UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

History of Science

2425-2-E2004P010

Learning area

3: Study of socio-economic and cultural aspects related to communication processes.

Learning objectives

Knowledge and understanding:

- Main concepts and themes on history and philosophy of science.
- Intellectual, social, and economic factors characterizing the development of scientific knowledge.
- Epistemological, social, and cultural implications of different scientific theories and traditions.

Applying knowledge and understanding:

- Improvement of the student's cultural background, increasing his critical attitude and awareness of philosophical and scientific investigation as a tool for the management and solution of collective issues.
- Acquaintance with different forms and practices of science and scientific communication, in an interdisciplinary perspective.
- Development of an adequate capacity for conceptual thinking.
- Development of analysis and interpretation skills of texts, images, and symbols.
- Development of design capacity, organization and coordination of cultural activities and projects concerning the history of scientific disciplines.

Contents

Title > **Nature, movement and knowledge: an history of concept of space**

The course is divided into two parts.

a) After some preliminary epistemological considerations (e.g. the concept of 'science', the relationship between theory and observation, the nature of scientific reasoning, the main models of explanation, and the debate between realists and anti-realists in science, the **first** institutional part will examine some fundamental moments of the history of Western philosophical and scientific thought from antiquity to the 20th century.

b) In the **second** (monographic) part, some particular conceptions of space and spatiality from the Greek world to general relativity will be examined in an interdisciplinary framework encompassing philosophy, physics, mathematics and psychology.

Detailed program

a) General part – *Fundamentals of history of philosophical scientific thought*

- Preliminary considerations of history and philosophy of science.
- The birth of Greek science.
- Hippocrates and the medical school of Cos.
- Science in Plato and Aristotle.
- The scientific culture of the Hellenistic age: medicine, mathematics and astronomy.
- The brief renaissance of the imperial age: Ptolemy and Galen.
- The decline of science in the late antique and medieval Western world.
- The Renaissance "revolution".
- Leonardo da Vinci and the world of techniques.
- The birth of modern science: the renewal of astronomy and medicine.
- Galileo Galilei and experimental method.
- Francis Bacon.
- Descartes and mechanism.
- The discovery of blood circulation and iatromechanism.
- Isaac Newton's natural philosophy.
- Lavoisier and the birth of modern chemistry.
- The foundation of the man sciences.
- Biology, physiology, and life sciences in the 19th century.
- Charles Darwin and the theory of evolution.
- Positivism, conventionalism, logical empiricism.
- Karl Popper and falsificationism.
- Change and revolution in science: Kuhn, Lakatos, Feyerabend.

b) Monographic part – *Nature, movement and knowledge: an history of concept of space*

- Preliminary considerations on the concept of space.
- Space, nature and motion in Greek thought and in the Middle Age.
- The new Renaissance cosmologies and the problem of infinite space.
- Newton's absolute space and Leibniz's critique.
- English empiricism, Kant and 20th century developments of the concept of space.
- Spaces and possible worlds: non-Euclidean geometries and the concept of curvature of space.
- The field concept in Faraday and Maxwell's electromagnetism.
- Einstein, the theory of relativity and four-dimensional space-time.

Prerequisites

None.

Teaching methods

28 in-person lecture-based classes.

Teaching methods consist in direct exposure, group discussion, analysis of historically and scientifically significant texts, and possible in-depth seminars.. The course is held in Italian. ***Class attendance is strongly recommended****.*

Assessment methods

The verification of learning will be carried out through a **written test**, divided into a part with 30 multiple-choice questions and a part with 3 open questions. The questions are aimed at testing the effective acquisition of the topics illustrated during the course, as well as to ascertain the ability to manage the contents of the proposed bibliography and the capability to critically deal with them.

Upon student's request, the exam can be integrated by an **oral examination**, on all the course topics.

There is no midterm exam.

Textbooks and Reading Materials

- Castellani, E., & Morganti, M. (2019). *La filosofia della scienza*. Bologna: Il Mulino (pp. 9-14, 17-30, 45-66, 79-83, 92-94, 96-101, 105-113, 116-124, 131-163, 177-179).
- Hall, A.R., & Boas Hall, M. (2022 [1964]). *Breve storia della scienza*, a cura di A. Molaro. Milano: Pgreco (pp. 13-146, 183-262, 343-359).
- Rossi, P. (1997). *La nascita della scienza moderna in Europa*. Roma-Bari: Laterza (pp. 3-16, 41-45, 55-214, 243-254, 317-359).
- Agazzi, E. (2024). *La scienza e l'anima dell'Occidente*. Milano-Udine: Mimesis (pp. 21-48) [available in scan on this e-learning page].
- Molaro, A. (2024). *Storia del concetto di spazio: dai Greci alla relatività generale*. Roma: Carocci (pp. 9-156, 165-192, 203-245, 264-307).
- Course slides and other reading materials available on this e-learning page.

Foreign students (Erasmus) may contact the lecturer to arrange an examination programme in English or French.

Sustainable Development Goals

QUALITY EDUCATION | GENDER EQUALITY | PEACE, JUSTICE AND STRONG INSTITUTIONS