

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	HUMANITIES AND SOCIAL SCIENCES		
<b>ACADEMIC UNIT</b>	DEPARTMENT OF HISTORY AND ARCHAEOLOGY		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE (CULTURAL HERITAGE MANAGEMENT AND NEW TECHNOLOGIES)		
<b>COURSE CODE</b>	<b>CI812</b>	<b>SEMESTER</b>	<b>8<sup>th</sup></b>
<b>COURSE TITLE</b>	GRAPH THEORY AND COMBINATORICS		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <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>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
Lectures	3	4	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Elective		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	No		
<b>COURSE WEBSITE (URL)</b>	<a href="http://www1.culture.upatras.gr/">http://www1.culture.upatras.gr/</a>		

### 2. LEARNING OUTCOMES

#### Learning outcomes

*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.*

*Consult Appendix A*

- Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- Guidelines for writing Learning Outcomes*

The course is an introduction to combinatorics and graph theory with special attention to problems and techniques with real world applications so that students acquire the necessary background and skills for using them efficiently in practice for addressing a variety of issues relevant to the Management of Cultural Heritage, with or without the support of New Technologies.

Students who regularly participate in course activities and successfully complete the course:

- have knowledge and understanding of fundamental issues in combinatorics and graph theory
- are able to use knowledge and understanding they have acquired in a way that shows a professional approach to their work or profession, and appropriately skilled to develop and support arguments and solve problems within their field
- have the ability to collect and interpret relevant data (typically within their field) to form judgments that include reflection on relevant social, scientific or ethical issues
- are able to communicate information, ideas, problems and solutions to specialized and non-specialized audience
- have developed knowledge acquisition skills necessary to further continue their studies with a high degree of autonomy
- have become familiar with computational thinking and are able to exploit its advantages in scientific, professional and practical issues

In particular, students who regularly participate in course activities and successfully complete the course:

1. have knowledge of fundamental principles and techniques in combinatorics and graph theory
2. understand problems relevant to real world applications of combinatorics and graph theory
3. are able to apply principles and techniques for computing solutions to corresponding problems
4. analyze problems / questions in order to gain understanding of their structure and components
5. suggest solutions to these problems by applying existing or new techniques and methods
6. evaluate findings (solutions or hardness results) through comparative application of alternative approaches
7. are familiar with computational thinking

<b>General Competences</b>	
<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>	
<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>
	.....

Familiarity with computational thinking  
 Search for, analysis and synthesis of data and information, with the use of the necessary technology  
 Adapting to new situations  
 Decision-making  
 Working independently  
 Team work  
 Working in an international environment  
 Working in an interdisciplinary environment  
 Production of new research ideas  
 Project planning and management  
 Criticism and self-criticism  
 Production of free, creative and inductive thinking

### 3. SYLLABUS

The course is an introduction to combinatorics and graph theory. Emphasis is placed on basic concepts of combinatorics (like combinations, permutations, distribution of objects, subsets, etc.) as well as on graph theoretical aspects of real world problems so that students acquire the necessary background and skills for using them efficiently in practice for addressing a variety of issues relevant to the Management of Cultural Heritage, with or without the support of New Technologies.

### 4. TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	Face to face, Distance learning	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of ICT in teaching (online lectures, course website, extensive use of Web resources), in communication/colaboration with students (mailing lists, social networks (Feacebook), course website, Doodles) and in the process of progress monitoring and evaluation (use of specialized software for the monitoring and evaluation of student progress)	
<b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail.</i>  <i>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>  <i>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</i>	<b>Activity</b>	<b>Semester Workload</b>
	Lectures	39
	Intense cooperation among professor and students also using ICT	8
	Independent study	53
	Course total (25 hours per credit)	<b>100</b>
<b>STUDENT PERFORMANCE EVALUATION</b> <i>Description of the evaluation procedure</i> <i>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</i>	Assessment - Grading Process (it is announced on the course website before the beginning of the semester and remains available throughout the semester)  The final score is obtained as a function of: (A) 2 intermediate computer-based multiple choice	

<p><i>presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>examinations. They contribute by 40% to the final score.</p> <ul style="list-style-type: none"> <li>- All students attending the course can participate in the intermediate examinations.</li> <li>- Scores are valid only for the current academic year.</li> <li>- Participation in the intermediate exams is not mandatory: students who decide not to participate in intermediate examinations are not excluded from the final examination in February. However, the 2 intermediate examinations contribute to the final score (by 40%).</li> </ul> <p>(B) a final, computer-based, multiple choice examination. It contributes by 60% to the final score.</p>
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### **5. ATTACHED BIBLIOGRAPHY**

<p><i>- Suggested bibliography:</i></p> <p>DISCRETE MATHEMATICS AND ITS APPLICATIONS, K. Rosen</p> <p>ELEMENTS OF DISCRETE MATHEMATICS, C. L. Liu</p> <p>DISCRETE MATHEMATICS, D. Hunter</p> <p><i>- Related academic journals:</i></p> <p>Electronic Journal of Graph Theory and Applications</p> <p>Romanian Journal of Applied Sciences and Technology</p> <p>International Journal of Advances in Social Sciences</p> <p>International Journal of Engineering Technologies and Management Research</p>
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