COURSE OUTLINE

1. GENERAL

SCHOOL	SCIENCE		
DEPARTMENT	COMPUTER SCIENCE		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	207EYYE	**SEMESTER**	2nd
COURSE TITLE	LOGIC AND LOGIC PROGRAMMING		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	2	5
Tutorial Exercises	1	
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Scientific Area
PREREQUISITES:	Discrete Mathematics (102ΓΥΥΚ)
TEACHING & EXAMINATION LANGUAGE:	Greek
COURSE OFFERED TO ERASMUS STUDENTS:	No
COURSE URL:	https://moodle.cs.duth.gr/course/view.php?id=64

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

The purpose of the course is to introduce to the scientific area of Logic and Logic Programming by presenting its historical development, studying mature technologies, and describing modern trends regarding a wide range of practical applications.

Specifically, the course material aims to introduce the principles of Logic Programming through a review of Propositional Logic and Predicate Logic. The aim is the methodical recognition of the uses of logic mainly in software development through the use of the Prolog programming language. Through Prolog, the basic concepts of logic programs are examined, such as facts, rules, questions, and simple and complex terms. Recursive data structures, truncation, and logical operators are taught with practical examples. Also demonstrated is the use of Prolog for the implementation of input/output processes as well as dynamic knowledge generation. Through examples, reference is made to practical applications of Prolog to modern problems of Artificial Intelligence.

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

- understand the basic principles of mathematical logic, propositional logic and first-order logic.
- recognize equivalent logical propositions and explain proof methods.
- understand and apply the various methods of logical proof.
- be familiar with the Prolog programming language
- represent knowledge and solve logical expressions.

- manipulate predicates with the Prolog programming language.
- understand the concept of recursion and design recursive rules.
- to create logic programs with the possibility of dynamically modifying knowledge.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,	*Project design and management*
ICT Use	*Equity and Inclusion*
Adaptation to new situations	*Respect for the natural environment*
Decision making	*Sustainability*
Autonomous work	*Demonstration of social, professional and moral responsibility and*
Teamwork	*sensitivity to gender issues*
Working in an international environment	*Critical thinking*
Working in an interdisciplinary environment	*Promoting free, creative and inductive reasoning*
Production of new research ideas	

- Search, analysis and synthesis of data and information, ICT Use
- Adaptation to new situations
- Decision making
- Autonomous work
- Production of new research ideas
- Promoting free, creative and inductive reasoning

3. COURSE CONTENT

1. Introduction to Set Theory
2. Turing Machines
3. Propositional logic: Semantics, operators, satisfiability, equivalence, standard forms
4. Propositional logic: Inference, logical proof, correctness and completeness, resolution principle
5. Propositional logic: Proof, axioms, Gentzen systems
6. Predicate logic: Terms, predicates, quantifiers, semantics, interpretation, substitution, unification
7. Predicate logic: Equivalences, inference mechanism, inference rules
8. Logic programming: Predicates, facts, rules, queries
9. Logic programming: complex terms, tracing, trees
10. Logic programming: Recursion, recursive programming with lists
11. Logic programming: Cut/program optimisation
12. Logic programming: Input/output procedures
13. Logic programming: Dynamic program modification

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use of ICT: • Prolog software • Email • Lecture notes at the distance education platform
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning,*	

Activity	*Workload/semester*
Lectures	26 x 2 = 52 hours
Team Project	13 x 2 = 26 hours
Personal study	45 hours
Exams	2 x 1 = 2 hours

Study visits, Study / creation, project, creation, project. Etc. *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>Total</td><td>**125**</td></tr></table>
STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others* *Please indicate all relevant information about the course assessment and how students are informed*	Written exam with Short Answer Questions

5. SUGGESTED BIBLIOGRAPHY

- Μάργαρης Α., Εισαγωγή στη Μαθηματική Λογική, 2017, Εκδόσεις Τζιόλα, ISBN 9789604185290, Κωδικός Βιβλίου στον Εύδοξο: 50657752
- Βλαχάβας, Ι., Κεφαλάς, Π., Βασιλειάδης, Ν., Κόκκορας, Φ., Σακελλαρίου Η., Τεχνητή Νοημοσύνη, 2020, ISBN 9786185196448, Εκδόσεις Πανεπιστημίου Μακεδονίας, Κωδικός Βιβλίου στον Εύδοξο: 94700120
- Johnsonbaugh R., Διακριτά Μαθηματικά, 2024, Εκδόσεις Τζιόλα, ISBN: 978618221057-4, Κωδικός Βιβλίου στον Εύδοξο:: 122086458