Universidad Zaragoza

Academic Year/course: 2023/24

66113 - Introduction to Research in Nanosciencie

Syllabus Information

Academic year: 2023/24
Subject: 66113 - Introduction to Research in Nanosciencie
Faculty / School: 100 - Facultad de Ciencias
Degree: 539 - Master's in Nanostructured Materials for Nanotechnology Applications
ECTS: 5.0
Year: 1
Semester: First semester
Subject type: Optional
Module:

1. General information

This course intends to provide students with necessary tools to efficiently develop their research in the fields of Nanoscience and Nanotechnology. The importance of the communications skills of a scientist will be highlighted and practical examples will be given. In addition, the students will be informed about the key stages of a scientific career in academia and industry. Topics such as how to design and write a grant or a project proposal will be analyzed through practical cases. The importance of intellectual property and how it can be protected will be studied.

These approaches and objectives are aligned with the achievement of SDG 9. Industry, innovation and infrastructures of the Agenda 2030. More specifically, they will create action to enhance research, foster innovation and upgrade industrial technologies.

2. Learning results

- Knowledge on the steps of the scientific method.
- Knowledge and understanding on the main stages in a scientist career.
- Capability to conduct an efficient and valid literature search.
- Understanding the basics of intellectual property rights and patents.
- Understanding the importance of oral and written communication in science.
- Knowledge on Ethical Issues arising from research in nanoscience.
- Understanding the seriousness of plagiarism.

3. Syllabus

- Introduction on how to search for the most relevant academic literature and how to keep up-to-date with the state of the art, including search databases.
- Software tools for: publishing and managing bibliographies, market studies.
- Scrutinity of the research process: the principle of reproducibility of experiments; the nature of scientific hypothesis; the protocols of the scientific method; how to perform data collection and analysis.
- How to analyse experimental and theoretical results: modelling experimental data. Identification of the relevance of the results within the current state of the art.
- Dissemination/publication of results. Definition of a Scientific Paper. The importance of clarity in scientific writing. The English as the language of scientific papers, and the non-native writers. The need of develop oral and written communication for dissemination.
- Peer review methods: direct, single and double blind methods. Ethical guidelines and data protection; Faking data & plagiarism.
- Roadmap of the researcher career: grants, how to improve the chance of getting a grant, pre-doctoral grants, research secondment, postdoc period).
- The need for a multidisciplinary curriculum; the basics to become a Nanoengineer or a nanoscientist; Areas of speciality; Nanoscientists and/or Nanotechnologists. Opportunities in academia and industry.
- Intellectual property rights.

4. Academic activities

Lectures. Topics will be presented, analysed and discussed through lectures. The lecturers will provide the students with notes, handouts or summaries of class content prior to the beginning of the class (preferably via Moodle) along with the recommended reading for more in-depth understanding of the topic. Open forum and discussion on the basic concepts and their application. Problem solving and practical case studies.

Assignments. Students will prepare a comprehensive report individually on a specific topic provided by the lecturers and submit a written copy at the end of the course and will do an oral presentation.

Autonomous work. Students are expected to spend about 48 hours to study theory, solve problems and work on the assignments.

Tutorials. Teacher?s office hours allow students to solve questions, discuss unclear course contents or doubts related to the assignment. It is advisable to come with clear and specific questions to tutorials.

5. Assessment system

For students choosing **Continuous Assessment** (attendance to at least 80% of this module lectures is required)

1. An individual monographic project (100% of the final result for the module) related to some of the topics included in the module descriptors.Through this indvividual work, the results of the learning process will be assessed with regard to the abilities required for the module such as bibliographic searching, data interpretation, oral and written communication skills, interaction with colleagues and professionals from other areas, etc. The following are assessed in the oral presentation: i) structure (logical division of content) and good distribution of time; ii) good scientific communication (concise presentation, direct, clear and pedagogical); iii) correct use of audio-visual equipment.

For students that did not pass the ongoing assessment or wish to increase their mark, **Global Assessment** comprising a written test (50%), and an oral test (50%) before a board of three lecturers from the subject area. In these tests, the student must display knowledge of the topics taught in this module as well as their ability to apply this knowledge to specific problems. Scientific communication skills will be evaluated, and here correct use of scientific language, audiovisual techniques, graphics, clarity of presentation, etc. will be expected.