UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Scientific method: the fundamental concepts

2526-102R-21

Title

Scientific method. The fundamental concepts

Teacher

Edoardo Datteri

Language

English

Short description

Philosophy of science is the branch of philosophy that concerns the meth-ods and fundamental concepts involved in scientific research. Key philo-sophical issues, such as the distinction between science and non-science, the characteristics of a good scientific explanation, the relationship be-tween theory and observation, the structure of scientific theories and the nature of the mind, are rarely covered in scientific courses. However, all 'good' scientists should reflect deeply on these issues. This course offers all Bicocca PhD students a unique opportunity to do so.

The course is open to PhD students in all research fields. It will cover issues relating to the foundations of science, ranging from physics to educational sciences. The lessons will be student-centred and prioritise discussion. More

specifically, in each lesson,

(1) the lecturer will provide definitions and epistemological considerations from the epistemological literature, raising questions for discussion;
(2) Then, participants will be invited to reflect on the definitions and discuss the questions raised in the first part of the lesson, drawing on their expertise and experience.

The lessons will be held in English. The lecturer will provide supplementary materials and texts via the e-learning platform.

Target audience

PhD students from all the courses offered in Bicocca (no philosophical prerequisites).

Maximum number of participans

30

Assessment method

The general objective of the course is to raise awareness of important philosophical questions that emerge in scientific research. Students will be asked to write a short, self-reflective paper of around 2,000 characters, summarising what they have learned on the course from a meta-cognitive perspective.

CFU / Hours

1 / 8

Teaching period and mode

January 9th, 16:00 - 18:00 U9-09

Title of the lesson: *Science*

Abstract. “Science” is the most fundamental concept in science. However, defining what science is, and what distinguishes science from other forms of knowledge acquisition, is an extremely challenging task. In this lesson, two famous yet unsuccessful attempts to solve this problem – the so-called verificationim and Popper’s falsificationism – will be critically analysed and discussed, in search of more promising solutions. The distinction between “hard” and “soft” sciences will be challenged.

January 16th, 16:00 - 18:00 U9-09

Title of the lesson: *Theory and observation*

Abstract. What is a theory, and what counts as an observation, in science? It is frequently assumed that theories are logically and conceptually distinct from observation, and especially that observation comes before theory formulation (both logically and temporally). However, the relation between the two is more complicated than this, and it may be even argued that observations somehow depend on pre-existing theories. The so-called “theory ladenness” of scientific observation (according to which observations are loaded with theory in science) will be critically discussed with the help of examples taken from the scientific literature.

January 23rd, 16:00 - 18:00 U9-09

Title of the lesson: *Scientific explanation and understanding*

Abstract. Scientific research pursues the explanation and understanding of natural phenomena. What exactly counts as a “good” explanation of a phenomenon? What objective and subjective factors determine one’s understanding of a phenomenon? Philosophers of science have produced several models of scientific explanation, which place constraints on the relationship between the phenomenon to be explained and the information provided to explain it. They include, among others, nomologico-deductive, teleological, functional, mechanistic, narrative explanations. These models of explanations will be sketched and discussed with reference to the various scientific research areas represented in the group of participants.

January 30th, 16:00 - 18:00 U9-09

Title of the lesson: *Scientific reductions and revolutions*

Abstract. How do scientific theories change, what kinds of changes can they undergo, and what happens when a theory loses credit in favour of other theories? Are the concepts of “scientific revolution”, “paradigm”, “research program” really useful to describe scientific change? How can different theories be related to one another? These huge questions would deserve a course-length treatment: they will be briefly introduced in the final lesson of the course, drawing on classic text by Kuhn, Lakatos, Feyerabend, with an eye on the contemporary debate on the sociology of science.

course registration on “Segreterie online”: from 19/12/2025 to 06/01/2026

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