

Course guide

33101 - EMRARN - Methodological Tools for Research on Natural Resources

Last modified: 06/06/2024

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: Guimerà Villalba, Xavier

Others: Gemma Mujal Ribalta

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

3. Capacity to use the scientific and technical information to respond efficiently to any demand of the preparation of an analytical method for the characterization of a natural or anthropogenic material.

Generical:

1. The ability to communicate effectively orally and in writing.
2. The ability to take the initiative and be creative.

TEACHING METHODOLOGY

Teaching methodology (face-to-face modality): In this module, students will participate in in-person classes where the course content will be presented. Through research activities or the resolution of practical cases, students will apply the concepts learned in a practical context. Additionally, autonomous learning will be promoted through control activities, such as questionnaires, and the development of continuous work throughout the course. This work will comprehensively address the general objectives of the course, allowing students to explore topics more deeply and develop critical thinking skills.

Teaching methodology (non-face-to-face modality): In this online course, the content will be presented through study materials accessible online. Students will work on the content through practical activities, such as reading articles and solving proposed problems. Autonomous learning will be encouraged with self-assessment tasks (questionnaires) and guided research activities. Additionally, students will develop continuous work throughout the course, which will address the general objectives of the course. This work will allow students to explore topics in depth, apply the knowledge acquired, and develop critical analysis skills.

LEARNING OBJECTIVES OF THE SUBJECT

- OG1: Develop a deep understanding of digital identity and its importance in academic and professional contexts.
OG2: Develop skills in researching, managing, and utilizing academic and scientific information resources.
OG3: Promote the ethical and effective use of information in academic work, integrating bibliographic and technological tools.
OG4: Empower students in the effective design of experimental research, from planning to execution.
OG5: Develop skills for precise and rigorous interpretation of experimental results, including error calculation and propagation.
OG6: Master scientific writing and research results presentation.
OG7: Acquire skills to effectively communicate research findings.



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

Introduction: Digital Identity

Description:

Digital Identity

Specific objectives:

OE1: Analyze the components and characteristics of digital identity.

OE2: Evaluate best practices for managing and protecting digital identity in academic and professional environments.

Related activities:

- Theoretical classes.
- Problem formulation and resolution in class.
- Independent study and work by the student.
- Individualized student follow-up and assessment.

Full-or-part-time: 8h

Theory classes: 3h

Self study : 5h

Module 1. Management and use of information resources

Description:

- 1.1. Library resources and the Discovery UPC search engine
- 1.2. Internet sources of information
- 1.3. Databases
- 1.4. The Web of Science
- 1.5. The Scopus database
- 1.6. Information search strategies
- 1.7. Citations and bibliographic references
- 1.8. Bibliographic reference managers
- 1.9. Use of AI tools

Specific objectives:

- OE3: Train in the use of the Discovery UPC search engine and library resources.
OE4: Teach to identify and evaluate sources of information on the internet.
OE5: Train in the use of databases, specifically Web of Science and Scopus.
OE6: Instruct in advanced information search strategies.
OE7: Promote the correct use of citations and bibliographic references.
OE8: Introduce the use of bibliographic reference managers.
OE9: Train in the utilization of artificial intelligence tools.

Related activities:

- Theoretical classes.
- Problem formulation and resolution in class.
- Independent study and work by the student.
- Individualized student follow-up and assessment.

Questionnaires: Q1.1, Q1.2, Q2.1, Q3.1, Q3.2

Activities: A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7

Full-or-part-time: 48h

Theory classes: 18h

Self study : 30h

Module 2. Design and interpretation of experimental research

Description:

- 2.1. Experimental research design
- 2.2. Modeling experimental results
- 2.3. Calculation and propagation of errors

Specific objectives:

- OE10: Understand the fundamental principles of experimental research design.
OE11: Apply sampling techniques and variable control methods in experimental design.
OE12: Master mathematical modeling of experimental results for subsequent analysis.
OE13: Learn appropriate methods for error calculation and propagation in experimental measurements.
OE14: Critically evaluate the uncertainty associated with experimental data and its implications in result interpretation.

Related activities:

- Theoretical classes.
- Problem formulation and resolution in class.
- Independent study and work by the student.
- Individualized student follow-up and assessment.

Questionnaires: Q2.1

Activities: A2.1, A2.2, A2.3

Full-or-part-time: 36h

Theory classes: 12h

Self study : 24h

Module 3. Scientific Writing and Presentation of Research Results

Description:

- 3.1. Style and Scientific Writing
- 3.2. The Scientific Article
 - 3.2.1. Structure of a Scientific Article
 - 3.2.2. When and How to Write a Scientific Article
- 3.3. Presentation of the Final Master's Project Report
 - 3.3.1. Elaboration of the Report: Written Presentation of the Project
 - 3.3.2. The Scientific Poster
 - 3.3.3. Oral Presentation of a Research Project

Specific objectives:

- OE15: Understand the basic principles of scientific writing.
- OE16: Analyze the typical structure of a scientific article.
- OE17: Learn the best practices for writing a scientific article.
- OE18: Familiarize oneself with the preparation of a Final Master's Project Report.
- OE19: Master the preparation of a scientific poster.
- OE20: Develop skills for orally presenting a research project.

Related activities:

- Theoretical classes.
- Problem formulation and resolution in class.
- Independent study and work by the student.
- Individualized student follow-up and assessment.

Questionnaires: Q3.1, Q3.2

Activities: A3.1, A3.2, A3.3

Full-or-part-time: 33h

Theory classes: 12h

Self study : 21h

ACTIVITIES

Questionnaires (2 modalities)

Description:

- Q1.1. Databases
- Q1.2. Bibliography
- Q2.1. Experimental design
- Q3.1. The scientific article
- Q3.2. Presentation of results

Specific objectives:

OE5, OE8, OE11, OE17, OE20

Material:

Atenea Campus

Delivery:

45 % of the course grade in both modalities

Full-or-part-time: 24h 10m

Self study: 20h

Theory classes: 4h 10m

Activities (2 modalities)

Description:

A1.1. Discovery UPC
A1.2. Internet Information Search
A1.3. WoS Activity
A1.4. Scopus Activity
A1.5. Document Citation
A1.6. Reference Manager
A1.7. Artificial Intelligence
A2.1. Experimental Design
A2.2. Results Modeling
A2.3. Error Propagation
A3.1. Article Structure
A3.2. Poster
A3.3. Oral Presentation

Specific objectives:

OE3, OE4, OE5, OE7, OE9, OE10, OE12, OE13, OE14, OE15, OE17, OE19, OE20

Material:

Atenea Campus

Delivery:

20 % of the course grade in both modalities

Full-or-part-time: 30h 50m

Self study: 20h

Theory classes: 10h 50m

Final project (2 modalities)

Description:

Project work:

- T1.1. Bibliography
- T1.2. State of the art
- T1.3. Summary
- T1.4. Poster
- T1.5. Oral presentation

Specific objectives:

OE1, OE2, OE6, OE16, OE18

Material:

Atenea Campus

Delivery:

35 % of the course grade in both modalities

Full-or-part-time: 40h

Self study: 40h

GRADING SYSTEM

Face-to-face modality:

Grade for the course = Questionnaires (45%) + Activities (20%) + Project (35%)

Non-face-to-face modality:

Grade for the course = Questionnaires (45%) + Activities (20%) + Project (35%)

BIBLIOGRAPHY

Basic:

- Cordon García, José A. Las nuevas fuentes de información: la búsqueda informativa, documental y de investigación en el ámbito digital. Madrid: Pirámide, 2016. ISBN 9788436836455.
- Rubió, J.; Puigpelat, F. Com parlar bé en públic. Barcelona: Mina, 2010. ISBN 8473065867.
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- Cargill, Margaret; O'Connor, Patrick. Writing scientific research articles: strategy and steps. Chichester, UK: Wiley-Blackwell, 2009. ISBN 9781405186193.
- Icart Isern, M. Teresa; Pulpón Segura, Anna M. Cómo elaborar y presentar un proyecto de investigación, una tesina y una tesis. Barcelona: Universitat de Barcelona, 2012. ISBN 9788447535989.