SYLLABUS [1]

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

1.1 Higher education institution	University Politehnica Timisoara
1.2 Faculty[2]/ Department [3]	Mechanical Faculty for Engineering/Materials and Manufacturing Engineering
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]			Surface Engineering / DD				
2.2 Coordinator (holder) of course activities			Assoc.Prof. Dragos Utu				
2.3 Coordinator (holder) of applied activities[6]			Assoc.Prof. Dragos Utu				
2.4 Year of study[7]	4	**2.5** Semester	7	**2.6** Type of evaluation	E	**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	5 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	3
3.1* Total number of fully assisted hours / semester	70 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	42
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	4.64 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			2
		training seminars / laboratories, homework and papers, portfolios and essays			1.64
3.7* Number of hours of unassisted activities / semester	65 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			28
		training seminars / laboratories, homework and papers, portfolios and essays			23
3.8 Total hours / week [10]	9.64				
3.8* Total hours /semester	135				
3.9 Number of credits	5				

4. **Prerequisites** (where applicable)

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[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.

4.1 Curriculum	•
4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	• Large classroom, Support materials, projector, Blackboard
5.2 to conduct practical activities	• Laboratory, whiteboard

6. Specific competencies acquired through this discipline

Specific competencies	•
Professional competencies ascribed to the specific competencies	• Production, processing and characterization of materials • • Technical and technological design of processes specific to the chemical and materials industries; ensuring and controlling the quality of the products • Performing calculations, demonstrations and applications to solve specific tasks of engineering and management based on knowledge in fundamental and engineering sciences
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	• The course and laboratory works aim at acquiring by students the theoretical and practical elements regarding the processes that appear on the metal surface (corrosion, wear, residual stresses and material fatigue), as well as the knowledge of methods and procedures to prevent them (deposition of layers , surface treatments, etc
7.2 Specific objectives	• It is considered the knowledge of the fundamental principles necessary for the understanding of the phenomena that appear in the systems surface layer substrate within the engineering materials

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
General aspects about surface engineering. Definition and objectives, technologies specific to surface engineering, characteristics and properties	4	Speech, demonstration, presentation of demonstration slides, free discussions
Corrosion. Definition, types of corrosion, corrosion mechanism, corrosion kinetics, corrosion protection methods	8	
Fatigue of materials. Introduction aspects, factors influencing fatigue, methods to improve fatigue resistance	4	
Wear of materials. Introduction aspects, categories of wear, methods	5	

[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.).

of protection against wear		
Coatings deposition using thermal spraying	4	
Protective layers deposited by welding	3	

Bibliography [13]

1. I.D.Utu, I. Mitelea, Introducere in Ingineria Suprafetelor, Editura Politehnica, 2018
2. Udrescu L., Tratamente de suprafaţă şi acoperiri, Ed. Politehnica, Timişoara, 2000
3. Handbook, Surface Engineering, vol. 5, ASM International,. 1994

8.2 Applied activities [14]	Number of hours	Teaching methods
Investigation of the structure of protective coatins by optical and electron microscopy	2	Speech, demonstration, presentation of demonstration slides, experiments, free discussions
Phases identification by X-Ray diffraction	2	
Structure and properties of thermochemically treated steels	2	
Protective layers deposited by welding and cladding	2	
Deposition methods of thermal spray protective coatings. Structure and properties of thermally sprayed coatings. Methods for testing thermally sprayed layers	8	
Evaluation of the corrosion, fatigue and wear behavior of materials	6	
Deposition of thin layers by PVD and CVD processes	2	
Determination of conventional surface hardening depth	2	

Bibliography [15]

1. Şerban, V.A, Răduţă, Codrean, C.,Uţu D., Opriş C.,Materiale şi tehnologii primare în experimente, Ed. Politehnica, Timişoara, 2013
2. Codrean C., I.D Utu, D. Buzdugan, V.A. Serban, Materiale metalice avansate –Aplicatii practice, Editura Politehnica, 2016
3. M. Popescu, C. Marta, A. Magda, A. Voicu, C. Locovei, A. Dupta, Acoperiri termice si reconditionari, teme experimentale, Editura Politehnica, 2008

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 knowledge acquired in the discipline "Surface Engineering" is important for the curriculum of the bachelor's field "Materials Engineering" because it ensures the acquisition / use of specific concepts for the design and manufacturing of technical systems, engineering materials and industrial processes.
- Many employers in the field of the license program require knowledge and skills in the field of changing the surface characteristics of parts and components in order to increase their operating performance.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Solving some theoretical topics related to the courses	Distributed examination	66 %
10.5 Applied activities	**S:**		
	L: Solving problems for laboratories	Written and oral examination	34 v%
	P[17]**:**		

[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.
[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.

	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])			
• Knowledge, expression and correct use of base aspects and principles. Solving and explaining applications of medium complexity			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
	……	……
Head of Department (signature)	**Date of approval in the Faculty Council [19]**	**Dean (signature)**
……		……

[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.