Managment and assessment of science

Academic Year: (2021 / 2022) **Review date: 08-07-2020**

Department assigned to the subject: Bioengineering and Aeroespace Engineering Department

Coordinating teacher: CUSSO MULA, LORENA

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

No recommendations

OBJECTIVES

SKILLS THAT THE STUDENT ACQUIRES WITH THIS SUBJECT

CG1 - Apply the principles of the scientific method, in order to provide innovative responses to the needs and demands of society.

CG2 - Search and interpret information obtained from appropriate bibliographic sources.

CG3 - Promoting the development of values and new attitudes that contribute to the conservation of the environment and sustainable development, as well as respect for the principles of equal opportunity and universal accessibility for people with disabilities.

CG4 - Acting with ethical responsibility and respect for fundamental rights, diversity and democratic values, as well as in the area of self-knowledge, evaluating inequalities based on sex/gender.

CB2 - That students know how to apply their knowledge to their work or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

CB3 - Students have the ability to gather and interpret relevant data (usually within their area of study) to make judgements that include reflection on relevant social, scientific or ethical issues.

CB4 - Students are able to convey information, ideas, problems and solutions to both specialist and non-specialist audiences.

TC1 - To have the ability to develop original thinking and promote the capacity for innovation, recognising and analysing a problem and proposing a scientific strategy to solve it.

TC2 - Be able to adapt to new situations, make decisions and show entrepreneurial capacity, initiative and leadership spirit.

TC3 - To acquire teamwork habits, both in multi- and interdisciplinary environments within the scientific field.

TC4 - Demonstrate organisational and planning skills, which allow adaptation to more or less complex scientific-technical problems or situations, always from the deontological framework and ethical commitment.

CE5 - Knowledge of the main current problems and future challenges of the sciences, as well as their practical applications and ethical and social implications.

SG9 - To develop projects in different fields of science, including carrying out a study, critically

interpreting the results obtained in it and evaluating the conclusions reached, as well as the capacity to transmit information in different areas of science, including the elaboration, writing and oral presentation of a scientific report.

SG10 - Analyse the challenges to the human being and the environment based on historical and philosophical knowledge of science.

SG11 - Developing and communicating the objectives and results of research projects on science and society using scientific information management techniques.

LEARNING OUTCOMES THAT THE STUDENT ACQUIRES

Upon completion of this course, the student should be able to:

- Identify, analyze and critically evaluate problems and relevant ethical and social arguments in the development of scientific activity.

- Communicate effectively, in writing and orally, the result of the analysis of the ethical and social dimensions of science and its applications.

- Know the Objectives of Sustainable Development (ODS) and the concept of sustainability.

- Originate and develop innovative knowledge about current problems of knowledge, science and technology from the different perspectives integrated in the Area of Logic and Philosophy of Science and related disciplines.

- Communicate scientific content to the general public using multiple formats (visual, oral, written).

- Work as a team, participate in discussion and debate forums contributing ideas and recognizing the contributions of others.
- Develop accessible documentation for non-experts in the field.

- Develop a historical vision of Science from its birth, through the different evolutions that have taken place, until reaching the current situation.

- To value and interpret the interdisciplinary scientific world in which we find ourselves today.

- To plan and execute all the phases of a research project.

- To carry out the drafting of a scientific project or study.

- To apply the scientific method and critically evaluate one's own scientific activity and that of others.

- To critically evaluate, from parameters of equity and sustainability, the applications of the knowledge acquired.

- Identify the social, economic and environmental implications of the academic-professional activities of the area of own knowledge.

- To develop models that exemplify social, economic and environmental impacts.

- To show sensitivity towards environmental issues.

- Demonstrate ethical awareness and empathy with the environment.

- Analyze critically and constructively environmental education programs and activities.

- Respect the diversity and plurality of ideas, people and situations.

- Recognize the ethical dimension of scientific and technical development.

- To critically assess different ethical challenges in today's world.

- To interpret the events of the current world from the physical, economic, social and cultural diversity. Maintain an ethical commitment.

- Propose projects and actions that are in accordance with the principles of ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.

- Recognize the implications of scientific knowledge for gender development.

- Apply in a critical, reflective and creative way the values of non-sexist knowledge.

DESCRIPTION OF CONTENTS: PROGRAMME

Science and Society in the 21st Century: Science and Progress. Scientific ethics, the precautionary principle and responsible research and innovation (RRI) Scientific integrity. Bioethics: ethical challenges in the biomedical sciences Ecological ethics Nature and human well-being Sustainability and global change Agenda 2030 and the Objectives of Sustainable Development (ODS)

Logic and Philosophy of Science: Introduction to the scientific method. Conjectures and refutations. Concepts, theories and models. Observation and experimentation. Scientific revolutions. Philosophy of special sciences. Space and Time. Matter and Energy. Origin and Nature of living beings. Android philosophy: information, intelligence and artificial life. Science, Engineering and Knowledge in the Contemporary World.

Communication and Divulgation of Science: Social Impact of Science. Communication Theory. Dissemination of research results (specialized public). Communication of science (to non-specialized public). Free format science communication project.

History of science: The birth of science. The scientific revolution. The illustration and the Newtonian science. The chemical revolution. Plant and animal life. Scientific medicine. The industrial revolution and thermodynamics. The new chemistry. Electromagnetism. The terrestrial geology. The evolution of the species. The nineteenth-century mathematics. Revolutions in physics (relativity and quantum physics) Science and warfare. Limitations of mathematics and bases
computer logic. The earth. Interdisciplinary chemistry. The DNA revolution. A non-linear world. An interdisciplinary scientific world.

Management and evaluation of Science: R+D+I systems: Spain, Autonomous Communities, Europe. Science policy. Actors in the system, funding programmes. Legal and economic aspects of scientific research. Design and management of research projects.

LEARNING ACTIVITIES AND METHODOLOGY

RAINING ACTIVITIES OF THE CURRICULUM REFERRING TO SUBJECTS

- Theoretical classes.
- Theoretical and practical classes.
- Public exhibitions
- Seminars
- Reading and commenting on text
- Tutorials
- Individual student and/or group work.
- Exams

TEACHING METHODOLOGIES TO BE USED IN THIS SUBJECT

- Expository method: oral presentations by the teacher supported, if necessary, with computer material (PowerPoint, videos, etc.). They provide the transmission of knowledge and activation of cognitive processes in the student.

- Project-oriented learning: carrying out projects in a given time to solve a problem or tackle a task by planning, designing and carrying out a series of activities, all based on the development and application of acquired learning and the effective use of resources.

- Cooperative learning: encourages the development of autonomous learning, through collaboration between peers.

- Learning through inverted classes: students prepare new contents under guidelines established by the teaching staff to, later, carry out face-to-face activities to solve doubts, pose problems related to what they have learned and carry out face-to-face micro-evaluations with the aim of retroactively reinforcing the learning process.

ASSESSMENT SYSTEM

% end-of-term-examination:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

Continuous evaluation: 60%.
- Performance of work, problems and/or practical activities.
- Participation in class and Aula Global: includes participation during the seminars, in the Aula Global forum, attitude in class, exercises in class (to be solved in groups or individually), or other activities.

Final exam: 40%.
- The final exam will cover the entire curriculum and will represent 40% of the final score. The minimum score in the final exam to pass the subject is 4.5 out of 10, regardless of the score obtained in the continuous assessment.

Extraordinary exam:
- The grade for students attending any extraordinary exam will be 40% of the extraordinary exam and 60% of the continuous assessment, if available. In the event of not presenting continuous assessment, the full weight of the grade will fall on the exam.

- Percentage weight of the Final Exam 40
- Percentage weight of the rest of the evaluation 60

BASIC BIBLIOGRAPHY

- Bucchi, M., & Trench, B. (Eds.) Handbook of public communication of science and technology, Routledge, 2008

- Cantor, G. N., Christie, J. R., Hodge, M. J. S., & Olby, R. C. (Eds.) Companion to the history of modern science, Routledge, 2006

- Harré, R. The philosophies of science, philarchive.org, 1985