

MODULE OUTLINE

1. GENERAL INFORMATION

SCHOOL	SCHOOL OF SCIENCE AND TECHNOLOGY		
PROGRAM COURSE	INFORMATICS		
LEVEL OF STUDY	UNDERGRADUATE		
MODULE CODE	PLI-31	YEAR OF STUDY	3 rd
MODULE TITLE	Artificial Intelligence – Applications		
INDEPENDENT TEACHING ACTIVITIES <i>in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits</i>		HOURS	CREDIS
Weekly teaching hours * 32 weeks		16-18	18 ECTS
COURSE TYPE <i>Background knowledge, Scientific expertise, General Knowledge, Skills Development</i>	Scientific expertise Compulsory		
PREREQUISITE MODULES:	No		
LANGUAGE OF INSTRUCTION AND EXAMS	GREEK		
THE MODULE IS OFFERED TO ERASMUS STUDENTS	No (due to annual duration of the module)		
MODULE WEBSITE (URL)	https://www.eap.gr/education/undergraduate/computer-science/topics/#texniti_noimosini Each module has its own space in the Learning Management System of EAP (http://study.eap.gr), with controlled access (use of code) for students and teaching staff.		

2. LEARNING OUTCOMES

<p>Learning Outcomes</p> <ul style="list-style-type: none"> The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:
<p>After completing PLI31/INF31 a student will be able:</p> <ul style="list-style-type: none"> to streamline problem solving by selecting a suitable representation for the state space and by applying fundamental search algorithms (exhaustive search, heuristic search) to represent knowledge in predicate logic and to convert it to a form that can be submitted to reasoning via resolution

- to solve a search/optimization problem using genetic algorithms, by suitably selecting a representation and some genetic operators
- to experimentally decide on the suitable architecture of a neural network to solve a classification/prediction problem
- to use the proper programming tools/environments for implementing all techniques mentioned above
- to combine representation, search, prediction and reasoning techniques towards developing systems that implement hybrid approaches

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

<i>Search for, analysis and synthesis of data and information by the use of appropriate technologies,</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for diversity and multiculturalism</i>
<i>Decision-making</i>	<i>Environmental awareness</i>
<i>Individual/Independent work</i>	<i>Social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Group/Team work</i>	<i>Critical thinking</i>
<i>Working in an international environment</i>	<i>Development of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment (Other.....citizenship, spiritual freedom, social</i>	<i>.....</i>
<i>Introduction of innovative research</i>	<i>awareness, altruism etc.)</i>

Search for, analysis and synthesis of data and information by the use of appropriate technologies
 Adapting to new situations
 Decision-making
 Individual/Independent work
 Introduction of innovative research
 Social, professional and ethical responsibility and sensitivity to gender issues
 Critical thinking
 Development of free, creative and inductive thinking

3. MODULE CONTENT

The main objective of the module is to impress upon students that computer science is an applied science that attempts to bridge the gap between man and machines. The module includes both foundations and applications of AI.

The tremendous advances of computing have not yet fully materialized into seamless communication with humans in natural language or into generic learning, though a wide array of applications has been fielded with success. Since Artificial Intelligence does aim to empower machines with traits or features of human intelligence, there is a strong incentive to study the techniques and the processes that allow a computer to display behaviour that resembles that of human beings, in a variety of contexts.

The module starts by covering fundamental concepts in state space representations and search for problem solving, constraints handling and adversarial search. It then moves on to

aspects of knowledge representation and reasoning with first-order logic and complements the treatment with an introduction to logic programming (with Prolog). It then moves on to deal with learning, placing an emphasis on neural networks (but, also, covering decision trees and clustering), and then moves on to genetic/evolutionary algorithms and genetic programming, presenting them as a stochastic search technique that can be used for a variety of optimization problems. Finally, hybrid algorithms are presented that combine the last two technologies in order to alleviate their disadvantages and enforce their advantages.

Besides the theoretical treatment, students are also introduced to a variety of systems and problems that can be used for a hands-on approach to the subject, ultimately aiming to show that any problem should be viewed as being suitable to be attacked from a variety of angles, and sometimes by a combination of techniques.

The key subjects of the module are:

- Artificial Intelligence and Expert Systems
- Neural Networks and Applications
- Genetic Algorithms and Applications

4. TEACHING METHODS--ASSESSMENT

<p>MODES OF DELIVERY <i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i></p>	<p>Distance education with five Group Counseling Meetings (OSS) during the academic year on weekends.</p>	
<p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY <i>Use of ICT in teaching, Laboratory Education, Communication with students</i></p>	<p>We use : Remote meetings tools (Webex, Teams), Presentation software (e.g. power point), Specialized software in the subjects under study (Prolog, WEKA, Prover9/Mace4, Microsoft Azure Machine Learning Studio, etc.).</p> <p>Additionally, the students use office automation tools, web browsers and e-reader for digital books.</p>	
<p>MODULE DESIGN <i>Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc</i></p>	<p>Activity</p>	<p>Annual Workload</p>
	<p>5 OSS (* 4 hours)</p>	<p>20</p>
	<p>Multiple choice exercises (8 * 2 Hours)</p>	<p>16</p>
	<p>Preparation of Assignments (4 assignments * 10 hours)</p>	<p>40</p>
	<p>Examination</p>	<p>3</p>
	<p>Individual study</p>	<p>423-497</p>
	<p>Total module workload (hours)</p>	<p>512-576</p>

<p><i>The study hours for each learning activity as well as the hours of selfdirected study are given following the principles of the ECTS.</i></p>	
<p>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS <i>Detailed description of the evaluation procedures.</i></p> <p><i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other.....etc.</i></p> <p><i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students</i></p>	<p>Elaboration of written assignments during the academic year, the average of the grades of which participates in the formation of the final grade of module by 30%, if there is a passable in the final or repetitive examinations. In the final written exams the grade of the written assignments participates in the formation of the final grade of module by 70%.</p> <p>All the criteria are posted, both in each written assignment (in the LMS study.eap.gr), as well as in the general regulation of HOU at: https://www.eap.gr/education/study-regulations/</p>

(6) SUGGESTED BIBLIOGRAPHY

<p><i>- Suggested bibliography:</i></p> <p>HOU Publications: Volume A: Artificial Intelligence and Expert Systems (2000). Volume B: Artificial Neural Networks (2008). Volume C: Genetic Algorithms and Applications (2001). (additional) Volume: Logic and Functional Programming (2003).</p> <p>As the above textbooks have not been translated into English, the titles shown above are renditions from the original titles in Greek.</p> <p>Additionally, the module uses a selection of chapters from the Greek translation of “Artificial Intelligence: a Modern Approach” by Russell and Norvig (2nd edition), as well a selection of chapters from the book “Artificial Intelligence” by Vlahavas et al. (3rd edition – in Greek), and further texts which have been custom-compiled for the module (in Greek).</p> <p>Additionally, the module features an extended compilation of complementary material (slides, pointers to video lectures, past assignments and exam papers) in the university LMS platform</p>
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-Related scientific Journals:

- 1) Artificial Intelligence (<https://www.journals.elsevier.com/artificial-intelligence>)
- 2) Journal of Artificial Intelligence Research (<https://jair.org/index.php/jair>)
- 3) Journal of Machine Learning Research (<http://www.jmlr.org>)