COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Informatics and Computer Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE		**SEMESTER**	**5**
COURSE TITLE	Digital Signal Processing		
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		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures		2	
Practices exercises		1	
Laboratory exercises		1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		4	5
COURSE TYPE general background, special background, specialised general knowledge, skills development	general background, specialised general knowledge		
PREREQUISITE COURSES:	Signals and Systems		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)		
COURSE WEBSITE (URL)			

(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

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

- **be familiar with the fundamental principles of modern digital telecommunication systems and Digital Signal Processing**
- **understands issues related to digital signal processing and the associated transmission techniques**
- **be familiar with the techniques required for implementation of modern digital telecommunications data transmission systems which are based on digital signal processing circuits**
- **understand the fundamental principles of statistical inference and apply them to practical conditions of Signals and Systems.**

General Competences

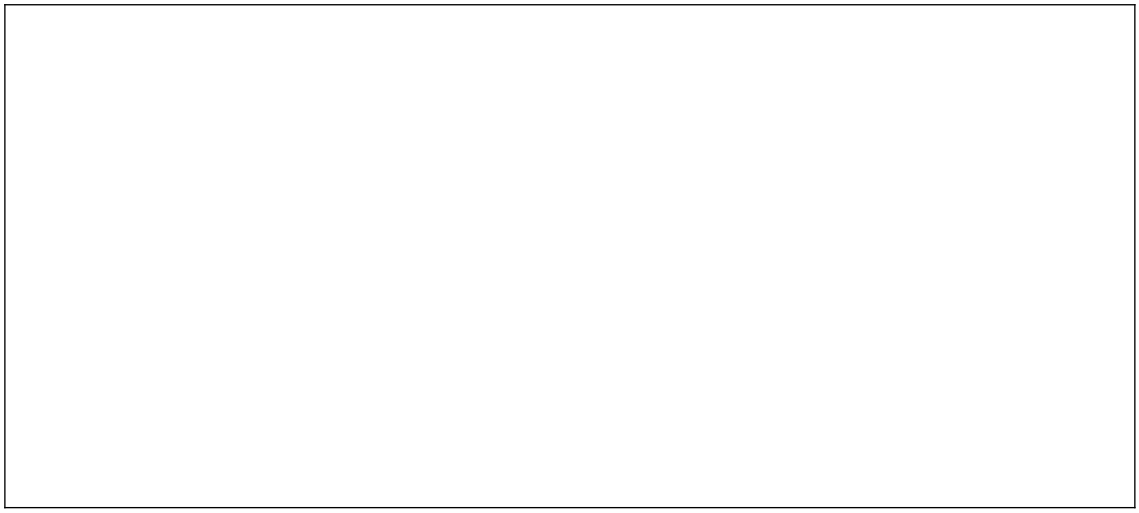
Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management
	Respect for difference and multiculturalism
	Respect for the natural environment
Adapting to new situations	Showing social, professional and ethical responsibility and sensitivity to gender issues
Decision-making	
Working independently	Criticism and self-criticism
Team work	Production of free, creative and inductive thinking
Working in an international environment	……
Working in an interdisciplinary environment	Others…
	…….
Production of new research ideas	

- Search, analysis and synthesis of data and information
- Decision making
- Teamwork
- Production of free, creative and inductive thinking

(3) SYLLABUS

- DSP Principles.
- Analog to digital signal conversion.
- Sampling theorem.
- Discrete time signals (Types, classification).
- Convolution.
- Analysis of discrete-time LTI systems.
- Systems described by difference equations.
- Correlation (cross-correlation, auto-correlation).
- FIR and IIR systems.
- Z tranform - Applications to the solution of differential equations.
- Analysis in the frequency domain.
- DTFT.
- DFT, FFT transforms.
- Implementation of discrete-time systems.
- Design of digital filters.
- Spectral analysis.
- Statistical Models of Stochastic Signals.
- Fundamental Principles of Parametric Estimation.
- Linear Estimation.
- Fundamental Principles of Signal Detection.
- Time-series analysis using wavelets



(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Use of ICT in teaching, laboratory education, communication with students</td><td>• Post material of the theoretical and of laboratory part of the course (notes, lecture slides, exercises, exam subjects, etc.) on the e-learning platform of the University.
• Use of e-mail and announcements on the e-learning platform so as to communicate with students.</td></tr>
<tr><td>TEACHING METHODS
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><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Practices exercises</td><td>13</td></tr>
<tr><td>Laboratory exercises</td><td>13</td></tr>
<tr><td>Course exercises</td><td>21</td></tr>
<tr><td>Independent Study</td><td>52</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>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.</td><td>I. Hand-written final exam (70%) which includes:
- Short answer questions
- Problem solving
II. Elaboration of laboratory exercises and final lab exam (30%)</td></tr>
<tr><td></td><td></td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

(1) A. Veloni, N. Miridakis, Digital Signal Processing, Tziola Publications, Thessaloniki, 2018.
(2) A. Oppenheim, R. Schafer, Digital Signal Processing, Fountas Publications, 2012.
(3) A. Veloni, N. Miridakis, E. Boukouvala, Digital and Statistical Signal Processing, CRC Press, 2018.
(4) J. Proakis, D. Manolakis, Digital Signal Analyis, Ion Publications,2012.
(5) S.K. Mitra, Digital Signal Processing: A Computer-Based Approach, 2nd ed., McGraw-Hill, 2000.
(6) V.K. Ingle and J.G. Proakis, Digital Signal Processing Using MATLAB, Brooks/Cole, 1999
(7) M.H. Hayes, Schaum's Outline of Digital Signal Processing, McGraw-Hill, 1998.
(8) S.K. Mitra and J.F. Kaiser (eds.), Handbook for Digital Signal Processing, Wiley-Interscience, 1993.

(9) K. Steiglitz, A Digital Signal Processing Primer: With Applications to Digital Audio and Computer Music, Addison-Wesley, 1996.
(10) A.Papoulis, Signal Analysis, McGraw-Hill, 1977.