

SYLLABUS ¹

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

1.1 Higher education institution	Politehnica University Timisoara
1.2 Faculty ² / Department ³	Mechanical Engineering/IMF
1.3 Chair	—
1.4 Field of study (name/code ⁴)	Materials Engineering /40
1.5 Study cycle	Master
1.6 Study program (name/code/qualification)	Advanced Materials and Technologies / 10

2. Information about discipline

2.1 Name of discipline/The educational classe ⁵	Advanced materials in engineering / specialization disciplines.						
2.2 Coordinator (holder) of course activities	Assoc.Prof. Dr.Eng. CDREAN Cosmin						
2.3 Coordinator (holder) of applied activities ⁶	Assoc.Prof. Dr.Eng. CDREAN Cosmin						
2.4 Year of study ⁷	1	2.5 Semester	2	2.6 Type of evaluation	E	2.7 Type of discipline ⁸	DCAV

3. Total estimated time (direct activities (fully assisted), partially assisted activities and unassisted activities⁹)

3.1 Number of hours fully assisted/week	3 ,of which:	3.2 course	2	3.3 seminar/laboratory/project	1
3.1* Total number of hours fully assisted/sem.	42 ,of which:	3.2* course	28	3.3* seminar/laboratory/project	14
3.4 Number of hours partially assisted/week	,of which:	3.5 project, research		3.6 training	3.7 hours designing M.A. dizertation
3.4* Number of hours pasrtially assisted/ semester	,of which:	3.5* project of research		3.6* training	3.7* hours designing M.A. dizertation
3.8 Number of hours of unassisted activities/ week	3 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field			1
		Study using a manual, course materials, bibliography and lecture notes			1
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays			1
3.8* Total number of hours of unasssited asctivities/ semester	42 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field			14
		Study using a manual, course materials, bibliography and lecture notes			14
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays			14
3.9 Total hrs./week ¹⁰	6				
3.9* Total hrs./semester	84				
3.10 No. of credits	6				

4. Prerequisites (where applicable)

4.1 Curriculum	<ul style="list-style-type: none"> Materials Science
4.2 Competencies	<ul style="list-style-type: none"> The association of knowledge, principles and methods of technical sciences domain with graphics for solving specific tasks

¹ The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex 3), updated based on the Specific Standards ARACIS of December 2016.

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 Fill in the code provided in HG no. 376/18.05.2016 or in HG similars annually updated.

⁵ The educational classes of disciplines (ARACIS – specific standards, art./paragraph 4.1.2.a) are: fundamental disciplines, field disciplines, majoring/specialization disciplines.

⁶ The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

⁷ The year of study to which the discipline is provided in the curriculum .

⁸ The types of disciplines (ARACIS – specific standards, art./paragraph 4.1.2.a) are: extended knowledge discipline / advanced knowledge discipline and synthetic discipline (DA / DCAV and DS) or art./paragraph 4.1.2 b) complementary discipline (DC)).

⁹ Within UPT, the number of hours from 3.1*, 3.2*,...,3.9* are obtained by multiplying by 14 (weeks) the number of hours from 3.1, 3.2,..., 3.9.

¹⁰ The total number of hours/week is obtained by summing up the number of hours from 3.1, 3.4 și 3.8.

5. Conditions (where applicable)

5.1 of the course	<ul style="list-style-type: none"> Lecture room equipped with whiteboard, projector and projection screen
5.2 to conduct practical activities	<ul style="list-style-type: none"> Laboratory of developing advanced materials; laboratory for characterization of amorphous and advanced materials

6. Specific competencies acquired through this discipline

Specific competencies	<ul style="list-style-type: none">
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> C1. Advanced materials, phase transformations and specific structures
Transversal competencies ascribed to the specific competencies	<ul style="list-style-type: none">

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

7.1 The general objective of the discipline	<ul style="list-style-type: none"> Knowledge of the stage of the art and trends in the production and characterization of advanced engineering materials
7.2 Specific objectives	<ul style="list-style-type: none"> Presentation of the main categories of advanced materials, structural and functional, revealing of the specific elements of investigation and characterization of advanced materials as well as of the main fields of application

8. Content

8.1 Course	Number of hours	Teaching methods
1. Defining advanced materials. Characterization and development trends	2	The teaching methods used are: lecture, demonstration, presentation slides, open discussion
2. Sintered metallic materials	2	
3. Amorphous and nanocrystalline metallic materials	4	
4. Metallic materials with special properties (superalloys, shape memory alloys, metallic foams)	6	
5. High performance polymeric materials	4	
6. Advanced ceramic materials	4	
7. Composite materials	6	

Bibliography¹¹ 1. Codrean, C., Uțu, D., Buzdugan, D., Șerban, V.A., Materiale metalice avansate – Aplicații practice, Ed. Politehnica, Timișoara, 2016
 2. Șerban, V.A, Răduță, A., Știința și ingineria materialelor, Ed. Politehnica, Timișoara, 2014.
 3. C. Codrean, V.A. Șerban, D. Uțu, Amorphous and nanocrystalline alloys, VDM Verlag Dr. Mueller Aktiengesellschaft&Co.KG, 2009.
 4. Codrean C., Șerban V.A., Metale amorfe și nanocrystaline, Ed. Politehnica, Timișoara, 2007.
 5. Crăciunescu C.M., Micro și nanoingineria aliajelor cu memoria formei, Ed. Politehnica, Timișoara, 2005
 6. Crăciunescu C.M., Materiale compozite, Ed. Sedona, 1998

8.2 Applied activities ¹²	Number of hours	Teaching methods
1. Modern methods of investigation and characterization of advanced metallic materials	2	The teaching methods used are: lecture, demonstration, presentation slides, demonstration experiment, open discussion
2. Structure and properties of sintered metallic materials with special properties	4	
3. Structure and properties of ceramic and polymeric materials	2	
4. Structure and properties of composite materials	2	
5. Obținerea și caracterizarea aliajelor amorfe și nanocrystaline	4	

Bibliography¹³ 1. Codrean, C., Uțu, D., Buzdugan, D., Șerban, V.A., Materiale metalice avansate – Aplicații practice, Ed. Politehnica, Timișoara, 2016
 2. Șerban, V.A, Răduță, A., Știința și ingineria materialelor, Ed. Politehnica, Timișoara, 2014.
 3. C. Codrean, V.A. Șerban, D. Uțu, Amorphous and nanocrystalline alloys, VDM Verlag Dr. Mueller Aktiengesellschaft&Co.KG, 2009.
 4. Codrean C., Șerban V.A., Metale amorfe și nanocrystaline, Ed. Politehnica, Timișoara, 2007.
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9. Coroboration 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

- The course provides understanding and using concepts on the development and characterization of advanced materials, so allows the student to assess and solve technical problem regarding processed materials

10. Evaluation

Type of activity	10.1 Evaluation criteria ¹⁴	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Note 5 is granted for 50% knowledge of each subject and grade 10 for 100% knowledge of each subject	Written exam	66%
10.5 Applied activities	S: Note 5 is granted for the correct answer to 50% of questions and 10 for the correct answer to all	Periodically testing by means of questionnaires	34%

¹¹ At least one title must belong to the department staff teaching the discipline, and at least one title must refer to a relevant work for the discipline, a national and international work that can be found in the UPT Library.

¹² The types of applied activities are those mentioned in 5. If the discipline contains more types of applied activities then they are marked, consecutively, in the table below. The type of activity will be marked distinctively under the form: „Seminar:”, „Laboratory:”, „Project:” and/or „Practice/Training:”.

¹³ At least one title must belong to the staff teaching the discipline.

¹⁴ The Syllabus must contain the evaluation method of the discipline, specifying the criteria, the methods and the forms of evaluation, as well as mentioning the share attached to these within the final mark. The evaluation criteria must correspond to all activities stipulated in the curriculum (course, seminar, laboratory, project), as well as to the methods of continuous assessment (homework, essays etc.)

	questions		
	L:		
	P:		
	Pr:		
	Tc-R¹⁵:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified ¹⁶)			
<ul style="list-style-type: none"> • Passing the exam requires a minimum amount of knowledge of 50% of the total volume of knowledge 			

Date of completion

25.11.2020

**Course coordinator
(signature)**

**Coordinator of applied activities
(signature)**

**Head of Department
(signature)**

**Date of approval in the Faculty
Council ¹⁷**

**Dean
(signature)**

¹⁵ Tc-R= Homework-Reports

¹⁶ For this point turn to "Ghid de completare a Fişei disciplinei" found at: http://univagora.ro/m/filer_public/2012/10/21/ghid_de_completare_fisa_disciplinei.pdf

¹⁷ The approval is preceded by discussing the study program's board's point of view with redgards to the syllabus.