■ CE57 - Topology

GENERAL

SCHOOL	EXACT SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CE57	**SEMESTER**	E
COURSE TITLE	TOPOLOGY		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
Lectures	4	5

COURSE TYPE	Scientific Field
PREREQUISITE COURSES	Real Analysis
LANGUAGE OF TEACHING AND EXAMINATIONS	Greek/English
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	http://eclass.uowm.gr/

LEARNING OUTCOMES

Learning Outcomes
With the successful attendance of the course, the students: • will understand basic notions of General Topology such as the notions of topological space, subspace, base and subbase, • will define topologies on a set, • will recognize various sets of a topological space like the open, closed, dense and nowhere dense sets, • will categorize the topological spaces under the view of separation axioms,

- will be able to use mappings between topological spaces like the continuous mappings, the open and closed mappings and the homeomorphisms,
- will understand the meaning of the Moore-Smith convergence and the necessity to generalize the notion of sequence in topological spaces,
- will understand the product of topological spaces,
- will understand the notions of compactness, local compactness and compactification,
- will understand the notions of connectedness, local connectedness and path connectedness,
- will understand the importance of Topology through its applications in various branches of Mathematics.

General Competencies

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Working independently for the enhancement of their self-esteem.
- Creation of new research ideas.
- Production of free, creative and inductive thinking, which is based on mathematical processes.

CONTENT OF THE COURSE

Metric spaces: Notion of metric space, examples of metric spaces, basic notions of metric spaces such as open and closed sets, closure, interior and boundary of a set.
Topological spaces: Notion of topology and examples of topological spaces,basic notions of topological spaces like open and closed sets, closure, interior, boundary, subspace, base and subbase of topology.
Separation axioms: T_0-space, T_1-space, T_2-space (or Hausdorff space), regular spaces, completely regular spaces, normal spaces.
Mappings and Moore-Smoth sequences: Continuous mappings, homeomorphisms, open and closed mappings, examples of mappings between topological spaces, Moore-Smith sequences.
Product of topological spaces: Product of finite and infinite family of topological spaces, properties of the product of topological spaces.
Compact topological spaces: The meaning of the compact topological space, examples of compact topological spaces, continuous mappings and compact topological spaces, local compact topological spaces, compactification.
Connected topological spaces: The meaning of the connected topological space, examples of connected topological spaces, continuous mappings and connected topological spaces, connected components, local connected topological spaces, path connected topological spaces.
Applications of Topology in branches of Mathematics.

TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD	In the classroom.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Use of e-class,. Communication through face-to-face discussions and e-mails.
TEACHING ORGANIZATION	**Activity** / **Semester Workload** Lectures — 52 hours Individual Study — 73 hours Course Total (25 hours per ECTS) — 125 hours
STUDENT EVALUATION	Written final examination 100%.

RECOMMENDED BIBLIOGRAPHY

1. D. Georgiou, S. Iliadis, General Topology, Publications Tziola, 2017 (Greek).
2. S. Negrepontis, Th.. Zachariadis, N. Kalamidas, V. Farmaki, General Topology and Function Analysis, Publications Symmetria, 1997 (Greek).

■ CE58 - Discrete Mathematics

GENERAL

SCHOOL	EXACT SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CE58	**SEMESTER**	E
COURSE TITLE	DISCRETE MATHEMATICS		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
Lectures	4	5

COURSE TYPE	Scientific Field
PREREQUISITE COURSES	-
LANGUAGE OF TEACHING AND EXAMINATIONS	Greek/English
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	http://eclass.uowm.gr/

LEARNING OUTCOMES

Learning Outcomes

Upon successful completion of the course, the students will be able to:

- compose mathematical arguments using mathematical logic,
- use evidential procedures, such as that of mathematical induction,
- apply combinatorial analysis to solve enumeration problems,
- know the concept of graphs and use them in simplifying and solving complex problems.

General Competencies

- Search, analysis and synthesis of data and information, using the necessary technologies.
- Adapting to new situations, making decisions.
- Work in a team.
- Promotion of free, creative and inductive thinking.

CONTENT OF THE COURSE

Sets and operations.
Propositional Logic and equivalences.
Proof methods (mathematical induction) and proof strategy.
Complexity of algorithms.
Relations and properties. Equivalence relation and classes, partial ordering relation.
Presentation of relations.
Integers and division. Elements of number theory.
Enumeration. Combinations, permutations.
Graphs and terminology. Graph representation. Subgraphs and isomorphisms. Coherence. Trees. Binary graphs. Matching in bipartite graphs. Maximum matches. Euler and Hamiltonian paths and circuits.

TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD	In the classroom.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Use of e-class. Communication through face-to-face discussions and e-mails.
TEACHING ORGANIZATION	**Activity** / **Semester Workload** Lectures — 52 hours Individual Study — 73 hours Course Total (25 hours per ECTS) — 125 hours
STUDENT EVALUATION	Progress-exam (calculation of indefinite and definite integrals) 30% Written final examination 70%.

RECOMMENDED BIBLIOGRAPHY

1. DISCRETE MATHEMATICS & Their Applications., Kenneth H. Rosen, Tziola Publications. (Greek)
2. DISCRETE MATHEMATICS & Their Applications, Susana S. Epp, Publications Kleidarithmos. (Greek)
3. DISCRETE MATHEMATICS, Kolountzakis M., Papachristodoulos C., Kallipos. (Greek)