

FIȘA DISCIPLINEI
1. Informations about program

1.1 Institution	WEST UNIVERSITY OF TIMISOARA
1.2 Faculty	FACULTY OF PHYSICS
1.3 Department	PHYSICS DEPARTMENT
1.4 Domain for university master studies	EXCACT SCIENCE
1.5 Level of study	MASTER
1.6 Study directions / calification	PHYSICS AN TECHNOLOGY OF ADVANCED MATERIALS

2. Informations about discipline

2.1 Subject matter	OPTICAL SPECTROSCOPY OF ADVANCED MATERIALS						
2.2 Course	Lector dr. Marius Ștef						
2.3 Seminar	-						
2.4 Laboratory	Lector dr. Marius Ștef						
2.5 Year of study	2	2.6 Semester	1	2.7 Type of evaluation	E	2.8 Subject category	Op-

3. The total estimated time (hours of teaching activities on semester)

3.1 Number of teaching hours on week	4	from which 3.2. course	2	seminar		3.3 laborato ry	2
3.2. Number of teaching hours on semester	56	from which course	28	seminar		laborato ry	28
3.3. Time distribution:							hours
Study of course notes, tutorials, bibliography and other notes							22
Supplementary study in library, on media etc.							14
Preparation of seminars / laboratory, homework, reports, portofolio and essay							14
Tutoring							14
Exams							4
Other activities.....							
3.4 Total hours of individual study	68						
3.5 Total hours on semester ¹	56						
3.6 Credits	8						

¹ Numărul total de ore nu trebuie să depășească valoarea (Număr credite) x 27 ore

4. Preconditions (where appropriate)

4.1 of curriculum	<ul style="list-style-type: none"> • Bazele spectroscopiei și laserilor • Fizica atomului și moleculei • Optică
4.2 of competences	<ul style="list-style-type: none"> •

5. Condition (where appropriate)

5.1 of the course	<ul style="list-style-type: none"> • laptop • projector
5.2 of the seminars	-
5.3 of the laboratory	<ul style="list-style-type: none"> • computer • experiment set-up

6. Specific competences

Professional competences	<ul style="list-style-type: none"> • Capacity of analyze and synthesize (adaptability to new situation, realization of synthesis and comparisons, correlations and propinquity). • Basic knowledge (thermodynamics of crystallization) • Basic knowledge necessary to profess (presentation, dialog) • Knowledge of foreign languages (English) • Theoretical understanding (of evolution of basic concepts in physics of crystallization) • Deep understanding (of basic notions, of physical parameters) • Experimental skills (the understanding of experiments) • Computational skills (PC uses for research, data acquisition) • Culture in Physics domain • Bibliography investigation • Learning skills • Skills for team working • The capacity to transfer the acquired knowledge in practical applications • Capacity to plan and organize experimental or theoretical applications • Capacity of solving characteristic problems for real physical systems. • Capacity of critical evaluations and auto evaluation. • Capacity of communication inside a group
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Transversal competences	<ul style="list-style-type: none"> effective use of information sources, communication resources and training assistance (Internet portals, specialized software, data bases, online courses, etc..) both in romanian and in a foreign language (english)
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7. Objectives (reieșind din grila competențelor specifice acumulate)

7.1 Main objective	<ul style="list-style-type: none"> Acquiring basic knowledge about optical spectroscopy
7.2 Specific objectives	<ul style="list-style-type: none"> To develop the capacity to analyze and synthesize Correlation with the basic knowledge acquired in other related disciplines

8. Contents

8.1 Course	Teaching methods	Observations
1. The interaction of radiation with substance	Exposure	2 hours
2. Optical spectroscopy	Exposure	2 hours
3. Devices and techniques in optical spectroscopy. Spectrophotometer and Spectrofluorimeter	Exposure	2 hours
4. Beer-Lambert Law. Absorption coefficient	Exposure	2 hours
5. Shape and bandwidth of a spectral band	Exposure	2 hours
6. Recording and preparing of optical absorption spectra	Exposure	2 hours
7. The principles of group theory. The symmetry of molecules	Exposure	2 hours
8. The classical theory of emission, absorption and scattering of electromagnetic radiation	Exposure	2 hours
9. The quantum theory of emission, absorption and scattering of electromagnetic radiation	Exposure	2 hours
10. Interpretation and analysis of optical absorption spectra	Exposure	2 hours
11. FTIR-Spectroscopy	Exposure	2 hours
12. Recording and analyzing of emission and excitation spectra.	Exposure	2 hours

13. Quantum yield. Stokes and anti-Stokes shift	Exposure	2 hours
14. Applications of optical spectroscopy	Exposure	2 hours
References		
1. M. Ștef, I. Nicoară, <i>Caracterizarea defectelor de structură cristalină</i> , Ed. Marineasa, Timișoara, 2009		
2. I. Nicoară, <i>Defecte de structură în cristale</i> , Ed. Mirton, Timișoara, 2003		
3. S. Amelinckx, <i>The direct observations of dislocations</i> , Acad. Press, N.Y. 1964		
4. A.A.Kaminskii, <i>Laser Crystals, Their Physics and Properties</i> , Springer-Verlag, Barlin/Heidelberg/New York, 1981		
5. I.Nicoară, D.Nicoară, <i>Cristale artificiale</i> , Ed.Mirton, Timișoara, 1999		
6. Y. Quere, <i>Physics of materials</i> , Gordon and Breach Science Publishers, 1998.		
7. W. Fowler, <i>Physics of color centers</i> , Acad. Press, 19688. B. Henderson, R. Bartram, “Crystal-Field Engineering of Solid-State Laser Materials”, Cambridge University Press, 2000		
8.2 Seminar		
8.3 Laboratory		
	Teaching methods	Observations
1. Labor protection	Demonstrative experiment	2 hours
2. Optical instruments used in optical spectroscopy.		2 hours
3. The study of molecular symmetry elements and operations using Diamond software		2 hours
4. Recording, processing and analysis of UV-VIS absorption spectra of materials with biomedical applications		4 hours
5. Recording, processing and analysis of IR absorption spectra of materials with biomedical applications		4 hours
6. Recording, processing and analysis of UV-VIS emission and excitation spectra of materials with biomedical applications		4 hours
7. Gaussian, Lorentzian and Voigt multi-peaks fit of absorption bands		4 hours
8. Gaussian, Lorentzian and Voigt multi-peaks fit of emission bands		4 hours
9. Sedintă de recuperare		2 hours

9. Evaluation

Activity	Evaluation criteria	Evaluation methods	Percentage of final mark
9.1 Curse	answers at exams (final evaluation)	oral	50%
9.2 Seminar			
9.3 Laboratory	final answers at laboratory	oral	25%

	activities		
	tests along the laboratories	oral	25%
9.4 Minimum performance standards			
correct formulation of the proposed subject without demonstrations			

Data completării:
03.09.2016

Semnătura titularului de curs:
Lect. Dr. Marius ȘTEF

Semnătura titularului de seminar/laborator:
Lect. Dr. Marius ȘTEF

Semnătura directorului de departament
Conf. Dr. Mihail LUNGU