a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM208Y02	*Semester*	8
Course title	**Heat treatment of metallic materials**		

Independent teaching activities	*Weekly teaching hours*	*ECTS*
Lectures	3	6.0
Laboratory exercises	2	

Course type	Knowledge deepening/consolidation
Course category	Compulsory for Direction 2
Prerequisite courses	-
Language of instruction and examinations	Greek
Is the course offered to Erasmus students	No
Course website (url)	https://eclass.uniwa.gr/courses/MECH145/

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:

- Distinguish the basic techniques of metallic materials heat treatment
- Identifies the properties of heat threated metallic materials
- Analyzes and recognize microstructure and mechanical properties of metallic materials before and after specific heat treatment sequences
-Selects tool steel for a given mechanical application
- Suggests appropriate heat treatments for a given steel tool
- Designs based on requirements / technical specifications the heat treatment sequences of metallic materials, in order to improve their mechanical properties
- Implements heat treatment of steels
- Evaluates the results of heat treatment
- Propose corrective suggestions to avoid heat treatment failure

b2. General competences

- Search for, analysis and synthesis of data and information with the use of the appropriate technology
- Autonomous work
- Decision making
- Team work
- Design and assessment of a given project
- Ability to critize and self- criticism

c) Syllabus

Introduction to heat treatment of metallic materials, Atoms diffusion, Diffusion mechanisms, Steels, Phase diagrams in equilibrium of steels, Steel Microstructure, Microstructure transformation during steels heating and cooling, Effect of alloying elements on steels properties, Heat treatment sequences based on atoms diffusion (Annealing), Quenching and tempering, Isothermal Transformation (IT Diagrams), Continuous cooling transformation (CCT Diagrams), Superficial heat treatments, Technical facts of tool steels/Steelmaker prospects, Heat treatment of nonferrous alloys.

<table>
<tr><td colspan="3">d) Teaching and learning methods - Evaluation</td></tr>
<tr><td>Delivery</td><td colspan="2">Face-to-face</td></tr>
<tr><td>Use of information and communications technology</td><td colspan="2">- Commercial/free/open source software
- Multimedia applications
- MS Teams/Moodle/eclass
- Open courses</td></tr>
<tr><td rowspan="7">Teaching methods</td><td>Activity</td><td>Semester workload</td></tr>
<tr><td>Lectures</td><td>36</td></tr>
<tr><td>Tutorials</td><td>13</td></tr>
<tr><td>Laboratory exercises</td><td>36</td></tr>
<tr><td>Computational exercises</td><td>13</td></tr>
<tr><td>Individual work</td><td>36</td></tr>
<tr><td>Course total</td><td>134</td></tr>
<tr><td>Student performance evaluation</td><td colspan="2">- Theory (50%): Open book written exam
- Lab (50%): Open book written exam (25%) and technical report based on implemented l heat treatment sequences (25%).</td></tr>
<tr><td colspan="3">e) Suggested bibliography</td></tr>
<tr><td colspan="3">1. Callister D. W. Jr., Rethwisch G. D. (2014). Materials science and engineering, 8th Ed., John Wiley & Sons, Inc.,USA.</td></tr>
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