

COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
DEPARTMENT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDER GRADUATE		
COURSE CODE	2302509	SEMESTER	2 nd
COURSE TITLE	Quality Control and Technology of Construction Materials		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS	
Lectures	2	6	
Laboratory	3		
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General Background Course		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)	http://moodle.teipir.gr		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i> 																			
<p>Upon the successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Know the basic construction materials and their properties. 2. Choose and apply the most appropriate for each case materials. 3. Solves most of the problems have learned. 4. Check the quality and suitability of construction materials 																			
<p>General Competences</p> <p><i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i></p> <table border="0"> <tr> <td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td> <td><i>Project planning and management</i></td> </tr> <tr> <td><i>Adapting to new situations</i></td> <td><i>Respect for difference and multiculturalism</i></td> </tr> <tr> <td><i>Decision-making</i></td> <td><i>Respect for the natural environment</i></td> </tr> <tr> <td><i>Working independently</i></td> <td><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i></td> </tr> <tr> <td><i>Team work</i></td> <td><i>Criticism and self-criticism</i></td> </tr> <tr> <td><i>Working in an international environment</i></td> <td><i>Production of free, creative and inductive thinking</i></td> </tr> <tr> <td><i>Working in an interdisciplinary environment</i></td> <td>.....</td> </tr> <tr> <td><i>Production of new research ideas</i></td> <td><i>Others...</i></td> </tr> <tr> <td></td> <td>.....</td> </tr> </table>		<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>	<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	<i>Team work</i>	<i>Criticism and self-criticism</i>	<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>	<i>Working in an interdisciplinary environment</i>	<i>Production of new research ideas</i>	<i>Others...</i>	
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(3) COURSE CONTENT

<p>Theory:</p> <p>Introduction: Historical and economic development of construction materials. Criteria for the selection and suitability of materials. Physical, chemical, mechanical, thermal, acoustic and electromagnetic properties of materials.</p> <p>Standardization in building materials: Standardization, controlling, testing. Material specifications. European standards.</p> <p>Rocks and natural stones: Geological distinction, mineralogical composition, controlling and testing of rocks. Categories of stones. Marble. Causes of destruction, means of protection and maintenance of natural stones.</p> <p>Aggregates: Origin, production, mining, processing, classification. Characteristic properties. Sieve analysis. Regulations for standard curves. Suitability, controlling, testing of aggregates. Correction of characteristics of aggregate mixtures. Fineness modulus of aggregates. Special categories of aggregates. Computational exercises in aggregates.</p> <p>Binders: Categories. Production methods. Mechanisms of setting and hardening. Current regulations. Clays. Lime. Magnesite cement. Plaster. Resins. Cement. Production. Mechanisms of setting and hardening. Controlling and testing. Cement Regulations. Special</p>

cement categories.
 Mortars: Categories, composition, properties, characteristics. Suitability criteria. Controlling and testing. Specifications - Regulations.
 Concrete: Categories of concrete. Classification criteria. Cement and aggregates used. Raw material for concrete. Concrete Technology Regulation. Concrete mix design calculations. Physicomechanical and chemical properties of concrete. Control methods. Workability of concrete and calculation methods. Penetration Test, Vebe.
 Concrete durability: carbonation mechanisms, penetration of chlorides, sulfate reactions, exposure to high temperatures, alkali-silica reaction in relation to the vulnerability of aggregates. Corrosion, technological measures for protection and prevention of corrosion mechanisms, rehabilitation methods for construction.
 Special concrete: High performance concrete, ready mix concrete (properties - applications). Lightweight concrete. Raw materials. Properties and applications of lightweight concrete. Controlling. Regulations. Calculations for mix design of lightweight concrete.
 Metallic construction materials: Criteria for the evaluation of materials. Classification. Structure. Iron - carbon alloys. Production, processing. Structural steel categories. Controlling. Structural steel testing. Aluminum. Linking of metal parts (bolting - riveting, welding). Corrosion of metallic materials.

Laboratory:

Aggregates: Quartering method for aggregates sampling. Sieve analysis and grading composition of aggregates. Determination of bulk density, specific gravity, coefficient of mass and porosity of aggregates. Determination of moisture content and water absorption of aggregates. Determination of specific gravity and water absorption of coarse and fine aggregates. Sand purity control, equivalent test. Determination of filler content. Correction in sieve analysis of aggregates.
 Metallic Materials: Thermal analysis, phase diagrams of alloys. Determination of hardness according to Brinell, Vickers, and Rockwell methods. Metallography, grain size. Steels. Tension under static loading. Proportionality, elastic, yield, fracture limits. Reduced conventional elongation at maximum load, hardening ratio, toughness.
 Concrete: Sampling, temperature, workability, apparent weight and air content of fresh compacted concrete. Conventional compressive strength. Planning, design and laboratory testing of concrete mix design.
 Cement: setting time, fineness, specific gravity, specific surface, compressive strength to fracture, volume stability of ring and autoclave.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Teaching using ICT, Laboratory Education using ICT, Communication and Electronic Submission	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i>	Activity	Semester workload
	Lectures	26
	laboratory practice	39
	Laboratory Exercises	30
	Preparation for Writing laboratory reports-homework	55

<p>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</p>		
	Total Course	150
<p>STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure</p> <p>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</p> <p>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</p>	<p>Theoretical part 60%: Written examination</p> <p>Laboratory Part 40%: Laboratory reports-homework, Written examination</p>	

(5) ATTACHED BIBLIOGRAPHY

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