SYLLABUS [1]

1. Information about the program

1.1 Higher education institution	Politehnica University of Timişoara
1.2 Faculty[2]/ Department [3]	Civil Engineering / Fundamentals of Physics for Engineers
1.3 Chair	—
1.4 Field of study (name/code[4])	Civil Engineering/80
1.5 Study cycle	bachelor
1.6 Study program (name/code/qualification)	Civil Engineering in English/10/Engineer

2. Information about the discipline

2.1 Name of discipline/ formative category[5]	Physics / DF						
2.2 Coordinator (holder) of course activities	Pretorian Simona						
2.3 Coordinator (holder) of applied activities[6]	Pretorian Simona						
2.4 Year of study[7]	1	**2.5** Semester	2	**2.6** Type of evaluation	E	**2.7** Type of discipline[8]	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [9]

3.1 Number of fully assisted hours / week	4 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	2
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	28
3.4 Number of hours partially assisted / week	of which:	**3.5** training		**3.6** hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	**3.5*** training		**3.6*** hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	2 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			0,5
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			0,5
3.7* Number of hours of unassisted activities / semester	28 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			7
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			7
3.8 Total hours / week [10]	6				
3.8* Total hours /semester	84				
3.9 Number of credits	3				

4. **Prerequisites** (where applicable)

4.1 Curriculum	• Mathematical analysis, Algebra and geometry (may be taken concurrently)

[1] The form corresponds to the Discipline File promoted by OMECTS 5703 / 18.12.2011 and to the requirements of the ARACIS Specific Standards valid from 01.10.2017.
[2] The name of the faculty which manages the educational curriculum to which the discipline belongs
[3] The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.
[4] The code provided in HG no.140 / 16.03.2017 or similar HGs updated annually shall be entered.
[5] Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).
[6] Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[7] Year of studies in which the discipline is provided in the curriculum.
[8] Discipline may have one of the following regimes: imposed discipline (DI), optional discipline (DO) or optional discipline (Df).
[9] The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.
[10] The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.2 Competencies	• Algebraic, vectorial, integral and differential calculus, basic high school physics

5. Conditions (where applicable)

5.1 of the course	• large classroom, laptop, projector, internet access, blackboard/whiteboard
5.2 to conduct practical activities	• Seminar room, blackboard/whiteboard / lab with specific experimetal stands and devices, computers with specific softwares, blackboard/whiteboard

6. Specific competencies acquired through this discipline

Specific competencies	• Aquire knowledge of the main principles and laws of physics
Professional competencies ascribed to the specific competencies	• Design of structural elements in civil engineering, specific to graduated study programme • Complying to quality and sustainable requirements for civil, industrial and agricultural constructions
Transversal competencies ascribed to the specific competencies	• Documentation in Romanian and foreign language, in view of professional and personal development, via continuous learning and efficient adaptation to the new technical specifications

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• Understand and use argued techniques, concepts and fundamental principles of physics to explain, interpret and solve problems-aspects of engineering
7.2 Specific objectives	• Knowledge of the main principles and laws of physics; • Ability to process and network physical phenomena using fundamental laws of physics in order to understand technical issues, multidisciplinary technological aspects; • Ability of applying the most appropriate mathematical techniques –algoritms for modeling physical phenomena at the formal interface between physics and engineering; solve problems involving physics knowledge using analytical and numerical methods; • Ability to obtain experimental information, organize them, analyze and interpret, draw conclusions;

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
INTRODUCTION Models and methods in physics; Unit systems.	2	lecture, explanations, examples, demonstrations, simulations,
NEWTONIAN MECHANICS Newton's laws; Gravitational force, friction force, centripetal force, inertial force; Movement of a mass point in a force field, initial	13	

[11] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".
[12] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

conditions; Energy, work, torque, angular momentum, moment of inertia; Theorems snd consevation laws.		benchmarking, problematization for individual study
OSCILLATIONS AND ELASTIC WAVES Simple Harmonic Motion; Superposition of two simple harmonic oscillations; Damped and Forced Oscillations; Waves equations; Energy; Interference, reflection and refraction, standing waves, attenuation, dispersion, (Doppler effect); Seismic waves; Acoustics and ultra-acoustics elements .	12	
THERMODYNAMICS Laws of themodynamics;Thermodynamic processes for ideal gas.	6	
ELECTRODYNAMICS Electric charge; Electric field sources, magnetic field sources; Electric current; Electromagnetic waves, characteristic phenomena. Thermal radiation.	9	
Bibliography [13] V.Dorobanţu, S.Pretorian , *Physics Between Fear and Respect*, Politehnica Publishing House, Timisoara 2009 Richard P. Feynman, Robert B. Leighton, Matthew Sands, *The Feynman lectures on physics ,* Addison-Wesley 1963; http://www.feynmanlectures.caltech.edu/I_toc.html , http://www.feynmanlectures.caltech.edu/II_toc.html , http://www.feynmanlectures.caltech.edu/III_toc.html		
8.2 Applied activities [14]	Number of hours	Teaching methods
Seminar: 1. Scalar and vector physical quantities-examples, symbolic and numerical calculus. Calculus and graphs for motion laws, velocity laws, accelerations, forces ; 2.The movement of a mass point under the action of weight; 3. Applications for forces, work, kinetic energy, potential energy, conservation laws; 4. Calculus and problematization for simple harmonic motion and superposition of two simple harmonic oscillations 5. Planar elastic waves-calculus and interpretation of the main characteristic quantities; 6. Thermodynamic transformations; Calculus of electric field and magnetic field for simple cases; 7.Numerical applications, estimations for pioneering results of modern physics and quantum theory	2 2 2 2 2 2 2	Examples, discussion, explanations, problematization, homework
Laboratory Experimentarium – experiments and explanations Mechanical modeling of Gauss and / or Maxwell statistical distribution laws; The electron's specific charge; Measurements for spring elastic constant evaluation; Photoelectric effect and Planck constant evaluation; Temperature Dependence of Semiconductor Resistance; Presentation of the Experimentarium essay, results revision and final	2 2 2 2 2 2	experiment in teams of 5-6 students as a practical example of some phenomena and physical laws, as a concrete demonstration of them using a theoretical aiding material,

[13] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.
[14] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".

discution	2	analysis and interpretation of the results within the team, by graphical and comparative representations, error analysis between teams.

Bibliography [15] Sears and Zemansky's, *University Physics*, 12th edition, 2008, Pearson Education (Sears, Zemansky and Young, *Fizică* (in Romanian),Editura Didactică şi Pedagogică, Bucureşti, 1983 -in UPT' Library); S. Pretorian, Elemente de fizică în probleme rezolvate şi propuse, Politehnica Publishing House, Timişoara, 2005 - selective translation http://www.et.upt.ro .

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- Knowledge of the main principles, laws and methods of physics develop necessary skills to understand, explain and interpret problems in civil engineering and for multidisciplinary technological situations.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Knowledge of the main principles and laws of physics and ability to process and network physical phenomena using fundamental laws of physics	Written exam, lasting 3 hours. Approximate structure of exam topics: 2 broader theoretical subjects and 4 short questions, aiming to state physical laws, with the appropriate formula, indicating units of measure, verifying dimensional relationships, etc.	2/3
10.5 Applied activities	**S:** Ability to solve known problems of engineering physics, to address some with finality still open, to argue; Homeworks;	Written tests, homework evaluation, answers and activity at the blackboard during the seminar	½ of 1/3
	L: Ability to properly use measuring devices, to organize experimental data, to analyze and interpret	Grade on each laboratory work + Experimentarium essay	½ of 1/3
	P[17]**:**		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [18])			
• Knowledge of the main principles and laws of physics; • Seminar: Ability to solve known problems of engineering physics taught in class; • Laboratory: Ability to properly use measuring devices, to organize experimental data and to calculate errors.			

Date of completion **Course coordinator (signature)** **Coordinator of applied activities (signature)**

[15] At least one title must belong to the discipline team.
[16] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)
[17] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.
[18] It will not explain how the promotion mark is awarded.

25.01.2018		
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Head of Department (signature)	**Date of approval in the Faculty Council [19]**	**Dean (signature)**
	12.02.2018	
……		……

[19] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.