SYLLABUS[1]

1. Information about the program

1.1 Higher education institution	University Politehnica Timisoara
1.2 Faculty[2] / Department[3]	Mechanics/Materials Engineering and Fabrication (IMF)
1.3 Chair	—
1.4 Field of study (name/code[4])	Materials Engineering/170
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			Heat and Mass Transfer Modeling				
2.2 Coordinator (holder) of course activities			conf. dr. ing. Bogdan RADU				
2.3 Coordinator (holder) of applied activities [5]			conf. dr. ing. Bogdan RADU				
2.4 Year of study[6]	I	**2.5** Semester	1	**2.6** Type of evaluation	E	**2.7** Type of discipline	Optional

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
Total hrs. of individual activities	60

3.8 Total hrs. / semester[7]	116
3.9 No. of credits	7

4. Prerequisites (where applicable)

4.1 Curriculum	• Mathematics, Materials science, Heat treatments
4.2 Competencies	• The course develops skills in advanced methods of investigating and quality control of materials

5. Conditions (where applicable)

5.1 of the course	• Course room with projector
5.2 to conduct practical activities	• Laboratory room with computer network

6. Specific competencies acquired

[1] The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).
[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 GD no. 493/17.07.2013.
[5] The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] The year of study to which the discipline is provided in the curriculum.
[7] It is obtained by summing up the number of hrs. from 3.4 and 3.7.

Professional competencies[8]	• Finite element analysis for solving thermal field and coupled fields developed in advanced materials processing.
Transversal competencies	• Solving problems of interaction between heat sources and force fields in processing advanced materials.

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

7.1 General objective of the discipline	• Basic knowledge for simulating mass transfer and heat fields, coupled or not with stress/strain fields, generated during processing advanced materials
7.2 Specific objectives	• Solving medium complexity problems of heat and mass transfer

8. Content

8.1 Course	No. of hours	Teaching methods
Basic concepts in finite element analysis	4	Lecture/discussion
Temperature field and mass transfer	4	Lecture/discussion
Numerical simulation of stationary thermal fields	6	Lecture/discussion
Numerical simulation of transitive thermal fields	6	Lecture/discussion
Numerical simulation of coupled fields	6	Lecture/discussion
Design optimization with finite element analysis	2	Lecture/discussion
Bibliography[9] 1. Zienkiewicz, O. C., Taylor, R. L. – The Finite Element Method – volume 1: The Basis, 5th edition, Butterworth-Heinemann Publishing House, Oxford 2002 2. Zienkiewicz, O. C., Taylor, R. L. – The Finite Element Method – volume 2: Solid mechanics, 5th edition, Butterworth-Heinemann Publishing House, Oxford 2002 3. Zienkiewicz, O. C., Taylor, R. L. – The Finite Element Method – volume 3: Fluid Dynamics, 5th edition, Butterworth-Heinemann Publishing House, Oxford 2002		
8.2 Applied activities[10]	No. of hours	Teaching methods
Preprocessing environment	2	Problem solving
Using the preprocessor for simplified model	2	Problem solving
Meshing of the simplified geometrical model	2	Problem solving

[8] 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 Naţional al Calificărilor din Învăţământul Superior RNCIS] (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.

[9] 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.

[10] 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:".

Loads and constrains of the simplified model	2	Problem solving
Visualization and analysis of the results using the postprocessor	2	Problem solving
Thermal file analysis in a part. Temperature distribution in a mold	4	Problem solving
Temperature analysis in a oven heated part. Temperature filed in a quenched part	4	Problem solving
Temperature field in a superficial quenched part. Temperature field in a welded joint	4	Problem solving
Temperature and stress-strain fields in a quenched part	2	Problem solving

Bibliography [11] 1. Zienkiewicz, O. C., Taylor, R. L. – The Finite Element Method – volume 1: The Basis, 5th edition, Butterworth-Heinemann Publishing House, Oxford 2002

2. Zienkiewicz, O. C., Taylor, R. L. – The Finite Element Method – volume 2: Solid mechanics, 5th edition, Butterworth-Heinemann Publishing House, Oxford 2002

3. Zienkiewicz, O. C., Taylor, R. L. – The Finite Element Method – volume 3: Fluid Dynamics, 5th edition, Butterworth-Heinemann Publishing House, Oxford 2002

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 discipline is correlated with expectation of employers, professional associations and other colleagues from teaching staff.

10. Evaluation

Type of activity	**10.1** Evaluation criteria	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Mark 5 – knowledge of 50% of the exam subjects and 10 for 100% of the exam subjects	Written examination	2/3
10.5 Applied activities	**S:**		
	L: Mark 5 – knowledge of 50% of the exam subjects and 10 for 100% of the exam subjects	Written examination	1/3
	P:		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)			
• Knowing of min. 50% of the course knowledge			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
10.04.2013	……	……
Head of Department (signature)	**Date of approval in the Faculty Council[12]**	**Dean (signature)**
……		……

[11] At least one title must belong to the staff teaching the discipline.
[12] Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparţine programul de studiu cu privire la fişa disciplinei.