

MODULE OUTLINE

1. GENERAL INFORMATION

SCHOOL	SCHOOL OF APPLIED ARTS AND SUSTAINABLE DESIGN		
PROGRAM COURSE	CCC PROTECTION OF CULTURAL HERITAGE AND MONUMENTS OF NATURE FROM THE EFFECTS OF CLIMATE CHANGE		
LEVEL OF STUDY	POSTGRADUATE		
MODULE CODE	CCC62	YEAR OF STUDY	2 nd
MODULE TITLE	Resilience Strategies for Monuments and Archaeological Sites		
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>	HOURS	CREDITS	
Weekly teaching hours 18-19* 30 weeks	560	20 ECTS	
COURSE TYPE Compulsory, Optional, Optional mandatory	Compulsory – Elective. Leads to specialization in Monuments and archaeological sites		
PREREQUISITE MODULES:	1 st year course modules		
LANGUAGE OF INSTRUCTION AND EXAMS	ENGLISH		
THE MODULE IS OFFERED TO ERASMUS STUDENTS	No (due to annual duration of the module)		
MODULE WEBSITE (URL)	https://www.eap.gr/en/protection-of-cultural-heritage-and-monuments-of-nature-from-the-effects-of-climate-change/topics/#ccc62 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

<p>Learning Outcomes</p> <ul style="list-style-type: none"> 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:
<p>By the successful completion of this module the Students:</p>

-shall apprehend the basics of the structural deterioration mechanisms of monumental structures, their pathologies and how these are expected to be exacerbated due to climate change.

-will develop a methodological way of thinking to mastermind the series of tests that, with the help of technology available, will lead to the understanding of the root causes of historical building deterioration.

-shall acquire the awareness and knowledge required for the implementation of a BIM procurement strategy.

-shall be equipped with necessary knowledge of risk analysis tools and of the reciprocal application of Risk Mitigation measures to Monuments and Archaeological Sites

-shall familiarize themselves with climate change adaptation and/or mitigation strategies for the protection of monuments and archaeological sites

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?

<i>Search for, analysis and synthesis of data and information by the use of appropriate technologies,</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for diversity and multiculturalism</i>
<i>Decision-making</i>	<i>Environmental awareness</i>
<i>Individual/Independent work</i>	<i>Social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Group/Team work</i>	<i>Critical thinking</i>
<i>Working in an international environment</i>	<i>Development of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment (Other.....citizenship, spiritual freedom, social</i>	<i>.....</i>
<i>Introduction of innovative research</i>	<i>awareness, altruism etc.)</i>

Search for, analysis and synthesis of data and information by the use of appropriate technologies,
Adapting to new situations
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Project planning and management
Critical thinking
Development of free, creative and inductive thinking

3. MODULE CONTENT

The scope of this module is to introduce the students to the pathology of monumental structures and archaeological sites, its relation to the impacts of climate change and the strategies that can be adopted for their effective protection.

Fundamental parameters of deterioration due to climate change, such as water ingress, corrosion, soil erosion etc., as well as other natural phenomena such as earthquake actions shall be assessed in a way as to emanate the intrinsic manner of structural deterioration.

A variety of mature technologies for identifying failure patterns and failure modes as well as structural monitoring techniques for the development of degradation patterns will be examined.

The array of investigative and monitoring methods spans from traditional methods to high technological edge. State-of-the-art non-destructive testing techniques, site examinations, in situ tests, and laboratory sample tests shall be explored and will be used for the benefit of the condition awareness of the monumental structures. Emphasis shall be given to the data fusion and data integration into Building Information Models (BIM). Necessary adaptations to the preventive maintenance projects shall be discussed.

Thus, the students shall develop the skills needed for the delivery of risk analysis, and development of reciprocal risk mitigation measures for the protection of monuments and archaeological sites.

The key subjects of the module are:

1. Vulnerability of buildings and structures of cultural interest to climate change
2. Technologies and techniques to identify problems and failures on built heritage
3. Monitoring monuments and archaeological sites
4. Adaptation and mitigation strategies for monuments and archaeological sites

4. TEACHING METHODS--ASSESSMENT

<p style="text-align: center;">MODES OF DELIVERY</p> <p style="text-align: center;"><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 style="text-align: center;">USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</p> <p style="text-align: center;"><i>Use of ICT in teaching, Laboratory Education, Communication with students</i></p>	<p>We use :</p> <p>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 style="text-align: center;">MODULE DESIGN</p> <p><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>	<table border="1"> <thead> <tr> <th style="text-align: center;">Activity</th> <th style="text-align: center;">Annual Workload</th> </tr> </thead> <tbody> <tr> <td>5 OSS (* 4 hours)</td> <td style="text-align: center;">20</td> </tr> <tr> <td>5 Horizontal tutorial OSS (* 2 hours)</td> <td style="text-align: center;">10</td> </tr> <tr> <td>Activities and Multiple Choice Exercises (32 x0.5 hours)</td> <td style="text-align: center;">16</td> </tr> <tr> <td>Preparation of Assignments (4 assignments * 15 hours)</td> <td style="text-align: center;">60</td> </tr> <tr> <td>Examination</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Individual study</td> <td style="text-align: center;">451</td> </tr> <tr> <td>Total module workload (hours)</td> <td style="text-align: center;">560</td> </tr> </tbody> </table>		Activity	Annual Workload	5 OSS (* 4 hours)	20	5 Horizontal tutorial OSS (* 2 hours)	10	Activities and Multiple Choice Exercises (32 x0.5 hours)	16	Preparation of Assignments (4 assignments * 15 hours)	60	Examination	3	Individual study	451	Total module workload (hours)	560
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<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>																	

(6) SUGGESTED BIBLIOGRAPHY

<p><i>- Suggested bibliography:</i></p> <ol style="list-style-type: none"> 1. Penelis, G.G., & G.G. Penelis. <i>Structural Restoration of Masonry Monuments: Arches, Domes and Walls</i>, CRC Press, 2020 2. Loughran P. <i>Failed Stone. Problems and Solutions with Concrete and Masonry</i>, Birkhäuser, 2007 3. <i>Failure Case Studies In Civil Engineering. Structures, Foundations, and the Geoenvironment</i>, ed. by P.A. Bosela, P.A. Brady, N.J. Delatte, M. K., American Society of Civil Engineers, 2013
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4. *Forensic Engineering 2009: Pathology of the Built Environment*, ed. by Shen-En Chen, et al., American Society of Civil Engineers, 2009
5. *Guideline for Structural Condition Assessment of Existing Buildings*, American Society of Civil Engineers, 2000
6. Mordue S, P. Swaddle, D. Philp, *Building Information Modeling For Dummies*, John Wiley & Sons, 2016
7. Ghosn M., G. Fiorillo, M. Liu, B. R. Ellingwood, *Risk-Based Structural Evaluation Methods: Best Practices and Development of Standards*, ASCE, 2020
8. *Structural Monitoring of ARTistic and historical BUILDing Testimonies, Selected, peer reviewed papers from the Final International Conference SMART BUILT 2014*, March 27-29, 2014, Bari, Italy ed. by D. Foti, Trans Tech Publications, 2014
9. Chen H. P., *Structural Health Monitoring of Large Civil Engineering Structures*, John Wiley & Sons, 2018
10. APT Bulletin: The Journal of Preservation Technology, 47(1), Association for Preservation Technology International (APT), 2016

Additional material is included in the Study Guide of the Course Module

-Related scientific Journals:

1. Anthropological and archaeological science
2. Change over Time: An International Journal of Conservation and the Built Environment
3. Environment and Planning D: Society and Space
4. Heritage
5. Heritage Science
6. Industrial Patrimony / Patrimoine de l'Industrie
7. International Journal of Heritage Studies
8. Journal of Archaeological science
9. Journal of Computer Applications and Quantitative Methods in Archaeology
10. Journal of Cultural Heritage
11. The Journal of Eastern Mediterranean Archaeology and Heritage Studies
12. Restoration of Buildings and Monuments