COURSE OUTLINE

GENERAL

SCHOOL	Sciences and Engineering		
ACADEMIC UNIT	Computer Science		
LEVEL OF STUDIES	1st Cycle		
COURSE CODE	MATH-111	**SEMESTER**	Fall, Spring
COURSE TITLE	Mathematics and Logic for Computation		

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**
	3.5	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*	General background
PREREQUISITE COURSES:	MATH-180 or Math Placement Test
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	

(1) 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*

After completion of the course students are expected to be able to:

- Analyze logical propositions via truth tables.
- Prove mathematical theorems using mathematical induction.
- Understand sets and perform operations and algebra on sets.
- Determine properties of relations, identify equivalence and partial order relations, sketch relations.
- Identify functions and determine their properties.
- Comprehend Elementary Number Theory results and apply them to modular arithmetic.

- Define graphs, digraphs and trees, and identify their main properties.
- Euler and Hamilton graphs, Traveling Salesman Problem, Minimal Spanning Tress and Algorithms (Brute Force, Kruskal's, Prim's, P-NP problems in relation to Travelling Salesman Problem).

- Apply graph Theory on problems from Computer Science. Emphasis on Planar Graphs.
- Produce summary statistics and present data.
- Evaluate combinations and permutations on sets.
- Comprehend the fundamental Concepts from Calculus. Continuity, Derivative, Integral

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Adapting to new situations

Decision-making

Working independently

Criticism and self-criticism

Production of free, creative and inductive thinking

SYLLABUS

- Set theory, operations and algebra, switching circuits as an application.
- Relations and their properties, closure of relations, directed graphs, relation matrices, equivalence relations, partial order relations, Hasse diagrams.
- Functions, domain, codomain, range, the properties of one-to-one and onto, composite and inverse functions.
- Introduction to logic, quantifiers and conditional propositions, truth tables.
- Proof by contradiction, contrapositive and Mathematical induction.

- Elementary Number Theory-Applications

- Graphs, directed graphs and trees, basic concepts, properties and definitions.
- Eulerian and Hamiltonian Graphs. Planar graphs and applications

- Directed Graphs-Dijkstra's Algorithm

- Data presentation and Descriptive Statistics: Histograms and Bar Charts, Measures of Location and Dispersion.

- Introduction to Calculus. The concepts of Continuity, Derivative, Integral.

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*	*Use of ICT in teaching / Χρήση ΤΠΕ* *Communication with students / Επικοινωνία με Φοιτητές*
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.*	Homework/Quizzes, One Midterm Exam and one Final Exam

Activity	***Semester workload***
Lectures	49
Homework/Quizzes	30
Midterm Preparation	31
Final Exam Preparation	40
Course total	***150***

ATTACHED BIBLIOGRAPHY

Required Textbooks / Readings:

Title	**Author(s)**	**Publisher**	**Year**	**ISBN**
Discrete Mathematics and its Applications (7th Edt)	Kenneth Rosen	McGraw Hill	2017	978-0-07-338309-5
Haggarty R.	Discrete Mathematics for Computing	Pearson	2002	978-0201730470

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Discrete Mathematics, 4th edition	Dossey J., Albert O., Lawrence S. and Charles E.	Addison Wesley	2001	978-0321079121