COURSE OUTLINE

(1) GENERAL

SCHOOL	Economy, Management and Informatics		
ACADEMIC UNIT	Department of Informatics and Telecommunications		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE		**SEMESTER**	
COURSE TITLE	Signal/Image Processing and Pattern Recognition		
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**
Courses		3	7
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*	General background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	TBA		

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(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*

This course deals with topics in digital signal/image processing and pattern recognition. Upon successful completion of the course, students will be able to:
- Understand the basic concepts of signal/image processing and analysis.
- Understand the basic concepts of data classification and clustering.
- Understand the basic structure and peculiarities of hyperspectral data.
- Understand the basic hyperspectral data processing techniques.
- Be able to handle basic techniques for all the above.

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.
- Team work.
- Production of new research ideas.
- Decision-making.

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(3) SYLLABUS

Introduction to 1-D discrete-time signals and systems.

- Filtering, prediction, parameter estimation
- Frequency domain representation

Image Processing.

- Frequency domain representation
- Image enhancement and restoration
- Image segmentation
- Image compression

Pattern Recognition.

- Classification (Bayes classifier, linear and non-linear classifiers)
- Clustering (clustering algorithms, clustering validation)
- Feature generation/selection

Hyperspectral image processing

- Spectral unmixing
- Classification/Clustering

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(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	- Use of ICT teaching - Communication with students
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*	***Activity Semester workload*** 39 Lectures 55 Laboratory practice/ Tutorials/Interactive teaching 81 Studying 175 Course total
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.*	Final examination (~70%) consisting of - Problem solving questions - Theory understanding short questions. Project examination and presentation (~30%)

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(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

- R.C. Gonzalez, R.E. Woods, Digital Image Processing, 3rd Edition, 2008.
- S. Theodoridis, K. Koutroumbas, Pattern Recognition, 4th Edition, Academic Press, 2009.
- Signal and Image Processing in Hyperspectral Remote Sensing, IEEE Signal Processing Magazine, January 2014.

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