Course guide
33103 - SIGTARN - Geographic Information Systems and Teledetection Applied to the Use of Natural Resources

Last modified: 12/06/2024

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

Degree: MASTER'S DEGREE IN NATURAL RESOURCE ENGINEERING (Syllabus 2015). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Vallbe Mumbru, Marc

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. A capacity for in-depth understanding of remote sensing and satellite imagery interpretation techniques applied to the characterisation and management of geological resources.

Generical:
2. The ability to summarise and think critically. The ability to adapt to new technologies.
3. The ability to take the initiative and be creative.

TEACHING METHODOLOGY

The course is based on the realization of directed learning activities, focusing on the study of geographic information systems (GIS), and the access and processing of remote sensing data. In the in-person modality, expository and practical classes will be carried out to introduce new concepts, guide the students in the use of computational resources, as well as to solve doubts. In the off-site modality, the course is designed around an asynchronous learning methodology, with learning activities that facilitate a workflow adaptable to different levels of interest and student availabilities. A program of activities is proposed that allows autonomous learning. In this latter case, the teacher will hold synchronous telematic support sessions, for the exposition of the topics, and inquiries. The use of advanced computational resources is a fundamental element in learning the contents of the subject. In this course, we will use QGis, which provides an advanced open source GIS environment for professional practice, research and learning.

LEARNING OBJECTIVES OF THE SUBJECT

The general ojective of the course is to establish a favorable framework to operate with digital metacartography fed with land surface data of physical magnitudes obtained remotely, with the purpose to conserve nature. In particular:
1. To understand the physical concepts that justify using images taken from artificial satellites to extract information on our planet.
2. To present digital image processing tools and become familiar with, and apply, the most typical remote sensing operations.
3. To bring attention to our geographic and natural environment through the practical use of satellite imagery and computer tools.

This is intended to capacitate the student to:
1. Conduct a research: Acquire a firm base of knowledge of the subject that allows her to be original in the development of ideas in the context of applied research.
2. Communicate an investigation: Master GIS techniques to create cartography that helps her communicate conclusions, knowledge and reasoning in a clear and concise way.
3. Take informed decisions: Gain a synthetic and analytical vision of the problems that help her form a judgment about the appropriate decisions to make in different situations.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	15,0	33.33
Hours large group	30,0	66.67

Total learning time: 45 h

CONTENTS

GEOGRAPHIC INFORMATION SYSTEMS

Description:
1. Introduction
2. Nature of geographic data. Georeferencing
3. GIS Data models and structure: raster, vector layers

Full-or-part-time: 18h
Theory classes: 11h
Practical classes: 7h

REMOTE SENSING

Description:
1. Theoretical fundamentals of data collection
1.1 Physical fundamentals
1.2 Space remote sensing systems
2. Digital processing of satellite imagery
2.1 Digital data matrix
2.2 Image and georeference correction
2.3 Digital classification

Full-or-part-time: 18h
Theory classes: 11h
Practical classes: 7h

TOPIC 3: CASE STUDIES

Description:
1. Practical examples with available data
2. Planning of a research assignment on the topic

Full-or-part-time: 9h
Theory classes: 5h
Practical classes: 4h

GRADING SYSTEM

Both in the in-person and in the off-site modalities, the system of qualification is the same and consists of a balanced weighting between the average of the marks of the weekly exercises and the mark of one final project applying the contents of the course to a topic of interest chosen by the student in agreement with the teacher.

BIBLIOGRAPHY

Basic:
- Chuvieco, E. Fundamentos de teledetección espacial. 3ª ed. rev. Madrid: Rialp, 1996. ISBN 843213127X.
- Sabins, Floyd F. Remote sensing: principles and interpretation. 3rd ed. New York: W.H. Freeman, 1997. ISBN 0716724421.
- Sobrino, José A., ed. Teledetección. València: Universitat de València, 2000. ISBN 8437042208.
- Vincent, Robert K. Fundamentals of geological and environmental remote sensing. Upper Saddle River: Prentice Hall, 1997. ISBN 0133487806.