**COURSE OUTLINE**

(1) **GENERAL**

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>Economy, Management and Informatics</th>
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<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>Department of Informatics and Telecommunications</td>
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<tr>
<td>LEVEL OF STUDIES</td>
<td>Postgraduate</td>
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<tr>
<td>COURSE CODE</td>
<td>SEMESTER</td>
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<tr>
<td>COURSE TITLE</td>
<td>Fundamentals of Remote Sensing</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>
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<tr>
<th>Courses</th>
<th>WEEKLY TEACHING HOURS</th>
<th>CREDITS</th>
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<tr>
<th>Practical Exercises</th>
<th>WEEKLY TEACHING HOURS</th>
<th>CREDITS</th>
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**COURSE TYPE**

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

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<tr>
<th>PREREQUISITE COURSES:</th>
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**LANGUAGE OF INSTRUCTION and EXAMINATIONS:**

| English               | |

**IS THE COURSE OFFERED TO ERASMUS STUDENTS**

No

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<tr>
<th>COURSE WEBSITE (URL)</th>
<th>TBA</th>
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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 is introductory to Remote Sensing physics, image analysis, and interpretation. It deals with sensor technologies and image handling in support to Space Applications and Earth Observation Systems development. Upon successful completion of the course, students will be able to:

- Describe the components of a modern remote sensing system.
- Differentiate between the different operational sensors.
- Identify the appropriate methodologies and tools linked with the image analysis/processing levels (e.g. image space reduction, and fusion, feature enhancement and extraction, etc).
- Recognise the electromagnetic spectrum physics and interactions with land & atmosphere
- Categorise the appropriate satellite systems/methods to use per application area.
- Explain the basics of SAR sensor physics, and its implementation in Remote Sensing.

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

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Team work.
- Adapting to new situations.
- Decision-making.
(3) SYLLABUS

1. Introduction to Remote Sensing:
- Components of a Remote Sensing System
- Existing imaging platforms (satellite, UAV, aerial) and image typology (VHR, HR, MR, LR), multi-hyper spectral imagery
- Radiometric, spectral, and spatial characteristics of state-of-the-art and planned sensor systems
- Sensor systems vs application areas
- Satellite system operators, existing GSs, image data archives, and access modes

2. Radiative transfer in the atmosphere:
- Transmission characteristics of microwave, infrared, and visible light in clear days and in cloud/fog/precipitation
- Passive and active remote sensing techniques
- Atmospheric remote sensing technology
- Earth data exploration

3. Image analysis and image processing methods:
- Image radiometric calibrations, and enhancements
- Image geometric corrections, rectification/ortho-rectification, and triangulation methods
- Band image arithmetics & spectral features derivation (e.g. spectral indices)
- Basics on image classification methods and object creation (e.g. single vs multi-date, supervised vs unsupervised, pixel vs object oriented, feature extraction and pattern recognition)

4. SAR Remote Sensing
- Introduction to SAR remote sensing principles
- Electromagnetic wave theory
- Scattering theory and decomposition techniques
- SAR interferometry, polarimetric SAR interferometry
- SAR based bio/geophysical parameter estimation

(4) TEACHING and LEARNING METHODS - EVALUATION

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<tr>
<th>DELIVERY</th>
<th>Face-to-face, Distance learning, etc.</th>
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| USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY | - Use of ICT teaching  
- Communication with students |
| TEACHING METHODS | Activity Semester workload |
| 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 | 39 Lectures  
13 Laboratory practice/ Tutorials/Interactive teaching  
65 Practical exercises  
83 Studying  
200 Course total |
| STUDENT PERFORMANCE EVALUATION | Final examination (~50%) consisting of  
- Problem solving questions  
- Open-ended questions.  
- Theory understanding short questions.  

Project examination and presentation (~50%)  

| Description of the evaluation procedure | Specifically-defined evaluation criteria are given, and if and where they are accessible to students.  

| 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  |

| ATTACHED BIBLIOGRAPHY | - Suggested bibliography:  
- Related academic journals:  