><td colspan="5">No</td></tr>
<tr><td rowspan="2">Type</td><td colspan="2" rowspan="2">Hours per week
Performance</td><td colspan="2" rowspan="2">Practice</td><td colspan="2" rowspan="2">Lab</td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr></tr>
<tr><td>Full time</td><td></td><td></td><td>0</td><td></td><td>5</td><td></td><td>0</td><td rowspan="2">Signature</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>correspondence</td><td></td><td>Semiannual</td><td>0</td><td>Semiannual</td><td>25</td><td>Semiannual</td><td>0</td></tr>
<tr><td colspan="2">Subject Officer</td><td>Name</td><td colspan="3">Dr. habil. Ferenc Szlivka</td><td>Status</td><td>Professor</td></tr>
<tr><td colspan="2">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="5">Goals, development objectives
o The aim of the course's education is to educate students about the current technical
o by solving tasks independently or primarily in small groups,
o group work, with tools and methods.
o After a successful course, students will be able to
o and to solve it in groupwork, to ensure that work and results are
O document, interpretation and evaluation.</td></tr>
<tr><td colspan="2" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="4"></td></tr>
<tr><td>Practice</td><td colspan="4">Consultation with the industrial and university consultants</td></tr>
<tr><td>Lab</td><td colspan="4"></td></tr>
<tr><td>Other</td><td colspan="4"></td></tr>
<tr><td colspan="2" rowspan="4">Requirements (expressed in academic results)</td><td colspan="5">Knowledge
o You are familiar with the rules for the preparation of technical documentation. - You are familiar with the organisational tools and methods associated with management, the technical legislation necessary for the exercise of the profession.
o Have extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes.
o Have comprehensive knowledge of machine, system and process design methods in the engineering field.</td></tr>
<tr><td colspan="5">Ability
o Prepared for processing and organizing, analysing and drawing conclusions of information collected during the operation of mechanical systems and processes.
o It is able to enrich the knowledge base of the mechanical field with original ideas.
o It is able to apply integrated knowledge of machinery, mechanical equipment, systems and processes, mechanical materials and technologies, and related electronics and information technology.
o It is capable of mastering the global design of complex systems based on a system-oriented, process-oriented mind-set.</td></tr>
<tr><td colspan="5">Attitude
o Using his acquired technical knowledge, he strives to gain as much knowledge as possible about observable phenomena, to describe and explain his legalities.
o Committed to high-quality, quality work, he sets an example for his colleagues to apply this approach.</td></tr>
<tr><td colspan="5">Autonomy and responsibility
Taking responsibility for his own work and the work of his peers.</td></tr>
<tr><td colspan="2">A brief description of the content of a subject</td><td colspan="5">Students can receive part-time tasks from the current application, research and innovation tasks of the Departments of Technology and solve problems brought by themselves from industry, in small groups or individually. Students independently explore and interpret problems, use the processing of domestic and international literature to gain an insight into the subject area, then formulate various solutions for implementation, sometimes conducting model experiments.</td></tr>
</table>

	In solving the tasks, the students apply the knowledge they have learned independently. The tasks for longevity management are primarily related to materials science, material technologies, repair and assembly, measurement and signal processing, and material testing and diagnostics. The task can be prepared for the diploma plan task.
Student activities	Regular consultation with industrial and university consultants. Incorporate the proposals into the forthcoming project report or the diploma plan paper. Continuous development and documentation of the thesis at an appropriate level.
Mandatory literature and availability	-Guide to the preparation of thethesis and diploma design. Extended version 2. UNIVERSITY PUBLISHER Recommended by a consultant, the topic is processed by literature.
Recommended literature and availability	Dr. Pál Majoros: Research methodology or how to write a good diploma thesis easily and quickly. National Textbook Publisher, Budapest, 1997.

Lifetime management

Title of the Course	in English	**Lifetime Management**							Level	Code	
	in Hungarian	Élettartam gazdálkodás							MSc 1. semester	DUEN-MUG-150	
Organized by		**University of Dunaújváros, Institute of Engineering**									
Compulsory pre-subject		none									
Type		Number of lessons per week							Requirement	Credit	Language
		Lecture		Practicum		Laboratory					
Full-time			**2**		**1**		0		**Examination**	**5**	**English**
Teacher responsible for the course		name				Dr. Péter Trampus			position	prof. emeritus	

Course objective, justification (content, outcome, place in the curriculum)	**Course objective** Having been learned the elements of life management of industrial facilities, on the basis of the reliability of operation and maintenance, the economy of the production process and taking further (quality, safety and environmental) aspects into consideration the student should be able to design the necessary actions, to make the decisions and arrangements in order to optimize the service life of an equipment or an industrial facility	
	Background, development goals In the past decades, life management became an independent, multidisciplinary area of engineering. Its key task is to have actual information on condition of operating systems and components, to maintain their function in accordance with the designer's intent which is a serious economic and quality / safety question as well. To be able to answer these questions one has to know the design principles of the systems and components; the technological processes, from which operation loading and other environmental conditions can be derived; the performance of the structural and functional materials used under operation loads and environment, i.e. the materials degradation processes, and the impact of the flaws and other inhomogeneities if any. The student has to be able to apply in skill level the methods of determination of loading in the component materials, as well as the methodologies to monitor and mitigate materials degradations. He/she has to be able to optimize operation and maintenance activities in order to achieve life management goals.	
Teaching modes	Lecture	Lectures using projector, flip chart
	Practicum	Maximum 20 students, calculations, demonstrations
	Laboratory	-
	Other	Preparation of home works, individual learning, studying literature
Requirements (in learning outcomes)	**Knowledge (K)** Knows the design principles of components; the technological processes from which the normal and off-normal loading and other operating conditions can be derived; the behaviour of structural and functional materials and the degradation processes and effects; the impact of flaws and other geometrical inhomogeneities in the materials.	
	Skills (S) Can apply the methodologies for determination of component loading (stress/strain states) and detection and mitigation of degradations. Can optimize operation and maintenance taking the goals of life management into account. Understands and applies the online and printed technical literature pertaining to life management.	
	Attitude (A) Seeks to contribute to the development of new methods and tools related to the technical field. Tries to utilize environmentally friendly technologies and to save bilt and natural environment. Tries to use energy-saving procedures and technologies.	

	Autonomy and responsibility (AR) Determines the methodology of analyses and/or inspection and testing; performs the analyses and the inspection or test, oversees the processes, the correctness of the calculated or measured / registered data, the quality of documentation responsible for the reliability of results.
Course content	The definition of lifetime and operational/service life. Life management as the complex of technical and economic arrangements (with the purpose of the optimization of the service life of industrial facilities and their equipment while maximizing the profit). The degradations and other losses of functions in the structural materials induced by the operation. Aging processes. Running out of the life of components and systems. The safety aspects of component aging (decrease of the safety margin). Ageing of the design philosophies and the applied technologies. Mitigating actions: aging management, reconstruction, replacement (restoration of the safety margin). Connection between maintenance and life management. Spare part strategies (inventory management, disappearance and replacement of producers and suppliers). The human aspects of life management.
Forms of student activity	Participation in the lectures (20%), practicum (20%), home work (10%), preparation of presentation (10%), individual learning (40%).
Compulsory literature	1. Shah, V. N., Macdonald, P. E. (1993): Aging and Life Extension of Major Light Water Reactor Components. Eslevier, Amsterdam. 2. Integrity for Life: Structural Integrity Assessment for Life Cycle Management (ed. Flewitt et al), EMAS Publishing, UK, 2004. 3. Presentation slides (in Moodle)
Recommended literature	1. Materials Ageing and Life Management (ed. B. Raj et al), Vol. 1-3. Allied Publishers, New Delhi, 2000. 2. Understanding and mitigating ageing in nuclear power plants (ed. P. Tipping), Woodhead Publishing, Oxford, 2010
Compulsory tasks during semester	Home works (in Moodle)
Midterm tests	1 written test, 1 home work

Maintenance strategies

<table>
<tr><td colspan="2" rowspan="2">Title of subject:</td><td>Hungarian</td><td colspan="3">Karbantartási stratégiák</td><td rowspan="2">Code:</td><td rowspan="2">DUEN(L)-MUG-255</td></tr>
<tr><td>English:</td><td colspan="3">Maintenance strategies</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td colspan="2">Institute:</td><td colspan="6">University of Dunaújváros</td></tr>
<tr><td colspan="2">Compulsory pre-subject:</td><td colspan="4">-</td><td>Code:</td><td>-</td></tr>
<tr><td colspan="2" rowspan="2">Type</td><td colspan="2" rowspan="2">Number of lessons per week
Lecture</td><td colspan="2" rowspan="2">Seminar</td><td rowspan="2">Practice/Laboratory</td><td rowspan="2">Requirements</td><td rowspan="2">Credit</td><td rowspan="2">Language of teaching</td></tr>
<tr></tr>
<tr><td>Full-time</td><td>39</td><td>Week</td><td>2</td><td>Week</td><td>1</td><td>Week</td><td>0</td><td>semester grade</td><td>5</td><td>English</td></tr>
<tr><td>Part-time</td><td>15</td><td>Term</td><td>10</td><td>Term</td><td>5</td><td>Term</td><td>0</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Teacher responsible for the subject</td><td colspan="2">name:</td><td colspan="3">Dr. Attila Szabó</td><td>position:</td><td>associate professor</td></tr>
<tr><td colspan="2">Purpose of the subject (content, outcome, place in the curriculum)</td><td colspan="6">Based on the attainment of modern trends in maintenance strategies, the students become capable of planning and optimizing the maintenance activities, recognizing and eliminating the weak points of equipment, selecting durability improving technologies and planning specific maintenance technologies.</td></tr>
<tr><td colspan="2" rowspan="4">Typical lesson types</td><td colspan="2">Lecture:</td><td colspan="5">Lecture using projector.</td></tr>
<tr><td colspan="2">Seminar:</td><td colspan="5">Using projector and additional materials.</td></tr>
<tr><td colspan="2">Laboratory</td><td colspan="5">-</td></tr>
<tr><td colspan="2">Other:</td><td colspan="5">-</td></tr>
<tr><td colspan="2">Requirements
(in learning outcomes)</td><td colspan="6">Knowledge
o Has a wide range of theoretical and practical training, methodological and practical knowledge for the design, manufacture, modeling, operation and management of complex mechanical systems and processes.
o Has a comprehensive knowledge of machine, system and process design methods in the mechanical field

Ability
o Ability to apply and further develop procedures, models, information technologies used in the design, organization and operation of mechanical systems and processes.
o Prepared for quality assurance of mechanical systems, technologies and processes, solving measurement and process control tasks.
o Ability to solve creative problems, solve complex tasks flexibly, as well as lifelong learning and commitment to diversity and value-based
Attitude
Strives to organize and perform its tasks in accordance with the expectations of environmental awareness, health awareness and sustainability
Autonomy and responsibility
o Shares the acquired knowledge and experience with the practitioners of</td></tr>
</table>

	his / her field in formal, non-formal and informal forms of information transfer. o Evaluates the work of his subordinates, promotes their professional development by sharing critical remarks. o In making its decisions, it takes into account the principles and application of environmental protection, quality management, consumer protection, product liability, equal access, occupational health and safety, technical, economic and legal regulations, and basic ethical standards. aaa.
Short description of subject content	Maintenance systems and strategies. Connection between maintenance and production. General maintenance philosophies/strategies: failure based corrective maintenance (FBCM), planned preventive maintenance (PM), condition based maintenance (CBM, CCM, CM); reliability centered maintenance (RCM), total productive maintenance (TPM), risk based maintenance (RBM, RBIM), parameter condition based maintenance (PCBM), automatic maintenance (AM). Instruments of RCM. Methods serving the analysis of reliability. Instruments of TPM. Applications of maintenance strategies. Strategies of rigid cycle structure. Strategies of flexible cycle structure. Strategy based on economic and reliability criteria. Substitution interventions. Restoration (repair) processes. Restoration methods. Problems of lifetime (durability). Lifetime increasing technologies. Relationships between properties, stress and technologies. Place and part of qualifying the traditional surface transforming technologies, modern thin layers, plasma procedures, laser procedures as well as surface layers in the development of maintenance strategies.
Forms of student activity	Processing of theoretical material with control 60% Independent processing of theoretical material 40% Task solution with management 15% Task independent processing 85%
Compulsory literature	Moodle
Optional literature	-
Compulsory tasks during semester	-
Midterm tests and their timing	2 tests, 5 and 12 weeks, 2 homeworks and 2 presentations.

Installation and Repair Technologies

<table>
<tr><td rowspan="2">Title of subject:</td><td>Hungarian</td><td colspan="3">Szerelés és javítástechnológiák</td><td rowspan="2">Code:</td><td rowspan="2">DUEN(L)-MUG-256</td></tr>
<tr><td>English:</td><td colspan="3">Installation and Repair Technologies</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td colspan="2">Institute:</td><td colspan="6">University of Dunaújváros</td></tr>
<tr><td colspan="2">Compulsory pre-subject:</td><td colspan="4">-</td><td>Code:</td><td>-</td></tr>
<tr><td rowspan="2">Type</td><td colspan="2" rowspan="2">Number of lessons per week</td><td rowspan="2">Requirements</td><td rowspan="2">Credit</td><td rowspan="2">Language of teaching</td></tr>
<tr><td>Lecture</td><td>Seminar</td><td>Practice/Laboratory</td></tr>
<tr><td>Full-time</td><td>39</td><td>Week</td><td>2</td><td>Week</td><td>0</td><td>Week</td><td>1</td><td>semester grade</td><td>5</td><td>English</td></tr>
<tr><td>Part-time</td><td>15</td><td>Term</td><td>10</td><td>Term</td><td>0</td><td>Term</td><td>5</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Teacher responsible for the subject</td><td colspan="2">name:</td><td colspan="2">Dr. Sánta Róbert</td><td>position:</td><td>associate professor</td></tr>
<tr><td colspan="2">Purpose of the subject (content, outcome, place in the curriculum)</td><td colspan="6">Based on attaining the procedures and instruments of mounting and restoration technologies, the mounting and restoration strategies, the planning methods of mounting and restoration processes, the students shall be capable of planning mounting and repair technologies as well as managing their application. In addition, they shall be capable of determining the costs of technologies as well as selecting the technology suitable for the given purpose based on technical and economic aspects.</td></tr>
<tr><td colspan="2" rowspan="4">Typical lesson types</td><td>Lecture:</td><td colspan="5">Lecture using projector.</td></tr>
<tr><td>Seminar:</td><td colspan="5">Using projector and additional materials.</td></tr>
<tr><td>Laboratory</td><td colspan="5">-</td></tr>
<tr><td>Other:</td><td colspan="5">-</td></tr>
<tr><td colspan="2">Requirements
(in learning outcomes)</td><td colspan="6">Knowledge
– Knows in detail the rules for preparing technical documentation. - Knows the organizational tools and methods related to management, the legislation of the field required for the practice of the profession.
– Has knowledge of measurement technology and measurement theory related to the field of engineering.
– Knows information and communication technologies related to mechanical engineering.

Ability
– Able to master the global design of complex systems based on a systems-based, process-oriented mindset.
– Ability to complexly plan and manage the use of technical, economic, environmental and human resources.
– Able to apply and further develop procedures, models, information technologies used in the design, organization and operation of mechanical systems and processes.

Attitude
– Seeks to contribute to the development of new methods and tools related to the technical field.
– Strives to develop the knowledge of both himself and his employees through continuous self- and further training.
– Strives to adhere to and adhere to the ethical principles of work and organizational culture.</td></tr>
</table>

	– Strives to adhere to and adhere to quality requirements. – Strives to organize and perform its tasks in accordance with the expectations of environmental awareness, health awareness and sustainability. **Autonomy and responsibility:** – Able to solve engineering tasks independently. – Takes the initiative in solving technical problems. – Take responsibility for the sub-processes under your control. – Makes professional decisions independently in its field of operation. – Encourages its employees and subordinates to practice responsibly and ethically. – Acts independently and proactively when solving professional problems. – They are responsible for sustainability, occupational health and safety culture and environmental awareness.
Short description of subject content	Place and part the mounting plays in planning of technology. Component parts of mounting units. Analysis of mounting: functional and technological analysis of the product to be mounted. Methods of assuring the mounting tolerance. Deterministic and stochastic models of mounting. Mounting procedures and their means. Mounting of workpieces, assembly (joining), control, special mounting procedures. Specification of tools, devices, machines, requisites, mounting demands and the necessary activities: mounting tree, graph of activities. General model of mounting process, event-oriented tree. Restoration by using mechanical methods; welding, soldering and brazing, thermal spray, sticking and plastic technology. Determining welding materials for hardfacing, planning the necessary pre-heating and heat treatment technology. Technologies of high energy density to modify surface integrity and surface solidifying procedures.
Forms of student activity	Processing of theoretical material with control 60% Independent processing of theoretical material 40% Task solution with management 15% Task independent processing 85%
Compulsory literature	Moodle
Optional literature	-
Compulsory tasks during semester	-
Midterm tests and their timing	2 tests, 5 and 12 weeks, 2 homeworks and 2 presentations.

Machine condition inspection methods

Name of the subject	HUNGARIAN	Gépállapot ellenőrzési módszerek			Level	Code:	
	English	Machine condition inspection methods			MSc 4. Semester	DUEN(L)-MUA-256	
Responsible Education Unit		Institute of Technology					
Mandatory pre-study name		Metrology and signal processing					
Type	Hours per week			Requirement	Credits	Language of education	
	Lecture		Practice	Lab			
All-time		2			Examination	5	Englich
Correspondence	Semester	10	Semester	Semester			
Subject Officer			Name	Dr. Andrew Nagy	Status	Associate Professor of College	

Training purpose and justification of the course (content, output, curriculum space)	**Goals, development objectives** *Students will be able to use machine status based on state-of-the-art non-destructive material testing and intervention-free diagnostics, based on practical examples method of determination and the planning of the audit itself..*	
Typical transfer methods	Performance	For all the students in high-performance, board performance. Use a projector (66.66% of total hours)(13 hours)
	Practice	
	Lab	Up to 30 people in groups of table counting exercises and lab measurements. (33.44% of total hours) (1 p.m.)
	Other	
Requirements (expressed in academic results)	**Knowledge** o You are familiar with and understand in detail the methods of knowledge, data collection, their ethical limitations and problem-solving techniques in the technical field. o Have knowledge of metrology and measurement theory related to the engineering field. You are familiar with information and communication technologies related to the engineering field. o You know and understand the tools and methods of computer modeling and simulation related to the field of mechanical engineering. - You have extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes.	
	Ability o It is able to apply the theories and related terminology in a given technical field in an innovative way when solving problems. o It is capable of a versatile interdisciplinary approach and resolution of specific problems within its field. o In solving a problem, it is able to organise cooperation with experts in related fields. o It can solve specific technical problems in its field in an innovative way using state-of-the-art knowledge acquisition and data collection methods. o It is able to use information and communication technologies and methods to solve technical problems..	
	Attitude o Using his acquired technical knowledge, he strives to gain as much knowledge as possible about observable phenomena, to describe and explain his legalities. o Committed to high-quality, quality work, sets an example for your colleagues to apply this approach. -	
	Autonomy and responsibility o Its decisions shall take into account the principles and application of environmental protection, quality, consumer protection, product liability, equal opportunity access, health and safety at work, technical, economic and legal regulations and the basic requirements of engineering.	
A brief description of the content of a subject	Technology tracking; planning for the necessary data processing; noise and vibration analyses; non-destructive material tests (visual, ultrasonic, swirlcurrent, acoustic emission, fast camera, thermal imaging); intervention-free diagnostics (measurement	

	of noise and fluctuations, use of inherent noise sources in diagnostics, coherence, wavelet, fuzzy and correlation methods in practice, autoregession, use of SPRT). Voltage foci of machinery and materials; condition check and vibration types of rotating machines, mathematical modelling of vibrations and flows, rotary machine testing in practice. Failure statistics and use in failure analysis, probability risk assessment, average time between two failures and expected time to failure; development of causal analyses, data sets and knowledge bases. Use fluctuation models and their time-dependent differential equations in frequency space through examples. Availability, monitoring and analysis of technological processes for machine status.
Student activities	Processing heard text with note-taking and recording of material using your own and electronically available note 40% Self-carrying measurement exercises 20% Tasks managed and self-processing 20% Solve test tasks 20%
Mandatory literature and availability	• Oliver Fodor - Gábor Pór: Destructive and non-destructive techniques, e-learning curriculum, Dunaújváros College, TAMOP 4.1.2 / A, 2011, moodle.duf.hu •Own literature research, according to the criteria given: http://literature.rockwellautomation.com/idc/groups/public/documents/webassets/browse results.hcst?familyTitle=General%20Information&categoryTitle=Condition%20 Monitoring&xLanguage=EN%20-%20English&CategoryId=3636&FamilyId=3638&passedLangVal=EN%20%20English. • ISO (2011). **ISO 17359:2011, Condition monitoring and diagnostics of machines - General guidelines. The** International Organization for Standardization **(ISO)**
Recommended literature and availability	• Randall, Robert Bond: Vibration-based condition monitoring: industrial, automotive and aerospace applications. Chichester: Wiley, 2011. 308 p. ISBN: 978-0-470-74785-8 • Kusek, Jody Zall, Rist, Ray C.: Ten steps to a results-based monitoring and evaluation system: a handbook for development practitioners. Washington, Dc: World Bank, 2004. • Idhammar, Torbjörn: Condition Monitoring Standards. Vol 1-4. Raleigh: IDCON, 2001-2009.

Weldability

Name of the subject	HUNGARIAN	**Hegeszthetőség**						Level			
	English	Weldability						MSc 3. Semester			**DUEN(L)-MUA-112**
Responsible Education Unit		Institute of Technology									
Mandatory pre-study name		No									
Type	Hours per week							Requirement	Credits	Language of education	
	Performance			Practice		Lab					
All-time			2		0		1	F	5	Hungarian	
Correspondence	Semester		10	Semester	0	Semester l	5				
Subject Officer				Name		Dr. habil Béla Palotas			Status	Professor Emeritus	

Training purpose and justification of the course (content, output, curriculum space)	**Goals, development objectives** *o The object is intended to give students an understanding of the rules of welding different materials, ways to avoid cracks. By learning the course curriculum, students should be able to determine the causes of defects related to welded bandages.*	
Typical transfer methods	Performance	For all the students in high-performance, board performance. Use a projector (66.66% of total hours)(26 hours)
	Practice	
	Lab	Laboratory practice in groups of up to 15 people. (33.33% of total hours) (1 p.m.)
	Other	
Requirements (expressed in academic results)	**Knowledge** o Have knowledge of metrology and measurement theory related to the engineering field. It has extensive theoretical and practical skills, methodological and practical knowledge for the design, manufacture, modeling, operation and management of complex mechanical systems and processes.	
	Ability o Capable of laboratory testing and analysis of materials used in the mechanical field, evaluation and documentation of test results. o Prepared for processing and organizing, analysing and drawing conclusions of information collected during the operation of mechanical systems and processes. o It is able to enrich the knowledge base of the mechanical field with original ideas. o It is able to apply integrated knowledge of machinery, mechanical equipment, systems and processes, mechanical materials and technologies, and related electronics and information technology. o It is capable of mastering the global design of complex systems based on a system-oriented, process-oriented mind-set. o Capable of complex planning and management of the use of technical, economic, environmental and human resources. o Capable of laboratory testing and analysis of materials used in the mechanical field, evaluation and documentation of test results. o Prepared for processing and organizing, analysing and drawing conclusions of information collected during the operation of mechanical systems and processes. o It is able to enrich the knowledge base of the mechanical field with original ideas. o It is able to apply integrated knowledge of machinery, mechanical equipment, systems and processes, mechanical materials and technologies, and related electronics and information technology. o It is capable of mastering the global design of complex systems based on a system-oriented, process-oriented mind-set. o Capable of complex planning and management of the use of technical, economic, environmental and human resources.	

	Attitude o It strives to do its work in a complex approach based on a system-oriented and process-oriented mind-set. o Its work examines and seeks to achieve research, development and innovation goals.
	Autonomy and responsibility It makes its decisions carefully, in consultation with representatives of other disciplines (primarily legal, economic, energy and environmental), independently, for which it assumes responsibility. o In making its decisions, it takes into account the principles and application of environmental protection, quality management, consumer protection, product liability, equal access, occupational health and safety, technical, economic and legal regulations, and basic ethical standards.
Short description of the course content	Welding heat processes, modelling of heat processes in different cases, calculation of different heat cycles and cooling rates. Causes of welding cracks (crystallization, cold, terrace and reheating cracks), avoidance of cracks. Calculation of the preheating temperature. Investigation of crack sensitivities. Material structural disorders caused by welding heat and their avoidance. Welding stresses, deformations, correct welding sequences. Modelling of welding stresses and deformations. Correct selection of welding consumables for different tasks. Rules for welding of non-alloy, weakly and highly alloyed steels (heat-resistant, cold-resistant, heat- and corrosion-resistant and tool steels). Overlay welding of tools. Rules for welding cast irons. Rules for welding of non-ferrous and light metals. Rules for welding ceramics and composites. Making mixed joints.
Forms of student activity	Processing of heard text with notes and recording of the material using own and electronically available notes 40% Performing measurement exercises independently 30% Controlled and independent processing of tasks 30%
Required reading and contact information	AWS Welding Handbook, Vol. 3.- 4., American Welding Society, Miamy, Fl, USA. • *moodle.duf.hu*
Recommended literature and contact information	• *Welding and related technologies, GTE. Budapest, 2007.* *Dr. Károly Bödök: Corrosion resistance of unalloyed, weakly and strongly alloyed structural steels, with special regard to their weldability, Corweld Ltd. publication, Bp.1997.*

Special materials and technologies

Subject name		In Hungarian		Special materials and technologies				Level		MSc	
		In English		Különleges anyagok és technológiák						DUEN(L)-MUA-115	
Responsible educational unit				Institute of Technology							
Name of Mandatory Preliminary Study				-							
Type		Number of weekly lessons						Requirements		Credits	Language of education
		Lecture		Seminar		Laboratory					
Full-time			2		0		1	Examination		5	English
Correspondence		Semester	10	Semester	0	Semester	5				
Responsible teacher				Name		Dr. Zsolt Csepeli				Position	lecturer

Educational goals	**Goals** ○ Students will be familiar with advanced and smart materials, and they will learn special material technologies. At the end of the semester students will be able to cope with material related problems in the field of lifetime management.	
Typical delivery methods	Lecture	Lectures with blackboard and projector.
	Seminar	
	Laboratory	Carrying out experiments and calculation.
	Other	
Requirements (expressed in learning outcomes/competencies to be acquired)	**Knowledge** ○ Students have detailed knowledge of the basic materials and technologies, and are familiar with the most frequently used material testing methods.	
	Ability ○ Students are able to characterise the different materials and technologies, and can define the appropriate questions.	
	Attitude ○ Try to apply state-of-the-art knowledge and methods to select the most appropriate material and technology.	
	Autonomy and responsibility ○ Can work independently and takes responsibility. Cooperates with experts from other fields to solve the revealed problems but can make their own decisions.	
Brief description of the subject content	High temperature lubricants. Technologies to repair degraded surfaces. The technique and technology of laser cladding. Computer simulation of laser cladding. The technology of rapid prototyping. Laser hardening of worn surfaces of large components. Unidirectional solidification of the alloys. Production technologies of ultrafine grained (UFG) and nanograin (NG) metals and alloys. Creep resistant, metal matrix composites. Shape memory alloys. Wear resistant ceramics.	
Activity forms of students	Understanding and assimilation of the topics of presentations 50% Testing of materials 30% Laboratory exercises 20%	
Compulsory reading and its availability	[1] David Segal: Materials for the 21st Century, Oxford University Press, USA, 2017 [2] Sabar D. Hutagalung: Materials science and technology, InTech, 2012 [3] Chang, Shun-Hsyung, Parinov, Ivan A., Topolov, Vitaly Yu: Advanced Materials, Springer, 2014	
Recommended reading and its availability	[4] Yuqing Weng: Ultra-fine Grained Steels, Metallurgical Industry Press, Springer, 2003 [5] WENG Yu-qing, SUN Xin-jun, DONG Han: Overview on the Theory of Deformation Induced Ferrite Transformation	

Diploma Thesis 1

Name of the subject	HUNGARIAN	**Diplomatervezés 1**					Level	Code:	
	English	Diploma Thesis 1					MSc 3. Semester	DUEN(L)-MUG-096	
Responsible Education Unit		Institute of Technology							
Mandatory pre-study name		No							
Type	Hours per week						Requirement	Credits	Language of education
	Performance		Practice		Lab				
Full-time		0		4		0	Practise note	10	English
Correspondence	Semester l	0	S Semester	20	Semester	0			
Subject Officer			Name		Dr. Peter Bajor		Status		Associate Professor of College

Training purpose and justification of the course (content, output, curriculum space)	**Goals, development objectives** o The aim of the course's education is to educate students about the current technical o by solving tasks independently or primarily in small groups, o group work, with tools and methods. o After a successful course, students will be able to o and to solve it in groupwork, to ensure that work and results are O document, interpretation and evaluation.
Typical transfer methods	Performance Practice: consultation with an industrial and university consultant Lab Other
Requirements (expressed in academic results)	**Knowledge** o You are familiar with the rules for the preparation of technical documentation. - You are familiar with the organisational tools and methods associated with management, the technical legislation necessary for the exercise of the profession. o Have extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes. o Have comprehensive knowledge of machine, system and process design methods in the engineering field. **Ability** o Prepared for processing and organizing, analysing and drawing conclusions of information collected during the operation of mechanical systems and processes. o It is able to enrich the knowledge base of the mechanical field with original ideas. o It is able to apply integrated knowledge of machinery, mechanical equipment, systems and processes, mechanical materials and technologies, and related electronics and information technology. o It is capable of mastering the global design of complex systems based on a system-oriented, process-oriented mindset. **Attitude** o Using his acquired technical knowledge, he strives to gain as much knowledge as possible about observable phenomena, to describe and explain his legalities. o Committed to high-quality, quality work, he sets an example for his colleagues to apply this approach. **Autonomy and responsibility** Taking responsibility for his own work and the work of his peers.
A brief description of the content of a subject	Students can receive part-time tasks from the current application, research and innovation tasks of the Departments of Technology and solve problems brought by themselves from industry, in small groups or individually. Students independently explore and interpret problems, use the processing of domestic and international literature to gain an insight into the subject area, then formulate various solutions for implementation, sometimes conducting model experiments. In solving the tasks, the students apply the knowledge they have learned independently.

	The tasks for longevity management are primarily related to materials science, material technologies, repair and assembly, measurement and signal processing, and material testing and diagnostics. Prepare the task for the diploma plan task. It's about 30% of the total.
Student activities	Regular consultation with industrial and university consultants. Incorporate the proposals into the forthcoming project report or the diploma plan paper. Continuous development and documentation of the thesis at an appropriate level.
Mandatory literature and availability	-Guide to the preparation of the thesis and diploma design. Extended version 2. UNIVERSITY PUBLISHER Recommended by a consultant, the topic is processed by literature.
Recommended literature and availability	Dr. Pál Majoros: Research methodology or how to write a good diploma thesis easily and quickly. National Textbook Publisher, Budapest, 1997

Diploma Thesis 2

<table>
<tr><td rowspan="2">Name of the subject</td><td colspan="2">HUNGARIAN</td><td colspan="4">Diplomatervezés 2.</td><td>Level</td><td>Code:</td></tr>
<tr><td colspan="2">English</td><td colspan="4">Diploma Thesis 2</td><td>MSc 4. Semester</td><td>DUEN(L)-MUG-097</td></tr>
<tr><td colspan="3">Responsible Education Unit</td><td colspan="6">Institute of Technology</td></tr>
<tr><td colspan="3">Mandatory pre-study name</td><td colspan="6">No</td></tr>
<tr><td rowspan="2">Type</td><td colspan="2" rowspan="2">Hours per week
Performance</td><td colspan="2" rowspan="2">Practice</td><td colspan="2" rowspan="2">Lab</td><td rowspan="2">Requirement</td><td rowspan="2">Credits</td><td rowspan="2">Language of education</td></tr>
<tr></tr>
<tr><td>All- time</td><td></td><td></td><td>0</td><td></td><td>12</td><td></td><td>0</td><td rowspan="2">Practise note</td><td rowspan="2">20</td><td rowspan="2">English</td></tr>
<tr><td>Correspondent</td><td></td><td>Semiannual</td><td>0</td><td>Semiannual</td><td>60</td><td>Semiannual</td><td>0</td></tr>
<tr><td colspan="3">Subject Officer</td><td>Name</td><td colspan="3">Gábor Ladányi</td><td>Position</td><td>College Assistant Professor</td></tr>
<tr><td colspan="3">Training purpose and justification of the course (content, output, curriculum space)</td><td colspan="6">Goals, development objectives
o The aim of the course's education is to educate students about the current technical
o by solving tasks independently or primarily in small groups,
o group work, with tools and methods.
o After a successful course, students will be able to
o and to solve it in groupwork, to ensure that work and results are
O document, interpretation and evaluation.</td></tr>
<tr><td colspan="3" rowspan="4">Typical transfer methods</td><td>Performance</td><td colspan="5"></td></tr>
<tr><td>Practice</td><td colspan="5">consultation with an industrial and university consultant</td></tr>
<tr><td>Lab</td><td colspan="5"></td></tr>
<tr><td>Other</td><td colspan="5"></td></tr>
<tr><td colspan="3" rowspan="4">Requirements (expressed in academic results)</td><td colspan="6">Knowledge
o You are familiar with the rules for the preparation of technical documentation. - You are familiar with the organisational tools and methods associated with management, the technical legislation necessary for the exercise of the profession.
o Have extensive theoretical and practical skills, methodological and practical knowledge in the design, manufacture, modelling, operation and management of complex mechanical systems and processes.
o Have comprehensive knowledge of machine, system and process design methods in the engineering field.</td></tr>
<tr><td colspan="6">Ability
o Prepared for processing and organizing, analysing and drawing conclusions of information collected during the operation of mechanical systems and processes.
o It is able to enrich the knowledge base of the mechanical field with original ideas.
o It is able to apply integrated knowledge of machinery, mechanical equipment, systems and processes, mechanical materials and technologies, and related electronics and information technology.
o It is capable of mastering the global design of complex systems based on a system-oriented, process-oriented mindset.</td></tr>
<tr><td colspan="6">Attitude
o Using his acquired technical knowledge, he strives to gain as much knowledge as possible about observable phenomena, to describe and explain his legalities.
o Committed to high-quality, quality work, he sets an example for his colleagues to apply this approach.</td></tr>
<tr><td colspan="6">Autonomy and responsibility
Taking responsibility for his own work and the work of his peers.</td></tr>
<tr><td colspan="3">A brief description of the content of a subject</td><td colspan="6">Students can receive part-time tasks from the current application, research and innovation tasks of the Departments of Technology and solve problems brought by themselves from industry, in small groups or individually. Students independently explore and interpret problems, use the processing of domestic and international literature to gain an insight into the subject area, then formulate various solutions</td></tr>
</table>

	for implementation, sometimes conducting model experiments. In solving the tasks, the students apply the knowledge they have learned independently. The tasks for longevity management are primarily related to materials science, material technologies, repair and assembly, measurement and signal processing, and material testing and diagnostics. The task is to prepare a diploma plan 100% of the total.
Student activities	Regular consultation with industrial and university consultants. Incorporate the proposals into the forthcoming project report or the diploma plan paper. Continuous development and documentation of the thesis at an appropriate level. Finish your thesis by the end of the semester.
Mandatory literature and availability	-Guide to the preparation of the thesis and diploma design. Extended version 2. UNIVERSITY PUBLISHER Recommended by a consultant, the topic is processed by literature.
Recommended literature and availability	- Dr. Pál Majoros: Research methodology or how to write a good diploma thesis easily and quickly. National Textbook Publisher, Budapest, 1997