COURSE OUTLINE

(1) GENERAL

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>Engineering</th>
</tr>
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<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>Department of Computer Engineering &amp; Informatics</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>CEID_ NY28 2</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>4th</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>Signals and Systems Theory</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

<table>
<thead>
<tr>
<th>WEEKLY TEACHING HOURS</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures and tutorials</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
</tr>
</tbody>
</table>

Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).

COURSE TYPE

Specialised general knowledge

general background, special background, specialised general knowledge, skills development

PREREQUISITE COURSES:

- Mathematics I (NY101)
- Mathematics II (NY102)
- Linear Algebra (NY110)
- Circuits Theory (NY182)

LANGUAGE OF INSTRUCTION and EXAMINATIONS:

Greek

IS THE COURSE OFFERED TO ERASMUS STUDENTS

No

COURSE WEBSITE (URL)

- http://xanthippi.ceid.upatras.gr/people/psarakis/courses/SP/signalnew.php

(2) 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

The goal of the course is the students to acquire the knowledge required to create an appropriate background that could potentially be used in the fields of computer science, computer technology and communications. Upon successful completion of the course a student will be able to:

- understand the signal spaces as generalizations of the well-known vector spaces and to analyse /compose continuous and discrete time signals by using appropriate bases of signals,
- understand the physical meaning of normed spaces and especially the inner product spaces,
- classify the systems by using the superposition and time invariance principle,
- understand the vital role of the complex exponential signals into analysis of LTI systems,
- obtain mathematical and physical inside of the generalized functions in both time and frequency domain,
- understand the meaning of impulse, frequency response and transfer function of a LTI system,
- understand the state space and the internal description of LTI systems,
- obtain inside of controllability, observability and asymptotic stability of a system,
- learn when a system is unstable and how it can be stabilized.

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
- Team work
to gender issues
- Working in an international environment
- Criticism and self-criticism
- Production of free, creative and inductive thinking
Working in an interdisciplinary environment
Production of new research ideas

Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas

(3) SYLLABUS

- Introduction to signal and systems theory
- Continuous and Discrete time linear systems, Impulse response, Linear Time Invariant (LTI) systems, lineal convolution
- Fourier series, and the family of complex exponentials signals, the complex exponential signals as eigensignals of LTI systems, Continuous and Discrete time Fourier Transform, Cosine and Sine transform, Frequency response, LTI systems as solvers of ordinary differential equations
- Distribution functions, regular and singular distribution functions, generalized Fourier transform
- Laplace Transform, Z-transform, Transfer function, BIBO stability of Continuous and Discrete time LTI systems
- State space, States, State equations, Controllability, Observability, Asymptotic stability, Stabilization of unstable systems, State feedback
- Partial Differential Equations and their solution by separation of variables

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<thead>
<tr>
<th>Activity</th>
<th>Semester workload</th>
</tr>
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<tbody>
<tr>
<td>Lectures</td>
<td>39 hours</td>
</tr>
<tr>
<td>Tutorials</td>
<td>26 hours</td>
</tr>
<tr>
<td>Study</td>
<td>80 hours</td>
</tr>
<tr>
<td>Exams</td>
<td>2 hours</td>
</tr>
<tr>
<td><strong>Course total</strong></td>
<td><strong>147 hours</strong></td>
</tr>
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STUDENT PERFORMANCE EVALUATION

The evaluation is performed in Greek language and is based on two independent parts. Specifically, a final written test that includes multiple choice questions and problem solving, and an oral one with short-answer questions.

Sample solutions to the written test are announced to provide students with a reference point for their marking. After the test marks are announced the students have the opportunity to see their mistakes and even to their grade.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals and conferences:
  - IEEE Transactions on Signal Processing
  - IEEE Transactions on Circuits and Systems
  - Elsevier Signal Processing
  - ICASP, Eusipco