

MODULE OUTLINE

1. GENERAL INFORMATION

SCHOOL	SCHOOL OF SCIENCE AND TECHNOLOGY		
PROGRAM COURSE	INFORMATICS		
LEVEL OF STUDY	UNDERGRADUATE		
MODULE CODE	PLI-44	YEAR OF STUDY	4 th
MODULE TITLE	Signals and Image Processing		
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	20 ECTS
COURSE TYPE <i>Background knowledge, Scientific expertise, General Knowledge, Skills Development</i>	Scientific expertise Optional		
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/#simat_epekserg 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>On successful completion of this module, students will be able to:</p> <ul style="list-style-type: none"> Understand basic principles of signals and systems; of fundamental transforms (Fourier, Laplace and Z); of convolution, sampling, frequency response and of the basic principles of digital filters in one-dimensional signals and images

- Interpret one- or multi-dimensional signals (speech, seismic, heart rate, etc), correctly implement the digitization of continuous-time signals, calculate the frequency content of signals and design basic filters for their processing.
- Apply simple digital image processing techniques, like image enhancement, image segmentation and image description
- Analyze and design continuous-time and discrete-time signal processing systems.

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 awareness, altruism etc.)</i>	<i>.....</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
 Development of free, creative and inductive thinking

3. MODULE CONTENT

The main objective of the module is to introduce the students in the fields of signals and their processing, which are fundamental for a large number of areas involving acquisition, processing, storage and transmission of information. In volume A, the notions of signals and systems and the related fundamental mathematical tools are presented (Fourier and Laplace transforms). Volume B focuses on digital signal and image processing, the discrete Fourier transform and the z transform in order to conclude with the design of digital filters. Also, an introduction to digital images is presented. In volume C, the processing of digital images is further described by highlighting image enhancement, segmentation through an introduction to pattern recognition with Bayesian classification.

The key subjects of the module are:

- A) Signals and Systems
- B) Digital Signal and Image Processing
- C) Image Analysis and Pattern Recognition

4. TEACHING METHODS--ASSESSMENT

<p>MODES OF DELIVERY Face-to-face, in-class lecturing, distance teaching and distance learning etc.</p>	<p>Distance education with five Group Counseling Meetings (OSS) during the academic year on weekends.</p>												
<p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY Use of ICT in teaching, Laboratory Education, Communication with students</p>	<p>During the meetings and the assignments, the following tools are used:</p> <ul style="list-style-type: none"> - Teleconference applications (Skype for business, Webex), - Presentation software (Powerpoint), - GNU Octave, Matlab <p>Also, the students use standard office tools, such as web browsers and e-readers for digital</p>												
<p>MODULE DESIGN 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</p> <p>The study hours for each learning activity as well as the hours of selfdirected study are given following the principles of the ECTS.</p>	<table border="1" data-bbox="695 699 1351 1035"> <thead> <tr> <th>Activity</th> <th>Annual Workload</th> </tr> </thead> <tbody> <tr> <td>5 OSS (* 4 hours)</td> <td>20</td> </tr> <tr> <td>Preparation of Assignments (4 assignments * 10 hours)</td> <td>40</td> </tr> <tr> <td>Examination</td> <td>3</td> </tr> <tr> <td>Individual study</td> <td>385-449</td> </tr> <tr> <td>Total module workload (hours)</td> <td>448-512</td> </tr> </tbody> </table>	Activity	Annual Workload	5 OSS (* 4 hours)	20	Preparation of Assignments (4 assignments * 10 hours)	40	Examination	3	Individual study	385-449	Total module workload (hours)	448-512
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Total module workload (hours)	448-512												
<p>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS Detailed description of the evaluation procedures.</p> <p>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.</p> <p>Specifically defined evaluation criteria are stated, as well as if and</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>												

where they are accessible by the students	
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(6) SUGGESTED BIBLIOGRAPHY

- Suggested bibliography:

HOU Publications:

1. Τόμος Α': Σήματα και Συστήματα, ΕΑΠ, Πάτρα. ΠΛΗ44/1
2. Τόμος Β': Ψηφιακή Επεξεργασία Εικόνων και Σημάτων, ΕΑΠ, Πάτρα 2003. ΠΛΗ44/2
3. Τόμος Γ': Ανάλυση Εικόνας και Αναγνώριση Προτύπων, ΕΑΠ, Πάτρα 2003. ΠΛΗ44/3

Additional digital material (and multimedia) is available through study platform.

-Related scientific Journals:

IEEE Transactions on Signal Processing

(<https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=78>)

2) Signal Processing (<https://www.journals.elsevier.com/signal-processing>)

3) IEEE Transactions on Image Processing

(<https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=83>)

4) Signal Processing: Image Communication (<https://www.journals.elsevier.com/signal-processing-image-communication>)

5) IEEE Transactions on Pattern Analysis and Machine Intelligence

(<https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=34>)

6) Pattern Recognition (<https://www.journals.elsevier.com/pattern-recognition>)