SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**Babeş-Bolyai University**
1.2 Faculty	**Faculty of Mathematics and Computer Science**
1.3 Department	**Department of Computer Science**
1.4 Field of study	**Computers and Information Technology**
1.5 Study cycle	**Bachelor**
1.6 Study programme / Qualification	**Information Engineering**

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)			**Physics** **Fizică**				
2.2 Course coordinator			Lect. Dr. Mihai Vasilescu				
2.3 Seminar coordinator			Lect. Dr. Mihai Vasilescu				
2.4. Year of study	**I**	2.5 Semester	**I**	2.6. Type of evaluation	**E**	2.7 Type of discipline	**Compulsory DF**
2.8 Code of the discipline		MLE7003					

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	5	Of which: 3.2 course	3	3.3 seminar/laboratory	1 LP 1 S
3.4 Total hours in the curriculum	70	Of which: 3.5 course	42	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					26
Additional documentation (in libraries, on electronic platforms, field documentation)					12
Preparation for seminars/labs, homework, papers, portfolios and essays					6
Tutorship					3
Evaluations					8
Other activities:					-

3.7 Total individual study hours	55
3.8 Total hours per semester	125
3.9 Number of ECTS credits	5

4. Prerequisites (if necessary)

4.1. curriculum	•
4.2. competencies	•

5. Conditions (if necessary)

5.1. for the course	Classroom equipped with blackboard, computer and video projector

5.2. for the seminar /lab activities	Classroom equipped with blackboard General physics laboratory (mechanics, electricity, optics)

6. Specific competencies acquired

Professional competencies	C1.1 Recognizing and describing specific concepts to calculability, complexity, programming paradigms and modeling of computing and communication systems C1.2 Using specific theories and tools (algorithms, schemes, models, protocols, etc.) for explaining the structure and the functioning of hardware, software and communication systems C1.3 Building models for various components of computing systems C1.4 Formal evaluation of the functional and non-functional characteristics of computing systems C1.5 Providing theoretical background for the characteristics of the designed systems
Transversal competencies	CT1 Honorable, responsible, ethical behavior, in the spirit of the law, to ensure the professional reputation CT3 Demonstrating initiative and pro-active behavior for updating professional, economical and organizational culture knowledge

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	Fixing theoretical and practical knowledge related to fundamental physical notions, understanding physical phenomena, forming practical skills, solving simple general physics problems
7.2 Specific objective of the discipline	-Acquisition of theoretical and practical knowledge related to fundamental physical notions, physical quantities and units of measurement, the establishment of fundamental principles and laws of physics. -Explanation of physical phenomena in mechanics, electricity and optics and their mathematical description. -Learning the basic methods of solving physics problems. -Formation of practical skills for measuring physical quantities, interpreting experimental results and studying physical phenomena.

8. Content

8.1 Course	Teaching methods	Remarks
1. Kinematics of a material point: physical quantities, vectors, velocity, acceleration. Uniform rectilinear motion, uniformly varied motion and circular motion	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
2. Dynamics. Principles of dynamics, types of forces, dynamics theorems. Mechanical work and power.	Conversation; Description; Problematization; Interactive, intuitive	

Conservative and non-conservative forces	presentations (animations and ppt)	
3. Kinetic energy, potential energy, mechanical energy, the law of conservation of energy. Linear harmonic oscillations. Defining damped and forced oscillations	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
4. Static material point. Concurrent forces. Reduction of concurrent forces at the origin of a Cartesian coordinate system. The moment of a force in relation to a point and an axis. Center of gravity. Material point equilibrium.	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
5. Electrostatic field, Coulomb's law, electric field intensity. Electricity, Gauss's law. Calculation of the electric field of some load distributions.	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
6. Mechanical work in the electrostatic field. Electric potential. Relation between electric potential and field. The potential for electric power distribution. The local (differential) form of the electrostatic equations.	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
7. Electrostatic balance of charged conductors. Electrostatic pressure. Electric field emission, ion microscope, imaging method. Electrical capacity of conductors. The capacitor. Spherical and cylindrical capacitor.	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
8. Electrostatic energy of discrete and continuous distributions of electric charge. General expression of electrostatic field energy. The energy of a charged capacitor.	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
9. Electric current and conduction. Electric current intensity, current density. Continuity equation. The local form of Ohm's law.	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
10. The classical theory of electrical conduction in metals. The relationship between the electrical and thermal conductivity of metals.	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
11. Energy band structures in solids. Conductors, semiconductors, insulators; Intrinsic semiconductors. Extrinsic semiconductors	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
12. Magnetic field. Creating the magnetic field. Magnetic forces. Ampere's law. Electromagnetic induction. Faraday's law	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
13. Introduction to optics. Concepts of light throughout history. Fermat's principle	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	
14. Imaging in optical systems in the Gaussian approximation. Light scattering. Optical prism	Conversation; Description; Problematization; Interactive, intuitive presentations (animations and ppt)	

Bibliography

1. A. Hristev, Mecanica şi acustica, Editura Didactică şi pedagogică, Bucureşti, 1982
2. Al. Nicula, Gh. Cristea, S. Simon, Electricitate si Magnetism, Ed. Didactica si Pedagogica, Bucuresti, 1982
3. S. E Fris, A. V. Timoreva, Curs de fizica generala. Vol. 2, Editura Tehnica, Bucuresti, 1964

8.2 Seminar / laboratory	Teaching methods	Remarks
S1. Discussing the methods of approaching physics	logical demonstration, inductive	

problems.	deductive methods	
S2. Solving mechanics exercises	logical demonstration, inductive deductive methods	
S3. Calculation of the electric field of some charge distributions; Calculation of the electric potential of some electric charge distributions; problems	logical demonstration, inductive deductive methods, formal and numerical calculation	
S4. Applications of the Poisson and Laplace equations; Calculation of the electrostatic potential energy of some electric charge distributions; problems	logical demonstration, inductive deductive methods, formal and numerical calculation	
S5. Calculation of the electrical potential of some isolated charged conductor systems. Capacitor networks. Calculation of the electrical resistance of homogeneous and inhomogeneous conductors.	logical demonstration, inductive deductive methods, formal and numerical calculation	
S6. Solving direct current circuits; Calculating the efficiency of a direct current circuit. Problems	logical demonstration, inductive deductive methods	
S7. Solving optical problems.	logical demonstration, inductive deductive methods	
L1. Introduction; basic rules. Introduction to error calculation. Tables and graphs.	Active – participatory; students work in groups of 2-3, prepare their paper, choose the initial conditions and perform experiments. The data are recorded in the laboratory notebooks, and the results, presented in the form of tables or graphs, are correlated with the theoretical or literature ones.	
L2. Study of uniform motion.		
L3. Study of uniformly accelerated motion.		
L4. Determination of resistance by the Wheatstone bridge method		
L5. Determination of resistances by ammeter and voltmeter method		
L6. Study of the temperature dependence of the resistivity of metals and semiconductors		
L7. Verification of practical knowledge		

Bibliography

1. A. Hristev, Mecanica şi acustica, Editura Didactică şi pedagogică, Bucureşti, 1982.
2. Romulus Tetean-Vinţeler, Ioan Grosu: Electricitate şi magnetism – probleme, NapocaStar 2002
3. Papers for laboratory work are posted on the internet

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

The content of the discipline is in line with what is studied in other university centers in the country and abroad. In order to adapt to the requirements imposed by the labor market, the content of the discipline was harmonized with the requirements imposed by the specifics of pre-university education, research institutes and the business environment

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	The degree of assimilation of basic knowledge	exam (theory)	50%
10.5 Seminar/lab activities	S: Ability to use basic knowledge in problem solving	seminar activity exam (problems)	10% 15%

	L:Ability to use measuring devices, to perform experiments, to process data	essay laboratory colloquium	10% 15%
10.6 Minimum performance standards			
➢ Achievement of at least 50% of each evaluation criterion			

Date | Signature of course coordinator | Signature of seminar coordinator

16.05.2022 ....

Date of approval | Signature of the head of department

Prof. dr. Laura Dioşan

24.05.2022