

## ■ CE58 - Discrete Mathematics

### GENERAL

<b>SCHOOL</b>	SCIENCES		
<b>DEPARTMENT</b>	MATHEMATICS		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE		
<b>COURSE CODE</b>	CE58	<b>SEMESTER</b>	E
<b>COURSE TITLE</b>	DISCRETE MATHEMATICS		
<b>INDEPENDENT TEACHING ACTIVITIES</b>	<b>WEEKLY TEACHING HOURS</b>	<b>ECTS</b>	
Lectures	4	5	
<b>COURSE TYPE</b>	Scientific Field		
<b>PREREQUISITE COURSES</b>	-		
<b>LANGUAGE OF TEACHING AND EXAMINATIONS</b>	Greek/English		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>	YES		
<b>COURSE WEBSITE (URL)</b>	<a href="http://eclass.uowm.gr/">http://eclass.uowm.gr/</a>		

### LEARNING OUTCOMES

<b>Learning Outcomes</b>
<p>Upon successful completion of the course, the students will be able to:</p> <ul style="list-style-type: none"> <li>• compose mathematical arguments using mathematical logic,</li> <li>• use evidential procedures, such as that of mathematical induction,</li> <li>• apply combinatorial analysis to solve enumeration problems,</li> <li>• know the concept of graphs and use them in simplifying and solving complex problems.</li> <li>• know all the basic families of graphs and their properties.</li> </ul>
<b>General Competencies</b>
<ul style="list-style-type: none"> <li>• Search, analysis and synthesis of data and information, using the necessary technologies.</li> <li>• Adapting to new situations, making decisions.</li> <li>• Work in a team.</li> <li>• Promotion of free, creative and inductive thinking.</li> </ul>

### CONTENT OF THE COURSE

Sets and operations. Propositional Logic and equivalences. Proof methods (mathematical
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induction) and proof strategy.

Relations and properties. Equivalence relation and classes, partial ordering relation.

Enumeration. Binomial Coefficients, Generator Functions, Combinations, permutations. Inclusion-Exclusion Principle.

Graphs and terminology. Graph representation. Subgraphs and isomorphisms. Connectivity. Trees. Bipartite graphs. Matching in bipartite graphs. Planar graphs. Maximum matches. Euler and Hamiltonian paths and circuits and graphs. Theorems of Kirchhoff, Dirac, Menger.

### TEACHING AND LEARNING METHODS - EVALUATION

<b>TEACHING METHOD</b>	In the classroom.	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b>	Use of e-class. Communication through face-to-face discussions and e-mails.	
<b>TEACHING ORGANIZATION</b>	<b>Activity</b>	<b>Semester Workload</b>
	Lectures	52 hours
	Individual Study	73 hours
	Course Total (25 hours per ECTS)	125 hours
<b>STUDENT EVALUATION</b>	Optional projects during the whole semester, with presentations. (bonus to the final grading) Written final examination 100%.	

### RECOMMENDED BIBLIOGRAPHY

1. Discrete Mathematics, C.Athanasiadis, Publications Efaltirio, 2023. (Greek)
2. Discrete Mathematics, Kolountzakis M., Papachristodoulos C., Kallipos. (Greek)
3. Discrete Mathematics and their applications., Kenneth H. Rosen, 8<sup>th</sup> edition, Tziola Publications, 2018. (Greek)
4. Discrete Mathematics and their Applications, Susana S. Epp, Publications Kleidarithmos, 2010. (Greek)