

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University, Cluj-Napoca
1.2 Faculty	Physics
1.3 Department	Department of the Condensed Matter Physics and Advanced Technologies
1.4 Field of study	Physics
1.5 Study cycle	Master
1.6 Study programme / Qualification	Solid State Physics

2. Information regarding the discipline

2.1 Name of the discipline		Experimental methods I					
2.2 Course coordinator		Lect. Dr. Roxana Dudric					
2.3 Seminar coordinator		Lect. Dr. Roxana Dudric					
2.4. Year of study	1	2.5 Semester	1	2.6. Type of evaluation	C	2.7 Type of discipline	DS

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	0	3.3 seminar/laboratory	4
3.4 Total hours in the curriculum	56	Of which: 3.5 course	0	3.6 seminar/laboratory	56
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					30
Additional documentation (in libraries, on electronic platforms, field documentation)					30
Preparation for seminars/labs, homework, papers, portfolios and essays					36
Tutorship					10
Evaluations					4
Other activities:					-
3.7 Total individual study hours		110			
3.8 Total hours per semester		166			
3.9 Number of ECTS credits		5			

4. Prerequisites (if necessary)

4.1. curriculum	<ul style="list-style-type: none"> Solid State Physics
4.2. competencies	<ul style="list-style-type: none"> Experimental methods

5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none">
5.2. for the seminar /lab activities	<ul style="list-style-type: none"> Seminar hall with table and video projector, access to the research equipments from the Institute of Physics of UBB

6. Specific competencies acquired

Professional competencies	<ul style="list-style-type: none"> Using of advanced knowledge of physics, mathematics and chemistry of solids for study in Solid State Physics and Materials Science. Individual planning and implementation of the experimental investigations and assessing of the obtained results from the perspective of their uncertainty. Ability to use basic research laboratory equipment and industrial laboratory for conducting research experiments. Capitalization of physical fundamentals, of methods and tools of solid state physics and materials science for specific production activities, expertise and monitoring. Mindset multi-and interdisciplinary.
Transversal competencies	<ul style="list-style-type: none"> Ability to communicate complex scientific ideas, conclusions derived from experimental investigations or results obtained during a scientific project. Achievement of the proposed professional tasks in an efficient and responsible way keeping in minds the effective laws and deontological rules. Applying the work methods that conduct to efficient results in a multidisciplinary team on diverse levels. Effective use of information sources and communication resources and training assistance, both in Romanian and in a foreign language

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	<ul style="list-style-type: none"> Acquiring theoretical and experimental notions concerning the preparation methods and structural characterization techniques in condensed matter physics
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> The students will learn several sample preparation methods for bulk materials and thin films. The students will be able to perform structural and morphological investigations on materials.

8. Content

8.1 Course	Teaching methods	Remarks
8.1.		
8.2 Seminar / laboratory	Teaching methods	Remarks
1. Introduction. General notions about planning an experiment, logbook, tables and graphs.	Presentation, debate, experiment	4 hours
2. Preparation methods for polycrystalline solids: arc-melting, induction melting, solid state synthesis, sol-gel, mechanochemical synthesis		16 hours
3. Preparation methods for thin films		4 hours
4. X-ray diffraction measurements on the prepared samples		8 hours
5. Rietveld analysis of the diffraction patterns		4 hours
6. Metallographic (microstructure) characterization		4 hours

7. SEM and EDX		4 hours
8. AFM and STM		4 hours
9. Data analysis		4 hours
10. Project presentation		4 hours
Bibliography		
[1] C. Kittel, Introduction to Solid State Physics, 7th ed., Wiley, 1996.		
[2] Ashcroft N. W., Mermin N. D., Solid State Physics, Holt-Saunders International Editions Tokyo, 1981.		
[3] V. Pop, I. Chicinaș, N. Jumătate, Fizica Materialelor. Metode experimentale, Presa Universitară Clujeană, 2001		
[4] I. Pop, V. Niculescu, Metode experimentale în studiul corpului solid, Ed. Acad. București, 1971		
[5] Vitalij K. Pecharsky and Peter Y. Zavalij, Fundamentals of Powder Diffraction and Structural Characterization of Materials, Second Edition, Springer 2009		
[6] Handouts		

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

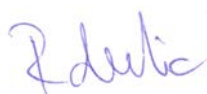
- The content of the discipline is in accordance with the subjects who are studied in the same field in romanian and foreign universities and with the specific demands of research institutes, economy and labour market.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course			
10.5 Seminar/lab activities	Basics: knowledge and understanding of concepts, basic principles of experimental methods.	Public presentation on an imposed theme.	50
	The quality of the prepared samples and of the experimental measurements	Supervising all activities	25
	Capacity to apply the learned knowledge in analysing the data.	Discussions	25
10.6 Minimum performance standards			
<ul style="list-style-type: none"> • To be present at minimum 75% of laboratories • Planning and carrying out an experiment 			

Date
01.02.2019

Signature of course coordinator



Signature of seminar coordinator



Date of approval

Signature of the head of department

Prof. Dr. Romulus Tetean

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