COURSE OUTLINE

GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Department of Mathematics		
LEVEL OF STUDIES	Graduate		
COURSE CODE	**ΓΕ5**	**SEMESTER**	Spring
COURSE TITLE	Algebraic Topology I		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
	3	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	*Special background. Specialised general knowledge. Skills development in connections with topology geometry and algebra.*
PREREQUISITE COURSES:	MAY413 General Topology, MAY422 Algebraic Stractures I
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://www.math.uoi.gr/~nondas_k/SimiosisAlgTop011.pdf

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*

Algebraic topology is a twentieth century field of mathematics that can trace its origins and connections back to the ancient beginnings of mathematics. One of the strengths of algebraic topology has always been its wide degree of applicability to other fields.

Nowadays that includes fields like physics, differential geometry, algebraic geometry, and number theory.

Familiarity with basic notions from point set topology. Compact open topology and function spaces. Why Lie groups are important. Cell complexes and the category of CW spaces. Connection between homotopy and important problems in geometry. How do we compute using homotopy? How can we distinguish between topological spaces?

General Competences

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?

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
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
Others

Η μετάβαση και ευχέρεια κατανόησης δύσκολων μαθηματικών αποδείξεων.
Αυτόνομη εργασία ώστε να έχουν την ευκαιρία να βελτιώσουν την ικανότητά τους για συγγραφή ατομικών μαθηματικών κειμένων.
Παροχή των απαραίτητων τοπολογικών γνώσεων ώστε να μπορούν να κατανοήσουν - αναλύσουν τοπολογικά-γεωμετρικά προβλήματα.

SYLLABUS

Compact open topology. GL(n) as Lie group. Cell complexes. Real and complex project space. Homotopy and Homotopy Type. Homotopy Equivalence. The Homotopy Extension Property. Paths and Homotopy. Homotopy groups. Covering Spaces. The Fundamental Group of the Circle. Induced Homomorphisms. The van Kampen Theorem. Applications to Cell Complexes. The Classification of Covering Spaces. Deck Transformations and Group Actions.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	*Face-to-face*
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	
TEACHING METHODS *The manner and methods of teaching are described in detail. 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.* *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*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *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 presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Written Examination, Oral Presentation, tests, written assignments.

Activity	***Semester workload***
Lectures	26
Working hours in class	13
Project	30
Assignments	40
Final	41
Course total	***150***

ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

A first course in topology, j. Muncres, Prentice Hall.

Algebraic Topology, A. Hatcher, https://www.math.cornell.edu/~hatcher/AT/

A Concise Course in Algebraic Topology, J. P. May,

www.math.uchicago.edu/~may/CONCISE/ConciseRevised.pdf