UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Scientific method: the fundamental concepts

2223-DOTT-MOD19

Title

Scientific method. The fundamental concepts

Teacher(s)

Edoardo Datteri

Language

English

Short description

Philosophy of science is a branch of philosophy concerned with the methods and the fundamental concepts involved in scientific research. Cornerstone epistemological 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 na-ture of mind, are rarely addressed in scientific courses. However, all “good” scientists ought to reflect on them deeply. This course represents a unique opportunity, for all the Bicocca PhD students, to do that.
The course is open to PhD students in all research fields. It will cover issues pertaining to the foundations of sciences ranging from physics to the educa-tional sciences, with an eye on the role of computer science in

understanding the world. The lessons will be centered on students and give priority to discus-sion. More specifically, in each lesson,

1. the lecturer will provide some definitions and epistemological consid-erations made in the epistemological literature and raise some ques-tions to be discussed.
2. Then, the participants will be invited to reflect on the definitions and discuss the questions raised in the first part of the lesson, drawing from their expertise and experience.
   The lessons will be held in English. The lecturer will provide supplementary ma-terials and texts through the e-learning platform.

May 5th, 9:00 am – 11:00 am

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.

May 12th, 9:00 am – 11:00 am

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.

**May 19h, 9:00 am – 11:00 am

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.

May 26th, 9:00 am – 11:00 am
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.

Target audience
PhD students from all the courses offered in Bicocca.

Participants
Min 5 Max 30

CFU / Hours

1 CFU / 8 hrs

Teaching period

05/05/2023 9:00 am -11:00 am U4.07
12/05/2023 9:00 am -11:00 am U2.04
19/05/2023 9:00 am -11:00 am U2.04
26/05/2023 9:00 am -11:00 am U2.04

course registration on “Segreterie online”: from 17/04/2023 to 2/05/2023

Sustainable Development Goals

QUALITY EDUCATION