

# SYLLABUS<sup>1</sup>

## 1. Information about the program

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

## 2. Information about the discipline

2.1 Name of discipline	Particulate and cellular materials						
2.2 Coordinator (holder) of course activities	Assoc. Prof. Dr. Eng. NICOARA Mircea						
2.3 Coordinator (holder) of applied activities <sup>5</sup>	Assoc. Prof. Dr. Eng. NICOARA Mircea						
2.4 Year of study <sup>6</sup>	I	2.5 Semester	1	2.6 Type of evaluation	E	2.7 Type of discipline	mandatory

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

3.1 No. of hrs. / week	4 , of which:	3.2 course	2	3.3 seminar/laboratory/ project/training	2
3.4 Total no. of hrs. in the education curricula	56 , of which:	3.5 course	28	3.6 applied activities	28
3.7 Distribution of time for individual activities related to the discipline					hrs.
Study using a manual, course materials, bibliography and lecture notes					28
Additional documentation in the library, on specialized electronic platforms and on the field					7
Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays					14
Tutoring					7
Examinations					2
Other activities					2
<b>Total hrs. of individual activities</b>					<b>60</b>
3.8 Total hrs. / semester <sup>7</sup>	116				
3.9 No. of credits	10				

## 4. Prerequisites (where applicable)

4.1 Curriculum	<ul style="list-style-type: none"> <li>Materials science, Heat treatments</li> </ul>
4.2 Competencies	<ul style="list-style-type: none"> <li>Basic knowledge about materials fabrication and characterization of materials</li> </ul>

## 5. Conditions (where applicable)

5.1 of the course	<ul style="list-style-type: none"> <li>Lecture room with projector</li> </ul>
5.2 to conduct practical activities	<ul style="list-style-type: none"> <li>PM laboratory, optical and SEM microscopy</li> </ul>

## 6. Specific competencies acquired

<sup>1</sup> The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).

<sup>2</sup> The name of the faculty which manages the educational curriculum to which the discipline belongs.

<sup>3</sup> The name of the department entrusted with the discipline, and to which the course coordinator / holder belongs.

<sup>4</sup> Fill in the code provided in GD no. 493/17.07.2013.

<sup>5</sup> The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

<sup>6</sup> The year of study to which the discipline is provided in the curriculum.

<sup>7</sup> It is obtained by summing up the number of hrs. from 3.4 and 3.7.

Professional competencies <sup>8</sup>	<ul style="list-style-type: none"> <li>• Competences to select and design appropriate cellular and granular materials material for specific applications</li> <li>• Characterization of structural/functional properties of component/structure</li> </ul>
Transversal competencies	<ul style="list-style-type: none"> <li>• Capacity to analyze and synthesize</li> <li>• Communication skills – conception of scientific essay, oral presentations using slides</li> <li>• Capacity to collaborate in working teams</li> </ul>

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

7.1 General objective of the discipline	<ul style="list-style-type: none"> <li>• Inform about basic principle about fabrication of specific classes of advanced materials</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• Confer skills to operate modern investigation techniques</li> <li>• Provide competence in numerical modelling of properties for specific classes of advanced materials</li> </ul>

### 8. Content

8.1 Course	No. of hours	Teaching methods
1. Fabrication and characterization of micro- și nano-powders.	6	Lecture/debates
2. General principles for fabrication of particulate materials.	6	Lecture/debates
3. Classification and properties of particulate materials. - Particulate materials with controlled porosity: filters, low-friction materials etc.  - Particulate materials for tools: high alloyed steels, hardmetals, cermets etc..  - Dispersion hardened materials and composites	8	Lecture/debates
4. Cellular materials: – general principles, fabrication, properties and applications - Metallic and ceramic foams  - Polymeric foams	8	Lecture/debates

<sup>8</sup> The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Național al Calificărilor din Învățământul Superior RNCIS] ([http://www.rncis.ro/portal/page?\\_pageid=117,70218&\\_dad=portal&\\_schema=PORTAL](http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL)) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

Bibliography <sup>9</sup> 1. A. Bose, W.B. Eisen – <i>Hot Consolidation of Powder and Particulates</i> , MPIF, Princeton NJ 2003		
2. C. Bernhardt – <i>Granulometrie</i> , DVGI Leipzig 1998,		
3. J. Banhart, M.F. Ashby, N.A. Fleck - <i>Cellular metals and metal foaming technology</i> , Verlag MIT, Bremen 2001.		
<b>8.2 Applied activities<sup>10</sup></b>	<b>No. of hours</b>	<b>Teaching methods</b>
Determining the granulometric fraction of powders	2	Presentation/Experiment
Metallographic analysis of micro- and nano-powders.	4	
Metallographic analysis of cellular materials	4	
Thermal and dilatometry analysis of fabrication processes for cellular and particulate materials.	4	
Methods for property characterization of cellular materials.	4	
Structural and morphological characterization by mean of image analysis	4	
Applications of cellular and particulate materials.	6	Presentations/debates
Bibliography <sup>11</sup> 1. A. Bose, W.B. Eisen – <i>Hot Consolidation of Powder and Particulates</i> , MPIF, Princeton NJ 2003		
2. C. Bernhardt – <i>Granulometrie</i> , DVGI Leipzig 1998,		
3. J. Banhart, M.F. Ashby, N.A. Fleck - <i>Cellular metals and metal foaming technology</i> , Verlag MIT, Bremen 2001.		

**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**

<ul style="list-style-type: none"> <li>Content of course and applications is continuously updated with expectations of prominent employers and contributions presented by scientific literature</li> </ul>
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**10. Evaluation**

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share of the final grade
<b>10.4 Course</b>	Assimilation of information and understanding basic principle of fabrication and characterization of cellular and particulate materials	Combined examination essay / questionnaire examination with 3 types of questions (67% of final qualification) - questionnaire with questions having 1 correct answer (40% of final score) questionnaire with questions having more than 1 correct answer (20% of final score) - explanations and commentaries on some schemes (20% of final score)	67%
<b>10.5 Applied activities</b>	<b>S:</b>		33%
	<b>L:</b> Active participation at experimental activities PowerPoint presentation of literature research on a specific theme	Oral presentation of experimental results Oral presentation of the literature research project	13% 20%
	<b>P:</b>		
	<b>Pr:</b>		

<sup>9</sup> At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.

<sup>10</sup> The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:“, „Laboratory:“, „Project:“ and/or „Practice/Training:“.

<sup>11</sup> At least one title must belong to the staff teaching the discipline.

**10.6** Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)

- 40% of maximum score

**Date of completion**

December 11, 2015

**Course coordinator  
(signature)**

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**Coordinator of applied activities  
(signature)**

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**Head of Department  
(signature)**

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**Date of approval in the Faculty  
Council<sup>12</sup>**

**Dean  
(signature)**

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<sup>12</sup> Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparține programul de studiu cu privire la fișa disciplinei.