

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	1.00

2. Data about the subject

2.1	Subject name	Mathematical analysis				
2.2	Course responsible/lecturer	Lect. Dr. Daniela Marian				
2.3	Teachers in charge of seminars	Lect. Dr. Daniela Marian				
2.4	Year of study	I	2.5 Semester	I	2.6 Assessment	Nota
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	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										34
	(b) Supplementary study in the library, online and in the field										8
	(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										10
	(d) Tutoring										3
	(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	

5. Requirements (where appropriate)

5.1	For the course	N/A Electronic Course
5.2	For the applications seminarului / laboratorului /	Individual work

6. Specific competences

Professional competences	<p>C1.1. Identifying the concepts, principles, basic theorems and mathematical methods, physics, chemistry, technical drawing, computer programming.</p> <p>C1.2. Using basic knowledge in the fundamental disciplines for theoretical explanation and interpretation of results, theorems, phenomena or specific processes of industrial engineering.</p> <p>C1.3. Applying the theorems, principles and basic methods of fundamental disciplines, for basic engineering calculations in design and operation of technical systems specific to industrial engineering, under qualified assistance</p> <p>C1.4. Appropriate use of standard assessment criteria and methods of fundamental disciplines for identification, modelling, analysis and qualitative and quantitative assessment of characteristics of the phenomena and parameters as well as the processing and interpretation of the results from specific industrial engineering processes.</p> <p>C1.5. Developing of specific industrial engineering projects and models based on identification, selection and use of principles, optimal methods and acknowledged solutions from the fundamental disciplines.</p>
Cross competences	<p>CT1. Applying the values and the ethics of the profession of engineer and the responsible execution of the professional duties under limited autonomy and qualified assistance. Promoting the logical reasoning, convergent and divergent, the practical applicability and the assessment and self-evaluation decisions.</p> <p>CT3. Objective self-evaluation of the need of continuous training for labor market insertion and the accommodation to its dynamic requirements and for personal and professional development. Effective use of language skills and knowledge of information technology and communication.</p>

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

7.1	General objective	To obtain knowledge about the basic results of mathematical analysis and their application in other discipline
7.2	Specific objectives	<ul style="list-style-type: none"> • To compute partial derivatives of functions of several variables • To compute the differential of functions of several variables and vector functions • To write Taylor's formula for functions of several variables • To study the extrema of functions of several variables • To compute definite integrals, improper integrals, double integrals, triple integrals, line integrals • To know applications of mathematics in different domains

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Differential Calculus for Real Functions of One Real	2	Oral	

Variable		presentation, notes on blackboard and multimedia presentation Students are asked and encouraged to ask questions	
Part I: Sets Endowed with different Structures (metric spaces, linear spaces, normed spaces). Real Functions. Vector Functions Part II: Differential Calculus for Real Functions of Several Variables. Partial Derivatives. Partial Derivatives of Higher Orders.	2		
Derivatives of Composite Functions. Homogeneous Functions. Directional Derivative. Differential Operators. Differentials. Differentials of Higher Orders	2		
Taylor's Formula for Real Functions of Several Variables. Differential Calculus for Vector Functions.	2		
Implicit Functions	2		
Changes of Variables	2		
Extrema of Functions of Several Variables	2		
Antiderivatives. Riemann integrals. Applications	2		
Improper integrals	2		
The length of a curve. Line Integrals with Respect to Arc Length	2		
Line Integrals with Respect to Coordinates. Line Integrals Path Independent. Applications of Line Integrals	2		
Double Integrals. Calculus by Iteration	2		
Green-Riemann's Formula. Changes of variables. Applications of Double Integrals	2		
Triple Integrals. Calculus by Iteration. Changes of variables. Applications	2		
Bibliography			
<ol style="list-style-type: none"> 1. A. F. Bermant, I. G. Aramanovich, Mathematical Analysis, Ed. Mir, Moscova, 1987 3. D. Inoan, Problems in differential and integral calculus, Mediamira, Cluj-Napoca, 2007 5. M. Ivan, Calculus, Ed. Mediamira, Cluj-Napoca, 2002 6. D. Marian, Mathematical Analysis, Ed. Mega, 2012 			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Differential Calculus for Real Functions of One Real Variable (Derivatives, Derivatives of Higher Orders. Taylor's Formula. Extrema)	1	Practical problems Students are asked and encouraged to ask questions	
Differential Calculus for Real Functions of Several Variables. Partial derivatives. Partial Derivatives of Higher Orders. Derivatives of Composite Functions	1		
Directional Derivative. Differential Operators. Differentials. Differentials of higher orders	1		
Taylor's Formula for Real Functions of Several Variables	1		
Implicit Functions. Changes of Variables	1		
Extrema of Functions of Several Variables.	1		
Antiderivatives. Riemann integrals. Applications. Improper	2		

integrals			
Line Integrals. Applications	2		
Double Integrals. Applications	2		
Triple Integrals. Applications	2		
Bibliography 2. A. F. Bermant, I. G. Aramanovich, Mathematical Analysis, Ed. Mir, Moscova, 1987 4. D. Inoan, Problems in differential and integral calculus, Mediamira, Cluj-Napoca, 2007 7. M. Ivan, Calculus, Ed. Mediamira, Cluj-Napoca, 2002 8. D. Marian, Mathematical Analysis, Ed. Mega, 2012			

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

A good engineer must have solid knowledge of mathematics to apply in the domain in which he works because the professional community requires well prepared engineers.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The ability to answer to theoretical questions and to solve practical problems	Written test (mark T)	T is 70%
10.5 Seminars /Laboratory/Project	The activity during classes is appreciated	Questions on each class. Activity of seminar (mark AS) Homework (mark H)	AS is 20% H is 10%
10.6 Minimum standard of performance $N=0,7T+0,2AS+0,1H$;			
The final credit can be received only if each of the mark's components is fulfilled: $N \geq 5$; $T \geq 5$			

Date of filling in:		Title Surname Name	Signature
14.06.2023	Lecturer	Lect.Dr. Daniela Marian	
	Teachers in charge of application	Lect.Dr. Daniela Marian	

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	2.00

2. Data about the subject

2.1	Subject name	Physics I				
2.2	Course responsible/lecturer	Prof.dr.Fechete Radu				
2.3	Teachers in charge of seminars	Lecturer dr. Ramona Chelcea				
2.4	Year of study	I	2.5 Semester	I	2.6 Assessment	E
2.7	Subject category	Formative category				DF
		Optionality				DI

3. Estimated total time

3.1	Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laboratory	1	3.3 Project	-
3.4	Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laboratory	14	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											14
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays											14
(d) Tutoring											1
(e) Exams and tests											3
(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	Good knowledge of high school physics Good knowledge of high school mathematics
4.2	Competence	Some knowledge in operating computers (Word, Power Point, Excel, www).

5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	N/A

6. Specific competences

Professional competences	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Manipulate the main physical quantities and measurement unit by using the fundamental physical laws characteristic to the studied phenomena during the solving of the problems. • Evaluate the measurement errors, the absolute and the relative errors. • Define and apply some basics concepts, physically principles and theory applied to materials science and engineering. • Identify and analyze specific problems and to elaborate strategies to solve them. • Identify diverse physical systems, to describe their properties and relations/interactions between the system components.
Cross competences	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Draw graphics of the variation of a specific quantity function of various parameters which are measured experimentally. • Plot the graphics using computer scientific software like Origin. • Operate with units with different order of magnitude and with the physical constants • Write a paper into a scientifically form using a MS Word template.

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

7.1	General objective	<ul style="list-style-type: none"> • Introduction of the most important physical quantities that are encountered in materials science engineering applications. • Introduction of the main laws of physics that play a central role in materials science engineering applications.
7.2	Specific objectives	<ul style="list-style-type: none"> ◆ Understanding of the most important laws of classical mechanics ◆ Knowledge of the oscillatory and wave phenomena ◆ Knowledge of the sound characteristics and transfer phenomena ◆ Knowledge of the most important laws of thermodynamics. ◆ The ability to document alone in a given scientific problem using the books library and the Internet. ◆ The ability to elaborate and to present a report on a given scientific problem ◆ The ability to represent graphically the physical quantities. ◆ The ability to use commercial computer programs for interpretation of the experimental data. ◆ The ability to solve a given physical problem and to express it in a mathematical form. ◆ The ability to work in a team for solving real physical problems

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Introduction in Physics. Fundamental and derivate physical quantities and their measurement units. Vectors and scalars.	2 hours		
Basics of kinematics: Elements of motion (reference system, trajectory, space). Velocity. Linear motions with constant velocity. Acceleration. Linear motion with constant acceleration.	2 hours		
Dynamics: 1 st , 2 nd and 3 rd principles of dynamics. Inertial mass. Force. Linear momentum. Momentum of force. Angular momentum. Conservations laws of: linear	2 hours		

momentum, kinetically momentum.		Exposing Conversation Description Problematization	
Dynamics: Mechanic work. Power. Energy (kinetic, potential, total). Conservations laws of energy.	2 hours		
Harmonic oscillations (elongation, speed, acceleration, energy of harmonic oscillating motion)	2 hours		
Damped oscillations. Damped oscillator energy. Damping parameters. Forced oscillations, resonance.	2 hours		
Waves. Wave function. Differential equation.	2 hours		
Speed of propagation of elastic waves in solids, liquids and gases. Energy characteristics of waves.	2 hours		
Absorption of waves. Reflection and refraction of waves. Diffraction of waves. Interference of waves. Standing waves.	2 hours		
Dispersion of waves. Acoustics: Definition. Sound sources. Sound pressure.	2 hours		
Sounds quality (sound intensity, sound pressure, sound level, acoustic level, timbre, noise). Shock wave (supersonic bang). Doppler effect.	2 hours		
Kinetic molecular theory of gases. Pressure of ideal gas. Thermal equation of state. Internal energy of the ideal gas.	2 hours		
Mechanical work heat in thermodynamics. First law of thermodynamics. Caloric equation of state. Ideal gas law. Polytropic process.	2 hours		
Second law of thermodynamics. Heat engine. Carnot cycle. Heat pump and refrigerator. Entropy. The third law of thermodynamics.	2 hours		
Bibliography			
<i>In UTC-N library</i>			
1. R. Fechete, Fundamental physics for engineers, course notes.			
2. E. Culea, S. Nicoara, Fundamentals of Physics, RISOPRINT, Cluj-Napoca 2004			
3. R. Fechete, Elemente de Fizica pentru Ingineri, Ed. UTPress, 2008.			
4. I.Ardelean, Fizica pentru ingineri, Ed. UTPres, 2005.			
5. I. Coroiu, E. Culea, Fizica I, Ed. UT. Press, 1999.			
<i>Multimedia teaching aids</i>			
6. Microsoft Encarta Encyclopedia.			
7. Encyclopedia Britannica.			
8. www.wikipedia.org			
9. http://users.pandora.be/educyclopedia/education/physicsbytopic.htm			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Seminars: Solving problems from the chapters presented in the course	14 hours	Exposing Conversation Description Experiment	
Physical quantities and measuring units. Errors due to measurement. Graphic representations.	2 hours	Exposing Conversation Description Experiment	
Determination of gravitational acceleration using a physical pendulum	2 hours		
Determination of the elastic constant of a spring	2 hours		
Determination of the Young modulus	2 hours		
Experimental study of transverse and longitudinal standing waves	2 hours		

Determination of the molar heat ratio of gases	2 hours		
Colloquium examination from laboratory works	2 hours		
Bibliography 1. I. Cosma, T. Ristoiu, Fizica aplicata: probleme rezolvate, UT. PRESS, Cluj-Napoca, ISBN 973-662-156-1, (2005). <u>R. Fechete</u> , R. Chelcea, D. Moldovan, S. Nicoara, I. Coroiu, C. Badea, E. Culea, I. Cosma, N. Serban, Fizica: Indrumator de laborator, UT. PRESS, Cluj-Napoca, ISBN 978-973-662-952-5, (2014).			

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

The Physics course aim to give to students the basics knowledge and abilities to interact with a technical environment (measurement technique, measurement units, physical law – mechanics, waves, thermodynamics – to realize an interface between environment properties and computer, to register an electric signal from a sensor, to understand the meaning of the signal (physical property) and to act accordingly).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The exam assumes a test of 1 hour (part 1) and 1 hour (part 2) from theoretical subjects	Written test	70 – 90 %
10.5 Seminars /Laboratory/Project	Students have the possibility to submit a scientific essay, a PowerPoint presentation or to build a practical project (usually based on sensors connected to an Arduino microcontroller, and the data can be processed using various software)	Written report or practical project with microcontrollers and various sensors, actuators. Oral PowerPoint presentation Frontal presentation	10 – 30 %
10.6 Minimum standard of performance			
Students must obtain a minimum of 2.75 points for the written test and to accumulate 1.75 points (total 4.5) for the practical applications.			

Date of filling in:		Title Surname Name	Signature
20.06.2023	Lecturer	Prof.dr.Fechete Radu	
	Teachers in charge of application	Lecturer dr. Ramona Chelcea	

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

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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	3

2. Data about the subject

2.1	Subject name	Chemistry						
2.2	Course responsible/lecturer	Associate professor habil. Chem. Rada Simona simona.rada@phys.utcluj.ro; radasimona@yahoo.com						
2.3	Teachers in charge of laboratory	Associate professor habil. Chem. Rada Simona simona.rada@phys.utcluj.ro; radasimona@yahoo.com						
2.4	Year of study	I	2.5	Semester	I	2.6	Assessment	E - exam
2.7.	Subject category	Formative category						DF
		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														15	
(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														5	
(e) Exams and tests														4	
(f) Other activities														0	
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	General knowledge of chemistry in high school
4.2	Competence	Arithmetics, Algebra, Mathematical analysis; Physics.

5. Requirements (where appropriate)

5.1	For the course	No. 103-105, Street B-dul Muncii, Hall M306, Cluj-Napoca
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5.2	For the laboratory applications	No. 103-105, Street B-dul Muncii, Hall C411, Cluj-Napoca
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6. Specific competences

Professional competences	<ol style="list-style-type: none"> To define the main aspects regarding the characterization of the chemical systems, of the periodic table of the elements, of the atom, of the aggregation states, of the models of chemical bonds. To describe the materials of interest in the industrial field, materials processing and environmental protection: metals, non-metals and alloys, amorphous materials, ceramics and semiconductors; To evaluate the structure-properties interrelationship in view of some applications in the fields of materials science and engineering. To describe the phenomena of electrolysis, galvanization, cathodic deposits, corrosion and anticorrosion protection; This syllabus aims to: <ul style="list-style-type: none"> - understand basic chemical concepts in sufficient depth to provide an adequate foundation for materials science specialisation; - use and understand methods of science, laboratory apparatus and measuring instruments; - interpret the experimental data, observations/investigations, graphical representations; - write the equation of chemical reactions; - see the relevance of Chemistry to everyday life.
Cross competences	<ul style="list-style-type: none"> - The ability to identify the objectives to be achieved, the available resources, the conditions for their completion, the working stages, the working times, the related deadlines and the related risks; - The use facts, concepts, principles and procedures in unfamiliar situations; transform data accurately and appropriately and to identify roles and responsibilities in a multidisciplinary team; - To develop the ability to work independently and collaboratively with others when necessary.

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

7.1	General objective	<p>The acquiring of general knowledge in the field of general chemistry necessary to support vocational training.</p> <p>Upon successful completion of this course, students will be able:</p> <ul style="list-style-type: none"> - to classify basic forms of matter; - to perform mathematical unit conversions; - to describe atomic structure and how it affects the structure of the Periodic Table of Elements, apply basic concepts of chemical bonding and predict simple molecular formulas, and write and analyze chemical formulas; - to know the interest materials in the electro techniques, electronics, communications, automation and computers: metals and alloys, plastics and semiconductors;
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		<ul style="list-style-type: none"> - to monitor the automated methods for the implementation of fixing the coefficients of chemical reactions; - to predict, depict and describe: gas behavior, basic properties of chemical bonding, molecular geometry and theory of bonding, liquids and intermolecular forces; - to deepen the phenomena of electrolysis, electroplating, cathodic deposition, the phenomena of corrosion and corrosion protection.
7.2	Specific objectives	<p>1. To know and apply the concepts of : atomic structure, properties of elements, metals, non-metals, alloys, chemical bonds, states of aggregation, gas laws, solutions chemistry including acid-base equilibrium;</p> <p>2. To make connections between different parts of the syllabus and applied concepts to a wide variety of unfamiliar situations and makes appropriate predictions.</p> <p>After reading discipline students will be able to:</p> <ul style="list-style-type: none"> - analyze the chemical substances in a qualitatively and quantitatively mode; - know how to interpret graphical results obtained as a result of the kinetic study of chemical reactions, of the thermodynamics of a chemical process

8. Contents

8.1.Lecture (syllabus)	Number of hours	Teaching methods	Notes
Fundamental concepts of chemistry: overview; classification of chemistry; historic perspectives; distribution of elements in nature, chemical combinations, amount of substance	2	class	
Atomic Structure: atom, element, isotopes, atomic models – Rutherford, Bohr, Bohr-Sommerfeld, quantum mechanical, Standard Model.	2	discussion conducted by	
Periodic table of elements: history, periods, groups, orbital, electronic configuration (atoms and ions), structure of the atom – position in periodic table interrelationship	2	teacher; Ppt.	
Periodic properties of element: atomic and ionic radius, ionization potential, electron affinity, electronegativity, valence - oxidation number, metallic and non-metallic character, melting and boiling points, heat and electricity conductivity, density, hardness, magnetic susceptibility	4	Presentation; Tutorials; Coaching:	
Chemical Bonds: ionic bond, ionic compound, crystal lattice, covalent bond – single and multiple bond, polar and nonpolar covalent bond, coordinate covalent bond, metallic bonding, crystal structure. Theories of chemical bonding: valence bond theory, molecular orbital theory, ligand field theory,	4	special assistance provided for	

hybridization theory – sp, sp ² , sp ³ , d ³ s, sp ³ d, sp ³ d ² , sp ³ d ³ hibridization. Intermolecular interactions: hydrogen bonding, dipole-dipole bonding, van der Waals forces.		students	
Gaseous state: ideal and real gases, Ideal gas laws; Boyle's, Gay-Lussac's, Charles's, Avogadro's, Dalton's law; Clapeyron-Mendeelev equation of state; Deviations from ideal behaviour of real gases – van der Waals equation. The greenhouse effect and acid rain.	2	having	
Liquid state: solution, gaseous mixtures, liquid solution, solid solutions, solubility, saturated and supersaturated solutions, miscibility, concentration, percentage concentration, molar concentration, molality, equivalents, titre, mole fraction, mole, volume and weight percentage, activities.	2	difficulty in the course.	
Chemical equilibrium: reversible and irreversible reaction, law of mass action, , homogeneous equilibrium: K _p , K _x , K _c interrelationship, pH, pOH, multiple equilibria, Le Chatelier's principle – effect of temperature, pressure and concentration, applications, heterogeneous equilibrium.	2	Exposure,	
Electrochemistry: electrolytic dissociation, electrodes, standard hydrogen electrode, electromotive force, Nersnt equation, electrode potential, electrochemical cells, Volta and Daniel cells, primary battery (Leclanche), secondary battery (lead acid battery), fuell cell using H ₂ and O ₂ , corrosion, electrolysis, electrolytic cells, Faraday's law of electrolysis, products of electrolysis, applications: extraction of metals and nonmetalls, rafining of metals, production of chemicals, electroplating, cathodic protection.	4	Conversation,	
Fundamentals of thermodynamics: thermodynamic system, heat, enthalpy, internal energy, exothermic and endothermic reaction, the zero, the first , the second and third law of thermodynamics, entropy, free energy, Gibbs enthalpy. Thermochemistry: heat of reaction, enthalpy of formation, Lavoisier-Laplace's and Hess's law, applications.	2	Problematizati	
Chemical kinetics and reaction mechanisms: reaction rates, rate law, reaction intermediates, catalyst, rate law and reaction orders, rate determing steps, the half-life, activation energy, Arrhenius equation, reaction mechanism: mechanisms and elementary process; zero, first, second, third order reactions; complex mechanisms (successive, simultaneous, opposite, with pre-equilibrium), homogeneous and heterogeneous catalysts, enzymes.	2	on,	
Bibliography		Algorithmizatio	
1. P. Atkins, T. Overton, J. Rourke, M. Weller, F. Armstrong, M. Hagerman, <i>Shriver & Atkins' Inorganic Chemistry</i> (5 th edition), 2010, Published in Great Britain by Oxford University Press, New York.		n,	
		Modeling	

2. V. S. Bagotsky, Fundamentals of electrochemistry (second edition), 2006, Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
3. M. Ungureșan, D. M. Gligor, General Chemistry, Ed. UTPRESS, Cluj-Napoca, 2012, pg. 490.
4. M. Ungureșan, L. Jantschi, Thermodynamics and Chemical Kinetics, Ed. Mediamira, Cluj-Napoca, 2005.

8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Presentation of work. Safety norms. Analytical balance. Chemical laboratory utensils, glassware and laboratory equipment	2	Using techniques, apparatus and materials; Observing, measuring and recording; Handling experimental observations and data; Planning and evaluating investigations.	Mathematical modeling and numerical simulations, experimental apparatus.
2. Study of the diffusion in gaseous state and molecular speeds	2		
3. Solution concentration. Acid-base and redox titration.	2		
4. Obtaining of the oxygen: study of the gases laws	2		
5. Determination of chemical formula of the crystalohydrates	2		
6. Hydrolysis of the salts	2		
7. Heat of formation of the magnesium oxide	2		
8. Redox reaction	2		
9. Metal corrosion	2		
10. Nickel corrosion protective electroplating	2		
11. Activity series of the metals. The thermite process	2		
12. Producing electricity from electrochemical cells	2		
13. Chemical kinetics	2		
14. Water analysis	2		
Bibliography			
1. L. Jantschi, S. Bolboaca, General chemistry laboratory activities, Academic Direct, Cluj-Napoca 2015.			
2. A. Mesaroș, L. Bolunduț, M. Ungureșan, General Chemistry Experiments, Ed. Galaxia Gutenberg, Colecția Tehne 5, ISBN: 978-973-141-228-3, 2010, pg. 197.			
3. L. Bolunduț, A. Mesaroș, M. Ungureșan, Electrochemistry Experiments, Ed. Galaxia Gutenberg, Colecția Tehne 1, 2009, pg. 110.			
4. M. Ungureșan, E. M. Pică, H. Nașcu, L. Marta, Chemistry exercises, Ed. Mediamira, Cluj-Napoca, 1999.			
5. H. W. Roesky, K. Mockel, Chemical curiosities: spectacular experiments and inspired quotes, VCH Publishers, New York, 1996.			

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

Collaborations with: National Institute of Research and Development for Isotopic and Molecular Technologies (INCDTIM) Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, Babes - Bolyai University, Cluj-Napoca.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Written Examination	Multiple choice evaluation	80%
10.5 Laboratory	Laboratory test	The written test	20%
10.6 Minimum standard of performance			

Date of filling in:		Title Surname Name	Signature
19.05.2023	Lecturer	Associate Prof. habil. dr. chem. Rada Simona	
	Teachers in charge of application	Associate Prof. habil. dr. chem. Rada 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

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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	4

2. Data about the subject

2.1	Subject name	Descriptive Geometry		
2.2	Course responsible/lecturer	Lecturer PhD. Eng. Scurtu Iacob-Liviu,		
2.3	Teachers in charge of seminars	Lecturer PhD. Eng. Scurtu Iacob-Liviu,		
2.4	Year of study	2.5 Semester	2.6 Assessment	E
2.7	Subject category	Formative category		DF
		Optionality		DOB

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											18
(b) Supplementary study in the library, online and in the field											16
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays											16
(d) Tutoring											4
(e) Exams and tests											4
(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	

5. Requirements (where appropriate)

5.1	For the course	Recommended presence
5.2	For the applications (laboratory)	Mandatory presence

6. Specific competences

Professional competences	<p>At the end of the courses and laboratories students must know:</p> <ul style="list-style-type: none"> • use of specific, standardized methods, in orthogonal representation of bodies, parts and to identify the geometric elements; • choosing on the basis of a thorough analysis of the initial data of an imposed theme, the most appropriate graphic methods for the required representations, respecting the national and international standards related to the technical drawing; • understanding the modality of representation, based on the representation in double orthogonal projection, of the pieces; • interpreting, drawing execution and analysing of the mechanical parts in correlations to the standardized representation norms.
Cross competences	<ul style="list-style-type: none"> • synthesis of the basic notions used in the technical drawing in order to have a correct, engineering vision regarding the view in space and the sense of proportion in the case of some mechanical parts and subassemblies • logical reasoning when choosing and solving a given technical application

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

7.1	General objective	Knowledge and deepening of the methods of plan representation of the bodies in space, by going through the stages of presentation of the standardized projection systems.
7.2	Specific objectives	Acquiring by the students of the ability to graphically represent, easily, through projections, some bodies and surfaces, as parts of the configuration of mechanical parts.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. The object of the discipline. Projection systems. Plan representation of points in space. Particular positions	2	Online presentation, discussions, technical drawings made during the course in dedicated applications	
2. The study of the line in the orthogonal representation. Particular lines	2		
3. Representation of the plan. Particular plans.	2		
4. Polyhedral surfaces. Orthogonal representation. Intersection with straight lines and planes. Developed method	2		
5. Cylindrical and conical surfaces. Orthogonal representation	2		
6. Intersection with straight lines and planes. Developed method			
7. Orthogonal projections in industrial design. Representation of drawing views. Descriptive study of a part (faces and edges)	2		

8. General principles of views representation in industrial technical drawing	2		
9. General principles of sections representation in industrial technical drawing.	2		
10. Determining the views and sections of the parts	2		
11. Dimensioning the mechanical parts and assembly	2		
12. Representation and dimensioning of threads and flanges	2		
13. Representation of removable threaded assemblies	2		
14. Applied studies for threaded assemblies. Representation in axonometry. Sectioning and dimensioning in axonometry	2		

Bibliography

1. Sanda Bodea, Iacob-Liviu Scurtu: Geometrie descriptivă și desen tehnic, Editura Risoprint, ISBN: 978-973-53-1902-1, Cluj Napoca, 2016
2. Crișan, N.-I., Bodea S., Scurtu Iacob-Liviu, "Desen tehnic pentru asamblări în proiectare", Editura Risoprint, ISBN 978-973-53-0920-6, Cluj-Napoca, 2012.
3. Crișan, N.-I., - „Geometrie Descriptivă” – corpuri cu suprafețe de rotație neriglitate și elicoidale, Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2005, ISBN: 973-751-076-3.
4. Bodea, S., Crișan, N.-I., Enache, I. – „Geometrie descriptivă” – curs pentru învățământul universitar tehnic, Editura RISOPRINT, Cluj-Napoca, 2003, ISBN: 973-656-353-7.
5. Crișan, N.-I., – „Noțiuni fundamentale în Desenul Tehnic Industrial” – Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-114-3.
6. Crișan, N.-I., – „Aplicații ale Geometriei Descriptive” – Lucrare pentru învățământul universitar tehnic în prezentare bilingvă româno - franceză, Editura RISOPRINT, Cluj-Napoca, 2006, ISBN: 978 - 973-751-351-9.
7. Crișan, N.-I., Enache, I., Budisan, T., – „Elemente de bază în Desenul Tehnic Industrial” – Îndrumător pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-110-0.

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8.2. Laboratory	Number of hours	Teaching methods	Notes
General standards. Formats, lines, scales, indicator. Geometric constructions	2	Onside	
Points in tridimensionality space, particular positions	2		
The study of lines. The relative position of two lines. Visibility	2		
Elements contained in the plan. Particular plans	2		
Study of polyhedral body. Plane sections and developments.	2		
Polyhedral body- Practical applications of developed body	2		
Control work I (from courses 1 ÷ 6 and from laboratories 1 ÷ 6)	2		
Orthogonal projections in the technical drawing	2		
Orthogonal projections – three projections	2		

Sketching parts complexity, I (without thread)	2		
Section types: Applications for parts with different configurations. Dimensioning of parts	2		
Sketching and dimensioning part with thread and flange	2		
Scale drawing after the axonometric representation of the threaded part	2		
Representation of threaded parts and assemblies. Final of works laboratory.	2		

Bibliography


1. Sanda Bodea, Iacob-Liviu Scurtu: Geometrie descriptivă și desen tehnic, Editura Risoprint, ISBN: 978-973-53-1902-1, Cluj Napoca, 2016
2. Crișan, N.-I., Bodea S., Scurtu Iacob-Liviu, "Desen tehnic pentru asamblări în proiectare", Editura Risoprint, ISBN 978-973-53-0920-6, Cluj-Napoca, 2012.
3. Crișan, N.-I., - „Geometrie Descriptivă” – corpuri cu suprafețe de rotație neriglitate și elicoidale, Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2005, ISBN: 973-751-076-3.
4. Bodea, S., Crișan, N.-I., Enache, I. – „Geometrie descriptivă” – curs pentru învățământul universitar tehnic, Editura RISOPRINT, Cluj-Napoca, 2003, ISBN: 973-656-353-7.
4. Crișan, N.-I., – „Noțiuni fundamentale în Desenul Tehnic Industrial” – Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-114-3.
5. Crișan, N.-I., – „Aplicații ale Geometriei Descriptive” – Lucrare pentru învățământul universitar tehnic în prezentare bilingvă româno - franceză, Editura RISOPRINT, Cluj-Napoca, 2006, ISBN: 978 - 973-751-351-9.
6. Crișan, N.-I., Enache, I., Budisan, T., – „Elemente de bază în Desenul Tehnic Industrial” – Îndrumător pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-110-0.
7. www.gdgi.utcluj.ro

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

The content of the discipline is correlated with the requirements of the specialized disciplines from the higher years of study and responds to the current requirements in the technical field.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The exam consists of two control papers	Notes for two written tests (one test in week 7 and one test in session)	80%
10.5 Laboratory	Homework with solved applications is corrected and graded if they are finished on time.	Application evaluations (note)	20%
10.6 Minimum standard of performance			
Minimum requirements: The grade from the course and the applications must be at least 5 in order to be able to make the final average			

Date of filling in:		Title Surname Name	Signature
15.05.2023	Lecturer	Lecturer Phd. Eng. Iacob-Liviu SCURTU	
	Teachers in charge of application	Lecturer Phd. Eng. Iacob-Liviu SCURTU	

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	5.00

2. Data about the subject

2.1	Subject name	Programming		
2.2	Course responsible/lecturer	Lecturer dr.eng. Monica Sas-Boca- Monica.Sas.Boca@ipm.utcluj.ro		
2.3	Teachers in charge of seminars	Lecturer dr.eng. Monica Sas-Boca- Monica.Sas.Boca@ipm.utcluj.ro		
2.4	Year of study	I	2.5 Semester	1
	2.6 Assessment	V		
2.7	Subject category	Formative category		DF
	category	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										20
	(b) Supplementary study in the library, online and in the field										19
	(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										14
	(d) Tutoring										2
	(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	Knowledge of WORD software application.

5. Requirements (where appropriate)

5.1	For the course	Projector, computer, on site/on-line at Technical University of Cluj-
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		Napoca
5.2	For the applications seminarului / laboratorului / proiectului	Technical University of Cluj-Napoca laboratories (G103) Laboratory with computers, smart board. C language programming environment. Mandatory attendance.

6. Specific competences

Professional competences	<p>C1. Identification, definition, use of notions in fundamental sciences specific to the field of engineering.</p> <p>C1.1 Expression through written and oral communication in technical language of the theoretical foundations in the field of engineering.</p> <p>C1.2 Formulation of hypotheses and operationalization of key concepts for explaining and interpreting processes in the field of mechanical engineering.</p> <p>ABILITIES</p> <p>C1.3 Selection of research-design principles, methods and procedures in order to solve problems specific to the engineering field.</p> <p>C1.4 Comparative analysis of data and their evaluation based on the theories and methods used in the applied research of mechanical systems, in a well-defined context.</p> <p>C1.5 Development of projects, models and prototypes of mechanical structures and systems, using established principles and methods in the field of engineering.</p> <p>Identifying and expressing the principles of operation of a mechanical system using the technical language and the physical-mathematical and informative apparatus specific to the engineering field.</p> <p>After completing the discipline, students will be able to: identify the component parts of a computer and specify what their important characteristics are, as well as how they interact; will know the EXCEL and POWER POINT software, will know elements of the MathCAD software; will be able to make logical schemes; will be able to solve simple engineering problems; they will be able to solve various examples of computation with the help of these software, adapting the information acquired in the discipline "Computer programming and programming languages" to the concrete situation in the laboratory.</p>
Cross competences	<p>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</p> <p>Carrying out activities and exercising the specific roles of teamwork, on different hierarchical levels and the entire technological flow of processing</p> <p>Promoting the spirit of initiative, dialogue, cooperation, positive attitude, respect for others, diversity and multiculturalism and the continuous improvement of one's professional activity</p> <p>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</p> <p>Effective use of multilingual skills and knowledge of information technology.</p>

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

7.1	General objective	Development of skills in the field of applied informatics in
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		support of the assimilation of knowledge and professional training using application software as well as the C programming language.
7.2	Specific objectives	<ol style="list-style-type: none"> 1. Acquiring some knowledge of "Programming", of the stages of building the mentioned software files. 2. Applying this knowledge in the objective reality of the laboratory / project / experiment 3. Understanding the small sample problems exposed in natural language and the development of solutions in the form computer programs; 4. Understanding the source code written by other programmers and the ability to analyze it.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction. Brief history of computer construction. Hardware and software components. Central unit. Input / output devices. Network topology. Operating systems	2	Lecture, heuristic conversation, interactive discussions, course presentations using the Power Point applicatio	On-site/on-line
2. WORD - WORD software commands. Create, save, or edit a WORD file. Context menu. Formatting pages, paragraphs and characters. Printing WORD files. Editing equations. Inserting objects. Creating tables. Drawing. EXCEL - Launch. The appearance of the home screen. Software-specific menus and tools. General information about performing mathematical calculation in tabular format.	2		
3. EXCEL - The appearance of the context menu for the selected cells. Making a mathematical series. Editing calculation formulas. Making diagrams. Formatting diagrams. POWER POINT - Launch in execution. The appearance of the home screen. Software-specific menus and tools. Animating the appearance of information. Slide transition.	2		
4. MATHCAD - The appearance of the home screen. Software overview. MathCAD software menus and tools. MathCAD identifiers. MathCAD operators. Writing an expression in MathCAD. Context menu of a region in MatCAD.	2		
5. MATHCAD - Functions in MathCAD. Use of units of measurement. Making a graphic representation. MathCAD error messages. Final example of a problem solved in MathCAD.	2		
6. Logical algorithms and schemes. Definition, properties and description of algorithms. Stages of solving problems.	2		

7. Programming languages. C language - features. The structure of the first program. From source code to executable. Data types. Constant variable. Input / output functions	2		
Bibliography			
1. M. Sas-Boca - Utilizarea aplicațiilor informatice în inginerie. Teorie și aplicații, Ed. Napoca Star, Cluj-Napoca, 2016, ISBN 978-606-690-374-5.			
2. M. Tintelecan– Elemente de Informatică Aplicată, Ed UTPress, Cluj-Napoca 2012.			
3. Pîslă L.D. – Utilizarea calculatoarelor compatibile IBM-PC, Casa Cărții de Știință, Cluj Napoca, 2003.			
4. Săbăduș D. și Pop M. – Utilizarea și programarea calculatoarelor, Editura UTPRES, Cluj Napoca, 2000.			
5. Rick Winter, Patty Witer and col. - Utilizare Microsoft Office pentru Windows - 2nd Edition, febr. 1999			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. General. Computer structure. Hard and soft elements. File management. WORD. Dialog boxes. Writing in Word. Creating and editing tables. Calculation in the table. Inserting images / documents / files. The main drawing of some graphics. Realization and insertion of equations.	2	The equipment is described, the technician exemplifies the way of working.	Students perform the measurements, write down the data, perform individually different operations specific to the related works and determine by calculation the results obtained.
2. EXCEL. Familiarity with interface, spreadsheet, worksheet. Enter text and numeric data in the spreadsheet, join / divide cells. Create series (numeric, data, text). Change spreadsheet layout. Entering formulas in MS Excel. Saving the calculation register.	2		
3. EXCEL. Moving in and between spreadsheets, inserting, arranging, moving, renaming, listing and deleting a spreadsheet and / or a spreadsheet. Changing the appearance of data in a calculation register. Sorting and filtering (advanced and automatic) data in MS Excel spreadsheets. Conditional formatting and imposing formatting conditions for data entered in a calculation register. Freezing rows and columns; Listing row or column labels; use of logical operators, concatenation operation.	2		
4. EXCEL. Subtotalization and subtotal operations. Relative, mixed and absolute addresses. Making diagrams. Formatting, manipulation and modification of diagrams. Insert graphic objects.	2		
5. MathCAD. Launch, save and leave the application. Menu, toolbars, commands, and MathCad worksheet. Variables in MathCad			
6. MathCAD. Numerical and symbolic calculation in MathCad. Functions in MathCad, Units of measure, equations in MathCad			
7. MathCAD. Graphical representation of mathematical functions (Cartesian, polar coordinates).			
8. MathCAD. Three-dimensional graphic representation.			
9. Partial examination			
10. Logic schemes.			

11. Programming languages. Stages of solving problems. Definition, properties and description of algorithms. C language - features. The structure of the first program. From source code to executable. Data types. Constant variable. Input / output functions			
12. Programming style. Operators and expressions. Precedence and associativity of operators. Default conversions			
13. Simple and structured C / C ++ expressions and instructions: expression statement, blank statement, compound statement, if statement, switch statement, and repetitive statements.	2		
14. Verification of knowledge by final testing.	2		
Bibliography			
1. M. Sas-Boca - Utilizarea aplicațiilor informatice în inginerie. Teorie și aplicații, Ed. Napoca Star, Cluj-Napoca, 2016, ISBN 978-606-690-374-5.			
2. L. C. Vaida, D. Pâslă – Utilizarea și programarea calculatoarelor - aplicații vol I, Ed. Mediamira, 2009,			
3. I. Ignat. - Programarea calculatoarelor. Îndrumător de lucrări de laborator. Ed. U.T.Pres, Cluj - Napoca, 2003, ISBN 973-662-024-7.			
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5. M. Arghir, O.A. Deteșan, A. Șoancă - Limbajul C – îndrumător de lucrări, Ed Quo Vadis, Cluj-Napoca 2001			
6. Aplicații C++ la adresa http://users.utcluj.ro/~somodi/lab/files/indr_lab_PC_edituraUTPres.doc			

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 within 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	Short test to assess the degree of assimilation of knowledge and skills to solve theoretical problems and program writing.	10 min. at the end of the course	20%
	Partial examination.		30%
	Verification		40%
10.5 Seminars /Laboratory/Project	Laboratory (note L); Homeworks	Evaluation of laboratory works and homeworks	10 %

10.6 Minimum standard of performance Minimum 50% of total activities.

Date of filling in:		Title Surname Name	Signature
10.12.2023	Lecturer	Lecturer dr.eng. Ioana Monica Sas-Boca	
	Teachers in charge of application	Lecturer dr.eng. Ioana 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	6.00

2. Data about the subject

2.1	Subject name	Materials Science and Engineering I					
2.2	Course responsible/lecturer	Lect. dr.ing. Sechel Argentina-Niculina - Niculina.Sechel@stm.utcluj.ro					
2.3	Teachers in charge of seminars	Lect. dr.ing. Sechel Argentina-Niculina - Niculina.Sechel@stm.utcluj.ro					
2.4	Year of study	1	2.5 Semester	1	2.6 Assessment	Exam	
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										25
	(b) Supplementary study in the library, online and in the field										5
	(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)))										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	
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5.2	For the applications seminarului / laboratorului / proiectului	Attendance at the laboratory is mandatory according to UTCN regulations
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6. Specific competences

Professional Competences	<p>Use of acquired knowledge to explain and interpret the interdependence of composition - structure - properties</p> <p>Knowledge of the difference between structural constituents of materials</p> <p>Knowledge of the mechanisms of formation and modification of the structure of a metallic material when applying classical processing technologies.</p> <p>Understanding and interpreting of binary equilibrium diagrams</p> <p>Knowledge of the properties and rules to symbolization of the usual non-alloyed steels.</p> <p>After completing the discipline students will be able to: - to identify on the basis of the equilibrium diagrams, for a certain composition the structural constituents and the phases and to calculate the quantity of both, structural constituents and phases; - to appreciate the properties of a material through quantitative laboratory evaluations; - to identify the typical metallographic constituents of the Fe-Fe₃C system; - to prepare the metallographic samples; - to use metallographic microscopes.</p>
Cross competences	<p>To promote efficiency and accountability in the activities carried out</p> <p>To promote the teamworking in practical laboratory activities</p>

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

7.1	General objective	Development of skills in the field of materials (interrelation between composition-structure-properties) in support of vocational training
7.2	Specific objectives	Assimilation of theoretical knowledge on: - the main classes of engineering materials - structure of materials - mechanisms for forming and modifying the structure of an alloy by interpreting equilibrium diagrams. Obtaining skills for the preparation of metallographic samples and performing analyzes by optical microscopy.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction to Materials Science and Engineering. Correlation composition - structure - processing - properties - uses. Materials for technical use: metals, ceramics, polymers, composites - general presentation.	2		

2. Basic properties of materials (mechanical, physical, chemical and technological).	2	Power Point Presentation Interactive teaching mode university lecture		
3. Notions about atomic structure, interatomic bonds.	2			
4. Materials structure. Crystalline and amorphous structure.	2			
5. Imperfections of the crystalline structure. Introductory notions of the dislocation theory.	2			
6. Diffusion. Diffusion mechanisms. The laws of diffusion. Influencing factors on diffusion.	2			
7. Metals crystallization process. Allotropy (polymorphism) of metals.	2			
8. Plastic deformation of metals - general principles. Work hardening. Recrystallization. Fracture	2			
9. General notions about alloys. Phases and structural constituents (metallographic). Alloy phase diagrams.	2			
10. Phase diagrams of binary alloy systems without solid state transformations.	2			Teacher-student dialogue
11. Phase diagrams of binary alloy systems with solid state transformations.	2			
12. Relationship between phase diagrams and properties. Ternary phase diagrams.	2			
13. Ferrous alloys. Fe - Fe ₃ C metastable phase diagram.	2			
14. Non-alloyed steels. The influence of carbon content on properties. Residual elements in steels. Classification and symbolization of carbon steels.	2			
Bibliography				
1. H. Colan, ș.a., Știință și Ingineria Materialelor, Vol. 1, Ed. UT Press, Cluj-Napoca, 2013				
2. V. Căndea, C. Popa, Inițiere în Știința Metalelor, Ed. Vega, București, 1995				
3. H. Colan, ș.a., Studiul Metalelor, București, EDP, București, 1983				
4. V. Căndea, C. Popa, N. Sechel, V. Buharu, Clasificarea și simbolizarea aliajelor feroase și neferoase, Ed. UT Press, Cluj-Napoca, 2010				
5. V.A. Șerban, A. Răduță, Știința și Ingineria Materialelor, Ed. Politehnica, Timișoara, 2006				
6. M. Rădulescu, Studiul Metalelor, EDP, București, 1982				
7. R. C. Ivănuș, Știința materialelor, Ed. Universitaria, Craiova, 2008.				
8. T. Dobra, D. Bota, L. Sorcoi, Știința Materialelor – Teste și aplicații, Ed. UT Press, Cluj-Napoca, 2004.				
9. D. Constantinescu, ș.a., Știința Metalelor, EDP, București, 1983				
10. W. D. Callister, David G. Rethwisch, Materials Science and Engineering on Introduction, J.Wiley & Sons, 2009				
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes	
1. Presentation of the laboratory works, of the way of development and of the norms of labor protection. Materials - properties, evolution, diversification.	2	Exposure and application	Metallographic microscopes	

2. Introduction in methods for investigating the structure of materials.	2	s	Metallographic sample grinding / polishing machine, Computer, Video projection system, drawings
3. Macroscopic study of metals (part I).	2		
4. Macroscopic study of metals (part II).	2		
5. Investigation of the structure by optical microscopy. Optical principles, operation and use of metallographic microscopes.	2		
6. Preparation of metallographic samples.	2		
7. Notations and calculations in crystalline systems.	2		
8. Applications of X-ray diffraction in the study of metals.	2		
9. Quantitative metallographic determinations.	2		
10. Crystallizations in binary alloys systems without solid state phase transformations.	2		
11. Crystallizations in binary alloys systems with solid state phase transformations.	2		
12. Crystallizations in the Fe - Fe ₃ C system.	2		
13. Study of the microstructure of alloys from Fe - Fe ₃ C system.	2		
14. Analysis of non-metallic inclusions in steels by microscopic methods.	2		
Bibliography			
1. V. Căndea, C. Popa, T. Marcu, Atlas - structuri metalografice, Ed. UT Press, Cluj-Napoca, 2012			
2. H. Colan, ș.a., Studiul metalelor – Îndrumător pentru lucrări de laborator, Lit. IPC-N, 1988.			
3. H. Colan, ș.a., Știință și Ingineria Materialelor, Vol. 1, Ed. UT Press, Cluj-Napoca, 2013			
4. M. Rădulescu, Studiul Metalelor, București, EDP, 1982.			

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 necessary for the future engineers who carry out their activity within departments of elaboration, testing or certification of the quality of a material through structure.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Assessment of the knowledge taught, by solving tests that consist of topics / questions from the theoretical part and problems	Written test - duration of assessment 1.5 hours	75 %
10.5 Seminars /Laboratory/Project	Students will be evaluated at each laboratory session (lab. 3-lab.14) taking into	- continuous evaluation	25 %

	account the degree of involvement, how to prepare, process and interpret the information on the topic. The final grade in the laboratory (L) represents the arithmetic mean of the grades from each session		
10.6 Minimum standard of performance			
Examination grade (E) \geq 5; Laboratory grade (L) \geq 5, (Final grade = 0.75E + 0.25L)			

Date of filling in:		Title Surname Name	Signature
25.05.2023	Lecturer	Lect. dr.ing. Argentina-Niculina Sechel	
	Teachers in charge of application	Lect. dr.ing. Argentina-Niculina Sechel	

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	7,00

2. Data about the subject

2.1	Subject name	Communication					
2.2	Course responsible/lecturer	Ph.D. Mihai Octavian Naghiu					
2.3	Teachers in charge of seminars	Ph.D. Mihai Octavian Naghiu					
2.4	Year of study	I	2.5 Semester	I	2.6 Assessment	Colloquy	
2.7	Subject category	Formative category					DC
		Optionality					DI

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		3.3 Project	
3.4	Total hours in the curriculum	50	of which	3.5 Course	14	3.6 Seminar	14	3.6 Laboratory		3.6 Project	22
3.7 Individual study:											
(a) Manual, lecture material and notes, bibliography										5	
(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										5	
(e) Exams and tests										2	
(f) Other activities											
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	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	

6. Specific competences

Professional competences	<p>Developing the ability to choose ways and means of communication appropriate to the context.</p> <p>Valuing the individual and group particularities of the interlocutors in order to achieve an efficient communication.</p> <p>Forming the ability to identify and eliminate sources of blocking and / or distorting the message in the communication process.</p> <p>Developing the ability to build and apply conflict prevention strategies.</p>
Cross competences	<p>Practicing continuous self-education skills and demonstrating critical, innovative and research skills.</p> <p>Demonstration of knowledge of the economic, ethical, legal and social context of exercising the profession for identifying tasks, planning activities and opting for responsible decisions, with completion in the design, drafting and presentation of a scientific paper.</p>

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

7.1	General objective	<p>Knowledge, understanding and appropriate use of the fundamental concepts of communication in order to increase efficiency at personal and organizational level.</p>
7.2	Specific objectives	<p>To identify the complex structure of the communication act with the highlighting of all the determining factors for its mechanism.</p> <p>To recognize the types of communication and to distinguish the different functions of communication.</p> <p>To integrate the types of communication to the specifics of their own activity.</p> <p>Developing the ability to apply different communication strategies and methods in various contexts.</p>

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
General considerations regarding the main communication techniques.	2	Intensified lecture Explication Conversation	
Conceptual delimitations. Classification and analysis of communication styles.	2		
Why do we communicate? Study of the communication-behavior nexus.	2		
Analysis of the main factors that influence behavior and communication.	2		
Analysis of the implications of communication and ethics in management. The importance and structure of the code of ethics in an organization.	2		

Study on the implications of communication and ethics in marketing. The role of communication in order to achieve success through an effective marketing strategy.	2		
Analysis of communication techniques used by major brands worldwide.	2		

Bibliography

- Pease Allan and Barbara, *The Definitive Book of Body Language*, 2017, Orion Paperbacks
- Carter Philip, *Assess your emotional intelligence*, 2009, Kogan Page London and Philadelphia
- Navarro Joe, *What every body is saying*, 2008, William Morrow & Company
- James Judi, *The Body Language Bible*, 2008, Ebury Press
- Richard Dawkins *The Magic of Reality: How We Know What's Really True*, 2012, Free Press
- Derek Parfit: *Reasons and Persons*, 1986, Oxford University Press, USA
- Peter Singer: *Practical Ethics*, 2012, Cambridge University Press
- Karl Popper, *Realism and the Aim of Science*, 1992, Routledge.
- Karl Popper, *The Logic of Scientific Discovery*, 2002, Routledge
- Barthes Roland, 1967, *Elements of Semiology* (Annette Laversand Colin Smith, Trans.), New York: Hill and Wang.
- Adamson Allen P., 2009, *Brand Simple*, Ed. Publica
- Alderman, Harold, *Heidegger's Critique of Science and Technology*, in *Heidegger and Modern Philosophy*, Edited by Michael Murray, London Yale University Press, 1978.
- Gates Michelle, 2017, *Grow Your Confidence, Assertiveness & Self-Esteem*, CreateSpace Independent Publishing Platform
- James William, *Pragmatism*, Ed. Bruce Kuklick. Indianapolis: Hackett, 1981
- Levine Madeline, 2008, *The Price of Privilege: How Parental Pressure and Material Advantage Are Creating A Generation of Disconnected and Unhappy Kids*, Ed. Harper Perennial
- Lévinas Emmanuel, *Totality and Infnit*, Pittsburgh: Duquesne University Press, 1969.
- Okrent Mark, *Heidegger's Pragmatism*, Cornell University Press, 1988.
- Paul Aaron, 2019, *Communications Skills Training*, independently published
- Ricoeur Paul, *The Task of Hermeneutics*, in *Heidegger and Modern Philosophy*, edited by Murray Michael, New Haeven and London Yale University Press, 1978.

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Assertiveness in communication. Analysis of communication styles.	2	Case study Problem-solving Brainstorming Critical thinking Debate	
Exemplifying the impact of the fundamental factors: personal, cultural, and social in communication and ethics.	4		
The study of communication techniques between ethics and manipulation in a managerial context.	4		
Analysis of the communication areas and study of the impact of emotional intelligence in communication.	4		
<p>Bibliography</p> <ul style="list-style-type: none"> ➤ Pease Allan and Barbara, <i>The Definitive Book of Body Language</i>, 2017, Orion Paperbacks ➤ Carter Philip, <i>Assess your emotional intelligence</i>, 2009, Kogan Page London and Philadelphia ➤ Navarro Joe, <i>What every body is saying</i>, 2008, William Morrow & Company ➤ James Judi, <i>The Body Language Bible</i>, 2008, Ebury Press ➤ Richard Dawkins <i>The Magic of Reality: How We Know What's Really True</i>, 2012, Free Press ➤ Derek Parfit: <i>Reasons and Persons</i>, 1986, Oxford University Press, USA ➤ Peter Singer: <i>Practical Ethics</i>, 2012, Cambridge University Press ➤ Karl Popper, <i>Realism and the Aim of Science</i>, 1992, Routledge. ➤ Karl Popper, <i>The Logic of Scientific Discovery</i>, 2002, Routledge ➤ Barthes Roland, 1967, <i>Elements of Semiology</i> (Annette Laversand Colin Smith, Trans.), New York: Hill and Wang. ➤ Adamson Allen P., 2009, <i>Brand Simple</i>, Ed. Publica ➤ Alderman, Harold, <i>Heidegger's Critique of Science and Technology</i>, in <i>Heidegger and Modern Philosophy</i>, Edited by Michael Murray, London Yale University Press, 1978. ➤ Gates Michelle, 2017, <i>Grow Your Confidence, Assertiveness & Self-Esteem</i>, CreateSpace Independent Publishing Platform ➤ James William, <i>Pragmatism</i>, Ed. Bruce Kuklick. Indianapolis: Hackett, 1981 ➤ Levine Madeline, 2008, <i>The Price of Privilege: How Parental Pressure and Material Advantage Are Creating A Generation of Disconnected and Unhappy Kids</i>, Ed. Harper Perennial ➤ Lévinas Emmanuel, <i>Totality and Infnit</i>, Pittsburgh: Duquesne University Press, 1969. ➤ Okrent Mark, <i>Heidegger's Pragmatism</i>, Cornell University Press, 1988. ➤ Paul Aaron, 2019, <i>Communications Skills Training</i>, independently published ➤ Ricoeur Paul, <i>The Task of Hermeneutics</i>, in <i>Heidegger and Modern Philosophy</i>, edited by Murray Michael, New Haeven and London Yale University Press, 1978. 			

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

Knowledge, use of and continuously improve communication skills are a must and represents an essential factor in professional development. The discipline offers students the opportunity to access a higher level in terms of communication management, which becomes a competitive advantage. At the same time, understanding and applying ethical principles is an imperative for ensuring moral integrity both individually and collectively.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Originality of thematic approaches. The quality of the presentation according to the academic demands.	Colloquy	80%
10.5 Seminars /Laboratory/Project	Appreciation of the quality results from the activities during the seminar classes.	Colloquy	20%
10.6 Minimum standard of performance			
Obtaining the minimum grade for passing the assessment.			

Date of filling in:		Title Surname Name	Signature
20.04.2023	Lecturer	Ph.D. Mihai Octavian Naghiu	
	Teachers in charge of application	Ph.D. Mihai Octavian Naghiu	

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	8.00

2. Data about the subject

2.1	Subject name	Physical Education and Sport				
2.2	Course responsible/lecturer	-				
2.3	Teachers in charge of seminars	Lecturer Ph D Mihai Olanescu				
2.4	Year of study	1	2.5 Semester	1	2.6 Assessment	A/R
2.7	Subject category	Formative category				O
		Optionality				DC

3. Estimated total time

3.1	Number of hours per week	1	of which	3.2 Course	-	3.3 Seminar	1	3.3 Laboratory	-	3.3 Project	-
3.4	Total hours in the curriculum	14	of which	3.5 Course	-	3.6 Seminar	14	3.6 Laboratory	-	3.6 Project	-
3.7	Individual study:										
	(a) Manual, lecture material and notes, bibliography										-
	(b) Supplementary study in the library, online and in the field										-
	(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										-
	(d) Tutoring										-
	(e) Exams and tests										10
	(f) Other activities										12
3.8	Total hours of individual study (summ (3.7(a)...3.7(f)))					36/11					
3.9	Total hours per semester (3.4+3.8)					50/25					
3.10	Number of credit points					2/1					

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Physically fit; necessary skills; knowledge, skills and motor skills accumulated in grades I-XII

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	Sport Hall B-dul Muncii no. 103-105; Polytechnic Swimming Pool

Bibliography			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Informing students about the requirements of the discipline. a. Testing the level of physical capacity of students; b. Re-accommodating students with physical effort.			
2. a. Exercises, relays and ball accommodation games. b. Acquiring the technical elements without the ball; c. Accommodating the body with water; d. Learning the correct grip; e. Fundamental positions, positioning and movement in the field, rotation; f. Maximizing the existing biomotor potential.			
3. a. Dribbling - traveling violation; b. Learning to hit the ball with the tip and side of the foot; c. Getting used to the horizontal position in the water; d. Learning the basic position; e. Passing the top ball with two hands; f. Adapting the sports activity for recreational purposes - improving the tone (legs, buttocks, arms, back).			
4. a. The starting and stopping. The pivoting. The shooting from the spot and from dribbling; b. Learning to hit the ball with the risk (inside, full, outside); c. Learning how to breathe in the water; d. Learning specific movements; e. Picking up a thrown ball (type of service); f. Complex exercises to achieve a good balance of oxygen consumption and intake in the body			
5. a. The fundamental position. movements; b. Learning to hit the ball with the knee and heel. c. Learning to float on water; d. Learning the middle game with the forehand. e. Learning the service from the front up (distance 4 - 5 m).			

<p>f. Adapting sports activity for recreational purposes - improving tone (legs, armrests, back).</p>			
<p>6. a. Change of direction with and without the ball; b. Learning to hit the ball with the head; c. Learning to slide in water; d. Learning the simple middle game with the backhand; e. Game without ball with simulation of learned elements; f. Complex exercises, in order to achieve a solid balance regarding the consumption and supply of oxygen in the body.</p>			
<p>7. a. Complex technical structures: dribbling, stopping, pivoting, passing; b. Learning the procedures of leading the ball; c. Learning to float and slide on the back; d. Learning the middle game cut with forehand; e. Taking over from work with two hands up; f. Stretching exercises - active or passive, performed individually or in pairs, performed on the floor or with wall support.</p>			
<p>8. a. 1x1 relationship; b. Learning to take over; c. Learning the movement of the legs at the chest on the chest; d. Learning the middle game, cut with the lapel; e. Organizing the 3 shots, taking over; f. Active or passive stretching exercises, performed individually or in pairs, performed on the floor or with wall support.</p>			
<p>9. a. Jump shooting; b. Learning deceptive movements; c. Learning to move the legs at the same time as breathing; d. Learning the middle game with half-flight with the forehand; e. High lift for attack in zones 3 and 4; f. Yoga exercises, stretching, self-massage.</p>			
<p>10. a. Themed games: improving the passes; b. Learning to put the ball back in play; c. Learning arms movement; d. Learning the middle game of semi-flight with the backhand; e. Attack in the direction of the momentum in zone</p>			

4; f. Rhythmic breathing in parallel with the movements performed			
11. a. 1x1 relationship; b. Learning the dispossession; c. Coordinating the movement of the arms and legs; d. Learning simple service with Forehand; e. 6x6 game with simplified rules; f. Keeping the principle of stretching elongation.			
12. a. Complex technical structures: catching the ball, dribbling, stopping; b. Learning the technical procedures of the goalkeeper; c. Freestyle swimming on the distance 25-50 meters; d. Learning the simple service with the backhand; e. Learning the attack blow from zone 2; f. "Non-stop" work without downtime, with correct breathing to optimize the body's endurance.			
13. a. Dribbling with different procedures: change of direction, pass; b. Learning practical movements on free kicks; c. Learning to start and return to the side; d. Learning to take over the simple service; e. Lift for attack in zones 2 and 3 (high, medium, forward); f. Aerobic steps exercises.			
14. a. Protecting the ball; b. Learning demarcation, penetration, overcoming; c. Learning to move the legs in the style of bras; d. Learning forehand cons in line; e. Taking the ball with two hands; f. Prophylactic exercises to form the correct posture and to combat various vicious attitudes of the spine (kyphosis, scoliosis, lordosis and spondylosis).			
Bibliography 1. Physical Education Course - Lithographed UTC-N 2. General physical development for students - UTC-N 3. Physical culture for youth - UT. PRESS			

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 necessary for the employees who carry out their activity in the field of Materials Engineering.

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	A minimum of 10 attendance at practical courses and passing control tests	Attendance at hours and passing the fitness tests, tracking the progress of each student. Control test. Route utility application in a certain time interval.	100%
	Exempt medical students: minimum 10 participation in classes and presentation of a paper/essay.	Presentation of the paper/essay. The topic for the paper is established together with the teacher from the class.	100%
	ONLINE - Microsoft Teams Platform	Paper/essay with 2 established topics	100%
10.6 Minimum standard of performance			

Date of filling in:		Title Surname Name	Signature
15.04.2023	Lecturer	Lecturer PhD Mihai Olanescu	
	Teachers in charge of application	Lecturer PhD Mihai Olanescu	

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	Modern Languages and Communication
1.4	Field of study Programme of study/specialization	Materials engineering Materials Science
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science/Engineering
1.7	Form of education	Full time
1.8	Subject code	9.10 Modern language I English 9.20 Modern language I French 9.30 Modern language I German

2. Data about the subject

2.1	Subject name	English French German I
2.2	Subject area	English, French, German language
2.3	Teachers in charge of seminars	Conf. dr. Sanda Pădurețu – Lb. engleză Sanda.Paduretu@lang.utcluj.ro
2.4	Professor in charge with the discipline	Conf. dr. Sanda Pădurețu
2.5	Year of study	I
2.6	Semester	1
2.7	Assessment	V
2.8	Subject category	DC/DO

3. Estimated total time

Year / Sem	Name of the discipline	Nr. weeks	Courses			Applications			Individual study	TOTAL	Credit		
			ore/săpt.	[ore/sem.]			[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 (English) and A1 / A2 (French) (cf. CEFR - Common European

		Framework of Reference for Languages)
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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	<p>Identifying the distinctive features of the foreign language for specific purposes</p> <p>Notions of professional language related to the workforce</p> <p>Knowledge of organizing information and structuring professional documents</p>
Cross competences	<p>Identification of continuous training opportunities, capitalization on resources and learning techniques for own development</p> <p>Capacity of reading and writing documents in a foreign language, useful for academic and/or - professional career</p> <p>Written communication competence in view of multicultural professional team work.</p>

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

7.1 General objective	Students should acquire knowledge and integrated skills to communicate in a foreign language in professional (technical and engineering) contexts and on job related topics.
7.2 Specific objectives	<p>Development of lexical, grammatical and discursive knowledge in specialized languages.</p> <p>Developing the competence to understand, transmit and evaluate an oral message in a professional technical context.</p>

8. Contents

8.2. Applications (seminar)		Teaching methods	Notes
1	Level group test	Strategii comunicative și interactive. Integrated skills, flipped classroom, blended learning	Online platform, Interactive board, CD Player, video projector, Consultations
2	Self-presentation: professional motivation. Introductory notions, recapitulative: presentation of personal data, recognition of affirmative / negative / interrogative forms.		
3	Higher technical education and educational systems Activities and professions; work and professional activities: instructions and		

	reporting on the progress of an ongoing activity.		
4	Jobs and interpersonal relationships Description of professional responsibilities. Engineer profile (studies, positions, fields of activity).		
5	Conventions for writing a letter of intent. Professional experience - writing a CV, motivation letter, preparing for the job interview: specific formulations in the foreign language.		
6	Numbers and numerical values: ordinal and cardinal numeral - form and use.		
7	Arithmetic and algebra: expression of arithmetic operations: addition, subtraction, multiplication, division; expression of fractional numbers, powers and roots.		
8	Description of other technical parameters (shapes, colors, materials, function or utility, etc.). Verb modes and tenses used in a technical description.		
9	Notions / elements of chemistry in a foreign language		
10	The laws of physics in a foreign language		
11	Energy conservation. Energy sources		
12	Forces and fields. Recapitulation		
13	Written assessment test		
14	Spoken assessment test		

Bibliography:

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Aspects of English Grammar in Technical Contexts, U.T. Press, Cluj-Napoca, 2015

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C.-H. Dumon, J.-P. Vermes, *Le CV, la lettre et l'entretien*, Paris, Eyrolles, 2006.

E. Cloose, *Le français du monde du travail*, Grenoble, PUG, 2009.

J. L. Penfornis Français.com, nouvelle édition, Paris, CLE International, 2012.

9. 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		30%
				Oral exam		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

20.04.2023

Professor in charge with
the discipline

Conf. dr. Sanda Pădurețu

Teachers in charge of the seminar

Conf. dr. Sanda Pădurețu

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	10.00

2. Data about the subject

2.1	Subject name	Linear algebra, analytic and differential geometry		
2.2	Course responsible/lecturer	Assoc.Prof.dr. Adela CAPATA adela.capata@math.utcluj.ro		
2.3	Teachers in charge of seminars	Assoc.Prof.dr. Adela CAPATA adela.capata@math.utcluj.ro		
2.4	Year of study	1	2.5 Semester	2
			2.6 Assessment	Exam
2.7	Subject category	Formative category		DF/DI
		Optionality		

3. Estimated total time

3.1	Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	2	3.3 Laboratory		3.3 Project	
3.4	Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	28	3.6 Laboratory		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										10
	(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										14
	(d) Tutoring										4
	(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	
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5.2	For the applications seminarului / laboratorului / proiectului	The presence at the seminars is mandatory.
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6. Specific competences

Professional competences	C1.1 Identifying notions, describing theories and using specific language.
	C1.2 To explain and interpretate correctly the mathematical concepts, by using specific language.
	C3.1 Identifying the basics used in the construction of the algorithms.
	C3.2 Interpretation of data and explanation of the steps involved in the problem that can be solved by algorithms.
	C2.1 Identify the basic notions used in the description of some phenomena and processes.
	C2.2 Interpretation of data processing results.
	C1.3 Correct application of basic methods and principles in solving mathematics problems.
	C1.4 Recognize the main classes / types of mathematical problems and select the appropriate methods and techniques for solving them.
Cross competences	CT1 Application of rigorous and efficient work rules, manifestation of responsible attitudes towards the scientific and didactic field, for the optimal and creative capitalization of one's own potential in specific situations, respecting the principles and norms of professional ethics.
	CT3 Efficient use of information sources and resources of communication and assisted professional training, both in Romanian and in a language of international circulation.

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

7.1	General objective	Development of competence in the field of analytical and differential geometry in the support of professional training.
7.2	Specific objectives	To calculate determinants of order three and higher. To solve a system of linear equations by different methods. To calculate vector products and to apply the rules acquired to practical problems in the technique. Know how to adapt an analytical or differential geometry problem and then to solve it. To model mathematically, from the point of view of analytical and differential geometry problems from the technical field. To apply the results learned in other fields.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Matrix, determinants. Systems of linear equations.	2	Presentation, discussions,	Students are encouraged to ask questions.
Vectorial spaces. Basis.	2		
Coordinate systems (axis, in plan and in space)	2	Explanations	
Free vectors. Addition and difference of vectors	2	Teams	

Multiplying a vector by a scalar. Decomposition of a vector by two and three directions. Projection of a vector on an axis. Direction of a cosine line and directional parameters			
Vector products. Scalar product. Vector product. Mixed product. Double vector product.	2		
First order algebraic surfaces: The plane.	2		
The line.	2		
Different problems involving the plane and the line.	2		
Conics .Ellipse. Hyperbola. Parabola	2		
Second order algebraic surfaces - quadrics. Ellipsoid. The hyperboloid with one cloth. The hyperboloid with two cloths. The elliptical paraboloid. The hyperbolic paraboloid.	2		
Differential geometry. Differential geometry of plane curves. The arc element. The direction cosine of the tangent. The normal line to a plane curve.	2		
The curvature of a plane curve. The contact of two curves. The osculating curves. The osculating circle. The cover of a family of plane curves.	2		
Differential geometry of space curves . The tangent to a space curve. Frenet's formulas.	2		
Differential geometry of surfaces. Curves drawn on a surface. The plane tangent and normal to a surface. The first fundamental form.	2		
<p>Bibliography</p> <ol style="list-style-type: none"> 1. Analytic geometry. Il'in VA, Poznjak EG, Moscova, Mir, 1984. 2. Elements of linear algebra. Peter IR, Laszlo SC, Viorel A, Cluj-Napoca, UT Press, 2014 3. An invitation to linear algebra and analytic geometry. Cimpean D, Inoan D, Rasa I, Cluj-Napoca, Mediamira, 2009 4. Potra TG, Rasa I, Toader G, Toader S. Algebra si geometrie, vol I, II, Transilvania Press, Cluj-Napoca, 2005 			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Matrix, determinants. Systems of linear equations.	2	conversations for fixing and consolidating the knowledge, examples Teams-online	Students are directly involved in problem solving and are encouraged to ask questions.
Coordinate systems	2		
The line in plane.	2		
Products of vectors. Decomposition of a vector.	4		
Plane	2		
The line in space.	2		
Different problems involving the plane and the line.	2		
Conics	2		
Cuadrics	2		
Plane curves	2		
Osculating curves	2		

Space curves	2		
Frenet's formulas	2		
Bibliography 1. An invitation to linear algebra and analytic geometry. Cimpean D, Inoan D, Rasa I, Cluj-Napoca, Mediamira, 2009 2. Potra TG, Rasa I, Toader G, Toader S. Algebra si geometrie, vol I, II, Transilvania Press, Cluj-Napoca, 2005			

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

A performant engineer must have a solid knowledge of mathematics, which he can apply in the fields in which he works, because good specialists are required on the labor market.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Solving 5 problems and a theory point.	2-hours written test, face-to-face or online on the Teams platform	75%
10.5 Seminars /Laboratory/Project	Seminar activity.	Evaluation of the seminar activity and of the homeworks	25%
10.6 Minimum standard of performance			
Minimum written exam is grade 5.			

Date of filling in:		Title Surname Name	Signature
13.06.2023	Lecturer	Assoc.Prof.dr. Adela CAPATA	
	Teachers in charge of application	Assoc.Prof.dr. Adela CAPATA	

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	11.00

2. Data about the subject

2.1	Subject name	Physics II				
2.2	Course responsible/lecturer	Prof.dr. Fechete Radu				
2.3	Teachers in charge of seminars	Lecturer dr. Ramona Chelcea				
2.4	Year of study	I	2.5 Semester	II	2.6 Assessment	E
2.7	Subject category	Formative category				DF
		Optionality				DI

3. Estimated total time

3.1	Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laboratory	1	3.3 Project	-
3.4	Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laboratory	14	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										14
	(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										14
	(d) Tutoring										1
	(e) Exams and tests										3
	(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	Good knowledge of high school physics Good knowledge of high school mathematics
4.2	Competence	Some knowledge in operating computers (Word, Power Point, Excel, www).

5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	N/A

6. Specific competences

Professional competences	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Manipulate the main physical quantities and measurement unit by using the fundamental physical laws characteristic to the studied phenomena during the solving of the problems. • Evaluate the measurement errors, the absolute and the relative errors. • Define and apply some basics concepts, physically principles and theory applied to materials science and engineering. • Identify and analyze specific problems and to elaborate strategies to solve them. • Identify diverse physical systems, to describe their properties and relations/interactions between the system components.
Cross competences	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Draw graphics of the variation of a specific quantity function of various parameters which are measured experimentally. • Plot the graphics using computer scientific software like Origin. • Operate with units with different order of magnitude and with the physical constants • Write a paper into a scientifically form using a MS Word template.

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

7.1	General objective	<ul style="list-style-type: none"> • Introduction of the most important physical quantities that are encountered in materials science engineering applications. • Introduction of the main laws of physics that play a central role in materials science engineering applications.
7.2	Specific objectives	<ul style="list-style-type: none"> ◆ Knowledge of the electrical, magnetically and electromagnetic phenomena. ◆ Knowledge of the electromagnetic waves ◆ The ability to document alone in a given scientific problem using the books library and the Internet. ◆ The ability to elaborate and to present a report on a given scientific problem ◆ The ability to represent graphically the physical quantities. ◆ The ability to use commercial computer programs for interpretation of the experimental data. ◆ The ability to solve a given physical problem and to express it in a mathematical form. ◆ The ability to work in a team for solving real physical problems

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Electricity. Introduction. Electric charge. Coulombian Force. Electric Field. Electric Field intensity.	2 hours		
Distributions of electrical charges. Mechanical work in the electric field. Electric potential.	2 hours		
The electric dipole. The potential and intensity of the electric field created by the dipole. Dipole energy in external electric field.	2 hours		
Electrical dipoles at the atomic and molecular level. Modalities of polarization of a dielectric (electronic polarization, ionic polarization and oriental polarization). Polarization density of a homogeneous material.	2 hours		
Electric Flux. Gauss law for the electric field. Applications of Gauss's law.	2 hours		

Gauss's law in dielectrics. Electric capacitor. Capacitor grouping. Electrostatic field energy.	2 hours	Exposing Conversation Description Problematization	
Electric current. Definition. Electric current intensity. Density of the electric current. Electrons in solids (Drude's model). Electrically conductivity. Ohm's law.	2 hours		
Elements of electric circuit. Electric power and energy. Branched electrical circuits. Kirchhoff's laws.	2 hours		
Magnetism: Magnetic field. Lorentz force. Magnetic force (Laplace force). Current loop in uniform magnetic field.	2 hours		
Sources of the magnetic field. Biot-Savart law. Magnetic field produced by a liner conductor. Magnetic field produced by a loop. Ampere's law. Magnetic force between two parallel conductors.	2 hours		
Magnetic flux. Gauss law for the magnetic field. Dipolar magnetic moment. Dipole energy in external magnetic field.	2 hours		
Electromagnetic induction. Faraday's law. Autoinduction. Magnetic energy.	2 hours		
Maxwell's equations (differential and integral forms). Electromagnetic waves: Maxwell's equations without sources and velocity.	2 hours		
Electromagnetic waves: transversally, intensity and energy. Electromagnetic wave spectrum.	2 hours		
Bibliography			
<i>In UTC-N library</i>			
<ol style="list-style-type: none"> 1. R. Fechete, Fundamental physics for engineers, course notes. 2. E. Culea, S. Nicoara, Fundamentals of Physics, RISOPRINT, Cluj-Napoca 2004 3. R. Fechete, Elemente de Fizica pentru Ingineri, Ed. UTPress, 2008. 4. I.Ardelean, Fizica pentru ingineri, Ed. UTPres, 2005. 5. I. Coroiu, E. Culea, Fizica I, Ed. UT. Press, 1999. 			
<i>Multimedia teaching aids</i>			
<ol style="list-style-type: none"> 6. Microsoft Encarta Encyclopedia. 7. Encyclopedia Britannica. 8. www.wikipedia.org 9. http://users.pandora.be/educyclopedia/education/physicsbytopic.htm 			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Seminars: Solving problems from the chapters presented in the course	14 hours	Exposing Conversation Description Experiment	
The study of thermoelectrically effect	2 hours	Exposing Conversation Description Experiment	
Determination of the viscosity coefficient	2 hours		
Study of electrical conductivity of metals	2 hours		
The determination of the energy gap of a semiconductor	2 hours		
Experimental verification of the Stefan-Boltzmann law	2 hours		
Studying the polarization of light	2 hours		
Colloquium examination from laboratory works	2 hours		
Bibliography			
<ol style="list-style-type: none"> 1. I. Cosma, T. Ristoiu, Fizica aplicata: probleme rezolvate, UT. PRESS, Cluj-Napoca, ISBN 973-662-156-1, (2005). 			
R. Fechete, R. Chelcea, D. Moldovan, S. Nicoara, I. Coroiu, C. Badea, E. Culea, I. Cosma, N. Serban,			

Fizica: Indrumator de laborator, UT. PRESS, Cluj-Napoca, ISBN 978-973-662-952-5, (2014).

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

The Physics course aim to give to students the basics knowledge and abilities to interact with a technical environment (measurement technique, measurement units, physical law – electricity and magnetism – to realize an interface between environment properties and computer, to register an electric signal from a sensor, to understand the meaning of the signal (physical property) and to act accordingly).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The exam assumes a test of 1 hour (part 1) and 1 hour (part 2) from theoretical subjects	Written test	70 – 90 %
10.5 Seminars /Laboratory/Project	Students have the possibility to submit a scientific essay, a PowerPoint presentation or to build a practical project (usually based on sensors connected to an Arduino microcontroller, and the data can be processed using various software)	Written report or practical project with microcontrollers and various sensors, actuators. Oral PowerPoint presentation Frontal presentation	10 – 30 %
10.6 Minimum standard of performance			
Students must obtain a minimum of 2.75 points for the written test and to accumulate 1.75 points (total 4.5) for the practical applications.			

Date of filling in:		Title Surname Name	Signature
20.04.2032	Lecturer	Prof.dr. Fechete Radu	
	Teachers in charge of application	Lecturer dr. Ramona Chelcea	

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	12.00

2. Data about the subject

2.1	Subject name	Materials Science and Engineering II		
2.2	Course responsible/lecturer	Lect. dr.ing. Sechel Argentina-Niculina - Niculina.Sechel@stm.utcluj.ro		
2.3	Teachers in charge of seminars	Lect. dr.ing. Sechel Argentina-Niculina - Niculina.Sechel@stm.utcluj.ro		
2.4	Year of study	1	2.5 Semester	2
			2.6 Assessment	Exam
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										25
	(b) Supplementary study in the library, online and in the field										15
	(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										14
	(d) Tutoring										2
	(e) Exams and tests										3
	(f) Other activities										
3.8	Total hours of individual study (summ (3.7(a)...3.7(f)))										69
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	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
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5.2	For the applications seminarului / laboratorului / proiectului	Attendance at the laboratory is mandatory according to UTCN regulations
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6. Specific competences

Professional Competences	<p>Use of acquired knowledge to explain and interpret the interdependence of composition - structure – properties.</p> <p>Knowledge of the properties and symbolization of alloyed steels, cast irons and non-ferrous alloys.</p> <p>Knowledge and identification of structural transformations that occur during heat treatment in alloys.</p> <p>Knowledge of the main categories of ceramic and polymeric materials, for technical use, their properties and use. After completing the discipline, the students will be able to:</p> <ul style="list-style-type: none"> - analyze and identify metallographic constituents in engineering materials (studied); - selection in according to the structure and properties the appropriate material for a certain application; - knows the influence of the structure on machinability by cutting, wear resistance and corrosion of metallic materials.
Cross competences	<p>Autonomous use of optical microscopy laboratory equipment.</p> <p>Promoting efficiency and accountability in the activities carried out.</p>

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

7.1	General objective	Development of skills in the field of materials (interrelation between composition-structure-properties) in support of vocational training
7.2	Specific objectives	<ol style="list-style-type: none"> 1. Assimilation of theoretical knowledge on the main categories of engineering materials and their properties 2. Using the knowledge gained in choosing the optimal material for certain applications

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Cast irons. Classification, structure, properties, principles of symbolization, applications.	2	Power Point	
2. Basics of heat treatments. Solid state phase transformations in iron-carbon alloys. Transformations when heating steels. Austenite transformations on cooling.	2	Prezentati on Interactiv e teaching	
3. The influence of thermal and thermochemical treatments on the structure and properties of alloys from	2		

the iron-carbon system		mode		
4. Alloyed steels. The influence of alloying elements on structure and properties. Classification and symbolization of alloyed steels.	2	university lecture		
5. Steels and alloys with special properties.	2	Teacher-student dialogue		
6. Copper and copper-based alloys.	2			
7. Aluminum and aluminum-based alloys.	2			
8. Magnesium and magnesium-based alloys.	2			
9. Titanium and titanium-based alloys. Other non-ferrous alloys	2			
10. Ceramic materials - structure and specific properties. Applications and processing of ceramic materials.	2			
11. Polymeric materials. The nature and structure of polymers.	2			
12. Mechanical and thermomechanical characteristics of polymers. Applications and processing of polymers.	2			
13. Composite materials - classification criteria, structure, properties, applications.	2			
14. The selection of engineering materials - basic criteria.	2			
Bibliography				
1. H. Colan, ș.a., Știință și Ingineria Materialelor, Vol. 1, Ed. UT Press, Cluj-Napoca, 2013				
2. V. Căndea, C. Popa, Inițiere în Știința Metalelor, Ed. Vega, București, 1995				
3. H. Colan, ș.a., Studiul Metalelor, București, EDP, București, 1983				
4. V. Căndea, C. Popa, N. Sechel, V. Buharu, Clasificarea și simbolizarea aliajelor feroase și neferoase, Ed. UT Press, Cluj-Napoca, 2010				
5. V.A. Șerban, A. Răduță, Știința și Ingineria Materialelor, Ed. Politehnica, Timișoara, 2006				
6. M. Rădulescu, Studiul Metalelor, EDP, București, 1982				
7. R. C. Ivănuș, Știința materialelor, Ed. Universitaria, Craiova, 2008.				
8. T. Dobra, D. Bota, L. Sorcoi, Știința Materialelor – Teste și aplicații, Ed. UT Press, Cluj-Napoca, 2004.				
9. D. Constantinescu, ș.a., Știința Metalelor, EDP, București, 1983				
10. W. D. Callister, David G. Rethwisch, Materials Science and Engineering on Introduction, J.Wiley & Sons, 2009				
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes	
1. Presentation of laboratory works and protection rules. Determination of mechanical strength and hardness of steels by quantitative metallographic analysis.	2	Exposure and applications	Metallographic microscopes	
2. Study of the structure of steels processed by cold and hot plastic deformation.	2		Metallographic sample grinding / polishing machine,	
3. Study of the structure of cast irons.	2		Computer, Video projection	
4. Heating defects of steels.	2			
5. Heat and thermochemical treatment structures of steels.	2			

6. Study of the structure of construction alloyed steels. The structure of alloyed steels with special properties.	2	system, drawings	
7. The structure of tool steels.	2		
8. The structure of copper alloys.	2		
9. The structure of aluminum, tin and lead alloys.	2		
10. The influence of the structure on the machinability by cutting of metallic materials.	2		
11. The influence of the structure on the wear resistance.	2		
12. The influence of structure on corrosion resistance.	2		
13. Ceramic materials. Polymeric materials.	2		
14. Composite materials structures.	2		
Bibliography			
1. V. Căndea, C. Popa, T. Marcu, Atlas - structuri metalografice, Ed. UT Press, Cluj-Napoca, 2012			
2. H. Colan, ș.a., Studiul metalelor – Îndrumător pentru lucrări de laborator, Lit. IPC-N, 1988.			
3. H. Colan, ș.a., Știință și Ingineria Materialelor, Vol. 1, Ed. UT Press, Cluj-Napoca, 2013			
4. M. Rădulescu, Studiul Metalelor, București, EDP, 1982.			

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 necessary for the future engineers who carry out their activity within some departments of elaboration, testing or certification of the quality of a material through structure.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Assessment of the knowledge taught, by solving tests that consist of topics / questions from the theoretical part and problems	Written test - duration of assessment 2 hours	75 %
10.5 Seminars /Laboratory/Project	Students will be evaluated at each laboratory session with considering the degree of involvement, how to prepare, process and interpret the information on the topic. The final grade in the laboratory (L) represents the arithmetic mean of the grades from each session	- continuous evaluation	25 %

10.6 Minimum standard of performance
Examination grade (E) \geq 5; Laboratory grade (L) \geq 5, (Final grade = 0.75E + 0.25L)

Date of filling in:		Title Surname Name	Signature
20.05.2023	Lecturer	Lect. dr.ing. Argentina-Niculina Sechel	
	Teachers in charge of application	Lect. dr.ing. Argentina-Niculina Sechel	

Date of approval in the department	Head of department
26.06.2023	Ass.prof.dr.eng. Mariana Pop
Date of approval in the faculty	Dean
10.07.2023	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	13.00

2. Data about the subject

2.1	Subject name	Technical drawing and infographics		
2.2	Course responsible/lecturer	Lecturer PhD. Eng. Scurtu Iacob-Liviu,		
2.3	Teachers in charge of seminars	Lecturer PhD. Eng. Scurtu Iacob-Liviu,		
2.4	Year of study	2.5 Semester	2.6 Assessment	E
2.7	Subject category	Formative category		DF
		Optionality		DOB

3. Estimated total time

3.1	Number of hours per week	4	of which	3.2 Course	1	3.3 Seminar	-	3.3 Laboratory	3	3.3 Project	-
3.4	Total hours in the curriculum	56	of which	3.5 Course	14	3.6 Seminar	-	3.6 Laboratory	42	3.6 Project	-
3.7 Individual study:											
	(a) Manual, lecture material and notes, bibliography										36
	(b) Supplementary study in the library, online and in the field										19
	(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										10
	(d) Tutoring										
	(e) Exams and tests										4
	(f) Other activities										-
3.8	Total hours of individual study (summ (3.7(a)...3.7(f)))										69
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	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	Recommended presence
5.2	For the applications (laboratory)	Mandatory presence

6. Specific competences

Professional competences	<ul style="list-style-type: none"> • To know the representation of geometric elements in space in the plane, based on the rules and theorems of descriptive geometry. • Understand how to represent, mark and dimension a piece in the two-dimensional system using the rules of double orthogonal projection (Monge clearance). • To synthesize the basic notions used in descriptive geometry and technical drawing in order to have a correct, engineering vision on some machine parts. • The acquisition of this discipline results in the theoretical and practical training of students in the correct representation of geometric bodies or combinations of them creating pieces. • To know how to apply the basic elements of descriptive geometry in the representation of a piece. • To evaluate different elements of a piece drawn to scale or sketch, by the practical application of the national (SR) and international (EN, ISO) standards in the technical drawing. • Know how to read and analyse a performance drawing of a part or set of parts. • Application of knowledge of descriptive geometry in the design of parts • To represent, note and dimension execution drawings of parts for machines and equipment. • Read and explain functionally a performance drawing of a piece
Cross competence	General knowledge of descriptive geometry, technical drawing and technical drawing standards.

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

7.1	General objective	Theoretical and practical training of students in the correct representation of geometric bodies or combinations of them by creating parts and assemblies of parts
7.2	Specific objectives	Representation, grading and dimensioning of execution drawings of parts for machines and equipment. Reading and functional explanation of an execution drawing of a piece.

8. Contents.

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Representation and dimensioning of flanges. Execution drawing of a part with thread and flanges. Detachable assemblies. Threaded assemblies. Representation and rating of components.	2	Online presentation, discussions,	
2. Detachable assemblies. Key assemblies. Non-removable assemblies. Welded assemblies. Detailed and simplified representation. Rivet assemblies.	2		
3. Elastic joints. Groove joints. The overall drawing. Rules of representation, rating and positioning of component parts. Composition table.	2		
4. Extractions of details. Inscription on the drawings of the quality prescriptions surfaces. Roughness - terminology and parameters. Dimensional tolerances.	2		

5. Geometric tolerances. Examples of use Representation and rating of machine parts. Shafts and axles	2	technical drawing s made during the course in dedicated applications	
6. Representation and rating of gears. Gear representation.	2		
7. Bearings. Sealing elements	2		
Bibliography 1. Sanda Bodea, Iacob-Liviu Scurtu: Geometrie descriptivă și desen tehnic, Editura Risoprint, ISBN: 978-973-53-1902-1, Cluj Napoca, 2016 2. Crișan, N.-I., Bodea S., Scurtu Iacob-Liviu, "Desen tehnic pentru asamblări în proiectare", Editura Risoprint, ISBN 978-973-53-0920-6, Cluj-Napoca, 2012. 3. Crișan, N.-I., - „Geometrie Descriptivă” – corpuri cu suprafețe de rotație neriglitate și elicoidale, Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2005, ISBN: 973-751-076-3. 4. Bodea, S., Crișan, N.-I., Enache, I. – „Geometrie descriptivă” – curs pentru învățământul universitar tehnic, Editura RISOPRINT, Cluj-Napoca, 2003, ISBN: 973-656-353-7. 5. Crișan, N.-I., – „Noțiuni fundamentale în Desenul Tehnic Industrial” – Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-114-3. 6. Crișan, N.-I., – „Aplicații ale Geometriei Descriptive” – Lucrare pentru învățământul universitar tehnic în prezentare bilingvă româno - franceză, Editura RISOPRINT, Cluj-Napoca, 2006, ISBN: 978 - 973-751-351-9. 7. Crișan, N.-I., Enache, I., Budisan, T., – „Elemente de bază în Desenul Tehnic Industrial” – Îndrumător pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-110-0. www.gdgi.utcluj.ro			
8.2. Laboratory	Number of hours	Teaching methods	Notes
L1. Bearings. Sealing elements L1. Representation and rating of flanges	3		
L2. Complex piece with flanges and thread	3		
L3. Threaded joints with fasteners	3		
L4. Key assemblies	3		
L5. Welded assemblies	3		
L6. Spring assemblies	3		
L7. The overall drawing - sketches of landmarks	3		
L8. The overall drawing - continuation of landmarks	3		
L9. General sketch	3		
L10. Extraction of details	3		
L11. Extraction of details - high complexity	3		
L12. Representation and rating of gears and gears	3		
L13. Quality surface requirements	3		
L14. General drawing with shafts, gears and bearings. Completion of works.	3		
Bibliography 1. Sanda Bodea, Iacob-Liviu Scurtu: Geometrie descriptivă și desen tehnic, Editura Risoprint, ISBN: 978-973-53-1902-1, Cluj			


<p>Napoca, 2016</p> <p>2. Crișan, N.-I., Bodea S., Scurtu Iacob-Liviu, "Desen tehnic pentru asamblări în proiectare", Editura Risoprint, ISBN 978-973-53-0920-6, Cluj-Napoca, 2012.</p> <p>3. Crișan, N.-I., - „Geometrie Descriptivă” – corpuri cu suprafețe de rotație neriglitate și elicoidale, Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2005, ISBN: 973-751-076-3.</p> <p>4. Bodea, S., Crișan, N.-I., Enache, I. – „Geometrie descriptivă” – curs pentru învățământul universitar tehnic, Editura RISOPRINT, Cluj-Napoca, 2003, ISBN: 973-656-353-7.</p> <p>4. Crișan, N.-I., – „Noțiuni fundamentale în Desenul Tehnic Industrial” – Curs pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-114-3.</p> <p>5. Crișan, N.-I., – „Aplicații ale Geometriei Descriptive” – Lucrare pentru învățământul universitar tehnic în prezentare bilingvă româno - franceză, Editura RISOPRINT, Cluj-Napoca, 2006, ISBN: 978 - 973-751-351-9.</p> <p>6. Crișan, N.-I., Enache, I., Budisan, T., – „Elemente de bază în Desenul Tehnic Industrial” – Îndrumător pentru învățământul universitar tehnic în prezentare bilingvă româno-franceză, Editura RISOPRINT, Cluj-Napoca, 2001, ISBN: 973-656-110-0.</p> <p>7. www.gdgi.utcluj.ro</p>			
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9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The content of the discipline is correlated with the requirements of the specialized disciplines from the higher years of study and responds to the current requirements in the technical field.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The exam consists of two control papers	Notes for two written tests (one test in week 7 and one test in session)	80%
10.5 Laboratory	Homework with solved applications is corrected and graded if they are finished on time.	Application evaluations (note)	20%
10.6 Minimum standard of performance			
Minimum requirements: The grade from the course and the applications must be at least 5 in order to be able to make the final average			

Date of filling in:		Title Surname Name	Signature
15.05.2023	Lecturer	Lecturer Phd. Eng. Iacob-Liviu SCURTU	
	Teachers in charge of application	Lecturer Phd. Eng. Iacob-Liviu SCURTU	

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	14.00

2. Data about the subject

2.1	Subject name	Crystallography and mineralogy				
2.2	Course responsible/lecturer	Conf. Dr. Phys. Florin Popa – florin.popa@stm.utcluj.ro				
2.3	Teachers in charge of seminars	Conf. Dr. Phys. Florin Popa – florin.popa@stm.utcluj.ro				
2.4	Year of study	1	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	3	of which	3.2 Course	2	3.3 Seminar	-	3.3 Laboratory	1	3.3 Project	-
3.4	Total hours in the curriculum	100	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										25	
(b) Supplementary study in the library, online and in the field										15	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										10	
(d) Tutoring										6	
(e) Exams and tests										2	
(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	

5. Requirements (where appropriate)

5.1	For the course	Physics and chemistry basic knowledge
5.2	For the applications seminarului / laboratorului /	Physics and chemistry basic knowledge

proiectului	
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6. Specific competences

Professional Competences	<ul style="list-style-type: none"> - To acquire nomenclature and terminology used in crystallography and mineralogy - Ability to discuss the causes and effects of composition variation on minerals structure, stability, and properties - To know the classification of crystalline structures on classes - To know the crystalline symmetry and how their can be established - To know what the physical properties of a crystalline structure are - To know the way of minerals are formed - To know the main minerals types from nature
Cross competences	<ul style="list-style-type: none"> - To acquire a scientific language, with engineering base - To be able to apply the symmetry and stereographic projection in technical field - To know the atoms ordering in materials and the way in which the atomic order leads to material properties - To know how to identify a material by optical means - To be able to exercise the specific roles of teamwork, on different hierarchical levels - To objectively self-assess the need for continuous professional training - Be able to use multilingual skills and knowledge of information technology effectively.

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

7.1	General objective	<ul style="list-style-type: none"> - Comprehension of atomic bonds, crystalline structure formation, and minerals properties.
7.2	Specific objectives	<ul style="list-style-type: none"> - Learning the crystalline structure and atomic planes - Type and number of space groups of crystal structures - Understanding the type and analysis route of crystalline symmetry - To know how the crystals and minerals are formed - To know the physical properties of crystal structures - To understand mineral formation reactions

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction. Crystallography and mineralogy definitions.	2	Lecture	Multimedia Blackboard
2. What is a crystal. How the crystal can be studied.	2	PowerPoint presentation	
3. Symmetry in crystals. Symmetry operations.	2	Interactive teaching mode	
4. Bravais network.	2	Dialogue - conversation professor - student	
5. Miller index. Spatial groups.	2		
6. Crystalline forms.	2		

7. Stereographic projection.	2		
8. X-ray structure determination.	2		
9. Crystallographic structure types. Allotropy.	2		
10. Physical properties of crystalline structures.	2		
11. Crystal formation. Material obtaining methods.	2		
12. Binary phase diagrams.	2		
13. Ternary phase diagrams.	2		
14. Mineral classification.	2		

Bibliography

1. C. Hammond, The basics of crystallography and diffraction, 3th edition, Oxford Science Publications, 2009
2. C. W. Correns, Introduction to mineral crystallography, and petrology, 2nd edition, Springer-Verlag Berlin Heidelberg GmbH 1969
3. C. Giacovazzo, Fundamentals of crystallography, Oxford Univeristy press, 1992
4. C. Kittel, Introduction to solid state physics, 7th edition, John Willey & Sons, New York, 1996

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Crystal structure.	2	Practical activities have the purpose of understanding the atoms ordering in structures and crystals. Formation and identification of minerals is highlighted.	Blackboard, computer
2. Crystalline network.	2		
3. Symmetry.	2		
4. Miller index.	2		
5. Crystallographic planes.	2		
6. Crystallographic directions.	2		
7. Binary phase diagram obtaining.	2		

Bibliography

1. C. Hammond, The basics of crystallography and diffraction, 3th edition, Oxford Science Publications, 2009
2. C. W. Correns, Introduction to mineral crystallography, and petrology, 2nd edition, Springer-Verlag Berlin Heidelberg GmbH 1969
3. C. Giacovazzo, Fundamentals of crystallography, Oxford Univeristy press, 1992
4. C. Kittel, Introduction to solid state physics, 7th edition, John Willey & Sons, New York, 1996

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

Understanding the relationship between atoms ordering and material properties connection
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10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	- understanding crystalline structure - connecton between symmetry and crystal structure	2 h written test (T)	100 %

	- process of structure observation - understanding mineral formation reactions		
10.5 Seminars /Laboratory/Project	- application of crystalline structure relation in crystals - mineral identification	continuous assessment	0 %
10.6 Minimum standard of performance			
$T \geq 5$			

Date of filling in:		Title Surname Name	Signature
20.04.2023	Lecturer	Associate professor Florin Popa	
	Teachers in charge of application	Associate professor Florin Popa	

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	15.00

2. Data about the subject

2.1	Subject name	Chemistry II				
2.2	Course responsible/lecturer	Associate prof. Amalia Zorica Mesaros, PhD eng. chem.				
2.3	Teachers in charge of seminars	Assistant prof. Mircea Năsu, PhD eng. chem.				
2.4	Year of study	I	2.5 Semester	2	2.6 Assessment	Examination
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	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											28
(b) Supplementary study in the library, online and in the field											10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays											14
(d) Tutoring											2
(e) Exams and tests											4
(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	Basic background in Chemistry I
4.2	Competence	Basic knowledge and concepts specific to Chemistry, Math, and Physics

5. Requirements (where appropriate)

5.1	For the course	Presence at Technical University of Cluj-Napoca. Gadgets turned off during the course.
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5.2	For the applications (laboratory)	Presence at laboratories is mandatory. Gadgets turned off during the laboratories. Homework is required.
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6. Specific competences

Professional competences	<p>To use the fundamental knowledge of Chemistry in systems engineering.</p> <p>To use the basic concepts, theories, and methods for the design, synthesis, and analysis of materials to implement/design/solve practical problems regarding systems engineering.</p> <p>To explain and to argue the answers based on the understanding and application of fundamental concepts from the field of Chemistry and Materials Chemistry.</p>
Cross competences	<p>Accomplishing the tasks in concordance with the imposed terms and requirements.</p> <p>Solving the tasks in accord with the general objectives.</p> <p>Permanent documentation and study.</p>

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

7.1	General objective	<ol style="list-style-type: none"> 1. Understand and be able to explain the general principles, laws, and theories of chemistry that are discussed and presented throughout the semester. 2. Use critical thinking and logic in the solution of problems 3. Apply learned Chemistry I lecture skills to new situations. 4. Demonstrate an understanding of chemistry through technological advancement. 5. Apply chemical principles in the laboratory setting
7.2	Specific objectives	<ol style="list-style-type: none"> 1. Understanding and manipulation of basic concepts in Chemistry and Materials Chemistry combined with Physics and Math. 2. Developing skills and abilities necessary for solving simple and complex problems of Chemistry. 3. Developing skills and abilities for the analysis of chemical phenomena in chemistry which are transposed as problems in the Systems Engineering domain. 4. Laboratory work emphasizes learning basic techniques, learning to manipulate the specific instruments and interpret numerical data, and learning the relationship between experimental measurement and chemical theory through guided, independent work by the student.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction: Chemical elements and chemical compounds in materials chemistry. Materials classification. "Top-down" and "bottom-up"	2		

approaches in the material's chemical synthesis.		Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation, learning by discovery.	Mainly use the blackboard. The projector used only for short ppt presentation or for presentation of some movies with recorded chemical experiments.
2. Hydrogen and hydrides. Structure – synthesis – properties – applications.	2		
3. Oxygen and oxides. Structure – synthesis – properties – applications.	2		
4. s- and p-block metals. Synthesis and chemical properties.	2		
5. Boron and borides. Structure – synthesis – properties – applications.	2		
6. Silicon, silicates. Nitrogen and nitrides. Structure – synthesis – properties – applications.	2		
7. d- and f-block metals. Synthesis and chemical properties.	2		
8. Semiconductors, superconductors. Synthesis, structure, and properties.	2		
9. Hydrocarbons – synthesis, molecular structure, and pollution effects.	2		
10. Organic compounds – precursors for organic polymers.	2		
11. Macromolecular polymers fabrications.	2		
12. The importance of synthesis – structure - morphology - properties correlations in materials chemistry.	2		
13. Materials with low dimensionality: from nanoparticles to nanocomposites and nanomaterials.	2		
14. Chemical approaches in the synthesis of low-dimensional materials.	2		
Bibliography:			
[1]. P. W. Atkins, L. Jones, <i>Chemical Principles</i> , W. H. Freeman & Company, 2007, ISBN-13: 978-0-7167-7355-9			
[2]. W.D. Callister, <i>Materials Science and Engineering - An Introduction</i> , John Wiley&Sons, Inc. New York, 2000, ISBN: 1118319222			
[3] D. Vollath, <i>Nanoparticles, nanocomposites, nanomaterials</i> , Wiley-VCH, 2013, ISBN: 978-3-527-33460-5			
8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Laboratory safely rules. Chemical formulas. Solutions and concentrations.	1	Teaching and experimental proof, teaching exercise, conversation, observation and analysis, individual and	Use of white/ magnetic board, computers and computer programs for data analysis.
2. Electrochemical synthesis of copper powders	1		
3. Materials density determination.	1		
4. Water analysis.	1		
5. Chemical synthesis of magnesium oxide nanoparticles by precipitation method.	1		
6. Chemical synthesis of magnetite nanoparticles.			
7. General characterization of as-synthesized MgO and	1		

Fe ₃ O ₄ nanoparticles.		team work.	
Bibliography: [1]. W.D. Callister, Materials Science and Engineering - An Introduction, John Wiley&Sons, Inc. New York, 2000, ISBN: 1118319222 [2]. H. Nascu, L. Marta, E. M. Pica, V. Popescu, M. Unguresan, L. Jantschi, Chimie, Îndrumător de lucrări practice, UTPres 2002]			

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

The course content and the acquired skills are in agreement with the expectations of the professional organizations and the employers in the field, where the students carry out the internship stages and/or occupy a job, and the expectations of the national organization for quality assurance (ARACIS).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills, logical coherence, skills of operating with acquired knowledge in individual complex activities.	Evaluation – written exam (theory and problems) (2 hours)	C = 75 %
10.5 Laboratory	The level of acquired abilities	- Continuous formative evaluation; - Seminary individual work (1 hour)	A = 25 %
10.6 Minimum standard of performance			
C ≥ 5 and A ≥ 5			

Date of filling in:		Title Surname Name	Signature
14.05.2023	Lecturer	Associate professor Amalia Mesaros	
	Teachers in charge of application	Assistant professor Mircea Năsui	

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	16.00

2. Data about the subject

2.1	Subject name	Physical Education and Sport II					
2.2	Course responsible/lecturer	Lecturer Ph D Mihai Olanescu					
2.3	Teachers in charge of seminars	Lecturer Ph D Mihai Olanescu					
2.4	Year of study	1	2.5 Semester	2	2.6 Assessment		A/R
2.7	Subject category	Formative category					DC
		Optionality					DI

3. Estimated total time

3.1	Number of hours per week	2	of which	3.2 Course	-	3.3 Seminar	2	3.3 Laboratory	-	3.3 Project	-
3.4	Total hours in the curriculum	28	of which	3.5 Course	-	3.6 Seminar	28	3.6 Laboratory	-	3.6 Project	-
3.7 Individual study:											
(a) Manual, lecture material and notes, bibliography											-
(b) Supplementary study in the library, online and in the field											-
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays											-
(d) Tutoring											-
(e) Exams and tests											10
(f) Other activities											12
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	
4.2	Competence	Physically fit; necessary skills; knowledge, skills and motor skills accumulated in grades I-XII

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	Sport Hall B-dul Muncii no. 103-105; Polytechnic Swimming Pool

Bibliography			
8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Informing students about the requirements of the discipline. a. Testing the level of physical capacity of students; b. Re-accommodating students with physical effort.			
2. a. Exercises, relays and ball accommodation games. b. Acquiring the technical elements without the ball; c. Accommodating the body with water; d. Learning the correct grip; e. Fundamental positions, positioning and movement in the field, rotation; f. Maximizing the existing biomotor potential.			
3. a. Dribbling - traveling violation; b. Learning to hit the ball with the tip and side of the foot; c. Getting used to the horizontal position in the water; d. Learning the basic position; e. Passing the top ball with two hands; f. Adapting the sports activity for recreational purposes - improving the tone (legs, buttocks, arms, back).			
4. a. The starting and stopping. The pivoting. The shooting from the spot and from dribbling; b. Learning to hit the ball with the risk (inside, full, outside); c. Learning how to breathe in the water; d. Learning specific movements; e. Picking up a thrown ball (type of service); f. Complex exercises to achieve a good balance of oxygen consumption and intake in the body			
5. a. The fundamental position. movements; b. Learning to hit the ball with the knee and heel. c. Learning to float on water; d. Learning the middle game with the forehand. e. Learning the service from the front up (distance 4 - 5 m).			

<p>f. Adapting sports activity for recreational purposes - improving tone (legs, armrests, back).</p>			
<p>6. a. Change of direction with and without the ball; b. Learning to hit the ball with the head; c. Learning to slide in water; d. Learning the simple middle game with the backhand; e. Game without ball with simulation of learned elements; f. Complex exercises, in order to achieve a solid balance regarding the consumption and supply of oxygen in the body.</p>			
<p>7. a. Complex technical structures: dribbling, stopping, pivoting, passing; b. Learning the procedures of leading the ball; c. Learning to float and slide on the back; d. Learning the middle game cut with forehand; e. Taking over from work with two hands up; f. Stretching exercises - active or passive, performed individually or in pairs, performed on the floor or with wall support.</p>			
<p>8. a. 1x1 relationship; b. Learning to take over; c. Learning the movement of the legs at the chest on the chest; d. Learning the middle game, cut with the lapel; e. Organizing the 3 shots, taking over; f. Active or passive stretching exercises, performed individually or in pairs, performed on the floor or with wall support.</p>			
<p>9. a. Jump shooting; b. Learning deceptive movements; c. Learning to move the legs at the same time as breathing; d. Learning the middle game with half-flight with the forehand; e. High lift for attack in zones 3 and 4; f. Yoga exercises, stretching, self-massage.</p>			
<p>10. a. Themed games: improving the passes; b. Learning to put the ball back in play; c. Learning arms movement; d. Learning the middle game of semi-flight with the backhand; e. Attack in the direction of the momentum in zone</p>			

4; f. Rhythmic breathing in parallel with the movements performed			
11. a. 1x1 relationship; b. Learning the dispossession; c. Coordinating the movement of the arms and legs; d. Learning simple service with Forehand; e. 6x6 game with simplified rules; f. Keeping the principle of stretching elongation.			
12. a. Complex technical structures: catching the ball, dribbling, stopping; b. Learning the technical procedures of the goalkeeper; c. Freestyle swimming on the distance 25-50 meters; d. Learning the simple service with the backhand; e. Learning the attack blow from zone 2; f. "Non-stop" work without downtime, with correct breathing to optimize the body's endurance.			
13. a. Dribbling with different procedures: change of direction, pass; b. Learning practical movements on free kicks; c. Learning to start and return to the side; d. Learning to take over the simple service; e. Lift for attack in zones 2 and 3 (high, medium, forward); f. Aerobic steps exercises.			
14. a. Protecting the ball; b. Learning demarcation, penetration, overcoming; c. Learning to move the legs in the style of bras; d. Learning forehand cons in line; e. Taking the ball with two hands; f. Prophylactic exercises to form the correct posture and to combat various vicious attitudes of the spine (kyphosis, scoliosis, lordosis and spondylosis).			
Bibliography 1. Physical Education Course - Lithographed UTC-N 2. General physical development for students - UTC-N 3. Physical culture for youth - UT. PRESS			

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 necessary for the employees who carry out their activity in the field of Materials Engineering.

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	A minimum of 10 attendance at practical courses and passing control tests	Attendance at hours and passing the fitness tests, tracking the progress of each student. Control test. Route utility application in a certain time interval.	100%
	Exempt medical students: minimum 10 participation in classes and presentation of a paper/essay.	Presentation of the paper/essay. The topic for the paper is established together with the teacher from the class.	100%
	ONLINE - Microsoft Teams Platform	Paper/essay with 2 established topics	100%
10.6 Minimum standard of performance			

Date of filling in:		Title Surname Name	Signature
14.05.2023	Lecturer	Lecturer PhD Mihai Olanescu	
	Teachers in charge of application	Lecturer PhD Mihai Olanescu	

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	Modern Languages and Communication
1.4	Field of study	Materials engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science/Engineering
1.7	Form of education	Full time
1.8	Subject code	17.10 Modern language II English 17.20 Modern language II French 17.30 Modern language II German

1. Data about the subject

2.1	Subject name	English French German II									
2.2	Subject area	English, French, German language									
2.3	Teachers in charge of seminars	Conf. dr. Sanda Pădurețu – Lb. engleză Sanda.Paduretu@lang.utcluj.ro									
2.4	Professor in charge with the discipline	Conf. dr. Sanda Pădurețu									
2.5	Year of study	I	2.6	Semester	2	2.7	Assessment	V	2.8	Subject category	DC/DO

3. Estimated total time

Year / Sem	Name of the discipline	Nr. weeks	Courses			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 (English) and A1 / A2 (French) (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	<p>Application of grammar, format rules and conventions regarding the writing of technical documents in the foreign language</p> <p>Elaboration, reformulation, summary and synthesis of texts in formal technical style</p>
Cross competences	<p>Ability for foreign language documentation, useful for academic and / or professional careers</p> <p>Oral and written communication skills in multicultural professional teams.</p>

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.

8.8. Contents

8.2. Applications (seminar)		Teaching methods	Notes
1	Means of transport. Bicycle / car construction	interactive. Integrated skills, flipped	Interactive board, CD Player, video project
2	The cars of the future		
3	The wind farm		
4	Types of materials		
5	Properties of materials		
6	Computer and areas of use		
7	Virtual reality systems		
8	Technical discoveries and inventions		
9	Description of objects and processes		
10	Alternative energies		
11	Behavior, culture, civilization.		
12	Types of official letters (letter requesting information / products,		

	letter of complaint)		
13	Written assignment		
14	Oral assignment		
<p>Bibliografie Glendinning, E. and Alison Pohl, <i>Technology 1</i>, OUP, 2008 Aspects of English Grammar in Technical Contexts, U.T. Press, Cluj-Napoca, 2015 Ibbotson, M., <i>Cambridge English for Engineering</i>, CUP, 2009. Ioani, M., <i>Le français de la communication scientifique et technique</i>, Ed. Napoca Star, Cluj-Napoca, 2002. Tescula, C., <i>Le français de la technique</i>, UT.Press, Cluj-Napoca, 2005. File „Présenter en français” (disponibil la biblioteca facultății). Paris, D.; Foltete Paris, B., <i>Environnement.com</i>, CLE International, Paris, 2009. E. Cloose, <i>Le français du monde du travail</i>, Grenoble, PUG, 2009. J. L. Penfornis <i>Français.com</i>, nouvelle édition, Paris, CLE International, 2012.</p>			

9. 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		30%
				Oral exam		40%
				Practical assessment (seminar activity, homework)		30%
<p>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%.</p>						
<p>Final grade: 0,3 Ts + 0,4 Po + 0,3 P</p>						

Date of filling in

20.06. 2023

Professor in charge with the discipline

Conf. dr. Sanda Pădurețu

Teachers in charge of the seminar

Conf. dr. Sanda Pădurețu

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	Modern Languages and Communication
1.4	Field of study Programme of study/specialization	Materials engineering Materials Science
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science/Engineering
1.7	Form of education	Full time
1.8	Subject code	100,00

2. Data about the subject

2.1	Subject name	English French German I									
2.2	Subject area	English, French, German language									
2.3	Teachers in charge of seminars	Conf. dr. Sanda Pădurețu – Lb. engleză Sanda.Paduretu@lang.utcluj.ro									
2.4	Professor in charge with the discipline	Conf. dr. Sanda Pădurețu									
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	V	2.8	Subject category	DC/DO

3. Estimated total time

Year / Sem	Name of the discipline	Nr. weeks	Courses			Applications			Individual study			TOTAL	Credit
			[ore/săpt.]			[ore/sem.]							
			S	L	P	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 (English) and A1 / A2 (French) (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	<p>Identifying the distinctive features of the foreign language for specific purposes</p> <p>Notions of professional language related to the workforce</p> <p>Knowledge of organizing information and structuring professional documents</p>
Cross competences	<p>Identification of continuous training opportunities, capitalization on resources and learning techniques for own development</p> <p>Capacity of reading and writing documents in a foreign language, useful for academic and/or - professional career</p> <p>Written communication competence in view of multicultural professional team work.</p>

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

7.1 General objective	Students should acquire knowledge and integrated skills to communicate in a foreign language in professional (technical and engineering) contexts and on job related topics.
7.2 Specific objectives	<p>Development of lexical, grammatical and discursive knowledge in specialized languages.</p> <p>Developing the competence to understand, transmit and evaluate an oral message in a professional technical context.</p>

8. Contents

8.2. Applications (seminar)		Teaching methods	Notes
1	Level group test	Strategii comunicative și interactive. Integrated skills, flipped classroom, blended learning	Online platform, Interactive board, CD Player, video projector, Consultations
2	Self-presentation: professional motivation. Introductory notions, recapitulative: presentation of personal data, recognition of affirmative / negative / interrogative forms.		
3	Higher technical education and educational systems Activities and professions; work and professional activities: instructions and reporting on the progress of an ongoing activity.		

4	Jobs and interpersonal relationships Description of professional responsibilities. Engineer profile (studies, positions, fields of activity).		
5	Conventions for writing a letter of intent. Professional experience - writing a CV, motivation letter, preparing for the job interview: specific formulations in the foreign language.		
6	Numbers and numerical values: ordinal and cardinal numeral - form and use.		
7	Arithmetic and algebra: expression of arithmetic operations: addition, subtraction, multiplication, division; expression of fractional numbers, powers and roots.		
8	Description of other technical parameters (shapes, colors, materials, function or utility, etc.). Verb modes and tenses used in a technical description.		
9	Notions / elements of chemistry in a foreign language		
10	The laws of physics in a foreign language		
11	Energy conservation. Energy sources		
12	Forces and fields. Recapitulation		
13	Written assessment test		
14	Spoken assessment test		
<p>Bibliography:</p> <p>Glendinning, E. and Alison Pohl, <i>Technology 1</i>, OUP, 2008</p> <p>Aspects of English Grammar in Technical Contexts, U.T. Press, Cluj-Napoca, 2015</p> <p><i>Students' Grammar of English</i>, U.T.Press, Cluj-Napoca, 2001.</p> <p>Rusu, M. & Rusu, I. - <i>Limba franceză – o metodă de gramatică</i>, Ed. Corint, București, 2002 (sau orice manual / culegere de exerciții disponibile în biblioteci și librării).</p> <p>Tescula, C., <i>Le français de la technique</i>, UT.Press, Cluj-Napoca, 2005.</p> <p>File „Présenter en français” (disponibil la biblioteca facultății).</p> <p>Paris, D.; Foltete Paris, B., <i>Environnement.com</i>, CLE International, Paris, 2009.</p> <p>C.-H. Dumon, J.-P. Vermes, <i>Le CV, la lettre et l'entretien</i>, Paris, Eyrolles, 2006.</p> <p>E. Cloose, <i>Le français du monde du travail</i>, Grenoble, PUG, 2009.</p> <p>J. L. Penfornis <i>Français.com, nouvelle édition</i>, Paris, CLE International, 2012.</p>			

9. 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
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				Oral exam		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

20.05.2023

Professor in charge with
the discipline

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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

FIȘA DISCIPLINEI

1. Date despre program

1.1 Instituția de învățământ superior	Universitatea Tehnică din Cluj-Napoca
1.2 Facultatea	Facultatea de Ingineria Materialelor și a Mediului
1.3 Departamentul	Departamentul de Specialitate cu Profil Psihopedagogic
1.4 Domeniul de studii	Științe ale educației
1.5 Ciclul de studii	LICENȚĂ
1.6 Programul de studii / Calificarea	Program de formare psihopedagogică în vederea obținerii certificării competențelor pentru profesia didactică de nivel I
1.7 Forma de învățământ	IF – învățământ cu frecvență
1.8 Codul disciplinei	101.00

2. Date despre disciplină

2.1 Denumirea disciplinei	Psihologia Educației		
2.2 Titularul de curs	Conf. dr. psih. Ionuț-Dorin STANCIU ionut.stanciu@dppd.utcluj.ro		
2.3 Titularul activităților de seminar / laborator / proiect	Asistent univ. dr. Alexandra CĂLUGĂR		
2.4 Anul de studiu	1	2.5 Semestrul	1
		2.6 Tipul de evaluare	E
2.7 Regimul disciplinei	Categoría formativă		DF
	Opționalitate		DOB

3. Timpul total estimate

3.1 Număr de ore pe săptămână	4	din care:	3.2 Curs	2	3.3 Seminar	2	3.3 Laborator	-	3.3 Proiect	-
3.4 Număr de ore pe semestru	56	din care:	3.5 Curs	28	3.6 Seminar	28	3.6 Laborator	-	3.6 Proiect	-
3.7 Distribuția fondului de timp (ore pe semestru) pentru:										
(a) Studiul după manual, suport de curs, bibliografie și notițe										7
(b) Documentare suplimentară în bibliotecă, pe platforme electronice de specialitate și pe teren										6
(c) Pregătire seminarii / laboratoare, teme, referate, portofolii și eseuri										4
(d) Tutoriat										
(e) Examinări										2
(f) Alte activități:										-
3.8 Total ore studiu individual (suma (3.7(a)...3.7(f)))					19					
3.9 Total ore pe semestru (3.4+3.8)					75					
3.10 Numărul de credite					3					

4. Precondiții (acolo unde este cazul)

4.1 de curriculum	-
4.2 de competențe	Operare pe calculator la nivel începător (utilizator): a. Folosire de software de tip Office (e.g. Microsoft Word, Open Office, Libre Office), b. Navigare pe internet la nivel începător

5. Condiții (acolo unde este cazul)

5.1. de desfășurare a cursului	Pentru predare online: platforma MS TEAMS; acces la internet; acces la tehnica de comunicare audio-video compatibila. Pentru predare onsite: Sală de curs, videoproiector & ecran de proiectare, difuzoare, tablă / instalație de sonorizare, tablă (clasică sau interactivă), flip
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	chart.
5.2. de desfășurare a seminarului / laboratorului / proiectului	Pentru predare online: platforma MS TEAMS; acces la internet; acces la tehnica de comunicare audio-video compatibila. Pentru predare onsite: Sală de curs, videoproiector & ecran de proiectare, difuzoare, tablă / instalație de sonorizare, tablă (clasică sau interactivă), flip chart.

6. Competențele specifice acumulate

Competențe profesionale	<p>Cunoștințe teoretice, (Ce trebuie sa cunoască) Cunoștințe despre...</p> <ul style="list-style-type: none"> - specificul psihologiei educației în relație cu alte ramuri ale psihologiei și cu alte științe ale educației; - specificul profesiei didactice și învățământului modern, inclusiv despre condiționalitățile moderne în educație (e.g., survenite odată cu dezvoltarea și incorporarea tehnologiei digitale în mediile și instrumentele de instrucție; legate de învățământul multicultural; legate de multi- și bilingvism) - înțelesul și aplicabilitatea conceptelor referitoare la sine în context școlar/academic și constructe înrudite; - mecanismele și formele învățării și diferitele perspective paradigmatică care au furnizat explicații științifice; - modele și persoane semnificative și rolul lor în învățare precum și despre dezvoltarea conceptelor și convingerilor despre sine în context academic (sinele academic) și constructe înrudite (e.g., autoeficacitatea, locusul de control, controlul academic etc.); - însemnătatea și influența culturii și specificului social asupra învățării (învățarea socială) și despre influența persoanelor model, inclusiv a persoanelor semnificative (model persons și significant others); - perspectivele actuale, validate științific, privitoare la sistemul cognitiv și procesările informaționale, precum și despre procesele cognitive de bază; - imaginație, creativitate, deprinderi, talent și supradotare și relevanța acestora pentru învățare și pentru sistemul de învățământ; - erorile de gândire și raționament și despre distorsiunile și biasurile cognitive - diferitele tipuri și stări emoționale, inclusiv sub aspectul rolului și impactului acestora asupra învățării (e.g., emoțiile academice) - motivație și rolul motivației în determinarea traseului individual, progresului și eficienței persoanei în demersuri personale și profesionale; despre diferite tipuri de motivație și factori motivaționali (inclusiv diferențieri și operaționalizări privitoare la scopuri, obiective, interese, dorințe, aspirații, nevoi, expectanțe, valori etc.); - stilurile de învățare, despre formele de învățare, despre mediile de învățare și despre nivelurile de învățare (inclusiv despre caracteristicile învățării academice la nivel terțiar și pe parcursul vieții—e.g., lifelong learning, adult learning, corporate learning) și despre oportunitățile și modalitățile optime de învățare adecvate vârstei și traseului profesional; - comunicarea didactică, specifică mediilor și obiectivelor instrucționale; despre atitudinea asertivă în comunicare în contrast cu atitudinile pasivă, agresivă și pasiv-agresivă; - organizarea și controlul mediului instrucțional (inclusiv în relație cu ambientul și caracteristicile grupului școlar); <p>formele și scopurile evaluării academice și despre construirea evaluărilor obiective, sistematice, standardizate versus adaptative și/sau individualizate.</p> <p>Deprinderi dobândite: (Ce știe să facă)</p> <ul style="list-style-type: none"> - Să se cunoască, să se descrie și să se exprime pe sine, inclusiv prin raportare la diferitele concepte referitoare la sine învățate la curs; - Să își identifice și să își activeze principalele structuri și factori motivaționali activi, aspectele motivaționale proprii care trebuie optimizate, și să folosească propriile structuri
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	<p>motivaționale pentru a-și optimiza traseul individual și profesional;</p> <ul style="list-style-type: none"> - Să aleagă și să parcurgă formele de învățare cele mai adecvate personalității proprii, vârstei și traiectului profesional dorit, și să întrețină active preocupările de învățare adecvate personalității, vârstei și profesiei; - Să argumenteze corect, să gândească critic, să identifice erorile de gândire și formulările pseudoștiințifice, biasările cognitive și distorsiunile de gândire, să identifice și să evite strategiile cognitive ineficiente; - Să identifice interesele proprii și ale altor persoane, în special în context academic, să dezvolte strategii constructive de aliniere a intereselor proprii cu cele ale altor persoane, să identifice sursele posibile de conflict/opoziție, să empatizeze cu alte persoane și să comunice eficient; - Să identifice, să aleagă și să folosească instrumentele software optime pentru asigurarea productivității personale și profesionale (e.g. pentru planificare strategică, managementul proiectelor, luarea și analiza deciziilor, organizare și programare calendaristică, managementul documentelor personale și de lucru, rețelelor profesionale și sociale) în învățarea proprie și în construirea și furnizarea instrucției școlare; - Să identifice și să construiască criterii și metode de evaluare adecvate obiectivelor de învățare; <p>Să identifice și să selecteze mediile instrucționale adecvate și optime în funcție de specificul instrucției;</p> <p>Abilități dobândite: (Ce instrumente știe să mânăuiască)</p> <p>În limitele competențelor dobândite la curs, și sub restricția nivelului introductiv și de fundamentare a pregătirii inițiale pentru profesia didactică a cursului, cursantul va putea demonstra, la nivel introductiv, următoarele abilități:</p> <ul style="list-style-type: none"> - Să folosească calendare instrucționale proprii, inclusiv bazate pe stabilire de scopuri și autoreglare a învățării; - Să folosească instrumente de cunoaștere psihologică adecvate nivelului de pregătire (e.g., chestionare de aptitudini, teste, etc.), respectiv să solicite și să folosească expertiză de specialitate din partea altor profesioniști activi în câmp instrucțional (e.g., psihologi, etc.) - Să folosească instrumente software pentru gestionarea parcursului academic (curricular) în limitele și la nivelul instrucțional al cursului; - Să folosească instrumente software pentru gestionarea și calcularea ponderii criteriilor de evaluare; - Să folosească instrumente conceptuale și software pentru identificarea și/sau construirea structurilor argumentative logice și depistarea erorilor logice; <p>Să folosească instrumentele clasice și digitale de lucru colaborativ și de asigurare a comunicării școlare.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Competențe transversale</p>	<p>Adițional competențelor formate în urma dezvoltării cunoștințelor și deprinderilor descrise mai sus, cursul de psihologia educației contribuie și la următoarele competente transversale, care privesc:</p> <ul style="list-style-type: none"> - Lucru colaborativ, în grupuri/echipe mici și medii; - Lucru interdisciplinar, care include înțelegerea, folosirea, și valorificarea cunoștințelor din alte discipline (e.g., contribuie și fundamentează însușirea cunoștințelor și deprinderilor didactice și metodice); - comunicarea și leadership-ul în grupuri mici și medii; - relaționarea și integrarea în grupuri diverse sub aspect cultural și etnic; <p>managementul extins și managementul specific (învățării) al timpului</p>

8. Conținuturi

8.1 Curs	Nr. ore	Metode de predare	Observații
Introducere în Psihologia Educației: terminologie și specific educațional; complexitatea educațională; eficiența didactică, condiționalități moderne în educație.	2	Curs interactiv: expunerea; prelegerea intensificată; explicația; conversația euristică; problematizarea; dezbateră; studiu de caz; jocul de rol.	În anul universitar 2020-2021, activitățile didactice (inclusiv evaluările) se desfășoară online
Dezvoltarea umană. Teorii fundamentale privind dezvoltarea. Dezvoltarea cognitivă, dezvoltarea morală și dezvoltarea limbajului. (t. Kohler, t. Erickson)	2		
Dezvoltarea umană. Teorii fundamentale privind dezvoltarea. Dezvoltarea cognitivă, dezvoltarea morală și dezvoltarea limbajului. (t. Piaget, t. Vigotsky)	2		
Învățarea umană. Teorii fundamentale privind învățarea. Perspectiva comportamentalistă. Parte 1: Conditionarea clasică.	2		
Învățarea umană. Teorii fundamentale privind învățarea. Perspectiva comportamentalistă. Parte 2: Conditionarea operantă.	2		
Procese cognitive. Parte 1: Modelul Procesării Informaționale.	2		
Procese cognitive. Parte 2: Formarea conceptelor, Uitarea, Transferul, Gândirea.	2		
Procese cognitive. Parte 3: Rezolvarea de Probleme, Raționament (deductiv și inductiv).	2		
Procese cognitive. Parte 4: Gândire critică și argumentație științifică.	2		
Procese cognitive. Parte 5: Biasări cognitive, erori logice și distorsiuni de gândire.	2		
Emoție și emoționalitate. Stări emoționale, emoții și sentimente. Teorii fundamentale privind emoționalitatea umană. Emoții academice relevante.	2		
Motivație. Teorii fundamentale ale motivației. Perspectiva comportamentalistă. Perspectiva cognitivă. Perspectiva socio-cognitivă.	2		
Motivare și autodeterminare. Scopuri, obiective, interese, dorințe, nevoi, idealuri, aspirații, expectanțe. Aspecte didactice privind autoreglarea învățării, componente cognitive, metacognitive, comportamentale și motivaționale.	2		
Comunicarea umană. Aspecte didactice ale comunicării: atitudine asertivă vs. pasivă, agresivă și pasiv-agresivă; asertivitatea în sala de curs pentru profesor și pentru elev/student.	2		
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- Sternberg, R. J., & Williams, W. M. (2009). *Educational psychology*. Upper Saddle River, NJ: Merrill.

8.2 Seminar / laborator / proiect	Nr. ore	Metode de predare	Observații
Abordări, principii și indicații psihologice în organizarea procesului de predare și a profesiei didactice	4	Problematizare, joc de rol, dezbatere, expunere	În anul universitar 2020-2021, activitățile didactice (inclusiv evaluările) se desfășoară online
Caracteristicile predării eficiente din perspectiva psihologiei	4		
Sinele academic și constructe înrudite (locus of control, autoeficacitatea, independența)	4		
Organizarea învățării (inițiere, menținere, monitorizare, adaptare). Autoreglare în învățare	4		
Motivare și automotivare. Autodeterminare și autodirijare a învățării	4		
Comunicarea asertivă și proactivă. Rolul și caracteristicile comunicării didactice	4		
Evaluare și autoevaluare în context școlar.	4		

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9. Coroborarea conținuturilor disciplinei cu așteptările reprezentanților comunității epistemice, asociațiilor profesionale și angajatorilor reprezentativi din domeniul aferent programului

Competențele dobândite la absolvirea acestui curs permit absolventului:

- fundamentarea științifică, sub aspect profesional, a învățării și formării ulterioare în cadrul profesiei didactice, respectiv a altor forme profesionale care vizează instrucția (mentorat, tutorat, coaching, etc.);
- o gestionare mai eficientă a vieții și productivității academice personale;
- înțelegerea și asumarea standardelor profesionale specifice pregătirii și activării în domeniul educațional (inclusiv a celor derivate din percepțiile, îndrumările și reglementările Colegiului Psihologilor din România, Asociației Psihologilor Americani, European Association for International Education, European Educational Research Organization).

Cursul încorporează și ține cont de rezultatele cercetării fundamentale și aplicate în domeniul științelor învățării cât și de obiectivele, necesitățile și prioritățile educației din România (exprimate în documentele programatice și operaționale actuale).

10. Evaluare

Tip activitate	10.1 Criterii de evaluare	10.2 Metode de evaluare	10.3 Pondere din nota finală
10.4 Curs	Rezolvarea de probleme și răspunsuri pentru subiecte din teorie (criteriile de evaluare vor include corectitudinea, completitudinea, concizia, fluența și claritatea rezolvării probelor de evaluare). Include evaluare de parcurs și de final.	Probe scrise (e.g., teste grila). (online)	70%
10.5 Seminar/Laborator /Proiect	Aprecieri rezultatelor activității din timpul orelor de curs (temele de	Portofoliu individual (selectie de repere).	30%

	parcurs vor include proiecte colaborative și proiecte individuale aferente topicilor parcurse și relevante pentru formarea deprinderilor și însușirea cunoștințelor vizate). Include evaluare de parcurs.	(online)	
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10.6 Standard minim de performanță
 Obținerea unui punctaj cumulat de minim 5 puncte, calculat în urma includerii evaluărilor de curs și de aplicații descrise mai sus.

Data completării:	Titulari	Titlu Prenume NUME	Semnătura
08.04.2023	Curs	Conf.univ. dr. Ionuț Dorin STANCIU	
	Aplicații	Asistent univ. dr. Alexandra CĂLUGĂR	

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	Modern Languages and Communication
1.4	Field of study	Materials engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Materials Science/Engineering
1.7	Form of education	Full time
1.8	Subject code	102

1. Data about the subject

2.1	Subject name	English French German
2.2	Subject area	English, French, German language
2.3	Teachers in charge of seminars	Conf. dr. Sanda Pădurețu – Lb. engleză Sanda.Paduretu@lang.utcluj.ro
2.4	Professor in charge with the discipline	Conf. dr. Sanda Pădurețu
2.5	Year of study	I
2.6	Semester	2
2.7	Assessment	V
2.8	Subject category	DC/DO

3. Estimated total time

Year / Sem	Name of the discipline	Nr. weeks	Courses			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 (English) and A1 / A2 (French) (cf. CEFR - Common European Framework of Reference for Languages)

5. Requirements (where appropriate)

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

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

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.

8.8. Contents

8.2. Applications (seminar)		Teaching methods	Notes
1	Means of transport. Bicycle / car construction	interactive. Integrated skills, flipped	Interactive board, CD Player, video project
2	The cars of the future		
3	The wind farm		
4	Types of materials		
5	Properties of materials		
6	Computer and areas of use		
7	Virtual reality systems		
8	Technical discoveries and inventions		
9	Description of objects and processes		
10	Alternative energies		
11	Behavior, culture, civilization.		
12	Types of official letters (letter requesting information / products, letter of complaint)		
13	Written assignment		

14	Oral assignment		
<p>Bibliografie</p> <p>Glendinning, E. and Alison Pohl, <i>Technology 1</i>, OUP, 2008</p> <p>Aspects of English Grammar in Technical Contexts, U.T. Press, Cluj-Napoca, 2015</p> <p>Ibbotson, M., <i>Cambridge English for Engineering</i>, CUP, 2009.</p> <p>Ioani, M., <i>Le français de la communication scientifique et technique</i>, Ed. Napoca Star, Cluj-Napoca, 2002.</p> <p>Tescula, C., <i>Le français de la technique</i>, UT.Press, Cluj-Napoca, 2005.</p> <p>File „Présenter en français” (disponibil la biblioteca facultății).</p> <p>Paris, D.; Foltete Paris, B., <i>Environnement.com</i>, CLE International, Paris, 2009.</p> <p>E. Cloose, <i>Le français du monde du travail</i>, Grenoble, PUG, 2009.</p> <p>J. L. Penfornis <i>Français.com</i>, nouvelle édition, Paris, CLE International, 2012.</p>			

9. 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		30%
				Oral exam		40%
				Practical assessment (seminar activity, homework)		30%
<p>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</p>						

Date of filling in

20.04. 2023

Professor in charge with the discipline

Conf. dr. Sanda Pădurețu

Teachers in charge of the seminar

Conf. dr. Sanda Pădurețu

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