SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	36.00

2. Data about the subject

2.1	Subject name			Machine elements and mechanisms			
2.2	Course responsible/lecturer			Assoc. Prof. dr.eng. Noveanu Simona			
2.3	Teachers in charge of seminars			Assoc. Prof. dr.eng. Noveanu Simona			
2.4 Year of study	3	2.5 Semester	5	2.6 Assessment			Ex
2.7 Subject category	Formative category						DD
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	5	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	1	3.3 Project	2
3.4 Total hours in the curriculum	70	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	14	3.6 Project	28

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	20
(b) Supplementary study in the library, online and in the field	5
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	25
(d) Tutoring	
(e) Exams and tests	5
(f) Other activities	

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	55
3.9 Total hours per semester (3.4+3.8)	125
3.10 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	General physics, General mechanics
4.2	Competence	Analysis and synthesis capacity

5. Requirements (where appropriate)

5.1	For the course	Online, Microsoft Teams
5.2	For the applications	Online, Microsoft Teams

6. Specific competences

Professional competences	After completing the course, the students will be capable to: Understand the fundamental principles of mechanical design; Know the machine parts and their role in various mechanical constructions; Use technical documentation in order to design various machine parts; Use various CAD software such as SolidWorks, AutoCad etc. in mechanical design.
Cross competences	Personal and professional development throughout continuously training, constant communication and conceptualization, dynamic and informed decision making.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	To develop the professional skills in the field of mechanical design.
7.2	Specific objectives	To develop student understanding of the theoretical background for basic and advanced kinematics and synthesis of mechanisms to achieve desired motion. To introduce students to basic and advanced computer-based tools for analysis and synthesis of mechanisms.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Fundamentals of Machine elements and mechanisms	2	Online, Microsoft Teams	
2. Bar mechanisms.	2		
3. Gear Trains.	2		
4. Cam design.	2		
5. Design of bolted joints.	2		
6. Shafts-hub connections. Key joint calculation. Spline connections.	2		
7. Design of pin assemblies.	2		
8. Shafts. Shafts components.	2		
9. Gearings.	2		
10. Cylindrical gearings.	2		
11. Bevel gearings.	2		
12. Worm gearings.	2		
13. Rolling bearings.	2		
14. Design of bearings units.			

Bibliography

1. Antonescu, P. Mecanisme, Editura Printech, București, 2003.
2. Buiga, O., Organe de mașini. Proiectarea optimală a transmisiilor mecanice cu angrenaje, Ed. Risoprint, Cluj-Napoca, 2018.

3. Crețu, S.M. Mecanisme analiză structurală. Teorie și aplicații, Editura Sintech, Craiova, 2010.
4. Filip, V. Mecanisme, Editura Bibliotecha, Târgoviște, 2003.
5. Grote, K.H, Antonsson, E.K. Springer Handbook of Mechanical Engineering, Springer-Verlag Berlin Heidelberg, 2009;
6. Haragâș, S., Pop, D., Buiga, O. Transmisii cu șuruburi. Calcul și proiectare Ed. Todesco, Cluj-Napoca, 2013.
7. Haragâș, S., Pop, D. Organe de mașini. Aplicații, Ed. Risoprint, Cluj-Napoca, 2018.
8. Haragâş S. Organe de maşini, Ed. Napoca Star, Cluj-Napoca, 2014.
9. Handra Luca, V., Stoica, I.A. – Introducere în teoria mecanismelor, vol. I, Editura Dacia, Cluj-Napoca, 1982.
10. Noveanu, S., - Mecanisme cu bare, Editura UTPress, Cluj-Napoca, 2020.
11. Pop, D., Haragâș, S. Organe de mașini, Ed. Risoprint, Cluj-Napoca 2014.

8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Analysis for bar mechanisms	2	Online, Microsoft Teams	
2. The gear ratio of the gear's trains.	2		
3. Bolted joints (threaded fasteners).	2		
4. Eficiency of threaded assemblies.	2		
5. Shafts-hub connections. Key joint and spline connections.	2		
6. Cylindrical gearings.	2		
7. Bevel and worm gearings.	2		

Bibliography

1. Maros, D., ș.a. Mecanisme, Îndrumător de lucrări, Lito. IPC-N, Cluj-Napoca 1984.
2. Noveanu, S. Fascicule lucrari Mecanisme, 2019.
3. Tătar, M.O., Elemente de inginerie mecanică. Îndrumător de laborator, Editura UTPress, Cluj-Napoca, 2013.

8.2. Project: designing a screw-nut mechanism	Number of hours	Teaching methods	Notes
1. Fundamentals of mechanical design. Analysis of the mechanism.	2	Online, Microsoft Teams	
2. Selecting the design solution.	2		
3. Thread calculus.	2		
4. Screw design.			
5. Strength calculus of the power screw.	2		
6. 3D model of the screw.	2		
7. Nut design.	2		
8. 3D representation of nut.	2		
9. Design and calculus of mechanism components.	2		
10. Driving mechanism design.	2		
11. Drawings for nut.	2		
12. Drawings for screw.	2		
13. Drawings for mechanism assembly, nut and screw.	2		
14. Deadline for submitting the project.	2		

Bibliography

1. Haragâș, S., Pop, D., Buiga, O. Transmisii cu șuruburi. Calcul și proiectare Ed. Todesco, Cluj-Napoca, 2013.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Machine elements and mechanisms course aims to introduce the most basic machine parts, giving insight to the engineering speciality with valuable contributions in training the future mechanical engineers as a designer.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Exam consisting of various course problems	Written exam: Mechanism Machine Elements	 ExamM=40% ExamME=60%
10.5 Seminars /Laboratory/Project	Interview regarding the mechanical design fundamentals	Discussion regarding the project and the laboratories practical activities	LabM=40% LabME=A/R
10.6 Minimum standard of performance			
G = 0.3·(0,6·ExamM+0.4·LabM)+0.7·(0,6·ExamME+0,4·PME) where: ExM≥5, LabM≥5, ExME≥5, PEM≥5			

Date of filling in: 19.04.2023		**Title Surname Name**	**Signature**
	Lecturer	Assoc. Prof. dr.eng. Noveanu Simona	
	Teachers in charge of application	Assoc. Prof. dr.eng. Noveanu Simona	

Date of approval in the department
26.06.2023

Head of department
Ass.prof.dr.eng. Mariana Pop

Date of approval in the faculty
10.07.2023

Dean
Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	37.00

2. Data about the subject

2.1	Subject name			Surfaces corrosion			
2.2	Course responsible/lecturer			Conf. dr. ing. Horațiu Vermeșan			
2.3	Teachers in charge of seminars			Conf. dr. ing. Horațiu Vermeșan			
2.4 Year of study	3	2.5 Semester	1	2.6 Assessment	C		
2.7 Subject category	Formative category						DS
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	16
(b) Supplementary study in the library, online and in the field	15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	15
(d) Tutoring	6
(e) Exams and tests	3
(f) Other activities	3

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Mathematical analysis, Physics, Chemistry, Materials science and engineering, Materials technology.
4.2	Competence	Basic notions of electrochemistry, information and documentation, team activity, use of data acquisition information technologies and their processing.

5. Requirements (where appropriate)

5.1	For the course	Laptop + for figures, tables and images;
5.2	For the applications seminarului / laboratorului / proiectului	Online presentation: specific laboratory instruments (millivoltmeters, milliammeters, current sources, saturated calomel reference electrodes, working electrodes of different metals), pH-meter; conductivity; analytical balance; rated balloons etc.

6. Specific competences

Professional competences	The main theoretical (fundamental notions of thermodynamics and electrochemical kinetics) and applied (implications of these aspects in corrosion and corrosion protection) aspects of electrochemistry; Emphasis is placed, in particular, on the applicability of the concepts covered: causes and effects of corrosion, corrosion rate, methods and techniques of corrosion protection; Through the related practical works, the aim is both the formation of skills for experimentation and solving numerical applications related to the corrosion phenomenon and the initiation in finding the optimal solutions for corrosion protection.
Cross competences	- analysis of corrosion and current methods of preventing and / or combating corrosion in the case of local or national targets; - the estimative and laboratory study of the evolution of the corrosion of some parts, structures, etc .; - estimating the impact of corrosion over certain periods of time; - building a mode of impact of corrosion, including economic impact.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Acquisition of theoretical knowledge and practical skills in the field of corrosion and corrosion protection.
7.2	Specific objectives	1. Assimilation of theoretical knowledge on corrosion and protection against corrosion. 2. Obtaining skills for the development of corrosion and corrosion protection control and management systems projects.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Defining corrosion. Some economic aspects of corrosion. Classification of corrosion processes.	2	Exposure Conversation Description Problematic	
Gas corrosion (chemical). Thermodynamics of dry gas corrosion. Kinetics of corrosion in dry gases. The mechanism of dry gas corrosion. Oxidation of metals at temperatures. Oxidation of metals at high temperatures.	2		
Oxidation of alloys in gases. Corrosion of metals and alloys in industrial gases at high temperatures. Corrosion of steels in sulfur compounds. Corrosion of metals in chlorine and hydrochloric acid. Corrosion of metals in non-polar	2		

liquid media. Corrosion of metals and alloys in liquid fuels and oils. Factors influencing gas corrosion.			
Electrochemical (wet) corrosion. Thermodynamics of electrochemical corrosion (wet). Kinetics of electrochemical corrosion (wet). The influence of different factors on electrochemical corrosion.	2		
Metal passivation	2		
Corrosion by microbial attack. Bacterial corrosion of stainless steels. Biological corrosion and the human body.	2		
Forms of corrosion. Generalized corrosion. Galvanic corrosion.	2		
Localized corrosion. Intergranular corrosion. Pitting corrosion. Weld corrosion. Cavernous corrosion. Filiform corrosion. Selective corrosion. Corrosion by differential aeration. Corrosion under paint.	2		
Concrete corrosion. Corrosion by crevice effect. Corrosion under voltage. Corrosion due to hydrogen embrittlement. Fatigue corrosion. Friction corrosion. Erosion corrosion. Cavitation corrosion.	2		
Corrosion in water. Water characterization. Factors that determine the corrosivity of water.	2		
Atmospheric corrosion. Characterization of atmospheres. Classification of atmospheric corrosivity. Dry atmospheric corrosion. Wet atmospheric corrosion. Corrosion in the industrial atmosphere. Corrosion in the marine atmosphere. Corrosion in the rural atmosphere.	2		
Soil corrosion. Soil characterization. Soil corrosivity. Factors that determine soil corrosivity.	2		
Methods for testing and measuring corrosion. Methods for determining corrosion.	2		
The impact of corrosion on the environment and society. The impact of corrosion on oil and gas transportation. The impact of corrosion on the water supply network, sewerage. The impact of corrosion on the pharmaceutical and food industry. The impact of corrosion on electricity production. The impact of corrosion on buildings, constructions. The impact of corrosion on shipping. The impact of corrosion on the car industry.	2		

Bibliography

1. R. Winston Revie, Herbert H. Uhlig, Corrosion and Corrosion Control, An Introduction to Corrosion Science and Engineering, 2008 John Wiley & Sons, Inc.
2. Philip A. Schweitzer, Fundamentals of Corrosion Mechanisms, Causes, and Preventative Methods, 2010 by Taylor and Francis Group, LLC.

8.2. Laboratory	Number of hours	Teaching methods	Notes
Presentation of laboratory works. Rules for labor protection, firefighting and environmental protection. Aspects of materials destruction by corrosion. Oxide formation on steel (corrosion)	2	Exposure Conversation Description Experiments	
Electrochemical corrosion testing of metals, by measuring the volume of gas resulting or consumed in the corrosion reaction in acidic and / or basic medium	2		
Corrosion potential of metals at electrochemical corrosion. Galvanic corrosion testing (contact corrosion)	2		
Differential aeration corrosion - the drip method. Differential aeration corrosion - concentration cell method. Thermal corrosion cells - measurement of the corrosion potential of thermal corrosion cells.	2		
Anodic oxidation (anodizing) of aluminum and its alloys (with conversion layers). Compaction of aluminum oxide films. Coloring of anodized aluminum.	2		
Protection of metals against corrosion by electrochemical deposits of zinc layers. Porosity of electrodeposited layers.	2		
Establishing the optimal parameters for the electrochemical deposition of metals, using the Hull cell. Presentation of the file with works. Evaluation of results.	2		
Bibliography VERMEȘAN, H., Corrosion and Anticorrosive Protection - laboratory works, Ed. Risoprint, Cluj-Napoca, 2010, ISBN 978-973-53-0313-6			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Regarding the course content and the formulation of concepts and examples for teaching, the holders of the discipline consulted the scientific materials and practical applications published in the country and abroad. They have also consulted and continue to collaborate with industry and industry professional associations, and other teachers.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Quiz with 30 questions from the theoretical and practical notions presented.	Written test - evaluation duration: maximum 3 hours	80%
10.5 Laboratory	Interpretation and evaluation of experimental results sent	Practical test - oral presentation, duration 1 hour	20%

	by the teacher.		
10.6 Minimum standard of performance			
Correct answer to at least 10 questions and obtaining the grade allowed for the practical test			

Date of filling in: 20.03.2023		**Title Surname Name**	**Signature**
	Lecturer	Conf. dr. ing. Horațiu VERMEȘAN	
	Teachers in charge of application	Conf. dr. ing. Horațiu VERMEȘAN	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	38.00

2. Data about the subject

2.1	Subject name				Technological processes in materials engineering I (Heat treatments)		
2.2	Course responsible/lecturer				Lecturer dr.eng. Sas Boca Monica – Monica.Sa.Boca@ipm.utcluj.ro		
2.3	Teachers in charge of seminars				Lecturer dr.eng. Sas Boca Monica – Monica.Sa.Boca@ipm.utcluj.ro		
2.4 Year of study	3	2.5 Semester	1	2.6 Assessment			E
2.7 Subject category	Formative category						DD
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	-	3.3 Laboratory	2	3.3 Project	-
3.4 Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	-	3.6 Laboratory	28	3.6 Project	-

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	14
(b) Supplementary study in the library, online and in the field	6
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	19
(d) Tutoring	3
(e) Exams and tests	2
(f) Other activities	-

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	44
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	-
4.2	Competence	-

5. Requirements (where appropriate)

5.1	For the course	-

5.2	For the applications	The presentation at the exam is conditioned by the complete performance of the laboratory works.

6. Specific competences

Professional competences	- To know the theoretical principles of volume heat treatments (annealing, hardening, tempering), as well as the fundamental elements of their application technology; - To understand the microstructural transformations that take place when heating and cooling of alloys in different regimes and the implications of the parameters of the heat treatment regime on the microstructure and properties of the product subjected to these technological operations; - To know and interpret the transformation diagrams for cooling of steels (IT and CCT diagrams); - To know the criteria according to which the volume heat treatment is prescribed for different applications (parts, semi-finished products and tools) taking into account the material and the pre-established requirements; - To prescribe heat treatment technology for parts and tools subject to various working conditions; - To characterize the microstructure of a heat treated alloy; - Application of basic principles and methods for solving problems in the exploitation of materials processing technologies, in order to make technological flows more efficient; - Appropriate use of standard criteria and methods for the analysis and evaluation of materials processing technologies and their implementation in accordance with the norms of quality, environment and labor protection.
Cross competences	- Carrying out activities and exercising the specific roles in the teamwork, on different hierarchical levels, promoting the spirit of initiative, dialogue, cooperation, positive attitude, respect for others, diversity and multiculturalism and continuous improvement of one's activity. - Objective self-assessment of the need for continuous professional training, in order to enter the labor market and to adapt to the dynamics of its requirements and for personal and professional development. - Effective use of multilingual skills and knowledge of information and communication technology.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	The course aims that student will acquire the essential knowledge regarding the theory and practical aspects of volume heat treatments applied to metallic products (semi-finished products, parts and tools).
7.2	Specific objectives	It is envisaged that at the end of the course students will know: • theoretical and practical aspects (purpose, materials to which it is applied, basic principles, technological elements, applications) of volume heat treatments (annealing, hardening, tempering) applied to the main categories of alloys; • the implications that the heat treatments have on the microstructure and properties resulting from the heat treatments and, consequently, to be able to prescribe the volume heat treatment that must be applied to a product to ensure its imposed mechanical / functional properties; • solving some problems in the application of heat treatment

		technologies.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Course 1. Introductory notions. Basic operations of a heat treatment. Technological parameters of the thermal cycle.	2	Lecture and dialogue with the students	Computer + video projector and classic board will be used. Video recordings of heat treatment technologies will also be presented.
Course 2. Microstructural characteristics and properties of the structural components of the Fe-C diagram - synthesis.	2		
Course 3. Calculation of heating and soaking times. Construction of heat treatment diagrams.	2		
Course 4. Isothermal structural transformations when cooling steels (IT diagrams).	2		
Course 5. Structural transformations at continuous cooling (CCC diagrams). Homogenization annealing.	2		
Course 6. Normalization, stress relieving, and softening (globulization) annealing.	2		
Course 7. Martensitic hardening. Hardening methods.	2		
Course 8. Hardenability and methods for its determination. Residual stresses. Hardening defects.	2		
Course 9. Tempering: structural transformations during tempering, types of tempering, particularities regarding the tempering process.	2		
Course 10. Thermomechanical treatments.	2		
Course 11. Heat treatments applied to cast iron parts.	2		
Course 12. Heat treatments applied to some representative parts and semi-finished products. Heat treatments applied to stainless steels.	2		
Course 13. Heat treatments applied to tool steels and main types of tools.	2		
Course 14. Hardening by precipitation. Heat treatments applied to aluminium and copper alloys.	2		

Bibliography

1. Dossett, J.L., Boyer, H.E. Practical Heat Treating, Second Edition, ASM International, Ohio, 2006.
2. ASM Volume 4, Heat Treating, ASM International 1991.
3. Course notes delivered to students in digital format (Word, Power Point).
4. Vermeşan H., Mudura P., Vermeşan G., Berar A. Bazele teoretice ale tratamentelor termice, Editura Universităţii din Oradea, 2002.
5. Munteanu, A., Munteanu, D., Tratamente termice si termochimice – teorie si aplicaţii, Editura Universităţii Transilvania din Braşov, 2007.
6. Socaciu, T., Moisoiu, A., Tratamente termice, Editura Universităţii „Petru Maior" Tg. Mureş, 2011.
7. Dulămiţă, T. ş.a., Tehnologia tratamentelor termice, EDP, Bucureşti, 1982.
8. Vermeşan, G. ş.a., Procedee speciale de tratamente termice, Litografia Institutului Politehnic Cluj-Napoca, 1990.
9. Vermeşan, G., Îndrumător pentru tratamente termice, Litografia Institutului Politehnic Cluj-

Napoca, 1987.
10. Relevant web sites.

8.2. Laboratory	Number of hours	Teaching methods	Notes
Work 1. Knowledge of the main equipment in the heat treatment laboratory. Norms of labor protection in the heat treatment laboratory.	2	Discussions with the students, quizzes and practical operations for the laboratory works	The laboratory equipment and apparatus will be used
Works 2-3. Calculation of heating curves for thin parts. Experimental verification of heating curves for thin parts made of different alloys.	4		
Work 4. Determinations and quantitative measurements using the metallographic microscope.	2		
Works 5-6. Appreciation of the results of different heat treatments by measurements of hardness and toughness and the correlation with the link between microstructure and properties.	4		
Work 7. Equilibrium and out-of-equilibrium structures in the Fe-C diagram. Continuous hardening of C 45 and C90U steels.	2		
Work 8. Determining the hardness of steels by the method of frontal hardening (Jominy method).	2		
Works 10-11. Establishing of the tempering parameters for carbon, alloy and tool steels.	4		
Works 12-13. Calculation of heating curves for solid parts made of different alloys.	4		
Work 14. Industrial visit.	2		

Bibliography

1. Laboratory notes delivered to students in a digital format.
2. Munteanu, A., Munteanu, D., Tratamente termice şi termochimice, teorie şi aplicaţii, Editura Universităţii Transilvania din Braşov 2007.
3. Ivanus, R. – Tratamente termice: îndrumător pentru lucrări de laborator, Editura Universităţii din Craiova, 2001.
4. Vermeşan, G. ş.a., Tratamente termice - Lucrări de laborator, I. P. Cluj-Napoca, 1987.
5. Cojocaru, M., Tarcolea, M., Modelarea interacţiunilor fizico-chimice ale produselor metalice cu mediile, Editura Matrix Rom, Bucureşti 1998.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies are in accordance with the requirements of employers regarding the necessary knowledge of engineers working in heat treatment workshops, design departments (conception and technology), quality assurance services, expertise and consulting companies in the field of heat treatment.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the

			final grade
10.4 Course	Grid test (20 questions), solving 5 theoretical topics with clearly specified requirements and solving 2 applications.	Written exam, 2 hours.	80%
10.5 Laboratory	Completion of the 14 laboratory works.	Evaluation of laboratory works.	20%
10.6 Minimum standard of performance			
- Accumulation of at least 4 points out of a maximum of 9 in the written exam; - Obtaining the minimum passing grade (five) for laboratory works.			

Date of filling in:		**Title Surname Name**	**Signature**
26.03.2023	Lecturer	Assoc.Prof.dr.eng. Gavril Negrea	
	Teachers in charge of application	Lecturer .dr.eng. Monica Sas Boca	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	39,00

2. Data about the subject

2.1	Subject name			Powder metallurgy		
2.2	Course responsible/lecturer			S.l.dr.ing. Thalmaier Gyorgy		
2.3	Teachers in charge of seminars			S.l.dr.ing. Thalmaier Gyorgy		
2.4 Year of study	3	2.5 Semester	5	2.6 Assessment	Exam	
2.7 Subject category	Formative category					DS
	Optionality					DOB

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar	0	3.3 Laboratory	1	3.3 Project	0
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar	0	3.6 Laboratory	14	3.6 Project	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	18
(b) Supplementary study in the library, online and in the field	-
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	2
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	36
3.9 Total hours per semester (3.4+3.8)	78
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	N/A
4.2	Competence	Basic knowledge of Technical Drawing, Materials Science and Materials Technology

5. Requirements (where appropriate)

5.1	For the course	Lectures online MS Teams/onsite
5.2	For the applications	Applications online MS Teams /onsite

6. Specific competences

Professional competences	After completing the discipline students will be able to: - To understand the technological processes in Powder Metallurgy; - To choose an elaboration strategy for a given product; - To use the specific PM investigation methods.
Cross competences	To know how to use laboratory equipment; to understand the technological process of manufacturing a part through powder metallurgy - To choose a suitable material according to the characteristics of the part to be manufactured

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of skills related to processing parts by powder metallurgy.
7.2	Specific objectives	Knowledge of the equipment used in the manufacture of parts by powder metallurgy; Knowledge of materials processing processes through MP; Knowledge of technological documentation on design technological processes of manufacturing parts by metallurgy powders; Related labour and environmental protection issues.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction. History of M.P. General manufacturing route specific to Powder Metallurgy	2	Interactive methods using digital equipment, video materials, cases studies	Digital media content included
2. Powder manufacturing processes	6		
3. Powder properties	6		
4. Powder forming processes	8		
5. Sintering	4		
6. Secondary Operations applied to PM parts	2		

Bibliography

1. Metals Handbook v. 7. Powder Metallurgy, Powder Metallurgy ASM,Ohio,USA, 1984.
2. Material and Powder Properties; Handbook 1; Hoganas Handbook for Sintered Components; Hoganas AB; 2004.
3. Production of Sintered Components; Handbook 2; Hoganas Handbook for Sintered Components; Hoganas AB; 2004.
4. Design and Mechanical Properties; Handbook 3; Hoganas Handbook for Sintered

Components; Hoganas AB; 2004.
5. German, R.M; Powder Metallurgy & Particulate Materials Processing; Metal Powder Industries Federation; Princeton, NJ; 2005.

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Presentation of the pressing and sintering equipment from the MP laboratory. Safety rules in the MP lab, presentation of the laboratory works.	2	Practical training	Prepare lab report for labs 2-7
2. Measuring metal powders	2		
3. Methods for obtaining metal powders. The influence of the manufacturing method on the powders shape.	2		
4. Determination some technological properties of metal powders	2		
5. Presability of metallic powders.	2		
6. Determination of the specific surface area of the powders	2		
7. Sintering studies. Herring's scaling law.	2		
Bibliography: German, R.M; Powder Metallurgy & Particulate Materials Processing; Metal Powder Industries Federation; Princeton, NJ; 2005			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired skills will be used in design, execution and control activities in the field of powder metallurgy and other industrial sectors where powders are used

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	5-10 questions	Written exam 2 h	75%
10.5 Seminars /Laboratory/Project	Overall activity + short quiz from lab reports	Oral/written exam 0.5 h	25%
10.6 Minimum standard of performance			
Minimum grade of 5 obtained at course exam and laboratory tests.			

Date of filling in:		**Title Surname Name**	**Signature**
05.04.2023	Lecturer	sl.dr.ing Gyorgy Thalmaier	
	Teachers in charge of application	sl.dr.ing Gyorgy Thalmaier	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	40

2. Data about the subject

2.1	Subject name	Management					
2.2	Course responsible/lecturer	s.l.dr.ing. Prica Calin					
2.3	Teachers in charge of seminars	s.l.dr.ing. Prica Calin					
2.4 Year of study	3	2.5 Semester	2	2.6 Assessment	colloquium exam		
2.7 Subject category	Formative category						DD
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laboratory	0	3.3 Project	0
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laboratory	0	3.6 Project	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	14
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	7
(d) Tutoring	0
(e) Exams and tests	2
(f) Other activities	0

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	33
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	It's not necessary
4.2	Competence	It's not necessary

5. Requirements (where appropriate)

5.1	For the course	Presence at Technical University of Cluj-Napoca
5.2	For the applications	Presence at seminars is mandatory.

	(laboratory)	

6. Specific competences

Professional competences	To know the management function of a company, techniques and methods of management function implementation. To understand the organisation mode of a commercial society from functional and structural point of view. To identify the management methods and techniques to apply in a specific context by company board. Capacity of working in a managerial team based on managerial plan and a laborious organization. To know to calculate and to analyse various performance indicators for an activity in a commercial society. Capacity to apply specific instruments of managerial activity.
Cross competences	To know the basic concepts from management field and their connection with other sciences, including engineering. Capacity to respect and apply professional ethical principles specific to managerial activity.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Developing competences in the management domain, learning the fundamental knowledge of management systems, methods and techniques.
7.2	Specific objectives	Assimilation of knowledges of management process and company organisation.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
The object of the discipline	2	Lecture PowerPoint presentation Interactive teaching mode Dialogue - conversation professor - student	Multimedia Blackboard
The company concept, the company's typology	2		
Management process: structure and stages of management process	2		
Management functions	4		
Processual organisation of a company	2		
Company functions	2		
Structural organisation of a company	2		
Decision system of a company: concept of managerial decision	2		
Managerial systems, methods and techniques	2		
Management by objectives, management by projects	2		
Product management; management by budges	4		

Management techniques based on innovation	2		
Bibliography [1]. Steven Cohen and William Eimicke, Management Fundamentals, Columbia University Press, 2020, ISBN: 9780231194495; [2]. Ricky Griffin, Fundamentals of Management, Ed. Cengage, 2014, ISBN: 1285849043 [3]. Stephen P. Robbins Mary A. Coulter, Management, Global Edition, Ed. Pearson Education Limited, 2017.			
8.2. Laboratory	Number of hours	Teaching methods	Notes
1.	2	Explication, conversation, Case Study.	Blackboard, computer.
2.	2		
3.	2		
4.	2		
5.	2		
6.	2		
7.	2		
Bibliography [1]. Steven Cohen and William Eimicke, Management Fundamentals, Columbia University Press, 2020, ISBN: 9780231194495; [2]. Ricky Griffin, Fundamentals of Management, Ed. Cengage, 2014, ISBN: 1285849043 [3]. Stephen P. Robbins Mary A. Coulter, Management, Global Edition, Ed. Pearson Education Limited, 2017.			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The competences will be necessary to the employees which will work in the management and marketing departments of the companies and to the future engineers in the materials science field which must be at date with the management methods and techniques.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Answers to the questions related to the subjects presented at courses.	Written test - 1 hours	75%
10.5 Laboratory	Solving problems similar with the ones presented at seminars.	Written test – 1 hour	25%
10.6. Minimum standard of performance			
General examination mark ≥ 5			

Date of filling in:		**Title Surname Name**	**Signature**
10.03.2023	Lecturer	s.l.dr.ing. Prica Calin	
	Teachers in charge of application	s.l.dr.ing. Prica Calin	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	41.00

2. Data about the subject

2.1	Subject name			Applied informatics II			
2.2	Course responsible/lecturer			Lecturer Ph.D Eng. DAN NOVEANU			
2.3	Teachers in charge of seminars			Lecturer Ph.D Eng. DAN NOVEANU			
2.4 Year of study	3	2.5 Semester	1	2.6 Assessment	Exam		
2.7 Subject category	Formative category						DF
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	1	3.3 Seminar	-	3.3 Laboratory	2	3.3 Project	-
3.4 Total hours in the curriculum	42	of which	3.5 Course	14	3.6 Seminar	-	3.6 Laboratory	28	3.6 Project	-

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	12
(b) Supplementary study in the library, online and in the field	18
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	10
(e) Exams and tests	8
(f) Other activities	0

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Technical drawing knowledge.

5. Requirements (where appropriate)

5.1	For the course	On-line
5.2	For the applications seminarului / laboratorului / proiectului	On-line

6. Specific competences

Professional competences	After completing the discipline students will be able to: • use the SolidWorks interface and organize the workspace. • make complete 3D technical drawings (construction, quotation, modification) as well as making 2D Drawing drawings (views, sections, quotations) • define the floorboards and print them. • reproduce a given outline. • present on a board with an appropriate standardized format the geometric pattern of a required part.
Cross competences	Acquiring knowledge specific to the field of engineering for the purpose of vocational training and entry into the labour market.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of competences in the field of assisted design.
7.2	Specific objectives	Development of 3D vision in space. Assimilation of theoretical knowledge on the use of SolidWorks. Ability to make 2D and 3D drawings in SolidWorks.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Introduction. The appearance of the software interface. Working environments. Graphic tools. View built entities.	2	Exposure, discussion	On-line, TEAMS
Establishing the basic entity in the making of parts. Creating parts by extrusion.	2		
Creating parts through revolution. Making holes, Chamfers and fillets.	2		
Making Entities through "Sweep", "Offset", "Pattern" and "Mirror"	2		
Create parts using the "Loft" command	2		
Create a mould for a previously made piece.	2		
Create a complex part, fully defined. Assemblies.	2		
Bibliography 1.Mikell P. Groover, Emory W. Zimmers, CAD/CAM: Computer-Aided Design and Manufacturing, Prentice-Hall International, Inc.1984. 2. Andrew Tizzard, An Introduction to Computer Aided Engineering, McGraw-Hill Book Company, 1994. 3. SolidWorks Company, User Manual.			

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1 Working environments. Establishing the basic entity at the time of creation of the parts.	2	Exposure and apps	On-line, TEAMS
2 Drawing of a piece using "Extrude"	2		
3 Examples of parts made by extrusion.	2		
4 Drawing of a revolution part.	2		
5 Examples of parts made by revolution.	2		
6 Adding different additional entities.	2		
7 Examples of parts to which additional entities have been added.	2		
8 Creating prts through "Loft"	2		
9 Examples of parts created with "Loft".	2		
10 Creating molds.	2		
11 Dimensioning	2		
12 Create a complex, fully defined part.	2		
13 Creating a 2D piece in «Drawing».	2		
14 Assemblies	2		
Bibliography 1.Mikell P. Groover, Emory W. Zimmers, CAD/CAM: Computer-Aided Design and Manufacturing, Prentice-Hall International, Inc.1984. 2. Andrew Tizzard, An Introduction to Computer Aided Engineering, McGraw-Hill Book Company, 1994. 3. SolidWorks Company, User Manual.			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Acquired competencies will be required for employees working in design, manufacturing, manufacturing services.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Theory questions.	On-line Grid Questionnaire – Duration of Evaluation 1/2 hours	20%
10.5 Seminars /Laboratory/Project	Themes, independent of laboratory hours, consisting of the making of parts.Making in SolidWorks a drawing of a part at first sight.	On-line Practical sample – duration 2 hours	80%
10.6 Minimum standard of performance			
Full realization of homework. Make at least 50% of the assessments.			

Date of filling in: 18.02.2023		Title Surname Name	Signature
	Lecturer	Lecturer Ph.D Eng. DAN NOVEANU	
	Teachers in charge of application	Lecturer Ph.D Eng. DAN NOVEANU	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	42.00

2. Data about the subject

2.1	Subject name			Theory of plastic deformation and fracture of materials		
2.2	Course responsible/lecturer			Assoc. prof. Pop Mariana		
2.3	Teachers in charge of seminars			Assoc.prof. Pop Mariana, Assoc.prof.Neag Adriana		
2.4 Year of study	III	2.5 Semester	5	2.6 Assessment		Exam
2.7 Subject category	Formative category					DD
	Optionality					DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	21
(b) Supplementary study in the library, online and in the field	7
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
(d) Tutoring	7
(e) Exams and tests	3
(f) Other activities	

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Notions of calculation: differential, integral, matrix, vectorial; Notions regarding: material classification, iron-carbon diagram; Notions of computer operation; Use of computer aided design software for making 2D and 3D geometric models.

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	

6. Specific competences

Professional competences	After completing the discipline students will be able to know: - plasticity hypotheses, plastic deformation laws, fracture theories, methods for calculating efforts in plastic deformation processes; -the main parameters of the processes of plastic deformation and breaking of materials; - parameters of material flow equations for different deformation conditions; -influence of process parameters on the conditions of plastic deformation and fracture of materials. - use the analytical methods to establish the efforts and deformations at the plastic deformation; - analyze the data of deformability tests by various methods (traction, twisting, discharge, rolling); - interpret the hardening curves and the standardized data regarding the formability of materials; -interpret the results of a modeling and simulation program of the state of stresses and deformations in a sample subjected to plastic deformation. -measures specific deformations, efforts, temperatures and deformation speeds; -use the experimental installations for the study of the deformability of the materials; -use a program for mathematical modeling and simulation of the main parameters of plastic deformation (stresses, strains, strain rates, temperature).
Cross competences	Application of the values and ethics of the engineering profession and responsible execution of professional tasks in the field of materials processing in conditions of limited autonomy and qualified assistance. Carrying out activities and exercising the specific roles of teamwork, on different hierarchical levels and the entire technological flow of processing Promoting the spirit of initiative, dialogue, cooperation, positive attitude, respect for others, diversity and multiculturalism and the continuous improvement of one's professional activity Objective self-assessment of the need for continuous professional training, in order to develop products with superior performance and to adapt to the dynamics of market requirements Effective use of multilingual skills and knowledge of information technology.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of competencies in the field of plastic deformation theory, deformability of materials in support of professional training.
7.2	Specific objectives	Assimilation of theoretical knowledge on: the state of stresses and strains in a body subjected to plastic deformation, the parameters of industrial processes of plastic deformation, the mechanisms of materials fracture, aspects regarding the modeling and simulation of the state of stresses and strains.

		2. Obtaining skills for determining: the flow curves of materials, the parameters of plastic deformation processes, the formability of a material under given conditions. 3. Obtaining skills for the use of modeling and simulation software in the field of plastic deformation and for interpreting the results obtained.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1.Definition of plastic deformation. Study of the stress-strain diagram in the tensile test and identification of the characteristic points. The connection between engineering and real parameters. The state of stress on plastic deformation. Applications.	2	Prelegere, conversatie	Video-proiector
2. Differential equations of equilibrium of streses, tensor, deviator, invariants . Deformation state at plastic deformation; definition of deformations; the connection between the displacement components and those of the deformation; deformation state diagrams; deformation speed. Applications.	2		
3. Mechanical schemes of plastic deformation. Relationships between stresses and strains. Plasticity hypotheses. Energy and strength required for plastic deformation. Rheological models for different types of materials. Applications.	2		
4. Mechanisms of plastic deformation. Dislocation theory (appearance and multiplication of dislocations). Plastic deformation of single crystals (sliding, staining). Plastic deformation of polycrystals.	2		
5. Methods for calculating the stresses and deformations at the plastic deformation: the slab method, the energy method, the sliding lines method, the finite difference method, the finite element method.	2		
6. The laws of plastic deformation (the law of volume constant, the law of the presence of elastic deformations at plastic deformation, the law of additional unitary efforts, the law of minimum resistance, the law of similarity).	2		
7. Deformation behavior of materials. Deformation resistance and influencing factors.	2		
8. Formability of materials and influencing factors. Methods for determining the formability of materials.	2		

Superplasticity.			
9. The main effects of plastic deformation (thermal effect, hardening, texturing, phase transformations, residual stresses). The influence of plastic deformation on the properties of deformed materials.	2		
10. Friction on plastic deformation. Friction models (Coulomb, Tresca). Influencing factors of friction. Methods for determining the coefficient of friction at plastic deformation.	2		
11. The mechanism of fracture in materials. Types of rupture, theoretical fracture strength. Fracture theories. Ductile and brittle fracture. Factors influencing the fracture type. Ductile-brittle transition temperature.	2		
12. Creep fracture. Fatigue fracture.	2		
13. Applications of the theory of plasticity and fracture to industrial processes of plastic deformation.	2		
14. Elements of modeling and simulation of material flow during plastic deformation. Constitutive equations of material. Experimental methods for establishing the parameters of deformation and fracture processes.	2		
Bibliography 1. Hosford, W., Caddell, R., Metal forming, mechanics and metallurgy, Prentice Hall, 1993. 2. Kalpakian, Manufacturing Engineering and Technology, Addison-Wesley Publishing, 1994. 3. Mielnik, E., Metalworking, science and engineering, McGraw Hill, 1991. 4. Sluzalec, A., Theory of metal forming plasticity, Springer, 2004. 5. Wagoner, R., Chenot, J., Fundamentals of metal forming, John Wiley &Sons, 1997.			

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Experimental verification of the laws of plastic deformation.	2	Exposition, discussions, experimental tests, simulations	Experimental installations, computers, software
2. Experimental determination of the deformation behavior of metals by tension.	2		
3. Determining the deformation and fracture behavior by compression.	2		
4. Deformation and fracture behavior by twisting.	2		
5. Experimental determination of the coefficient of friction.	2		
6 Study of the parameters of cold plastic deformation processes (stresses, deformations, deformation speeds, temperature) with the help of Forge software.	2		
7 Study of the parameters of hot plastic deformation processes (stresses, deformations, deformation speeds, temperature) with the help of Forge software.	2		

Bibliography

Neag, A., Pop, M., Plastic Deformation, Aplication, UTPress, 2009.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies will be necessary for the technological engineers who carry out their activity either in the design workshops / research laboratories or in the productive sections.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	On-going evaluation based on 2 tests and final evaluation (problems and questions from theory)	Final written evaluation - duration of evaluation 2 hours	75%
10.5 Laboratory	On-going evaluation based on discussions and self-evaluations and final evaluation by test.	Discussions, tests - duration of evaluation 1 hour	25%
10.6 Minimum standard of performance			

Date of filling in:		**Title Surname Name**	**Signature**
10.05.2023	Lecturer	Assoc.prof.Pop Mariana	
	Teachers in charge of application	Assoc.prof.Pop Mariana	

Date of approval in the department
26.06.2023

Head of department
Ass.prof.dr.eng. Mariana Pop

Date of approval in the faculty
10.07.2023

Dean
Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	43.00

2. Data about the subject

2.1	Subject name			Industrial environmental protection			
2.2	Course responsible/lecturer			Conf. dr. ing. Horațiu Vermeșan			
2.3	Teachers in charge of seminars			Conf. dr. ing. Horațiu Vermeșan			
2.4 Year of study	3	2.5 Semester	1	2.6 Assessment	C		
2.7 Subject category	Formative category					DD	
	Optionality					DI	

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	9
(b) Supplementary study in the library, online and in the field	6
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	6
(d) Tutoring	6
(e) Exams and tests	3
(f) Other activities	3

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	33
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	-
4.2	Competence	Minimum knowledge of physics, chemistry, materials processing technologies

5. Requirements (where appropriate)

5.1	For the course	Laptop + for figures, tables and images;
5.2	For the applications	Online presentation: specific laboratory instruments, pH-meter;

	seminarului / laboratorului / proiectului	conductivity; analytical balance; rated balloons etc.

6. Specific competences

Professional competences	To know the specific problems of environmental protection and the concept of sustainable development. To know methods of analysis of quality indicators for environmental factors: water, atmosphere, soil, etc., To identify the environmental aspects of a technological process of materials processing. To know the types of monitoring and the best techniques available by fields of activity. The integrated approach to determine the best technological process for a certain concrete location and for a certain activity.
Cross competences	Making connections to other disciplines studied (Materials Chemistry, Physics, Mechanics, Materials Technology, etc.); Understanding the interdisciplinarity of environmental protection engineering; Promoting awareness of the importance of multidisciplinary and transversal character in environmental protection engineering,

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Training and development of competencies regarding environmental protection applied in the industrial activity of materials science and engineering
7.2	Specific objectives	Acquiring skills on the principles of determining the basic properties of environmental factors (water, air, soil), Formation of basic skills for analyzing the environmental impact associated with technological processes and identifying risks.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Brief history of environmental issues Significant global events specific to the concept of sustainable development	2	Exposure Conversation Description Problematic	
Practical application in industry of the concept of sustainable development. SMM. Eco-label.	2		
Analysis of industrial processes - environmental impact	4		
Work environment	4		
Water protection. Sources of water pollution in industrial areas	4		
Atmosphere protection. Sources of air pollution	4		
Soil protection. Sources of soil pollution	4		
Industrial waste. Characteristics, collection, recovery, and storage	2		

Vibrations and noises in industry	2		
Bibliography 1. Ochman D., Podoliński T. Environment protection in industrial areas, Jawecki Bartosz, 2014, ISBN: 978-83-61389-42-2 2. A. Malik, E. Grohmann, Environmental Protection Strategies for Sustainable Development, 2012, ISBN 978-94-007-1590-5 3. J. Rivera, M. A. Delmas, Business and environmental protection: An introduction. Human Ecology Review, Vol. 11, No. 3, 2004, 4. Andrzej G. Chmielewski, Bumsoo Han, Sunil Sabharwal, Maria Helena Sampa, Environmental Protection: Reducing Environmental Pollution, Reference Module in Earth Systems and Environmental Sciences, Elsevier, 2020, ISBN 9780124095489, https://doi.org/10.1016/B978-0-12-409548-9.12331-0.			
8.2. Laboratory	Number of hours	Teaching methods	Notes
Presentation of laboratories, labor protection training	2	Exposure Conversation Description Experiments	
Determination of water quality indicators.	2		
Determination of moisture in materials.	2		
Granulometric analysis of soil and sludge.	2		
Determination of sedimentation time of materials suspended in wastewater.	2		
Determining the noise level generated by industrial activities.	2		
Determination of microclimate parameters and light intensity in the industrial environment. Determination of Total Volatile Organic Compounds in Air.	2		
Bibliography 1. U.S. Environmental Protection Agency, Recovery, Reuse, and Recycle of Industrial Waste, 1983, 2. J. Jeffrey Peirce, Ruth E Weiner, E Aarne Vesilind, Environmental Pollution and Control, Butterworth-Heinemann, 1998, ISBN-13:978-0-7506-9899-3. 3. H. Koren, M. Bisesi, Handbook of Environmental Health, Lewis Publishers, 2003, ISBN 1-56670-547-9			

9. Bridging course contents with the expectations of the representatives of the community, professional associations, and employers in the field

The skills acquired will be in line with the requirements that potential employers in the field of engineering and environmental protection and materials processing may have.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Correctness and complexity of the knowledge gained	Written exam - combined test (grid and solving similar topics to the course)	60%
	Interest in the presented	Oral - involvement in	10%

	notions and active presence in the course and laboratory	discussions and the quality of questions asked by students. Ideas for solving problems addressed according to the program.	
10.5 Laboratory	The quality of the theoretical knowledge acquired at the virtual laboratory for the specific basic activities of environmental protection.	Written test - grid and solving some laboratory assignments	30%
10.6 Minimum standard of performance			
Each student must demonstrate that he has acquired an acceptable level of knowledge and understanding in the field of Industrial Environment Protection and that he is able to use his knowledge in solving concrete technological situations. Passing the exam is conditioned by obtaining a minimum grade of 5 both for the evaluation of the written exam and for the practical and theoretical activity in the laboratory.			

Date of filling in:		**Title Surname Name**	**Signature**
20.04.2023	Lecturer	Conf. dr. ing. Horațiu VERMEȘAN	
	Teachers in charge of application	Conf. dr. ing. Horațiu VERMEȘAN	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	44.00

2. Data about the subject

2.1	Subject name			Surface engineering			
2.2	Course responsible/lecturer			Lecturer dr.eng. Noveanu Dan – Dan.Noveanu@ipm.utcluj.ro			
2.3	Teachers in charge of seminars			Lecturer dr.eng. Noveanu Dan – Dan.Noveanu@ipm.utcluj.ro			
2.4 Year of study	3	2.5 Semester	2	2.6 Assessment			E
2.7 Subject category	Formative category						DS
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	-	3.3 Laboratory	1	3.3 Project	1
3.4 Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	-	3.6 Laboratory	14	3.6 Project	14

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	7
(b) Supplementary study in the library, online and in the field	5
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	5
(d) Tutoring	-
(e) Exams and tests	2
(f) Other activities	-

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	19
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	-
4.2	Competence	-

5. Requirements (where appropriate)

5.1	For the course	-
5.2	For the applications laboratorului / proiectului	The presentation at the exam is conditioned by the performance of the seven laboratory works and the acceptance of the project.

6. Specific competences

Professional competences	• Application of basic principles and methods for solving problems in the exploitation of surface engineering technologies, in order to design optimal technological flows; • Appropriate use of standard criteria and methods for the analysis and evaluation of surface engineering technologies and their implementation in accordance with the norms of quality, environment and labour protection. • To know the purpose, the basic principles, the materials to which it is applied, the characteristics of the modified/deposited layer, the advantages, disadvantages, the limits of applicability and the relative level of costs for the main surface treatments (mechanical, thermal, thermochemical, conversion, ion implantation , thermal spraying, physical and chemical and vapor deposition - PVD and CVD).
Cross competences	- Carrying out activities and exercising the specific roles in the teamwork, on different hierarchical levels, promoting the spirit of initiative, dialogue, cooperation, positive attitude, respect for others, diversity and multiculturalism and continuous improvement of one's activity. - Objective self-assessment of the need for continuous professional training, in order to enter the labour market and to adapt to the dynamics of its requirements and for personal and professional development. - Effective use of multilingual skills and knowledge of information and communication technology.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	The course aims that student will acquire the essential knowledge on the theory and practical aspects of surface engineering technologies (surface treatments and coatings) applied to a wide range of materials, parts, tools and semi-finished products.
7.2	Specific objectives	It is considered that at the end of the course the students will be able to: • Know the basic aspects of surface engineering technologies; • Know the main criteria according to which a surface treatment is prescribed for different applications, taking into account the material, required surface properties and the heat treatment previously applied; • Characterize a surface layer modified / deposited by surface treatments; • Prescribe surface treatment technologies; • Apply the methods of quality control specific to different of surface treatments; • Evaluate the wear resistance of surface treated materials.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Course 1. Synthesis on wear and corrosion processes. The role of surface treatments and coatings. Classification of surface treatments.	2	Lecture and dialogue with the students	Computer + video projector and classic board will be used. Video recordings of surface engineering technologies will also be presented.
Course 2. Mechanical surface treatments (surface strain hardening).	2		
Course 3. Surface hardening by induction and by flame.	2		
Course 4. Carburizing: principle, purpose, main parameters, carburizing steels, pack carburizing.	2		
Course 5. Carburization in gaseous environment: carburizing regimes, carburizing in natural gas, carburization in controlled atmosphere. Vacuum carburization and plasma carburization.	2		
Course 6. Nitriding: Fe-N diagram, nitriding principle, purpose, steels for nitriding, structure and properties of the nitrided layer. Gas nitriding.	2		
Course 7. Plasma nitriding. Factors influencing the characteristics of the nitrided layer.	2		
Course 8. Carbonitriding and nitrocarburizing. Oxynitrocarburizing.	2		
Course 9. Thermochemical surface treatments with B, Al, Si and Cr.	2		
Course 10. Ion implantation. Conversion coatings.	2		
Course 11. Hardfacing: principle of the process, purpose, materials and methods of deposition.	2		
Course 12. Thermal spraying.	2		
Course 13. Introductory notions on vapor deposition coating (PVD and CVD methods).	2		
Course 14. Duplex treatments. Selection criteria for surface treatments / coatings. Case studies.	2		

Bibliography

1. Dossett, J.L., Boyer, H.E. Practical Heat Treating, Second Edition, ASM International, Ohio, 2006.
2. ASM Volume 4, Heat Treating, ASM International 1991.
3. Course notes delivered to students in digital format (Word, Power Point).
4. Vermesan G., ş.a., Introducere în ingineria suprafeţelor, Editura Dacia, Cluj-Napoca, 1999.
5. G. Arghir ş.a., Procedee avansate în ingineria suprafeţelor, Editura U.T. Press, Cluj-Napoca, 1998 (partially in English).
6. H. Vermeşan ş.a., Carburarea, Editura Risoprint, Cluj-Napoca 2001.
7. Gabor, C., Munteanu, D., Munteanu, A., Straturi subţiri cu rol decorativ obţinute prin depunere fizică din vapori, Editura Universităţii Transilvania din Braşov, 2010.
8. Relevant web sites .

8.2. Laboratory/Project a) Laboratory	Number of hours	Teaching methods	Notes
Work 1. Determination the intensity of the shot peening with the Almen method.	2	Discussions with the students, quizzes and practical operations for the laboratory	The laboratory equipment and apparatus will be used
Work 2. Determination of case depth for induction hardened parts.	2		
Work 3. Determination of the total and conventional depth of surface hardened thin layers.	2		
Work 4. Determining the depth of the carburized layer	2		

("cemented layer").		works	
Work 5. Determining the depth of the nitrided layer.	2		
Work 6. Behavior of a tool steel subjected to various thermal / thermochemical treatments.	2		
Work 7. Mechanical methods for determining the adhesion of thin layers deposited from the vapor phase.	2		
b) Project The project will contain 20-30 pages and will have as its theme the design of surface treatment technology for a given part. The main chapters of the project are: analysis of the part material, analysis of functional role and requirements, establishing of necessary properties / functional characteristics, establishing of heat treatment technology and related technological calculations, design of charging devices, establishing of control methodology, calculation of costs.			
Bibliography 1. Vermeşan, H., Negrea, G., Ingineria suprafeţelor – lucrări practice, Editura Risoprint, Cluj-Napoca, 2001. 2. Boiciuc, S., Ingineria suprafetelor: indrumar de laborator, Galati University Press, Galati, 2010. 3. Vermeşan, G. ş.a., Tratamente termice - Lucrări de laborator, I. P. Cluj-Napoca, 1987. 4. Munteanu, A., Munteanu, D., Tratamente termice şi termochimice, teorie şi aplicaţii, Editura Universităţii Transilvania din Braşov 2007. 5. Laboratory notes delivered to students in a digital format. 6. Relevant web sites.			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies are in accordance with the requirements of employers regarding the necessary knowledge of engineers working in heat treatment/surface engineering workshops, conception and technology design departments, research laboratories, quality assurance services, expertise and consulting companies in the field of surface engineering.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Grid test (20 questions), solving 5 theoretical topics with clearly specified requirements and solving 2 applications.	Written exam, 2 hours.	70%
10.5 Laboratory/Project	Fulfilment of the project and of the 7 laboratory works requirements.	Evaluation of the project and laboratory works (questions, verification of calculated data and compliance with deadlines).	30%
10.6 Minimum standard of performance			
- Accumulation of at least 4 points out of a maximum of 9 in the written exam; - Obtaining the minimum passing grade (five) for the project and laboratory works.			

Date of filling in: 26.03.2023		Title Surname Name	Signature
	Lecturer	Assoc.Prof. dr.eng. Gavril Negrea	
	Teachers in charge of application	Lecturer dr.eng. Dan Noveanu	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	45

2. Data about the subject

2.1	Subject name			Manufacturing Engineering		
2.2	Course responsible/lecturer			Lecturer dr.eng. IWE Marius Bodea - mbodea@stm.utcluj.ro		
2.3	Teachers in charge of seminars			Lecturer dr.eng. Thalmayer Gyuri, Lecturer dr.eng. Prică Călin		
2.4 Year of study	3	2.5 Semester	2	2.6 Assessment	Examination	
2.7 Subject category	Formative category					DD
	Optionality					DI

3. Estimated total time

3.1 Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	0	3.3 Laboratory	1	3.3 Project	1
3.4 Total hours in the curriculum	75	of which	3.5 Course	28	3.6 Seminar	0	3.6 Laboratory	14	3.6 Project	14

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	8
(b) Supplementary study in the library, online and in the field	2
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	6
(d) Tutoring	1
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study (sum (3.7(a)...3.7(f)))	19
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	Materials Science and Mechanical Engineering
4.2	Competence	Good knowledge in materials science, physics, technical drawing

5. Requirements (where appropriate)

5.1	For the course	Faculty of Materials and Environmental Engineering
5.2	For the applications seminarului / laboratorului / proiectului	Materials Testing Laboratory E10, Welding Laboratory E09, Fabrication Laboratory E09/2

6. Specific competences

Professional competences	The students will be able to understand and use efficiently knowledge for planning and designing industrial manufacturing processes. They will be prepared to work in a cross-functional environment that comprises engineering, manufacturing, production control, quality assurance, continuous improvement, and business departments. The students will learn the essential manufacturing knowledge that is required to implement and manage manufacturing processes.
Cross competences	Reading and interpreting technical drawings that refers to industrial manufacturing processes fabrication. The students will gain also manufacturing projects coordination skills, being able to respond to the basic problems encountered in manufacturing engineering like: • What are the problems? • What are the data? • What are the unknowns? • What are the constraints? • What are the feasible solutions? • How the solution is validated?

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Providing theoretical and practical skills required in the industrial manufacturing processes.
7.2	Specific objectives	Acquiring the necessary skills in order to plan, design, implement, and manage manufacturing projects successfully.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Product Development and Design. Advanced Manufacturing with Cloud, Internet of Things, and Sustainability.	2	Interactive methods using digital equipment's, video materials, study cases	Digital media content available and e-learning resources.
2. Design for manufacture and assembly. Design of experiments. ANOVA and Six Sigma	2		
3. Computer-aided Design and Manufacturing	2		
4. Manufacturing Processes: Forming and Shaping	2		
5. Metal Cutting, Turning and Milling Processes	2		
6. Laser Materials Processing	2		
7. Additive Manufacturing Technologies	2		
8. Abrasive Jet Machining and Electrochemical Machining	2		
9. Grinding Fundamentals	2		
10. Robotics and Automation in Manufacturing Processes	2		
11. Machine Vision. Green Technology and Manufacturing	2		
12. Plastic Molding Processes	2		
13. Quality inspection. Risk Management	2		
14. Engineering Economics. Risks, Uncertainty in the Analysis	2		

Bibliography

1. ASM Handbook: Vol. 16: Machining, ISBN 0-87170-377-7, ASM Int., 1993.
2. Hwaiyu Geng, Manufacturing Engineering Handbook, 2nd Edition, 2016, ISBN: 978-0-07-183978-5.
3. Schey, John A., "Introduction to Manufacturing Processes", McGraw Hill, 2nd Edition, 1987.
4. Groover M.P., "Principles of Modern Manufacturing-SI Version", John Wiley, 4th Edition, 2011.
5. Tlusty, G., "Manufacturing Process and Equipment", Prentice Hall Inc., 2000.
6. Mielnik, E. M., "Metal Working Science Engineering", McGraw Hill, 1991.

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Design of experiments. ANOVA based experimental designs	2	Practical training	Preparing Welding Procedure Specifications for each process
2. Design for Six Sigma	2		
3. Injection Mold fabrication. Additive manufacturing	2		
4. Metal cutting, turning and milling processes	2		
5. Engineering economics. Risks and uncertainties	2		
6. Failure Analysis in manufacturing processes	2		
7. Robotics and Machine Vision. Case study	2		
8. Project. A full operational project for an industrial manufacturing process in collaboration with a partner company. The project will comprise the part design, essential manufacturing processes, the technology investments and process planning.	14	Project study	

Bibliography

1. ASM Handbook: Vol. 16: Machining, ISBN 0-87170-377-7, ASM Int., 1993.
2. Hwaiyu Geng, Manufacturing Engineering Handbook, 2nd Edition, 2016, ISBN: 978-0-07-183978-5.
3. Schey, John A., "Introduction to Manufacturing Processes", McGraw Hill, 2nd Edition, 1987.
4. Groover M.P., "Principles of Modern Manufacturing-SI Version", John Wiley, 4th Edition, 2011.
5. Tlusty, G., "Manufacturing Process and Equipment", Prentice Hall Inc., 2000.
6. Mielnik, E. M., "Metal Working Science Engineering", McGraw Hill, 1991.
7. Kalpakjian, Schmid, Manufacturing Processes for Engineering Materials, 5th Ed., Pearson Education, ISBN No. 0-13-227271-7.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The course assure the students qualification in manufacturing engineering by learning essential principles for design and operations considerations, safety, environment issues, maintenance, economy and best practices for planning, implementing and controlling operational processes. The Manufacturing Engineering course is specifically designed to provide technical knowledge for personnel who are responsible for the planning, designing, implementation, and management of manufacturing processes, but also for decision makers who are responsible for strategic decisions regarding technology investments and capacity planning.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Quiz questions (100 points)	Oral & writing 2h	80%
10.5 Seminars /Laboratory/Project	Overall activity during the semester	Oral & writing	20%
10.6 Minimum standard of performance			
Minimum 50 points obtained at course test and laboratory tests.			

Date of filling in: 20.04.2023		**Title Surname Name**	**Signature**
	Lecturer	Dr.Ing. IWE Bodea Marius	
	Teachers in charge of application	Dr.Ing. Thalmayer Gyuri	
		Dr.Ing. Pricǎ Călin Virgil	

Date of approval in the department 26.01.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	46.00

2. Data about the subject

2.1	Subject name			Quality engineering			
2.2	Course responsible/lecturer			Assoc.prof.Pop Mariana			
2.3	Teachers in charge of seminars			Assoc.prof.Pop Mariana			
2.4 Year of study	3	2.5 Semester	6	2.6 Assessment			C
2.7 Subject category	Formative category						DD
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laboratory		3.3 Project	
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laboratory		3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	15
(b) Supplementary study in the library, online and in the field	4
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	2
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	33
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications seminarului / laboratorului / proiectului	

6. Specific competences

Professional competences	To know how to appreciate the quality of a product; To know how to organize the department for quality assurance in a company; To know the legislation in force regarding the quality of the products; To know the legislation regarding the qualification and certification of the staff; After completing the discipline students will be able to: – establish the quality control procedure for a part or product. – to establish the control points on the production flow of the products. – to draw up a program for the certification of the personnel quality assurance staff.
Cross competences	

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	- Identification, analysis of concepts, theories and specific methods for designing materials processing technologies -Application of basic principles and methods for solving problems in the exploitation of materials processing technologies, in order to streamline technological flows
7.2	Specific objectives	- Appropriate use of standard criteria and methods for the analysis and evaluation of materials processing technologies and their implementation in accordance with the norms of quality, environment and labor protection -Elaboration of professional projects with the use of principles and methods established in the field for the elaboration of materials processing technologies in accordance with the norms of quality, environment and labor protection.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Product quality concepts History, quality estimation methods, definitions, standards	2	Exposition, discussions	Video projector
Theoretical bases of quality control Control methods, control plans, quality management, reliability analyzes, etc	2		
Control of the design activity Stages of a product cycle, product design, technical-economic studies, project quality inspection,	2		

Statistical quality control Control of product batches, control methods, theoretical bases of statistical control, stability of the manufacturing process, statistical analysis of the manufacturing process.	2		
Implementation of the quality system according to the ISO 9000 standard Presentation of the series of ISO 9000 standards, implementation methods, internal quality audit, product traceability,	2		
Organizing activities to ensure product quality	2		
Capability of manufacturing processes	2		
Product quality control during use by beneficiaries	2		
Economic analysis of quality costs, total quality manager, product certification and accreditation of laboratories.	2		
Qualification of personnel according to EN287-1,2 (European / International Engineers, Inspectors, Operators)	2		
Qualification of product production procedures.	2		
Certification of quality systems on the technological flow of products.	2		
Certification of environmental management systems according to ISO 14000	2		
Qualification of staff in ensuring product quality	2		

Bibliography

1. Rusu T., Quality management, Mediamira Publishing House 1997, Cluj-Napoca,, ISBN 973-95153-0-0.
2. Munteanu, R., Rusu, T. Introduction to Quality Engineering Mediamira Publishing House 2002, Cluj-Napoca ,, ISBN 973-8396-72-3.
3. Bolboaca, L., I., Bulgaru, M., - Quality Engineering, Applications, Alma Mater Publishing House, Cluj-Napoca, 2003, ISBN 973-9358-57-8
24 Rusu Tiberiu - Industrial Products Quality Management - Applications - UTCN Publishing House -1994
4. SR EN 729
5. DIN 18800
6. SR EN 287
7. ISO 14000
8. SR EN 288

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Methods for evaluating and comparing product quality	2	Exposition of the theoretical part and Use of equipment	
Methods for evaluating and comparing product quality using non-quality indicators Methods and tools for processing numerical data on product quality.	2		

Quality control techniques and tools used for numerical data analysis - Control charts for variables.	2	practical execution.	Specific technologi es.
Quality control techniques and tools used for numerical data analysis - Attribute control charts.	2		
Methods and tools for analysis, evaluation and improvement of product and process quality. Cause-effect diagram. Process diagram.	2		
Methods and tools for analysis, evaluation and improvement of product and process quality. Method 8D.	2		

Bibliography

1. Rusu T., Quality management, Mediamira Publishing House 1997, Cluj-Napoca,, ISBN 973-95153-0-0.
2. Munteanu, R., Rusu, T. Introduction to Quality Engineering Mediamira Publishing House 2002, Cluj-Napoca ,, ISBN 973-8396-72-3.
3. Bolboaca, L., I., Bulgaru, M., - Quality Engineering, Applications, Alma Mater Publishing House, Cluj-Napoca, 2003, ISBN 973-9358-57-8
24 Rusu Tiberiu - Industrial Products Quality Management - Applications - UTCN Publishing House -1994
4. SR EN 729
5. DIN 18800
6. SR EN 287
7. ISO 14000
8. SR EN 288

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies will be necessary for the employees who carry out their activity within the quality assurance and control services and for the technological engineers.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Solving a topic of theory synthesis and a case study.	Written test - evaluation time - 2 hours	75%
10.5 Seminars /Laboratory/Project	Presentation of a paper on a given topic.	Exposure 0,5 hour	25%
10.6 Minimum standard of performance			
Solving the case study and presenting the report			

Date of filling in:		**Title Surname Name**	**Signature**
24.04.2023	Lecturer	Assoc.prof. Mariana Pop	
	Teachers in charge of application	Assoc.prof. Mariana Pop	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	47,00

2. Data about the subject

2.1	Subject name			Basics of Computer Aided Design			
2.2	Course responsible/lecturer			Conf.dr.ing.Dan Frunza		Dan.Frunza@ipm.utcluj.ro	
2.3	Teachers in charge of seminars			Conf.dr.ing.Dan Frunza		Dan.Frunza@ipm.utcluj.ro	
2.4 Year of study	III	2.5 Semester	6	2.6 Assessment	C		
2.7 Subject category	Formative category						DD
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	2	of which	3.2 Course	0	3.3 Seminar		3.3 Laboratory	2	3.3 Project	
3.4 Total hours in the curriculum	28	of which	3.5 Course	0	3.6 Seminar		3.6 Laboratory	28	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	20
(b) Supplementary study in the library, online and in the field	0
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	27
(d) Tutoring	0
(e) Exams and tests	2
(f) Other activities	0

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	47
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	Technical Drawing
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications seminar / lab / proj.	80% Teams 20% onsite

6. Specific competences

Professional competences	Design of high-performance technologies for the processing of materials based on the concept of sustainable development and under conditions of high quality of the products obtained.
Cross competences	1. The use of expert knowledge for the design of high-performance technologies, under quality conditions of the products obtained 2. Integrated use of the conceptual and methodological apparatus and a minimum data set for the design of high-performance material processing technologies

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of high-performance technologies specific to materials engineering using an innovative spectrum of qualitative methods.
7.2	Specific objectives	Definition of techniques for designing high-performance materials engineering technologies, environmentally sustainable.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Bibliography			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1.Parametric design: Link part dimensions to equations and global variables.	2	Case study	
2. Advanced Design. Develop a flexible efficient design, then modify it while maintaining the design intend.	2		
3. 3D Sketching	2		
4. 3D Sketching with Planes.	2		
5. Moulded products Design, techniques for designing moulded products with multiple components.	2		
6. Mould design for plastic components	4		
7. Dies design for close die forging	4		
8.Routing pipes and tubes.	2		
9.Sheet metal. Applying basic sheet metal commands such	2		

as flanges and bends.			
10.Design Tables. Create variations of the same object by customizing parameters	2		
11.Toolbox. Add standard hardware components to an assembly	2		
12. Advanced Drawings. Create sections, details, exploded views dimensions, bills of materials, etc.	2		

Bibliography

1. Solidworks help and tutorials

2.. Groover, M.P., Zimmers, E.W., "CAD/CAM: Computer Aided Design and Manufacturing", Prentice-Hall International Editions, 1984

3.. Tizzard, A., "An introduction to Computer-Aided Engineering", McGraw-Hill Book Company, 1994

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course			
10.5 Seminars /Laboratory/Project	Solve an app on computer	Practical examination on computer	100%
10.6 Minimum standard of performance			

Date of filling in:		**Title Surname Name**	**Signature**
14.05.2023	Lecturer	Conf.dr.ing Dan Frunza	
	Teachers in charge of application	Conf.dr.ing.Dan Frunza	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	48.00

2. Data about the subject

2.1	Subject name			Technological processes in materials engineering II (Plastic deformation)	
2.2	Course responsible/lecturer			Assoc. prof. Pop Mariana	
2.3	Teachers in charge of seminars			Assoc.prof. Pop Mariana, Lecturer Sas Boca Monica	
2.4 Year of study	III	2.5 Semester	6	2.6 Assessment	Exam
2.7 Subject category	Formative category				DD
	Optionality				DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	14
(b) Supplementary study in the library, online and in the field	4
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	8
(d) Tutoring	4
(e) Exams and tests	3
(f) Other activities	

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	33
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Notions regarding: classification and properties of materials, iron-carbon diagram, basic notions regarding the main processes of material processing; Notions of computer operation; Use of computer aided design software for making 2D and 3D geometric models.

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	

6. Specific competences

Professional competences	After completing the discipline students will be able to: -To know the basic elements of plastic deformation: the mechanism of plastic deformation, the laws of plastic deformation, the thermal regime of deformation, the technological bases of plastic deformation processes. - To know the technological parameters of the plastic deformation processes. - To know the principles of elaboration of a processing technology by plastic deformation. - To know how to calculate the main technological parameters of plastic deformation operations. - To know the advantages of plastic deformation processes compared to other processing processes. - To use a program for mathematical modelling and simulation of the main parameters of plastic deformation (stresses, strains, strain rates, temperature). - To know how to use the analytical methods for calculating the deformation force and pressure for the main plastic deformation operations.
Cross competences	Application of the values and ethics of the engineering profession and responsible execution of professional tasks in the field of materials processing in conditions of limited autonomy and qualified assistance Carrying out activities and exercising the specific roles of teamwork, on different hierarchical levels and the entire technological flow of processing Promoting the spirit of initiative, dialogue, cooperation, positive attitude, respect for others, diversity and multiculturalism and the continuous improvement of one's professional activity Objective self-assessment of the need for continuous professional training, in order to develop products with superior performance and to adapt to the dynamics of market requirements Effective use of multilingual skills and knowledge of information technology.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of competencies in the field of processing processes by plastic deformation of materials in support of professional training.
7.2	Specific objectives	1. Assimilation of theoretical knowledge on: the principles of plastic deformation processing processes, their advantages compared to other processing processes, technological parameters of industrial plastic deformation processes, the principles of achieving a plastic deformation processing technology. 2. Obtaining skills for: measuring the main technological parameters of plastic deformation processes (degree of deformation, deformation speed, temperature, deformation

		force); choosing the optimal processing technology for a given piece. 3. Obtaining skills for the use of modeling and simulation software for determining the material flow and technological parameters of plastic deformation processes (deformation force, temperature, deformation energy, friction energy, etc.).

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1 Notions of plastic deformation theory. Behavior of materials in plastic deformation;	2	Prelegere, conversatie	Video-proiector
2. Deformation resistance; formability. Methods of determination;	2		
3. Semi-finished products used for plastic deformation; cutting semi-finished products for plastic deformation; Thermal regime of plastic deformation; Advantages and disadvantages of plastic deformation processes compared to other manufacturing processes.	2		
4. Equipment used for plastic deformation. Constructive principles, technical characteristics.	2		
5 Forging processes; basic operations for open die forging: upsetting, stretching, drilling, bending, twisting (technological elements, materials); Applications.	2		
6. Close die forging of metals and alloys. Advantages disadvantages. Principles, deformation conditions, materials, deformation parameters. Applications.	2		
7. Extrusion of parts and semi-finished products. Methods, advantages disadvantages. Principles, deformation conditions, materials, deformation parameters. Applications.	4		
8. Drawing of wires, bars, tubes. Advantages disadvantages. Principles, deformation conditions, materials, deformation parameters. Applications.	2		
9. Semi-finished rolling processes, finished products; Principles, deformation conditions, materials, deformation parameters. Applications.	2		
10. Plastic sheet deformation processes. Deep-drawing and stamping; Principles, deformation conditions, materials. Applications.	2		
11. Operations after plastic deformation; Criteria for choosing the optimal technology for processing a piece. Applications.	2		
12. Non conventional plastic deformation processes.	2		

13. Aspects regarding the simulation of plastic deformation processes. Applications	2		
Bibliography Altan, T., s.a., Cold and hot forging, ASM International, 2005, Dieter, G., Mechanical metallurgy, McGraw Hill, 1988, Hosford, W.,F., Caddell, R.,M., Metal forming, mechanics and metallurgy, Prentice Hall, 1993. Lange, K., Handbook of metal forming, Society of manufacturing engineers, 1985. Laue, K., Stenger H., Extrusion, American Society for Metals, 1981, Pop, M., Plastic deformatiom, Ed. Mega, 2014 Schey, J., A., Tribology in Metalworking, American Society for Metals, 1984. Metals Handbook, Vol.14, Forming and Forging, Ninth Edition			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Prezentarea lucrarilor	2	Exposition, discussions, experimental tests, simulations	Experimental installations, computers, software
2.Gaurirea cu dorn plin si tubular	2		
3.Matritarea cu bavura, Matritarea fara bavura: stabilirea fortei de matritare	2		
4.Studiul influentei parametrilor geometrici ai zonei de deformare asupra fortei de extrudare	2		
5.Trefilarea sarmelor: stabilirea fortei de trefilare	2		
6.Stabilirea fortei de deformare la laminare	2		
7. Aplicarea softului Forge in analiza procedeelor de deforamre plastica. Compararea rezultatelor obtinute prin simulare cu cele experimentale.	2		
Bibliography Neag, A., Pop, M., Plastic Deformation, Aplication, UTPress, 2009.			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies will be necessary for the technological engineers who carry out their activity either in the design workshops / research laboratories or in the productive sections.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	On-going evaluation based on 2 tests and final evaluation (problems and questions from theory)	Final written evaluation - duration of evaluation 2 hours	75%
10.5 Laboratory	On-going evaluation based on discussions and self-evaluations and final evaluation by test.	Discussions, tests - duration of evaluation 1 hour	25%
10.6 Minimum standard of performance			

Date of filling in: 10.05.2023		Title Surname Name	Signature
	Lecturer	Assoc.prof.Pop Mariana	
	Teachers in charge of application	Assoc.prof.Pop Mariana	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	49

2. Data about the subject

2.1	Subject name			Technological processes in materials engineering III (Casting)			
2.2	Course responsible/lecturer			Assoc. Prof. PhD.Eng. Adriana NEAG adriana.neag@ipm.utcluj.ro			
2.3	Teachers in charge of seminars			Assoc. Prof. PhD.Eng. Adriana NEAG adriana.neag@ipm.utcluj.ro			
2.4 Year of study	3	2.5 Semester	2	2.6 Assessment			E
2.7 Subject category	Formative category						DD
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	11
(b) Supplementary study in the library, online and in the field	11
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	9
(d) Tutoring	
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	33
3.9 Total hours per semester (3.4+3.8)	117
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	General knowledge in materials science.

5. Requirements (where appropriate)

5.1	For the course	

5.2	For the applications seminarului / laboratorului / proiectului	

6. Specific competences

Professional competences	After completing the course students will be able to: • Describe the casting process; • Explain the melting and the solidification process of metals; • Describe the metallurgical aspects; • Design pattern and mould; • Understand the different casting process and their application.
Cross competences	• Abilities to establish interpersonal relationships, teamwork, respecting the norms of professional ethics and deontology, taking responsibility for the decisions made and potential risks; • Ability to efficiently use technical information sources (Internet, specialized software applications, databases, online courses, etc.).

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Providing detailed information about the melting and casting processes. Imparting knowledge of various technological parameters used in metal casting. Providing adequate knowledge of impurities removal and molten metal treatment. Describing methods for the quality assurance of components made by casting.
7.2	Specific objectives	Using basic scientific knowledge (from mathematics, physics, chemistry, thermodynamics, etc.) to define and explain the specific concepts of metal casting. Acquiring fundamental knowledge of metal casting in order to apply them at industrial level.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Introduction: Casting as a process of Manufacturing. Basic materials used in foundry. Factors that determine the selection of a casting alloy.	2	Presentation	
Fundamental concepts concerning alloy elaboration & steps involved.	4		
Structure and properties of metal dross. Gating systems and their characteristics; the effects of gates on aspiration; turbulence and dross trap;	2		

Melting. Basics of molten metal treatment. The mechanism and kinetics of refining processes. Methods of impurities removal. Degasification in liquid metals-Sources of gas, degasification methods. Basic steps involved.	4		
Treatment of molten metal to refine the granulation. The refining agents. Fluxing and flushing, grain refining, pouring temperature. Stir casting set up, procedure, uses, advantages and limitations.	4		
Basics of casting, Technological elements. Metal mold casting methods. Moulding factors in casting design. Hydraulic and thermal phenomena that accompany the casting of alloys. Advantages & limitations of casting process.	4		
Solidification: Definition, Solid-liquid interface, Nucleation, Growth, Solidification variables, Rate of solidification, Directional solidification and methods.	4		
Casting defects- causes, features and remedies. Residual stresses; hot tears and cracks in castings; various parameters affecting surface finish and related defects.	4		

Bibliography

1. Manufacturing & Technology: Foundry Forming and Welding, P.N. Rao, 3rd Ed., Tata McGraw Hill, 2003.
2. Soporan, V., Constantinescu, V., Crişan, M., Solidificarea aliajelor-preliminarii teoretice, Editura Transilvania Press, Cluj-Napoca, 1995, ISBN 973-9704-1-5.
3. Soporan, V., Lehene, T., Introducere în teoria turnării şi solidificării aliajelor, Editura Casa Cărţii de Ştiinţă, Cluj-Napoca, 2001, ISBN 973-686-226-7.
4. Soporan, V., Sisteme de proiectare a pieselor turnate, Editura Dacia, Cluj-Napoca, 1996, ISBN 973-35-0589-7
5. Soporan, V., Constantinescu, V., Modelarea la nivel macrostructural a solidificării aliajelor, Editura Dacia, Cluj-Napoca, 1995, ISBN 973-35-0526-9.
6. G. Zirbo, V., Soporan, Bazele teoretice ale turnării, Vol I, U.T.Cluj-N., 1994.

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Laboratory presentation. Controlling risks from foundry work.	2	Learning by doing	
Analysis and calculation of the melts composition. Example study.	2		
Elimination methods and control of dissolved gases in foundry alloys.	2		
Mould design – details to take in consideration. Case study.	2		
Measurement of fluidity; effects of various parameters on fluidity.	2		
Study of alloy shrinkage.	2		

Review of casting design; recent trends.	2		

Bibliography

1.Zirbo, G., Dragoş, E., Rusu, T., Nagy, E., Sas, G., Soporan, V., Lehene, T., Topan, G – Îndrumător pentru proiectare tehnologii de turnătorie, Institutul Politehnic Cluj-Napoca, 1986.

2.Albiță, Gh., Rădulescu, C., "Rețele de turnare", Editura tehnică, București, 1976.

3.Sofroni, L., Brabie, V., Bratu, C., Ștefănescu, F., "Aplicații și probleme la cursul Bazele teoretice ale turnării", Partea I, Centrul de multiplicat, IPB, București, 1983.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The discipline's content is adapted and satisfies the requirements imposed by the market, being agreed by social partners, professional associations and employers in the field related to the bachelor program, thanks to the skills that the discipline develops, as long-term results of the educational process.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course		Oral examination	70%
10.5 Seminars /Laboratory/Project	Solving laboratory applications	Quiz	30%
10.6 Minimum standard of performance			

Date of filling in:		**Title Surname Name**	**Signature**
13.04.2023	Lecturer	Assoc. Prof. PhD.Eng. Adriana NEAG	
	Teachers in charge of application	Assoc. Prof. PhD.Eng. Adriana NEAG	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	50,00

2. Data about the subject

2.1	Subject name			Heating equipments		
2.2	Course responsible/lecturer			Lecturer Tintelecan Marius-marius.tintelecan@ipm.utcluj.ro		
2.3	Teachers in charge of seminars			Lecturer Tintelecan Marius-marius.tintelecan@ipm.utcluj.ro		
2.4 Year of study	III	2.5 Semester	2	2.6 Assessment	verification	
2.7 Subject category	Formative category					DS
	Optionality					DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Laboratory	1
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Laboratory	14
3.7 Individual study:						
(a) Manual, lecture material and notes, bibliography						18
(b) Supplementary study in the library, online and in the field						5
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays						7
(d) Tutoring						-
(e) Exams and tests						3
(f) Other activities						-

3.8 Total hours of individual study (sum (3.7(a)...3.7(f)))	33
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3,00

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	The presence at the laboratory will be compulsory

6. Specific competences

Professional competences	To know the theoretical bases of the operation of thermotechnological equipments and installations. To know the destination, construction and equipment of the main types of metallurgical thermal machinery and installations To evaluate and interpret the values of energy-technological and technical-economic indicators specific to control processes To know the characteristics of refractory and thermal insulation materials and aspects regarding energy efficiency and environmental protection.
Cross competences	After completing the discipline students will be able to: - to establish / calculate the main data for the design / choice of thermotechnological equipment and installations and to determine the thermal powers and the consumption of fuel and energy and to interpret the data of an energy balance - to use methods to control the combustion of fuels in energy-technological equipment - to choose the most technological and energetic equipment for the respective processing technologies.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	After completing the development of competencies in the field of thermal equipment and installations, in support of professional training and processing.
7.2	Specific objectives	1. Acquiring the technical knowledge of the construction / use of thermal equipment and installations. 2. Applying this knowledge in the objective reality of the laboratory / experiment.

8. Contents

8.1. **Lecture (syllabus)**	Number of hours	Teaching methods	Notes
1. <u>Overview</u> Object and importance of the course. The role of Heating equipments. Classification of metallurgical thermal aggregates. Energy-technological and technical-economic efficiency indicators.	2	PowerPoint presentation Interactive teaching mode Dialogue - conversation professor - student	Multimedia Blackboard
2. <u>Constructive elements of thermal aggregates</u> Foundation. Fireplace. The walls. Vaults. Auxiliary construction elements. Refractory materials used in the construction of metallurgical furnaces.	2		
3. <u>Heat production in the workspace of metallurgical aggregates</u> Usual fuels. Combustion of gaseous fuels. Combustion of liquid fuels. Combustion of solid fuels.	2		

4. Electric heating. With resistors. By induction. With electric arc. With infrared radiation. With the electron beam. With plasma.	2	PowerPoint presentation Interactive teaching mode Dialogue - conversation professor - student	
5. Resistors. Construction materials. Fixing them. Their sizing	2		
6. Inductors. Construction of inductors. Their sizing.	2		
7. Electrodes. Infrared heating. Plasma heating. Electron beam heating.	2		
8. The conversion of chemical energy into caloric energy .The construction of flame heating systems. Flame stabilization. Burners. Special burners.	2		
9. The injectors. Constructive variants.	2		
10. Gas dynamics of aggregates and heating systems. Geometric overpressure. Variation of overpressure in different technical variants of metallurgical furnaces.	2		
11. The calculation of pressure losses. Friction pressure losses. Local pressure losses. Total pressure losses on a flow path.	2		
12. Chimney with natural draft. Its sizing. Artificial draft chimney.	2		
13. Heat recovery of combustion products. Recuperators.	2		
14. Thermal balance of furnaces. Thermal balance of flame furnaces. Thermal balance of electric ovens.	2		

Bibliography

1. Biris,I- Agregate termice metalurgice.I.P.C.-N., 1989.
2. Biris,I., Boer, M., Negrea, G. Agregate termice metalurgice. Lucrări de laborator. U.T.C.-N. 1996.
3. Deac Cristina, Biris,I., Boer, M., - Recuperatoare de căldură. Editura U.T.PRES, Cluj-Napoca, 2004, ISBN 973- 662-101-4.
4. Samoilă, C., Drugă, L., Stan, L. –Cuptoare si instalatii de încălzire.E.D.P.,Bucuresti,1983.
5. Nicolae A., Predescu ,C. – Bazele teoretice ale agretelor termotehnologice din industria materialelor metalice. Ed. Printech, 2001, Bucuresti

8.2. **Laboratory**	Number of hours	Teaching methods	Notes
1. Presentation of the laboratory, works and norms of security technique in work at the" Heating Equipments" laboratory	2	Explication, conversation, Case Study.	Blackboard, computer, specialized software
2. Temperature measurement methods. Measuring temperatures with heat-resistant, with thermoelectric pyrometers and radiation pyrometer.	2		
3. Determination of the heat accumulated in the construction of the electric furnace with corindon bar resistors	2		
4. Determination of the temperature field in the walls for furnaces with continuous regime	2		
5. The calculation of the chimney height with natural draft.	2		
6. Checking the size of the chimney with natural draft.	2		
7. Determining the thermal balance of a metallurgical furnace.	2		

Bibliography

1. Biris,I- Agregate termice metalurgice.I.P.C.-N., 1989.
2. Biris,I., Boer, M., Negrea, G. Agregate termice metalurgice. Lucrări de laborator. U.T.C.-N. 1996.
3. Deac Cristina, Biris,I., Boer, M., - Recuperatoare de căldură. Editura U.T.PRES, Cluj-Napoca, 2004, ISBN 973- 662-101-4.
4. Samoilă, C., Drugă, L., Stan, L. –Cuptoare si instalatii de încălzire.E.D.P.,Bucuresti,1983.

Nicolae A., Predescu ,C. – Bazele teoretice ale agretelor termotehnologice din industria materialelor metalice. Ed. Printech, 2001, Bucuresti

15. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies will be necessary for the technological engineers who carry out their activity either in the design workshops / research laboratories or in the productive sections.

16. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	On-going evaluation based on 2 tests and final evaluation (problems and questions from theory)	Final written evaluation - duration of evaluation 2 hours	75%
10.5 Laboratory	On-going evaluation based on discussions and self-evaluations and final	Discussions, tests - duration of evaluation 1 hour	25%

	evaluation by test.		
10.6 Minimum standard of performance: Minimum 50% of total activities.			

Date of filling in: 16.04.2023		**Title Surname Name**	**Signature**
	Lecturer	Lecturer Tintelecan Marius	
	Teachers in charge of application	Lecturer Tintelecan Marius	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	51

2. Data about the subject

2.1	Subject name			Welding and related processes			
2.2	Course responsible/lecturer			Lecturer dr.eng. IWE Marius Bodea - mbodea@stm.utcluj.ro			
2.3	Teachers in charge of seminars			Lecturer dr.eng. IWE Marius Bodea			
2.4 Year of study	3	2.5 Semester	3	2.6 Assessment		Examination	
2.7 Subject category	Formative category					DS	
	Optionality					DI	

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar	0	3.3 Laboratory	1	3.3 Project	0
3.4 Total hours in the curriculum	75	of which	3.5 Course	28	3.6 Seminar	0	3.6 Laboratory	14	3.6 Project	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	1
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))	33
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	Materials Science and Mechanical Engineering
4.2	Competence	Good knowlege in materials science and physics

5. Requirements (where appropriate)

5.1	For the course	Faculty of Materials and Environmental Engineering
5.2	For the applications seminarului / laboratorului / proiectului	Welding Laboratory Room E10 – FMEE Faculty

6. Specific competences

Professional competences	The graduates will be able to understand and use efficiently knowledge of: Welding terminology. The basics of arc welding processes with/without shielding gases. Materials selection for welding applications - filler and auxiliary materials. The fundamental principles and theory of solid-state welding, resistance welding processes. Oxy-gas welding and related processes. The soldering and brazing processes. Thermal spraying and thermal cutting processes. Quality control during manufacture. Welding imperfections and acceptance criteria. Non Destructive Testing Methods.
Cross competences	Reading and interpreting technical drawings that refer to welding fabrication. Selecting welding technologies and equipments required in welding fabrication, according to the materials used, dimensions, volume production, quality assurance etc. Choosing the right joint types, filler metals, welding parameters etc. accordingly to specific welding conditions: welded materials, welding position, mechanical resistance criteria etc. Undestanding the causes that can lead to welding imperfections.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Providing theoretical and practical skills required in the welding fabrication fields.
7.2	Specific objectives	Understanding the welding phenomena and related processes at an advanced level, the students being able to design and supervise the basic welding operations.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. History of welding. Terms and definitions. Welding classification. Joint types and classification.	2	Interactive methods using digital equipments, video materials, study cases	Digital media content available and e-learning resources.
2. Thermal sources for welding. Thermal Cycle in Welding. Welding residual stress and distortion.	2		
3. Arc welding fundamentals. Shielded metal arc welding process SMAW	2		
4. Submerged Arc Welding – SAW	2		
5. Gas Shielded Arc Welding – GMAW (MIG/MAG)	2		
6. Gas Tungsten Arc Welding – GTAW (TIG)	2		
7. Plasma Arc Welding - PAW. Electroslag welding – ESW	2		
8. Laser Welding – LBW, Electron Beam Welding – EBW	2		
9. Thermit Welding – TW	2		
10. Oxyfuel gas welding. Soldering and brazing.	2		
11. Oxygen cutting. Other cutting processes.	2		
12. Thermal spraying processes. Welding repairs	2		
13. Weldability and welding imperfections	2		
14. Non Destructive Testing in welding applications	2		

Bibliography

1. ASM Handbook: Vol. 6: Welding, Brazing, and Soldering, ISBN 0-87170-377-7(V.1), ASM Intern., 1993.
2. Sindo Kou, Welding Metallurgy, 2nd Ed., John Wiley & Son Inc., ISBN 0-471-43491-4, 2003.
3. Ibrahim Khan, Welding Science and Technology, New Age International Ltd., Publishers, ISBN 978-81-224-2621-5, 2008.
4. J. Nadzam, Gas Metal Arc Welding Guidelines, Lincoln Electric, 2005.
5. Edward R. Bohnart , TIG Handbook for GTAW Gas Tungsten Arc Welding, 2002, Miller Company.
6. KOBE STEEL Ltd, Weld Imperfections and Preventive Measures, 4th Ed.
7. SSAB Co, TECHSUPPORT No.47, Avoidance of discontinuities in the joint, www.ssab.com

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Welding safety measures. Welding symbolization	2	Practical training	Preparing Welding Procedure Specifications for each process
2. Shielded metal arc welding process SMAW	2		
3. Gas Shielded Arc Welding – GMAW (MIG/MAG)	2		
4. Gas Tungsten Arc Welding – GTAW (TIG)	2		
5. Oxyfuel gas welding and related processes	2		
6. Solid state welding processes	2		
7. Non Destructive Testing and welding imperfections	2		

Bibliography

1. ASM Handbook: Vol. 6: Welding, Brazing, and Soldering, ISBN 0-87170-377-7, ASM Int., 1993.
2. CWB Group - Industry Services, Welding Procedure Guide, 2008.
3. ESAB, Repair and Maintenance Welding Handbook, 2nd Edition
4. Global Engineering Documents JEFFERSON'S WELDING ENCYCLOPEDIA ON CD-ROM, 2002.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The welding course content support the students qualification in order to perform in a large number of industries that use welding to manufacture their products, that in turn represent the driving force of a modern economy. They are largely responsible for building the infrastructure, capital goods, and commercial products that sustain a relatively high standard of living for billions of people across the world. Welding-related industries like the power plants industry, factories, bridges construction, vehicles, pipelines manufacturing a.o. are essential to generate, store, and distribute food, fuel, and products to a multitude of families and businesses.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Quiz questions (100 points)	Oral & writing 2h	80%
10.5 Seminars /Laboratory/Project	Overall activity during the semester	Oral & writing	20%
10.6 Minimum standard of performance			
Minimum 50 points obtained at course test and laboratory tests.			

Date of filling in:		Title Surname Name	Signature
20.04.2023	Lecturer	Dr.Ing. IWE Bodea Marius	
	Teachers in charge of application	Dr.Ing. IWE Bodea Marius	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	52,10

2. Data about the subject

2.1	Subject name			Marketing		
2.2	Course responsible/lecturer			Lecturer Denes-Pop Ioana		
2.3	Teachers in charge of seminars			Lecturer Denes-Pop Ioana		
2.4 Year of study	III	2.5 Semester	2	2.6 Assessment	verification	
2.7 Subject category	Formative category					DC
	Optionality					DO

3. Estimated total time

3.1 Number of hours per week	2	of which	3.2 Course	1	3.3 Seminar	1
3.4 Total hours in the curriculum	28	of which	3.5 Course	14	3.6 Seminar	14
3.7 Individual study:						
(a) Manual, lecture material and notes, bibliography						12
(b) Supplementary study in the library, online and in the field						4
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays						3
(d) Tutoring						-
(e) Exams and tests						3
(f) Other activities						-

3.8 Total hours of individual study (sum (3.7(a)...3.7(f)))	22
3.9 Total hours per semester (3.4+3.8)	50
3.10 Number of credit points	2,00

4. Pre-requisites (where appropriate)

4.1	Curriculum	it's not necessary
4.2	Competence	it's not necessary

5. Requirements (where appropriate)

5.1	For the course	**IN SITU / ONLINE**, Teams platform, depending on the epidemiological situation and the decisions of the Senate of the Technical University of Cluj-Napoca.

		The onsite scenario involves: Classroom, teaching aids (PC, video projector, blackboard), teaching materials. The teaching activities will take place cf. HSU 1226 / 10.09.2020. The teaching activities will take place in a problematic and heuristic spirit. Students will not attend lectures with their mobile phones open. Telephone conversations during the course will not be tolerated, nor will students leave the classroom to pick up personal phone calls. **The online scenario** assumes that each student has an account on the MS Teams platform in order to participate in online teaching activities (according to HSU 1226 / 10.09.2020).
5.2	For the applications	**IN SITU / ONLINE**, Teams platform, depending on the epidemiological situation and the decisions of the Senate of the Technical University of Cluj-Napoca. **The onsite scenario** involves: Seminar room, teaching aids (PC, video projector, blackboard), teaching materials. The teaching activities will take place cf. HSU 1226 / 10.09.2020. Students will not attend lectures with their mobile phones open. Telephone conversations during the course will not be tolerated, nor will students leave the classroom to pick up personal phone calls. The online scenario involves using the MSTeams platform. The deadline for teaching homework is set by the application holder in agreement with the students. Requests for its postponement will only be accepted on well-founded grounds.

6. Specific competences

Professional competence	Acquiring basic and specialized knowledge on marketing and industrial markets. To analyse the marketing mix of a company and to take the necessary measures so that it can have a profitable activity.
Cross competences	Knowledge of the basics of marketing and their connection with other sciences, including engineering. Ability to respect the principles of professional ethics specific to marketing.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Developing skills in marketing, acquiring basic knowledge about the marketing mix.
7.2	Specific objectives	1. Knowledge and understanding • The assimilation of the knowledge regarding the components of the environment in which the companies carry out their activity. • Knowledge of market research tools;

		• Knowledge of marketing tools and strategies; • Knowledge of the basic notions related to product, price, promotion and distribution; • Thorough knowledge of one's own business by the entrepreneur / manager, so that he is always up to date with the position that his company has on the market, thus identifying in due time the appropriate marketing strategies; Understanding how the market works. 2. Explanation and interpretation: • Explain the impact that a marketing plan can have on a company's market position. • Explain the impact that a company's marketing mix can have on it and take the necessary measures so that it can have a profitable activity. 3. Instrumental – applications • To be able to analyze the marketing mix of a company. • Identifying business opportunities and determining appropriate ways to act through effective marketing plans • The ability to apply the specific action modalities to the marketing activity for the economic profitability of an industrial company 4. Attitudinal: • To understand the benefits of applying marketing optics within a company. • To appreciate correctly the information obtained, to be able to analyze it so that in the end it can contribute to the elaboration of an effective marketing plan.

8. Contents

8.1. **Lecture (syllabus)**	Number of hours	Teaching methods	Notes
1. Introduction to marketing. Marketing concepts. The objective and functions of marketing management. Specialization and marketing functions.	2	PowerPoint presentation Interactive teaching mode Dialogue - conversation professor - student	INSITU/ONLINE Cursurile se vor desășura Insitu sau online **cf. HSU 1226/10.09.2020** ***Platforma MS Teams***
2. Marketing environment. Components and characteristics of the microenvironment and macroenvironment. Market definition and analysis. Market components.	2		
3. Marketing Information System. Marketing research. Methods, tools and techniques needed to gather information on the market. Components of a questionnaire and methods of its elaboration.	2		
4. Marketing mix. Product life cycle: Product policy and its	2		

implementation, service marketing.			
5. Price and its influencing factors. Price classification, ways to set them and price strategies used. Price policies.	2		
6. Product promotion and forms of promotion. Promotional techniques and policies. Elaboration of the promotional budget.	2		
7. Distribution: concept, role, importance and functions. Types of distribution channels. Distribution policy - Distribution strategies and factors pursued in the design of a distribution channel.	2		
Bibliography 1. *Kotler, P., Armstrong, G., Saunders, J., Wong, V., Principiile marketingului, Editura Teora, Bucureşti 1998.* 2. *Kotler, Ph., Managementul marketingului, Editura Teora, Bucureşti, 1996.* 3. *Ştefănescu, P., Bazele marketingului, Bucureşti, 1994.* 4. *Baker, M. J., Marketing, Societatea Ştiinţă şi Tehnică, Bucureşti, 1997.* 5. *Denes-Pop, Ioana, Marketing, UTPRESS, Cluj-Napoca, 2018.*			
8.2. **Seminar**	Number of hours	Teaching methods	Notes
1. The concept of marketing. Marketing orientation. Case studies;	2	Explication, conversation, Case Study.	INSITU/ONLINE Seminariilese vor desfășura insitu cf. **HSU 1226/10.09.2020 sau** se pot desfășura **online *(platforma MS Teams),* în funcție de scenariu privind Sars-Cov 2, cf hotărârii Senatului UTCN**
2. The company environment. Case studies. Company market: the Porsche case. Absolute and relative market share. Statistical link between the degree of urbanization and the average volume of sales per capita. Market segmentation - $\chi 2$ test;	2		
3. Marketing research. The survey. The case of the questionable questionnaire. Scaling consumer assessments (semantic differential). Likert's ladder. Fishbein-Rosenberg model;	2		
4. The marketing mix. The product. Launch of new products. Case studies;	2		
5. The price. Case studies. Estimating the psychological price;	2		
6. Promotion strategies used. Case studies	2		
7. Distribution. Case studies. Choosing the optimal distribution option.	2		
Bibliography 1. *Kotler, P., Armstrong, G., Saunders, J., Wong, V., Principiile marketingului, Editura Teora, Bucureşti 1998.* *2. Kotler, Ph., Managementul marketingului, Editura Teora, Bucureşti, 1996.* *3. Ştefănescu, P., Bazele marketingului, Bucureşti, 1994.* 4. *Denes-Pop, Ioana, Marketing, UTPRESS, Cluj-Napoca, 2018.*			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies will be necessary for the employees who carry out their activity within the marketing services of a company but also for the future engineers in the field of materials science who must be up to date with the market requirements at a given moment.

The curriculum of the discipline is designed to facilitate the training of professional skills (specific to the profession, provided in the RNCIS documents) and transversal skills. The contents addressed include current issues (at national level) that are the subject of interest and / or debates conducted by professional associations / employers with concerns in the field of environmental protection and engineering. They also cover fundamental topics of the discipline that ensure students' familiarity with the specific problems of the discipline. (concept, theories, ideas, critical analysis).

10 Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Discipline-specific criteria (correct definition of the notions presented, critical discussion of the topics addressed, etc.) General evaluation criteria (completeness and correctness of knowledge, logical coherence, fluency in expression, strength of argument)	Written examination consisting of a grid test consisting of questions covering the whole subject 25%). Also, separately, if necessary, students will answer during the semester, in writing, questions related to the course support (25%). If the exam will consist only of the grid test it will represent 50% of the grade from the exam.	50%
10.5 Seminar	Acquiring the knowledge presented at the seminar / Making reports related to the seminar topics discussed. Attendance at the seminar	The written exam completes the grid test which assesses the knowledge assimilated through the course and consists of questions that cover the entire subject covered in the seminar (25%). Also, separately, if necessary, students will answer during the semester, in writing, questions related to the seminar support (21%). If the exam consists only of the grid test, it will represent 46% of	50%

		the grade related to the seminar. Attendance at the seminar (4%). Also, there is the possibility to appreciate the way to deepen the subject by making a paper to cover the topic of the seminar.	
10.6 Minimum standard of performance			
Knowledge of the basic concepts of entrepreneurship. Condition for obtaining credits: N≥5, E≥5; S≥5, where: N = 0.50 E + 0.46 S + 0.04 P; E - exam grade, S - seminar grade, P - seminar attendance.			

Date of filling in:		**Title Surname Name**	**Signature**
16.03.2023	Lecturer	Lecturer Denes-Pop Ioana	
	Teachers in charge of application	Lecturer Denes-Pop Ioana	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	52.2

2. Data about the subject

2.1	Subject name	Business strategy					
2.2	Course responsible/lecturer	s.l.dr.ing. Merie Violeta					
2.3	Teachers in charge of seminars	s.l.dr.ing. Merie Violeta					
2.4 Year of study	3	2.5 Semester	2	2.6 Assessment	colloquium exam		
2.7 Subject category	Formative category						DC
	Optionality						DO

3. Estimated total time

3.1 Number of hours per week	2	of which	3.2 Course	1	3.3 Seminar	1	3.3 Laboratory	0	3.3 Project	0
3.4 Total hours in the curriculum	28	of which	3.5 Course	14	3.6 Seminar	14	3.6 Laboratory	0	3.6 Project	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	5
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	5
(d) Tutoring	1
(e) Exams and tests	1
(f) Other activities	0

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	22
3.9 Total hours per semester (3.4+3.8)	50
3.10 Number of credit points	2

4. Pre-requisites (where appropriate)

4.1	Curriculum	It's not necessary
4.2	Competence	It's not necessary

5. Requirements (where appropriate)

5.1	For the course	Presence at Technical University of Cluj-Napoca
5.2	For the applications	Presence at seminars is mandatory.

	(laboratory)	

6. Specific competences

Professional competences	To know: basic concepts of management, marketing and business strategy; theoretical-methodological fundaments of strategies; business strategies. To understand the modes of company strategy elaboration. To evaluate the results of strategies application. Assimilation of fundamental and specialized concepts regarding the managerial strategies of a company. To know to analyse the data referring to the market and the environment in which the company evolves. To apply the strategy for economic profitability for an industrial company.
Cross competences	To adopt the necessary strategies for the good work of a company with respect the deontological norms.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of competences in the management and strategy of a company.
7.2	Specific objectives	Assimilation of knowledge referring to the strategy typology which can be applied to a company. Gaining skills for business strategy elaboration.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Concept, typology and the role of business strategy	2	Lecture PowerPoint presentation Interactive teaching mode Dialogue - conversation professor - student	Multimedia Blackboard
Elaboration and implementation of the company general strategy	2		
Remodelling of managerial system of a company.	2		
Evaluation of the results obtained by applying the strategy	2		
Market strategies. Strategies in the research-development field.	2		
Investments strategies. Strategies for human resources development.	2		
Strategies of quality. Strategies for company digitalisation.	2		

Bibliography [1]. Collective book, Business Book, Ed. DORL, 2003, ISBN: 1409341267 [2]. David Campbell, Business Strategy, Ed. Macmillan Education UK, 2011.			
8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Strategies for technology improvement	2	Explication, conversation, Case Study.	Blackboard, computer.
2. Joint-venture strategies.	2		
3. Export strategies	2		
4. Strategies in company- banking financial system relation	2		
5. Strategies for external expansion of a company	2		
6. Control strategies	2		
7. Marketing strategies applied by leaders and small companies.	2		
Bibliography [1]. Collective book, Business Book, Ed. DORL, 2003, ISBN: 1409341267 [2]. David Campbell, Business Strategy, Ed. Macmillan Education UK, 2011.			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The competences will be necessary to the employees which will have the activities in the marketing/management departments and to the engineers in the materials science field which must be up to date with the current strategies of a company at a moment.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Answers to the questions related to the subjects presented at courses.	Written test - 1 hours	75%
10.5 Laboratory	Solving problems similar with the ones presented at seminars.	Written test – 1 hour	25%
10.6. Minimum standard of performance			
General examination mark ≥ 5			

Date of filling in:		**Title Surname Name**	**Signature**
14.04.2023	Lecturer	s.l.dr.ing. Merie Violeta	
	Teachers in charge of application	s.l.dr.ing. Merie Violeta	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	52.3

2. Data about the subject

2.1	Subject name	Ethics and academic integrity					
2.2	Course responsible/lecturer	Associate professor Traian Florin Marinca					
2.3	Teachers in charge of seminars	Associate professor Traian Florin Marinca					
2.4 Year of study	3	2.5 Semester	2	2.6 Assessment	colloquium exam		
2.7 Subject category	Formative category						DC
	Optionality						DO

3. Estimated total time

3.1 Number of hours per week	2	of which	3.2 Course	1	3.3 Seminar	1	3.3 Laboratory	0	3.3 Project	0
3.4 Total hours in the curriculum	28	of which	3.5 Course	14	3.6 Seminar	14	3.6 Laboratory	0	3.6 Project	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	5
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	5
(d) Tutoring	1
(e) Exams and tests	1
(f) Other activities	0
3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	22
3.9 Total hours per semester (3.4+3.8)	50
3.10 Number of credit points	2

4. Pre-requisites (where appropriate)

4.1	Curriculum	It's not necessary
4.2	Competence	It's not necessary

5. Requirements (where appropriate)

5.1	For the course	Presence at Technical University of Cluj-Napoca
5.2	For the applications	Presence at seminars is mandatory.

	(laboratory)	

6. Specific competences

Professional competences	Theoretical knowledge. Familiarizing the student with the issues of designing and planning the scientific experiment, with the analysis and presentation of the experimental data and with the experimental methods of general interest in the study of materials. Acquiring methods and means of scientific documentation, ethics and academic integrity, anti-plagiarism legislation Acquired skills: To know the problems of designing and planning the scientific experiment, the theory of measurement errors, the correct representation of the results, efficient documentation, writing scientific papers, theses, reports.
Cross competences	Acquiring skills related to error calculation, correct choice of research means. Transversal skills in the field of advanced materials and technologies for their production / processing / use, areas of convergence of several fields such as physics, chemistry, materials science, specific legislation.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Learning the methodology of experimental research and issues of ethics and academic integrity
7.2	Specific objectives	• Knowledge of calculation of measurement errors, calculation with approximate numbers, measurement chains, error propagation • Learning the method of documentation through books, articles, internet • Knowledge of programming experiments, drawing up a research plan • Knowledge of the principles of drafting / preparation of projects, reports, and scientific papers • Learning ethics in research • Knowledge and avoidance of various forms of plagiarism

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Measurement errors, statistical hypotheses, criteria for eliminating gross errors, Calculation 1` with approximate numbers,	2	Lecture PowerPoint presentation Interactive teaching mode	Multimedia Blackboard
2. Smallest squares method, regression analysis, representation of results, confidence intervals	2		
3. Notions of experimentation strategy. Documentation. Choosing the type of experiment, designing the experimental program.	2		
4. Factorial experiments	2		

5. Writing project applications, reports and scientific papers	2	Dialogue - conversation professor - student	
6. Good conduct in scientific research. Specific legislation	2		
7. Plagiarism, its identification and avoidance in scientific publications	2		

Bibliography

[1]. M. Tiron, Metoda celor mai mici patrate, EDP, Bucuresti
[2]. A. Albu, I. Tăpălagă, L. Morar, E. Tăciulescu, Bazele cercetării experimentale, Lito UTCN, Cluj-Napoca, 1984
[3]. C. Oprean, M. Tâțu, Cercetarea experimentală şi prelucrarea datelor, Ed. Univ. L.Blaga, Sibiu, 2007
[4]. A. Pisoschi, A. Ardelean, Introducere în metodologia cercetării ştiinţifice, Ed. Univ. Vasile Goldiş, Arad, 2005
[5]. Elena Emilia Stefan, Etica si integritate academica, Editura ProUniversitaria Bucuresti, 2018
[6]. V. Pop, I. Chicinaş, N. Jumate, Fizica materialelor. Metode experimentale, Ed. Presa universitară clujeană, Cluj-Napoca, 2001
[7]. M. Ashby, How to write a paper, 6th Edition, Engineering Department, University of Cambridge, Cambridge, April 20052005
[8]. A. Buttler, Comment rédiger un rapport ou une publication scientifique ?, Université de Franche-Comté - Laboratoire de chrono-écologie -CNRS/UMR 6565, 2002
[9]. Laws: L 206/2004, L 1/2011, l 319/2003

8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Calculations with errors. Examples of determining the maximum relative error of a physical quantity inaccessible directly to the experiment	2	Explication, conversation, Case Study.	Blackboard, computer.
2. Presentation of results, specific curves in materials engineering, tracing of experienced curves, regression analysis. Examples of experimental programming.	2		
3. Scientific databases. Examples of documentation using databases. How to read an article.	2		
4. Writing reports and scientific papers.	2		
5. Discussion of copyright and anti-plagiarism legislation. Bad practices in scientific research	2		
6. Plagiarism. Forms of plagiarism. Anti-plagiarism legislation. Anti-plagiarism rules. Anti-plagiarism software. Similarity reports	2		
7. Discussion of real examples of scientific plagiarism.	2		

Bibliography

[1]. M. Tiron, Metoda celor mai mici patrate, EDP, Bucuresti
[2]. C. Oprean, M. Tâțu, Cercetarea experimentală şi prelucrarea datelor, Ed. Univ. L.Blaga, Sibiu, 2007
[3]. A. Pisoschi, A. Ardelean, Introducere în metodologia cercetării ştiinţifice, Ed. Univ. Vasile Goldiş, Arad, 2005
[4]. Elena Emilia Stefan, Etica si integritate academica, Editura ProUniversitaria Bucuresti, 2018

[5]. V. Pop, I. Chicinaş, N. Jumate, Fizica materialelor. Metode experimentale, Ed. Presa universitară clujeană, Cluj-Napoca, 2001
[6]. M. Ashby, How to write a paper, 6th Edition, Engineering Department, University of Cambridge, Cambridge, April 20052005
[7]. A. Buttler, Comment rédiger un rapport ou une publication scientifique ?, Université de Franche-Comté - Laboratoire de chrono-écologie -CNRS/UMR 6565, 2002
[8]. Legislatia din domeniu: L 206/2004, L 1/2011, l 319/2003
[9]. Site-urile: http://www.cnatdcu.ro/, https://www.uefiscdi.ro/, http://www.research.gov.ro/, https://www.edu.ro/ , http://ad-astra.ro/ , http://cne.ancs.ro/
[10]. Databases: http://apps.webofknowledge.com.am.e-nformation.ro, http://www.scientific.net/, http://www.scopus.com/home.url, http://www.sciencedirect.com/, http://integru.org/

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Companies that have testing / research laboratories, research institutes require that engineers know the research methodology through its components: documentation, experimentation, experimental data processing, writing technical and research reports

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Answers to the questions related to the subjects presented at courses. Note C	Written test - 1 hours	50%
10.5 Laboratory	Presenting a material related to a topic presented at courses. Note S		50%
10.6. Minimum standard of performance			
General examination mark N, N≥ 5, N=0,5C+0,5S			

Date of filling in:		**Title Surname Name**	**Signature**
18.04.2023	Lecturer	Associate professor Traian Florin Marinca	
	Teachers in charge of application	Associate professor Traian Florin Marinca	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	53

2. Data about the subject

2.1	Subject name	Practical Activity II					
2.2	Course responsible/lecturer	Associate professor Traian Florin Marinca, marinca.traian@stm.utcluj.ro					
2.3	Teachers in charge of seminars	Associate professor Traian Florin Marinca, marinca.traian@stm.utcluj.ro					
2.4 Year of study	2	2.5 Semester	2	2.6 Assessment	V		
2.7 Subject category	Formative category					DS	
	Optionality					DI	

3. Estimated total time

3.1 Number of hours per week	0	of which	3.2 Course	0	3.3 Seminar	0	3.3 Laboratory	0	3.3 Project	0
3.4 Total hours in the curriculum	90	of which	3.5 Course	0	3.6 Seminar	0	3.6 Laboratory	0	3.6 Project	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	0
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	0
(d) Tutoring	0
(e) Exams and tests	0
(f) Other activities	0

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	10
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	---
4.2	Competence	General engineering knowledges

5. Requirements (where appropriate)

5.1	For the course	-
5.2	For the applications	Practice agreement with companies.

	(laboratory)	

6. Specific competences

Professional Competences	- Learning of a process/technological flux in production; - Utilising the knowledges about the materials properties in the study of the behaviour of materials in technological flux – from the raw materials to the final products. - Appreciation over the quality of the final products and materials and also of the process; - Using the industrial apparatus/installations;
Cross competences	- Teamwork; - Deadlines; - Tasks; - Familiarisation with the product processes and socialisation in the industrial environment; - Understanding the hierarchy in the enterprise/factory/company/etc

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Be familiar and understanding the technological processes, industrial production and industrial equipments
7.2	Specific objectives	Study of the material characteristics/materials quality over the technological flux; Knowing the operation mode of the apparatus/installation from a given technological flux;

8. Contents

At company/factory/enterprise choice.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Skills will be required for employees who will work as engineers in production and/or quality departments.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Practical activity	The students will briefly present their activity in the company with the accent on the practical parts.	Oral tests/question and answers session (O)	50%
10.5 Laboratory	The student will present a notebook where they will describe their activity in the company. Their activities	practice notebook (N)	30%

	will be presented with a timetable.		
10.6. Minimum standard of performance			
P ≥ 5, O≥ 5, N≥ 5, P (the general examination mark) = 0,5O+0,5N			

Date of filling in:		**Title Surname Name**	**Signature**
14.03.2023	Lecturer	Assoc.prof. Traian Florin MARINCA	
	Teachers in charge of application	Assoc.prof. Traian Florin MARINCA	

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Materials and Environmental Engineering
1.3	Department	Materials Science and Engineering
1.4	Field of study	Materials Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science
1.7	Form of education	Full time
1.8	Subject code	108.00

2. Data about the subject

2.1	Subject name			Modern language V		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge of seminars			Conf. dr. Sanda Pădureţu – Lb. engleză Sanda.Paduretu@lang.utcluj.ro		
2.4 Year of study	III	2.5 Semester	I	2.6 Assessment	C	DC/DFac
2.7 Subject category	Formative category: Modern language					
	Optionality DC/DFac					

3. Estimated total time

Year / Sem	Name of the discipline	Nr. weeks	Course	Applications			Course	Applications			Individual study	TOTAL	Credit
			[ore/săpt.]				[ore/sem.]						
				S	L	P		S	L	P			
I	Modern language	14	-	2	-	-	-	28	-	-	22	50	2

3.1	Number of hours per week	2	3.2	of which, course:	-	3.3	applications:	2
3.4	Total hours in the curriculum	50	3.5	of which, course:	-	3.6	applications:	28

Individual study	Ore
Manual, lecture material and notes, bibliography	7
Supplementary study in the library, online and in the field	2
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	8
Tutoring	2
Exams and tests	3
Other activities	-

3.7	Total hours of individual study	22
3.8	Total hours per semester	28
3.9	Number of credit points	2

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Minimum level of knowledge of the modern language B1 / B2

		(cf. CEFR - Common European Framework of Reference for Languages)

5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	Class attendance, individual study Rooms B 102, B 103 / M102, M 104 - onsite MS Teams Platform – online

6. Specific competences

Professional competences	Application of grammar, format rules and conventions regarding the writing of technical documents in the foreign language Elaboration, reformulation, summary and synthesis of texts in formal technical style
Cross competences	Ability for foreign language documentation, useful for academic and / or professional careers Oral and written communication skills in multicultural professional teams.

7. Discipline objectives (as results from the key competences gained)

7.1	General objective	Development of linguistic and communicative skills in a foreign language in professional situations.
7.2	General objectives	Assimilation of the basic lexicon in the fields of interest and related of materials science and engineering. Effective use of language and communication skills in the foreign language.

3. Contents

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Jobs, people and organizations	2	Communicative and interactive strategies. Integrated skills, flipped learning, blended	Online platform, Interactive board, CD Player, video projector
2. Work and jobs. Ways of working	2		
3. Recruitment and selection. Skills and qualifications	2		
4. Pay and benefits. People and workplaces	2		
5. The career ladder	2		
6. Managers, executives and directors	2		

		learning	
7. Business people and business leaders	2		
8. Organizations 1	2		
9. Organizations 2	2		
10. Business ethics	2		
11. Professional behaviour	2		
12. Social issues / Environmental issues	2		
13. Oral assessment	2		
14. Written assessment	2		

Bibliography

Bill Mascull, Business Vocabulary in use, Cambridge University Press, 2010
Glendinning, E. and Alison Pohl, Technology 1, OUP, 2008
Aspects of English Grammar in Technical Contexts, U.T. Press, Cluj-Napoca, 2015
Ibbotson, M., Cambridge English for Engineering, CUP, 2009.

4. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Optimizing communication with the interlocutor / partner on the labor market

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Seminar Applications		Fulfilling work tasks at the written test, taking part in a conversations or a monologue, seminar activity, homework		Written exam Oral exam		30% 40%
				Practical assessment (seminar activity, homework)		30%
10.4 Minimum standard of performance: The student is accepted at the final evaluation, if his/her contribution to the seminar topics is 80%. The grade is calculated if each component is correctly done at least 60%.						
Final grade: 0,3 Ts + 0,4 Po + 0,3 P						

Date of filling in	Professor in charge with the discipline	Teachers in charge of the seminar
20.04.2023	Conf. dr. Sanda Pădureţu	Conf. dr. Sanda Pădureţu

Date of approval in the department 26.06.2023	Head of department Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty 10.07.2023	Dean Prof.dr.eng. Cătălin Popa