

## SYLLABUS

### 1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Construction
1.3	Department	Civil engineering
1.4	Field of study	Civil engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Civil engineering/ Engineer
1.7	Form of education	Full time
1.8	Subject code	12.00

### 2. Data about the subject

2.1	Subject name				Physics						
2.2	Subject area				Physics						
2.3	Course responsible/lecturer				S.L. Dr. Eng. Corpodean Dumitrita <a href="mailto:Dumitrita.Corpodean@phys.utcluj.ro">Dumitrita.Corpodean@phys.utcluj.ro</a>						
2.4	Teachers in charge of seminars				S.L. Dr. Eng. Corpodean Dumitrita <a href="mailto:Dumitrita.Corpodean@phys.utcluj.ro">Dumitrita.Corpodean@phys.utcluj.ro</a>						
2.5	Year of study	1	2.6	Semester	2	2.7	Assessment	E	2.8	Subject category	DF/DI

### 3. Estimated total time

3.1	Number of hours per week	3	3.2	of which, course:	2	3.3	applications:	1
3.4	Total hours in the curriculum	42	3.5	of which, course:	28	3.6	applications:	14
Individual study								hours
Manual, lecture material and notes, bibliography								14
Supplementary study in the library, online and in the field								-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								14
Tutoring								3
Exams and tests								2
Other activities								-
3.7	Total hours of individual study	33						
3.8	Total hours per semester	75						
3.9	Number of credit points	3						

### 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"> <li>• Identify common physical phenomena and explain them.</li> <li>• To express in mathematical form the text of a physical problem. To apply specific algorithms in solving problems and to interpret the obtained results from physically point of view.</li> <li>• To know some procedures for measuring specific fundamental physical quantities (directly): time, length, mass, temperature, electric current intensity, light intensity, and derivatives (by indirect measurements): speed, acceleration, energy, changed heat, mode elasticity, frequency.</li> <li>• To graphically represent the experimental data and to obtain information from the graphical representations.</li> <li>• Use computer programs to interpret physical data.</li> <li>• To compare the practical results with the theory and to draw conclusions.</li> </ul>
Cross competences	<p>The students will be able to:</p> <ul style="list-style-type: none"> <li>• To develop teamwork skills to solve real problems in physics.</li> <li>• To identify specific laws in physics in other disciplines.</li> <li>• Be able to write a scientific paper.</li> </ul>

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

7.1	General objective	Acquiring some knowledge of physics, necessary to understand the specialized disciplines and using the fundamentals of physics in applied fields related to Industrial and Agricultural Civil Constructions.
7.2	Specific objectives	<ul style="list-style-type: none"> <li>• Solving physical problems.</li> <li>• Acquisition of notions about oscillating motion, elastic waves, sound waves and ultrasound.</li> <li>• Understanding the phenomena of heat transport and moisture.</li> <li>• Graphical representation of physical quantities and extraction of information on graphic path.</li> </ul>

## 8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1. Introduction to physics. Material point mechanics: Defining and measuring physical quantities. The dimension of physical quantities. Elements of kinematics and material point dynamics.	Didactic discourse, exposure and explanation of curricular subjects, narrative-story related to the physics history and association with real life facts. Didactic conversation (heuristics and catechetic) in which the students are involved. Demonstration of physical laws in mathematical form and using objects to	
2. Position and displacement vector. Vector speed. Acceleration vector. The law of motion in uniform and uniformly varied motion. Galileo's equation. Speed in curvilinear motion. Acceleration in curvilinear motion.		
3. Circular motion. The law of motion. Angular speed. Uniform circular motion. Angular acceleration. Uniformly varied circular motion. The connection between angular quantities and linear quantities in uniform circular motion. The vector character of angular quantities.		
4. Dynamics. Newton's Law 1 <sup>st</sup> (Law of Inertia). The principle of Galilean relativity. Newton's second law (Fundamental law of dynamics). The impulse of bodies. Newton's Third Law (Law of Mutual Actions). Mechanical work. Energy. Mechanical power.		

5. Law of energy conservation. Impulse conservation law. The moment of force. The kinetic moment. The law of conservation of kinetic moment.	represents the physical phenomena at reduced scale. Demonstration with technical means like multimedia presentations (Power Point presentation on PC, video-projections). Problematization (problematize) presentations of laws and principles of general physics with situations from real life, and situations from the future work of students. Role-play by students under the teaching supervision for some basics physical experiments/ Problematization, demonstration demonstration Online Exposure - TEAMS	
6. Types of forces. The law of universal attraction. Gravitational force. The weight. Friction force. The elastic force. The inertial forces.		
7. Oscillatory motion. Harmonic oscillations. Damped oscillations.		
8. Oscillatory motion. Forced oscillations. Resonance. Superposition of oscillations.		
9. Waves in elastic environments: The speed of longitudinal and transverse waves. The equation of plane harmonic waves. Attenuation of elastic waves.		
10. Wave phenomena: Huygens' principle. Reflection and refraction of waves. Wave interference. Wave diffraction.		
11. Acoustics: Stationary waves. Sound waves. Wave pressure. Wave intensity and wave strength. Sound level and hearing level. Sound characteristics. Doppler effect. Ultrasounds.		
12. Elements of photometric optics.		
13. Elements of thermodynamics. Temperature. The heat. Specific heat. Internal energy. Principles of Thermodynamics. Thermal machine efficiency.		
14. Heat transport phenomena. Thermal conduction. Thermal convection. Thermal radiation.		
Bibliography		
1. E. Culea, S. Nicoara, Fundamentals of Physics, RISOPRINT, Cluj-Napoca 2004. 2. Radu Fechete, Elemente de fizica pentru ingineri, Editura UT Press, 227 pg., ISBN 978-973-662-375-2 (2008). 3. I.Ardelean, Fizica pentru ingineri, Ed. UTPres, 2005. ( <a href="http://nmr.utcluj.ro/teaching/">http://nmr.utcluj.ro/teaching/</a> ). 4. Illoara Coroiu, Eugen Culea, Fizica, Edf. U.T. Pres, 1999. 5. Ileana Lupsa, Fizica I. 6. Gh. Cristea, I. Ardelean, Elemente fundamentale de Fizica Vol I (Mecanica, Căldura, Termodinamica), Ed. Dacia. 7. Gh. Cristea, I. Ardelean, Elemente fundamentale de Fizica II (Electricitate, Magnetism), Ed. Dacia. 8. Cursul de Fizica Berkeley, Vol I – Mecanica, Ed. Didactica si Pedagogica, 1981. 9. T.I.Cretu, Fizica-curs universitar, Ed. Tehnica, 1996. 10. E. Luca&colectiv, Fizica, Ed. Didactica si Pedagogica, 1981. 11. O. Pop & colectiv Fizica I, Litografia Politehnicii Cluj-Napoca, 1987. Enciclopedia educationala de la adresa: <a href="http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html">http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html</a>		
8.2. Applications/Seminars	Teaching methods	Notes
S1. Problems of kinematics of the movement of the material point.	Problematization, Dialogue, Demonstration Exposition, / Problematization,	
S2. Problems of dynamics of the movement of the material point.		
S3. Problems of calculation of mechanical work, energy and power.		

S4. Problems of oscillations and mechanical waves.		
S5. Acoustics problems.		
S6. Thermodynamic problems.		
S7. Thermal conductivity. Thermal radiation. Thermal convection. Evaluation of heat transfer coefficients through multi-layer partitions.		
Bibliography		

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

The discipline is a fundamental one, ensuring the knowledge and skills necessary to understand the specialized disciplines in the field of civil engineering.

**10. Evaluation**

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Correctness of fundamental knowledge in the field of Physics with applications in Construction.	Onsite: 2-hour written test containing complex questions.	70 %
10.5 Applications	Ability (skills) to solve specific problems in the field of Physics with applications in Construction / Ability to build practical projects alone or in a team.		30 %
10.6 Minimum standard of performance			
$G \geq 5$ (five)			
Date of filling in:		<b>Title Surname Name</b>	<b>Signature</b>
	Course	Lecturer Dr. Eng. Corpodean Dumitrita	
	Applications	Lecturer Dr. Eng. Corpodean Dumitrita	

Date of approval in the Council of Civil engineering Department

Head of Physics and Chemistry Department

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Date of approval in the Council of Faculty of Constructions

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Prof.dr.ing. Daniela Lucia Manea

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