

26938 - History of Science

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	447 - Degree in Physics
ECTS	5.0
Course	
Period	Second semester
Subject Type	Optional
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

This course has a value of 5 ECTS. It is focused on the application of basic knowledge on historical development of science and technology to case studies based on primary sources.

5.2. Learning activities

1. Master lectures on history of science and physics (40 hours).
2. Analysis of primary sources (10 hours).
3. Teacher-guided case studies based on historical scientific texts: writing a team-based assignment (2-3

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students/team) explaining events, procedures, ideas, concepts in a historical scientific text, including what happened and why.

5.3.Program

1. Science in the Ancient and Medieval World

1. The Origins of Rational Science: Technology and Philosophy.
2. Materialism and Idealism. The Scientific Legacy of the Classic World: Mathematics, Astronomy and Mechanics.
3. Science in the Middle Ages: Arabic Science. Medieval Science in the Christian West. The Transformation of Feudalism by the new Techniques.

2. The Birth of Modern Science (1450-1690)

1. The Renaissance (1440-1540): Science and Technology in the Renaissance. Copernicus and Vesalius.
2. Science during the first bourgeois revolutions (1540-1650): Kepler, Galileo and Harvey. Bacon and Descartes.
3. Science attains Full Age (1650-1690): The development of the new image of the world . The Synthesis of Newton.

3. 18 th century: Science in the Age of Enlightenment and the beginning of the Industrial Revolution

1. Historical context. Scientific activity and dissemination of science.
2. Electricity. Heat. Astronomy and cosmology.
3. The birth of a new chemistry.
4. Physiology and the problem of the origin of life.
5. Natural history. Geology: the discovery of time.

4. 19 th century: the institutionalization of science and the beginning of the contemporary world

1. French science between 1789 and 1814.
2. Lamarck, Darwin and Wallace. Charles Lyell and modern geology.
3. Mendel, the father of genetics. The cell interior. Ramón y Cajal: cells in the nervous system.
4. Scientific medicine: Bernard, Helmholtz, and the first law of thermodynamics. Pasteur: the microbial origin of diseases.
5. The development of organic chemistry. Dalton and the foundations of modern chemistry.
6. Electromagnetism: Faraday and Maxwell. Thermodynamics and statistical physics. A new electromagnetic world.
7. X-rays, radioactivity, and the electron. Nineteenth century clouds over physics.
8. Spectroscopy and the birth of astrophysics.
9. Analytical mathematics and group theory. New mathematical worlds: non-Euclidean geometry and the concept of infinity.

5. 20 th century: "The century of Science"

1. Planck and the quantum discontinuity. The structure of the atom and the old quantum theory. Quantum mechanics (1925-1927).
2. Nuclear physics. Elementary particles. The transistor and quantum chemistry.
3. Einstein: special relativity and general relativity.
4. The expansion of the Universe. Wegener and continental drift.
5. Gödel and the limits of mathematics. Computers and experimental mathematics. Fermat's last theorem.
6. The discovery of DNA and the chemistry of life

5.4.Planning and scheduling

5.5.Bibliography and recommended resources