Subject content

1. Program information

1.1 University	West University of Timisoara
1.2 Faculty	Physics
1.3 Department	Physics
1.4 Study direction	Physics
1.5 Study cycle	Master
1.6 Study program	Advanced research methods in physics

2. Subject matter information

2.1 Subject matter				Complements of Theoretical Physics			
2.2 Subject teacher				Lect.dr Ion Cotaescu			
2.3 Subject applications teacher				Lect.dr. Victor Ambrus			
2.4 Study year	1	2.5 Semester	1	2.6 Assessment type	Ex	2.7 Subject type	Ob **ARMP 1101**

3. Study time distribution

3.1 Nr. of hours/week	4	In which: 3.2 course	2	3.3 seminar/lab	2
3.4 Total hours in educational plan	56	In which: 3.5 curs	28	3.6 seminar	56
Time distribution:					**hours**
Study after lecture notes, bibliography or notes					65
Additional documentation in the library, electronic specialty platforms/ field					18
Seminar / laboratory preparations, homework, portfolio and essays					39
Tutoring					4
Exams					3
Other activities……					

3.7 Total number of personal study hour	**119**
3.8 Total number of hours in semester	**175**
3.9 Number of credits	**7**

4. Preconditions (where appropriate)

4.1 curriculum	●
4.2 skills	●

5. Conditions (where appropriate)

5.1 for course	• Mathematics
5.2 for seminar/lab	• Mathematics

6. Course Objectives

Cunoștințe	-to know the advanced notions in the field of Physics, which involves a critical understanding of theories and principles -to know the working formulas for calculations with physical quantities using properly the principles and laws of physics -to know the language specific to the field -to know physical phenomena and interpret them by formulating hypotheses and operationalizing key concepts and the appropriate use of laboratory equipment
Abilități	-to deduce the working formulas for calculations with physical quantities, using appropriately the principles and laws of physics -To describe physical systems using specific theories and tools (experimental and theoretical models, algorithms, schemes, etc.) -to apply the principles and laws of physics in solving theoretical or practical problems, under conditions of qualified assistance
Responsabilitate și autonomie	-participate in some concrete physics experiments -to be autonomous in the context of handling laboratory equipment, including in situations requiring an interdisciplinary approach - to autonomously use information sources and resources for communication and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation

7. Table of content

7.1 Course	Teaching methods	Observations
1. Newtonian mechanics. Notions of rigid solid mechanics, moments of inertia, symmetry.	Exposition, demonstration, heuristic conversation	Course support and bibliographic materials will be sent to students by e-mail
2. Theoretical mechanics. Lagrange and Hamilton equations, the principle of minimum action, conservation laws.	Exposition, demonstration, heuristic conversation	

3. Quantum mechanics. Schrodinger equation. Principles of quantum mechanics, operators and eigenvalues.	Exposition, demonstration, heuristic conversation	
4. The magnetic moment and the spin.	Exposition, demonstration, heuristic conversation	
6. Elements of perturbation theory.	Exposition, demonstration, heuristic conversation	
7. Lorentz transformations and special relativity.	Exposition, demonstration, heuristic conversation	

Bibliography
1. Serban Titeica, Mecanica Cuantica (Editura Academiei R.S.R. 1984).
2. A. Messiah, Mecanica Cuantica (Editura Stiintifica 1973).
3. I Cotaescu, Curs de mecanica cuantica (Tipografia Universitatii din Timisoara 1990).
4. Arno Bohm, Quantum Mechanics (Springer-Verlag 1994)
5.Viorica Florescu, Tudor Marian, Mircea Zaharia, Probleme de Mecanica Cuantica (Univ. Bucuresti 1986)
6. L. Landau, E.M. Lifsit, Mecanica cuantica. (Editura Tehnica, Bucuresti 1968) .

7.2 Seminar(S) / labs(L)	**Teaching methods**	**Observations**
1. Inertial reference systems, Galileo transformations, coordinate systems.	Conversation, investigation, case study.	
2. The problem of the two bodies, the movement in the central field, conservation laws.	Conversation, investigation, case study.	
3. Harmonic oscillator.	Conversation, investigation, case study.	
4. Hydrogen atom, quantum numbers.	Conversation, investigation, case study.	
5. ½ Spin, Schrodinger-Pauli equation.	Conversation, investigation, case study.	
6. Some calculations of perturbations to simple stationary systems.	Conversation, investigation, case study.	
7. Diamagnetism and paramagnetism.	Conversation, investigation, case study.	
8. Theory of special relativity problems.	Conversation, investigation, case study.	

Bibliography
1. Serban Titeica, Mecanica Cuantica (Editura Academiei R.S.R. 1984).
2. A. Messiah, Mecanica Cuantica (Editura Stiintifica 1973).
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8. Relation between subject content and the expectations of employers

Theoretical physics gives work skills in domain topics and related topics in which the future graduate could work. Mainly related with physics, chemistry, material science, etc., will be useful in practice.

9. Assessment

Activity type	10.1 Assessment criteria	10.2 Assessment method	10.3 Percent in final mark
10.4 Course	The assimilation level of knowledge gained	Oral examination	60%
10.5 Seminar / labs	Capacity of solving specific problem	Written test	40%
10.6 Minimum performance standards			
-To know the basic terminology -To correct address three topics, even if they cannot develop completely; -Do not make major mistakes.			

Data completării:
30.09.2024

Titular de disciplină:
Lect.dr.Ion Cotaescu

Data avizării în department:

Director de departament
Conf. dr. Ștefu Nicoleta