

# COURSE GUIDE – short form

Academic year 2017-2018

Course name <sup>1</sup>	<b>Heating processes bases</b>					Course code	2SM12DI S		
Course type <sup>2</sup>	DID	Category <sup>3</sup>	DI	Year of study	II	Semester	II	Number of credit points	3

Faculty	Of Materials Science and Engineering	Number of teaching and learning hours <sup>4</sup>						
Field	Materials Engineering	Total	L	T	LB	P	IS	
Specialization	Materials Processing Engineering	42	14	-	14	-	14	

Pre-requisites from the curriculum <sup>5</sup>	Compulsory	Not applicable
	Recommended	Not applicable

General objective <sup>6</sup>	Processing of a metallic or non-metallic charge in the furnace and outside it, in view of obtaining of a smelting that to determine castings performances.
Specific objectives <sup>7</sup>	Analysis, in detail, of general technological procedure of processing of a metallic and non-metallic charge, in a furnace and outside it, for obtaining of melting – charge preparing, furnace preparing, charging, smelting, superheating of the metallic bath, metallurgical treatment of the metallic bath (in furnace and outside it) and evacuation.

Course description <sup>8</sup>	<ol style="list-style-type: none"> <li>1. History of alloys manufacturing, beginning with bronze and to superalloys.</li> <li>2. Metallurgical system of manufacture <ol style="list-style-type: none"> <li>2.1 Structure</li> <li>2.2 Interactions among parts of the metallurgical system – examples.</li> <li>2.3 Manufacture technological procedure – short presentation of the stages</li> </ol> </li> <li>3. Charge preparation. Analytical calculation of the proportion of chemical element and metallic kinds from the charge.</li> <li>4. Furnace preparation. Classifications of the furnaces <ol style="list-style-type: none"> <li>4.1 Cupola. Sketch</li> <li>4.2 Induction furnace. Sketch</li> <li>4.3 Electric arc furnace. Sketch</li> </ol> </li> <li>5. Furnace charging</li> <li>6. Smelting <ol style="list-style-type: none"> <li>6.1 Smelting mechanism</li> <li>6.2 Oxidation processes</li> <li>6.3 Slag – definition and formation</li> <li>6.4 Smelting with total oxidation</li> <li>6.5 Smelting with partial oxidation</li> <li>6.6 Smelting without oxidation</li> <li>6.7 Dephosphorization of ferrous alloys</li> </ol> </li> <li>7. Superheating in liquid state <ol style="list-style-type: none"> <li>7.1 role of the superheating and phenomena of reduction /oxidation - boiling.</li> <li>7.2 Desulphurization. Example for a ferrous metallic bath – with lime and Mn.</li> <li>7.3 Deoxidation by precipitation, diffusion and physical methods.</li> <li>7.4 Alloyage</li> </ol> </li> <li>8. Evacuation</li> <li>9. Metallic bath treatment outside furnace <ol style="list-style-type: none"> <li>9.1 Bubbling with inert gases</li> <li>9.2 Treatment with synthetic slags</li> <li>9.3 Treatment in vacuum</li> <li>9.4 Inoculation</li> </ol> </li> </ol> <p>There are 4 laboratory works.</p>
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Assessment		Schedule <sup>9</sup>	Percentage of the final grade (minimum grade) <sup>10</sup>
Continuous assessment	Class tests along the semester	W5, 10 and 14	10% (at least 5 mark)
	Activity during laboratory work	w1-w14	40% (at least 5 mark)
	Homework	w12	10% (at least 5 mark)
Final assessment	Final assessment form <sup>11</sup>   colloquium	W14	40% (at least 5 mark)
	Examination procedures and conditions: Oral exam, exam tickets. A ticket contains three exam subjects. It is required that two topics must be marked with marks of at least 5. Mark exam passage must be at least 5. Examination takes place if the lab, homework and each of the three tests have a proportion mark of at least 5, only.		

Course organizer	Vasile Cojocaru Filipiuc, dr. eng., prof.	
Teaching assistants	Raluca Florea , dr., eng., assist.	

<sup>1</sup>Course name from the curriculum

<sup>2</sup> DF – fundamental, DID – in the field, DS – specialty, DC – complementary (from the curriculum)

<sup>3</sup> DI – imposed, DO –optional, DL – facultative (from the curriculum)

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<sup>4</sup> Points 3.8, 3.5, 3.6a,b,c, 3.7 from the Course guide – extended form (L-lecture, T-tutorial, LB-laboratory works, P-project, IS-individual study)

<sup>5</sup> According to 4.1 – Pre-requisites - from the Course guide – extended form

<sup>6</sup> According to 7.1 from the Course guide – extended form

<sup>7</sup> According to 7.2 from the Course guide – extended form

<sup>8</sup> Short description of the course, according to point 8 from the Course guide – extended form

<sup>9</sup> For continuous assessment: weeks 1 – 14, for final assessment – colloquium: week 14, for final assessment-exam: exam period

<sup>10</sup> A minimum grade might be imposed for some assessment stages

<sup>11</sup> Exam or colloquium