COURSE MODULE – Remote Imaging and Sensing

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>ECTS CREDITS</th>
<th>COURSE LEVEL</th>
<th>COURSE INSTRUCTOR/s</th>
<th>DURATION PERIOD</th>
<th>EXPECTED PRIOR-KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Master</td>
<td>Francisco José Olmo Reyes / Juan Luis Nieves</td>
<td>SEMESTER 2</td>
<td>Photonics and Optics Fundamentals, Image Processing and Analysis, Basics and Fundamentals with Matlab</td>
</tr>
</tbody>
</table>

**AIM**

This course develops the fundamentals of remote sensing techniques. The course covers the basic principles of remote sensing, a revision of the electromagnetic radiation and its interaction with matter, some basics ideas about the atmosphere both as a transfer medium and as an observational object, advanced topics in surface and atmosphere remote sensing. Different platforms and sensors used in remote sensing will be presented including imaging systems. Pre-processing aspects of remotely sensed data will be addressed paying special attention to atmospheric and radiometric corrections. On completion of this course the students will be able to:

- Understand the bases of the remote sensing process.
- Approach to the remote sensing procedures applied to the surface and atmosphere.
- Distinguish the different kind of sensors and platforms used in remote sensing.
- Understand the need of atmospheric correction of surface remote sensing data.
- Apply atmospheric correction to real remote sensing data.
- Extract surface and atmospheric variables from remote sensing data.

**TEACHING ACTIVITIES**

This course is based on exchanges and discussions between students and instructors, lectures and practical session activities, as well as homework.

**COURSE OUTLINE**

(topic 1) Remote sensing: basic principles
(topic 2) Electromagnetic radiation and its interaction with matter.
(topic 3) Basics principles of atmospheric remote sensing and radiative transfer.
(topic 4) Remote sensing sensors: airborne and surface systems, optical, UV-VIS-IR and microwave sensors, imaging and non-imaging systems.
(topic 5) Pre-processing of remotely sensed-data: atmospheric correction, calibration.
(topic 6) Extraction of surface and atmospheric variables from remote sensing data.
(topic 8) Future applications

**PRACTICAL ACTIVITIES**

- Design of look up tables for atmospheric correction.
- Atmospheric correction of remote sensing images.
- Extraction of geophysical surface and atmospheric variables from remote sensing data.

**LEARNING OUTCOMES**

- **Knowledge and Comprehension** of the fundamentals, principles, applications, limits, relationships, of all concepts and topics covered by this course;
- **Application, Analysis, Synthesis and Evaluation** skills of the main concepts and topics covered by this course;
- Ability to apply/implement concepts and principles introduced in the lectures on practical tasks and on industrial study cases;
- Ability to self-learn, to understand some problems and to suggest/find solutions to solve these problems.

---

1 The meaning of keywords in italic used to define Learning Outcomes are detailed in Annex.
FORMS OF ASSESSMENT

Written exam (50%), Practical works (50%)

ASSESSMENT CRITERION

<table>
<thead>
<tr>
<th>Excellent - outstanding performance</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good - above the average standard but with some errors</td>
<td>B</td>
</tr>
<tr>
<td>Good - generally sound work with a number of notable errors</td>
<td>C</td>
</tr>
<tr>
<td>Satisfactory - fair but with significant shortcomings</td>
<td>D</td>
</tr>
<tr>
<td>Sufficient - performance meets the minimum criteria</td>
<td>E</td>
</tr>
<tr>
<td>Fail - some more work required before the credit can be awarded FX</td>
<td></td>
</tr>
<tr>
<td>Fail - considerable further work is required</td>
<td>F</td>
</tr>
</tbody>
</table>

Detail of criteria used to assess acquired skills:
- Activities and questionnaires giving evidence of knowing (20%)
- Activities and questionnaires giving evidence of comprehension/understanding (20%)
- Activities and questionnaires giving evidence of analysis (20%)
- Activities and questionnaires giving evidence of synthesis (20%)
- Activities and questionnaires giving evidence of evaluation (20%)

The evaluation of informal learning outcomes will be based on questionnaires and laboratory notebook (self-evaluation, learning diary).

LITERATURE AND STUDY MATERIALS


CONTACT DETAILS

Course coordination: Prof. Francisco José Olmo Reyes- Universidad de Granada (SPAIN)
E-mail: fjolmo@ugr.es Office: 33 (Department of Applied Physics)