

COURSE MODULE OUTLINE

(1) General information

SCHOOL	SCHOOL OF APPLIED ARTS AND SUSTAINABLE DESIGN		
PROGRAM COURSE	PROTECTION OF CULTURAL HERITAGE AND MONUMENTS OF NATURE FROM THE EFFECTS OF CLIMATE CHANGE (CCC)		
LEVEL OF STUDY	POSTGRADUATE (MSc)		
COURSE UNIT CODE	CCC52		1 st
COURSE TITLE	MATERIAL SCIENCE		
INDEPENDENT TEACHING ACTIVITIES <i>in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS	
Weekly teaching hours 18-19* 30 weeks	560	20 ECTS	
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4</i>			
COURSE TYPE Compulsory, Optional, Optional mandatory	COMPULSORY		
PREREQUISITE COURSES:	NONE		
LANGUAGE OF INSTRUCTION AND EXAMS:	ENGLISH		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No (due to annual duration of the module)		
COURSE WEBSITE (URL)	https://www.eap.gr/en/protection-of-cultural-heritage-and-monuments-of-nature-from-the-effects-of-climate-change/topics/#ccc52 Each module has its own space in the Learning Management System of EAP (https://study.eap.gr/login/index.php), with controlled access (use of code) for students and teaching staff.		

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:

APPENDIX A

- Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.
- Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and

APPENDIX B

- Guidelines for writing Learning Outcomes

After the completion of the module, students are expected to:

- familiarize with the principles of interdisciplinary subjects discussed,
- get introduced to the chemical composition of the materials, characterization of materials, typical processing principles,
- understand elementary mechanics and strength of materials
- become acquainted with the most important methods of investigative works,
- understand their primary field of application and their potential efficiency and effectiveness to the task at hand,
- become acquainted to the main nondestructive diagnostic technologies (NDT) used for Cultural Heritage monuments.
- familiarize with the Systematic Degradation Patterns of the Monuments,
- obtain an introductory knowledge gained on conservation treatment procedures where the Non-Destructive Methods are used for Damage mapping,
- be able to recognize the most important geophysical methods used for the investigation and preservation of the Cultural heritage and understand their field of application,
- obtain an introduction to methodological interpretation and assessment of research results in studies of Cultural Heritage

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,

Adapting to new situations

Decision-making

Individual/Independent work

Group/Team work

Working in an international environment

Working in an interdisciplinary environment (Other.....citizenship, spiritual freedom, social

Introduction of innovative research

Project planning and management

Respect for diversity and multiculturalism

Environmental awareness

Social, professional and ethical responsibility and

sensitivity to gender issues

Critical thinking

Development of free, creative and inductive thinking

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awareness, altruism etc.)

- Adapting to new situations
- Search for, analysis and synthesis of data and information by the use of appropriate technologies
- Decision-making
- Individual/Independent work

- Project planning and management
- Working in an interdisciplinary environment
- Critical thinking
- Development of free, creative and inductive thinking

(3) COURSE CONTENT

The main objective of the present module is to introduce the students to materials science with special focus on traditional and Cultural Heritage materials and issues emerging due to climate change.

The key subjects of the module are:

1. Material Science
2. Diagnostic Technologies for investigating material conditions
3. Deterioration of materials
4. Investigation of CH sites and entities in view of their preservation

More specifically:

Discipline 1: Introduction to Material Science

The scope of this discipline is to introduce the students into the basic scientific terms of material science. The subjects to be taught involve elementary definitions from, chemistry, crystallography, mechanics of materials – stress-strain relations and strength of materials, and some introductory elements of material pathology.

Discipline 2: Diagnostic technologies for material failure

With this discipline, it is aimed to introduce the student to the state of the art of investigative works for the protection of our cultural heritage. It is also hoped that methodological thinking shall be generated regarding the array of site and laboratory options available and the suitability of them in the conservation undertakings. One important parameter worth mentioning here is that the value of the various methods and techniques is magnified when they are suitably interconnected, feeding other investigative processes, towards the better understanding of the conservation/restoration tasks.

Discipline 3: Material Ageing

The third discipline of the Study module contains a brief description of major deterioration factors for monuments as well as a selected study cases of deteriorated monuments along with the relevant novel restoration procedures which are discussed. Pollutant agents are discussed, along with conservation and restoration procedures. Along with the presentation of typical deterioration of monumental structures there is also a discussion of suggested methodologies for uprating the structures.

Discipline 4: Archaeometry

The last discipline of the module is dedicated to Geophysical methods adapted to archaeological investigations and monitoring. The array of most advanced methods are presented. Their origin, developmental pattern pros and cons are discussed, along with suggested interpretation methods of the data collected.

(4) TEACHING METHODS--ASSESSMENT

<p>MODES OF DELIVERY <i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i></p>	<p>Distance education with five Group Counseling Meetings (OSS) during the academic year on weekends.</p>	
<p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY <i>Use of ICT in teaching, Laboratory Education, Communication with students</i></p>	<p>We use : Remote meetings tools (cisco webex), Presentation software (e.g. power point),</p> <p>Additionally, the students use office automation tools, web browsers and e-reader for digital books.</p>	
<p>COURSE DESIGN <i>Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.</i></p> <p><i>The study hours for each learning activity as well as the hours of selfdirected study are given following the principles of the ECTS.</i></p>	<p>Activity/Method</p>	<p>Annual workload</p>
	<p>5 Group tutorial meetings x 4 hours</p>	<p>20</p>
	<p>5 Horizontal tutorial OSS (* 2 hours)</p>	<p>10</p>
	<p>Activities and Multiple Choice Exercises (32 x 0.5 hours)</p>	<p>16</p>
	<p>Preparation of 4 assignments (4 x 20 hours)</p>	<p>60</p>
	<p>Examination</p>	<p>3</p>
	<p>Individual study</p>	<p>451</p>
	<p>Total</p>	<p>560</p>

<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS</p> <p><i>Detailed description of the evaluation procedures:</i></p> <p><i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other.....etc.</i></p> <p><i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.</i></p>	<p>Elaboration of written assignments during the academic year, the average of the grades of which participates in the formation of the final grade of module by 30%, if there is a passable in the final or repetitive examinations. In the final written exams the grade of the written assignments participates in the formation of the final grade of module by 70%.</p> <p>All the criteria are posted, both in each written assignment (in the:https://study.eap.gr/login/index.php), as well as in the general regulation of HOU at: https://www.eap.gr/wp-content/uploads/2022/03/kanonismos-spoudwn-isxys- apo-to-didaktiko-etos-2022-2023.pdf</p>
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(5) SUGGESTED BIBLIOGRAPHY:

<p>- Suggested bibliography</p> <ol style="list-style-type: none"> 1. William Hosford <i>Elementary Material Science</i>, – ASM Intl 2013 2. ZainulHuba and Robert Bulpett <i>Material Science and Design For Engineers</i>, – Trans Tech Publications – 2012 3. D Hull and D. J. Bacon <i>Introduction to Dislocations</i>, Elsevier 2011, Fifth Edition 4. Carosena Meola, 2010, “Recent Advances In Non-Destructive Inspection”, NovaScience Publishers Inc. New York, 5. Abdel Salam Hamdy Makhlouf, Mahmood Aliofkhazraei, 2018, “Handbook of Materials Failure Analysis With Case Studies From the Construction Industries”, Elsevier Science & Technology, 6. C P. Dillmann, D. Watkinson, E. Angelini and A. Adriaens (eds.), 2013, “Corrosion and conservation of cultural heritage metallic artefacts”, European Federation of Corrosion Publications NUMBER 65, Woodhead Publishing Limited 7. Bernhard Schrefler and Pierre Delage (eds.) <i>Environmental Geomechanics</i>, 2013, John Wiley & Sons, Inc. 8. Oliver Anthony Clark and Anthony Clark <i>Prospecting methods in archaeology</i>, Taylor & Francis Group, 9. David Bradley, Dudley Cecil Creagh <i>Physical Techniques in the Study of Art, Archaeology and Cultural Heritage, Volumes 1,2</i> Elsevier Science & Technology, 2006-2007 <p>Additional material is included in the Study Guide of the Course Module</p> <p><i>Related scientific Journals:</i></p> <ol style="list-style-type: none"> 1. Anthropological and Archaeological Science 2. Heritage Science 3. International Journal of Heritage Studies 4. Journal of Archaeological Science 5. Journal of Computer Applications and Quantitative Methods in Archaeology 6. Journal of Cultural Heritage 7. Archaeometry
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