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 / 170
1.5 Study cycle	Bachelor
1.6 Study program (name/code/qualification)	Materials science / 10

2. Information about the discipline

2.1 Name of discipline/ formative category[5]	Amorphous metals/ DS						
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]	4	**2.5** Semester	7	**2.6** Type of evaluation	D	**2.7** Type of discipline[8]	DO

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	3 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	1
3.1* Total number of fully assisted hours / semester	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** 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	3 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	42 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			14
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			14
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	• Materials science I and II,

[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.

	• Elaboration and solidification of materials, • Metallic materials
4.2 Competencies	• Associating knowledge, principles and methods in the technical sciences of the field with graphical representations for solving specific tasks • Evaluation and optimal solution of technical problems related to processed materials, by applying concepts, theories and experimental methods

5. Conditions (where applicable)

5.1 of the course	• Lecture room equipped with whiteboard, projector and projection screen
5.2 to conduct practical activities	• Laboratory of developing amorphous alloys; laboratory for characterization of amorphous alloys

6. Specific competencies acquired through this discipline

Specific competencies	•
Professional competencies ascribed to the specific competencies	• Evaluation and optimal solution of technical problems related to processed materials, by applying concepts, theories and experimental methods • Carrying out technical evaluation activities on issues related to sustainable development in the field of materials industries
Transversal competencies ascribed to the specific competencies	•

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

7.1 The general objective of the discipline	• Evaluation and optimal solution of technical problems related to amorphous alloys, by applying concepts, theories and experimental methods
7.2 Specific objectives	• Acquiring knowledge on the characteristics of amorphous metals and the correlation atomic arrangement - structure - properties for this category of advanced materials • Knowledge of processing methods as well as the fields of application of amorphous metals

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
1. The structure of amorphous metals (Structural states; Metastable structures: quasi-amorphous structure, amorphous structure;)	2	The teaching methods used are: lecture, demonstration, presentation slides,
2. Thermodynamics and kinetics of the formation of metallic materials with amorphous structure (Glass transition, Factors that	4	

[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.).

determine the capacity of amorphization, Families of amorphous alloys)		open discussion
3. Methods for obtaining amorphous metal alloys by deposition and by solid state reactions	2	
4. Methods for obtaining amorphous alloys by rapid solidification of the melt (Melt-spinning methods, Melt extraction methods, Methods for casting bulk amorphous alloys)	6	
5. Thermal stability of amorphous alloys (Crystallization temperature, Heating transformations, Kinetics of crystallization of amorphous metals	4	
6. Heat treatments applied to amorphous alloys	2	
7. Properties of amorphous alloys (Mechanical property; Physical property; Chemical properties)	4	
8. Applications of amorphous metal alloys (Applications as soft magnetic materials; Applications as high strength materials; Applications in composite materials; Applications as corrosion resistant materials; Applications as brazing alloys)	4	
Bibliography [13] 1. Codrean C., Șerban V.A., Metale amorfe și nanocristaline, Ed. Politehnica, Timișoara, 2007. 2. Călin Mariana, s.a., Materiale amorfe și nanocristaline, Ed. Printech, 1999 3. Gâdea Suzana, s.a., Aliaje amorfe, Ed. Științifică și enciclopedică, 1988		

8.2 Applied activities [14]	Number of hours	Teaching methods
1. Structural analysis of amorphous metals by X-ray diffraction	2	The teaching methods used are: lecture, demonstration, presentation slides, demonstration experiment, open discussion
2. Construction of TTT crystallization diagrams. Determination of the critical cooling rate for amorphization	2	
3. Determination of the chemical composition of master-alloy	2	
4. Elaboration of amorphous alloys in the ribbons form. The principle of the method, installation, technological parameters	2	
5. Elaboration of bulk amorphous alloys in the rods form. The principle of the method, installation, technological parameters.	2	
6. Determination of thermal stability and activation energy of amorphous metal crystallization	4	
Bibliography [15] 1. Codrean C., Șerban V.A., Metale amorfe ăi nanocristaline, Ed. Politehnica, Timișoara, 2007. 2. Călin Mariana, s.a., Materiale amorfe și nanocristaline, Ed. Printech, 1999 3. Gâdea Suzana, s.a., Aliaje amorfe, Ed. Științifică și enciclopedică, 1988		

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

- The course ensures the understanding and use of the notions regarding the elaboration and characterization of amorphous alloys, so that it allows the graduate to evaluate and solve the optimal technical problems related to processed materials as well as to carry out technical evaluation activities on issues related to sustainable development in the materials industries.

10. Evaluation

[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".
[15] At least one title must belong to the discipline team.

Type of activity	**10.1** Evaluation criteria [16]	**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 questions	Periodically testing by means of questionnaires	34%
	L:		
	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])			
• 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)

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Coordinator of applied activities (signature)

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Head of Department (signature)

……

Date of approval in the Faculty Council [19]

Dean (signature)

……

[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.

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