GENERAL

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>Engineering</th>
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<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>Computer Engineering and Informatics Department</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>CEID_NE4017</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>Spring (elective)</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>Mathematical Logic and Applications</td>
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**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*

- Lectures, and tutorial exercises: 5 hours, 5 credits

**WEEKLY TEACHING HOURS**

- Lectures and tutorial exercises: 5

**CREDITS**

- 5

**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

**PREREQUISITE COURSES:**

- None

**LANGUAGE OF INSTRUCTION and EXAMINATIONS:**

- Greek

**IS THE COURSE OFFERED TO ERASMUS STUDENTS:**

- Yes

**COURSE WEBSITE (URL)**

- [https://eclass.upatras.gr/courses/CEID1139/](https://eclass.upatras.gr/courses/CEID1139/)

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

**Working knowledge of the syntactic form of First-Order formulas, and of the basic properties of their truth values.**

**Understanding of basic questions and problems, concerning formal proofs in First-Order Logic.**

**Knowledge of the most important proof systems for First-Order Logic.**

**Knowledge of computational methods for formal proof discovery.**

**Theoretical skills relevant to logical equivalence of formulas.**

**Skills on solving computational problems about logical equivalence.**

**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...

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Production of new research ideas

Criticism and self-criticism
SYLLABUS

Introduction to the basic concepts and techniques of First-Order Logic, emphasizing precise mathematical descriptions of concepts and applications thereof. Examination of the uses of theory to design algorithms for problems of logical equivalence, and to verify their correctness. Coverage: Syntax and semantics of First-Order formulas. Notions of implication and logical equivalence, correlative notions of formal proof. Main proof systems for First-Order Logic, properties of correctness and completeness. Computational methods for formal proof discovery, applications to problems of logical implication and logical equivalence.

TEACHING and LEARNING METHODS - EVALUATION

<table>
<thead>
<tr>
<th>DELIVERY</th>
<th>Face-to-face, Distance learning, etc.</th>
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<tbody>
<tr>
<td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td>
<td>Use of course web page to supplement teaching, and to communicate with students</td>
</tr>
<tr>
<td>TEACHING METHODS</td>
<td>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</td>
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<tr>
<th>Activity</th>
<th>Semester workload</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>39</td>
</tr>
<tr>
<td>Tutorials</td>
<td>26</td>
</tr>
<tr>
<td>Non-directed study</td>
<td>60</td>
</tr>
<tr>
<td>Course total</td>
<td>125</td>
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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 (in Greek), including brief questions on theory and simple problems to be solved. Evaluation is based on: extent of theoretical knowledge, precision and correctness of solutions. Answers to exam questions are discussed in the course tutorials.

ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
  M. Huth, M.Ryan, “Logic in Computer Science”

- Related academic journals: