# Course guide
# 330337 - GTES - Land and Underground Space Management

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

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| **Degree:** | MASTER'S DEGREE IN MINING ENGINEERING (Syllabus 2013). (Compulsory subject). |

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

## LECTURER

**Coordinating lecturer:**  LLUIS SANMIQUEL PERA

**Others:**

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Specific:**
1. (ENG) Capacitat per a la realització d'estudis sobre gestió territorial i espais subterranis.

**Transversal:**
2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

## TEACHING METHODOLOGY

The teaching methodology is fundamentally based on the use of a computer in order to be able to follow most of the activities carried out in the classroom. In fact, the explanations given by the teacher mainly refer to operations to be carried out using land management software such as ArcGis. For this reason, it is essential that students can try out the different operations on the computer.

## LEARNING OBJECTIVES OF THE SUBJECT

## STUDY LOAD

| Type | Hours | Percentage |
|---|---|---|
| Self study | 80,0 | 64.00 |
| Hours medium group | 45,0 | 36.00 |

**Total learning time:** 125 h

# CONTENTS

## Title of content 1: Introduction to territorial management and underground spaces: General concepts and geographic information systems as a tool for territorial management.

**Description:**
This content is focused in:
- Concepts of territorial management and underground spaces.
- Introduction to a geographic information system (GIS).
- Introduction to the "ArcGis" software.

**Specific objectives:**
Upon completion of this content, the student will achieve the following knowledge:
- Concepts of territorial management, underground spaces and GIS.
- Aspects of the generic and basic part of the "ArcGis" software.

**Related activities:**
Master class of theoretical concepts. Master class of aspects of the "ArcGis" software through the computer in which the students in the computer room try out the concepts given by the professor at the same time as the explanations or shortly afterwards. Carrying out exercises by the computer.

**Full-or-part-time:** 12h
Theory classes: 4h
Laboratory classes: 2h
Self study : 6h

## Content title 2: Vector GIS

**Description:**
In this content we work:
- Origin of information in vector GIS.
- Presentation of information in vector GIS.
- Main analyzes to be carried out in vector GIS.
- Realization of examples applied to territorial management and underground spaces.

**Specific objectives:**
Upon completion of this content, the student will achieve the following knowledge:
- Aspects related to the creation, manipulation, editing, management, ... of a vector GIS.
- Previous aspects through ArcGis.

**Related activities:**
Master class on theoretical concepts. Master class through the computer in which the students in the computer classroom are testing the same moment of the explanations or shortly after, the concepts given by the teacher. Carrying out exercises with the computer.

**Full-or-part-time:** 75h
Theory classes: 3h
Laboratory classes: 22h
Self study : 50h

## Content Title 3: Raster GIS

**Description:**
In this content we work:
- Origin of information in raster GIS.
- Digital terrain models.
- Representation of information in raster GIS.
- Elementary, local, neighborhood and zonal operations in raster GIS.
- Realization of examples.

**Specific objectives:**
Upon completion of this content, the student will achieve the following knowledge:
- Aspects related to the creation, manipulation, editing, management, ... of a raster GIS.
- Previous aspects through ArcGis.

**Related activities:**
Master class through the computer in which the students in the computer classroom are testing the same moment of the explanations or shortly after, the concepts given by the teacher. Carrying out exercises with the computer.

**Full-or-part-time:** 38h
Theory classes: 5h
Laboratory classes: 9h
Self study : 24h

# ACTIVITIES

## TITLE OF ACTIVITY 1: PRACTICE: CREATION OF A VECTORIAL SIG APPLIED TO TERRITORIAL MANAGEMENT

**Description:**
The main objective will be to produce a vectorial GIS that will be used to carry out territorial management.

**Specific objectives:**
Training with the "ArcGis" software and consolidating the knowledge given on vectorial GIS applied to territorial management.

**Material:**
Computers and "ArcGis" software

**Delivery:**
It represents 60% of the laboratory or internship grade.

**Full-or-part-time:** 21h
Self study: 14h
Laboratory classes: 7h

## TITLE OF ACTIVITY 2: PRACTICE: CREATION OF A VECTORIAL GIS APPLIED TO THE MANAGEMENT OF UNDERGROUND SPACES

**Description:**
The main objective will be to carry out a vectorial GIS that will be used to manage underground spaces.

**Specific objectives:**
Training with the "ArcGis" software and consolidating the knowledge that has been given about vectorial GIS applied to the management of underground spaces.

**Material:**
Computers and "ArcGis" software.

**Delivery:**
It represents 40% of the laboratory or internship grade.

**Full-or-part-time:** 15h
Self study: 10h
Laboratory classes: 5h

## ACTIVITY 3 TITLE: INDIVIDUAL ASSESSMENT TEST 1

**Description:**
Individual performance in a computer classroom of 2 or 3 exercises of all the practical contents of the subject covering all the specific learning objectives of the indicated contents. Correction by the professor.

**Specific objectives:**
To evaluate the knowledge acquired by the students with respect to the practical contents of the subject.

**Material:**
Approach of 2 or 3 problems to be solved with computer using the "ArcGis" software.

**Delivery:**
Resolution of the problems by the student. It represents a part of the evaluation.

**Full-or-part-time:** 12h
Self study: 10h
Theory classes: 2h

## ACTIVITY 4 TITLE: INDIVIDUAL ASSESSMENT TEST 2

**Description:**
Individual realization of a test questionnaire of about 10-15 questions, as well as 2-3 explanatory questions.

**Specific objectives:**
To evaluate the knowledge acquired by the students with respect to the theoretical contents of the subject.

**Material:**
Test questionnaire approach, plus 2-3 explanatory questions.

**Delivery:**
Resolution of theoretical examination. It represents a part of the evaluation.

**Full-or-part-time:** 7h
Self study: 6h
Theory classes: 1h

## GRADING SYSTEM

The final grade is calculated with the following formula:

Nfinal= 0,75·( NexTeo·0.4 + NexProbl·0.6)+ 0,10·Computer practicals + 0,15·Subject related work

Nfinal: final grade

NexTeo= Theory exam grade
NexProbl= Qualification of problems to be solved using ArcGis

Below you can see the 5 evaluation systems established by the MUEM verification report, with the total % of weighting for the systems used in this subject:

Partial and/or global tests, or synthesis tests: 75%
Laboratory and/or computer practicals: 10%
Reports:
Oral presentations:
Work related to the subject: 15%


## EXAMINATION RULES.

It is important to point out that other skills and qualities are required that are generic and applicable to any activity in the university academic environment, such as: the spirit of sacrifice, neatness, the capacity for synthesis, teamwork, respect for the rest of the classmates and the professor, perseverance, etc.


## BIBLIOGRAPHY

**Basic:**
- Santos, J. M. Sistemas de información geográfica [on line]. Madrid: Universidad Nacional de Educación a Distancia, 2004 [Consultation: 25/11/2022]. Available on: https://lectura-unebook-es.recursos.biblioteca.upc.edu/viewer/9788436276169. ISBN 8436220064.
- Hutchinson, S. Inside ArcView GIS 8.3. Clifton Park: Thomson/Delmar Learning, 2004. ISBN 0766834751.
- Bustillo, M.; López, C. Manual de evaluación y diseño de explotaciones mineras. Madrid: Entorno Gráfico, 1997. ISBN 8492170824.
- Zurita Espinosa, Laureano. La Gestión del conocimiento territorial. Madrid: Ra-Ma, cop. 2011. ISBN 9788499640952.
- Peña Llopis, Juan. Sistemas de información geográfica aplicados a la gestión del territorio: entrada, manejo, análisis y salida de datos espaciales:teoría general y práctica para ESRI ArcGIS 9 [on line]. 4a edición. San Vicente (Alicante): Editorial Club Universitario, 2010 [Consultation: 31/07/2024]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3191662. ISBN 9788484549987.