

SYLLABUS

Approved,
DEAN,

1. Program Data

1.1. Institution of Higher Education	Babeş-Bolyai University
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Engineering Science
1.4. Field of Study	Electrical Engineering
1.5. Course of Study	Bachelor
1.6. Study Program	Industrial Informatics

2. Discipline Data

2.1. Discipline Name	Physics						
2.2. Course Coordinator	Ş.I.dr.fiz. Hațiegan Cornel						
2.3.1. Seminary Coordinator	Ş.I.dr.fiz. Hațiegan Cornel						
2.3.2. Laboratory Coordinator	Ş.I.dr.fiz. Hațiegan Cornel						
2.3.3. Project Coordinator							
2.4. Year of Study	I	2.5. Semester	2	2.6. Evaluation Time	E	2.7. Discipline Regime	Cmp.

3. Estimated Total Time (hours per semester of teaching activities)

3.1. Number of Hours per Week	5	from which: 3.2. Course	3	3.3. laboratory	1	3.4 seminary	1
3.4. Total Hours from the Curriculum Plan	70	from which: 3.5. Course	42	3.6. laboratory	14	3.7 seminary	14
Time Fund Distribution - hours							80 ore
Study of Handbook, Course Materials, Bibliography & Notes							50
Additional Documentation in Library, on Special E-learning Platforms & in the Field							15
Preparation of seminars/laboratories/ projects, topics, reports, portfolios & essays							9
Mentoring							4
Examination							2
Other Activities							
3.7. Total Time of Individual Study	80						
3.8. Total Hours per Semester	150						
3.9. Number of Credits	6						

4. Pre-condition (where is the case)

4.1. of Curriculum	• Mathematics, general notions in chemistry
4.2. of Competences	• Basic computer knowledge

5. Condition (where is the case)

5.1. of Course Progress	• knowledge of basic notions of physics and mathematics
5.2.1. of Seminary Progress	• course study
5.2.2. of Laboratory Progress	• knowledge of laboratory work
5.2.3. of Project Progress	•

6. Acquired Specific Competences

Professional Competences	<ul style="list-style-type: none"> • CP1 – Applying and adapting of knowledge from the field of mathematics, physics, informatics specific in the field of electrical engineering. • CP2 - Operating with specialized concepts in the field of computer technology and information technology.
Transversal Competences	<ul style="list-style-type: none"> • CT2 – Identify roles and responsibilities in a multidisciplinary team and apply effective relationship and work techniques within the team. • CT3 - Efficient use of information resources and assisted communication and training resources (internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation.

7. Discipline Objectives (coming out from the Checklist of Acquired Specific Competences)

• 7.1. General Objective of Discipline	• Knowledge of the basics of physics with applications in engineering.
• 7.2. Specific Objectives	<ul style="list-style-type: none"> • Ways of understanding the scientific concepts of physical phenomena. • The study of physical phenomena in the context of existing laws, principles and physical theories. • Experiments and ways of processing measurement results. • Statistical interpretation of measurement results.

8. Content

8.1. Course	Teaching methods	Observation
1) Newtonian mechanics 1.1 Mechanics material points. Position vectors. Speed. Acceleration. 1.2 Principles of Newtonian mechanics 1.4 Laws of conservation: momentum, kinetic moment, energy. 1.5 Movement in the central field. 1.6 Oscillations.	Exposure, problematization, heuristic conversation, explanation, challenging students to dialogue	6 hours
2) Elements of fluid mechanics. 2.1 Fluid statics. 2.2 Fluid dynamics	- / / -	2 hours
3) Analytical mechanics. 3.1 Generalized coordinates; connections, travel. 3.2 Hamilton's principle and Lagrange's equations. 3.3 Hamilton's system of canonical equations; phase space. 3.4 The Hamilton-Jacobi Equation. Liouville's theorem.	- / / -	4 hours
4) Thermodynamics. 4.1 The fundamental postulates of thermodynamics. 4.2 Principle I of thermodynamics. Applications of principle I. 4.3 Principle II of thermodynamics. 4.4 Characteristics and potential thermodynamic functions. 4.5 Phase transformations.	- / / -	6 hours
5) The basics of classical electrodynamics. 5.1 Electrostatics 5.2 Electrokinetics .Characteristic measurement units of electric current. 5.3 Magnetostatics. Magnetic field characteristics. 5.4 Maxwell's equations.	- / / -	6 hours
6) Wave theory. 6.1 The equation of waves (one-dimensional, two-dimensional and three-dimensional). 6.2 Vector waves. 6.3 The principle of wave overlap. Wave groups. 6.4 Reflection and refraction of waves. 6.5 Wave absorption. 6.6 Wave interference. 6.7 Wave diffraction.	- / / -	6 hours
7) Elastic waves. 7.1 Phase speed of elastic waves. 7.2 Propagation of elastic waves in fluids. 7.3 Elastic wave energy. 7.4 Doppler effect. 7.5 Physiological acoustics. 7.6 Ultrasound.	- / / -	4 hours
8) Electromagnetic waves. 8.1 Electromagnetic field propagation. 8.2 Reflection and refraction of waves. Fresnel's formulas. 8.3 Light interference and diffraction. 8.4 Light absorption and dispersion.	- / / -	6 hours
9) Quantum physics. 9.1 Thermal radiation. 9.2 Laws of thermal radiation. 9.3 Planck's law. 9.4 Atomic models.	- / / -	2 hours

Bibliography:

- Cornelia Moțoc- „Fizica” , vol. I, Editura ALL, 1994
- Frank S. Crawford, ș.a.- „Cursul de fizică Berkeley” , vol. I-V, Editura Didactică și Pedagogică, 1983
- Ioan Luminosu- „Fizică-elemente fundamentale” , Editura Politehnica,Timișoara, 2004
- H.D. Young -„Fizică” , Editura Didactică și Pedagogică București, 1983
- Cornel Hațiegan, Lenuța Suciuc -„Fizică Tehnologică.Teorie și Aplicații” , Editura UEM, Reșița, 2010
- Dușan Popov, Ioan Damian-„Elemente de fizică generală” , Editura Politehnica,Timișoara, 2002
- E. Luca, ș.a.- „Fizică” , Editura Didactică și Pedagogică București, 1976
- I.Bunget, ș.a.- „Compendiu de fizică” , Editura Științifică și Enciclopedică București, 1988
- I. Pop - „Fizică Generală” , Editura Didactică și Pedagogică București, 1970
- D. Halliday , R. Resnick - „Fizică” , vol. I-II, Editura Didactică și Pedagogică București, 1976

8.2.1. Seminary	Teaching methods	Observation
Measurement units. Vector calculation		2 hours
Classical mechanics applications		2 hours
Oscillation applications		2 hours
Theoretical mechanical applications		2 hours
Thermodynamics applications		2 hours
Applications considering wave theory		4 hours

Bibliography:

- Cornelia Moțoc- „Fizica” , vol. I, Editura ALL, 1994
- I. Pop - „Fizică Generală” , Editura Didactică și Pedagogică București, 1970

<ul style="list-style-type: none"> Frank S. Crawford, ș.a.- „<i>Cursul de fizică Berkeley</i>”, vol. I-V, Editura Didactică și Pedagogică, 1983 		
8.2.2. Laboratory	Teaching methods	Observation
Labor protection rules.	Group work, problem solving and discovery, linking theoretical knowledge to practical applications	B1.4 / 2 hours
Experimental study of the gravitational pendulum	- / / -	B1.4 / 2 hours
Determination of the propagation velocities of longitudinal ultrasonic waves in solids.	- / / -	B1.4 / 2 hours
Determination of latent heat of melting ice.	- / / -	B1.4 / 2 hours
Determination of focal length on converging and divergent lenses	- / / -	B1.4 / 2 hours
The study of thermal radiation. Stefan - Boltzmann law	- / / -	B1.4 / 2 hours
Completion of laboratory activity	- / / -	B1.4 / 2 hours
Bibliography: Cornel Hațiegan, Lenuța Suciu -, „ <i>Fizică Tehnologică. Teorie și Aplicații</i> ”, Editura UEM, Reșița, 2010 Gh, Radu. „ <i>Fizica – Lucrări de laborator</i> ” ., Editura UEM, Reșița, 1994		
8.2.3. Project	Teaching methods	Observation

9. Corroborating Discipline's Contents with the Expectation of the Epistemic Community Representatives, the Professional Associations and the Employers' Representatives from the Programme Corresponding Field

<ul style="list-style-type: none"> They have been established with the main employers by previous discussions at the study programme substantiation.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Weight from the final grade
10.4. Course	Debates participation	Number of interventions	5 %
	Acquired knowledge level	Exam (on paper)	40 %
10.5.1. Seminary	Activity / implication	Number of interventions	5 %
	Gained competence level	Exam (on paper)	20 %
10.5.2. Laboratory	Activity / implication	Number of interventions	10 %
	Gained competence level in practice	Interactive	20 %
10.5.3. Project	Readiness in phrasing the project stages		
	Project quality		
10.6. Performance Minimum Standard			
<ul style="list-style-type: none"> Completion of Applicative Activities (laboratory work accomplishment by the minimum grade of 5). Completion of each exams subject by the minimum grade of 5. 			

Completion Date

May 2022

Course Coordinator's Signature

Ș.I.dr.fiz. Hațiegan Cornel

Laboratory/Seminary Coordinator's Signature

Ș.I.dr.fiz. Hațiegan Cornel

Department Endorsement Date

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Chief of Department Signature

Ș.I.dr.fiz. Hațiegan Cornel