



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Scientific method: the fundamental concepts

2122-DOTT-MOD21

Title

Scientific method. The fundamental concepts

Teacher(s)

Prof. Edoardo Datteri

Language

English

Short description

In order to carry out methodologically solid scientific research, one must properly understand, and be able to sensibly use, fundamental concepts of science such as the notion of theory, observation, explanation, understanding, model – and, above all, the concept of science itself (as distinguished by other ways to acquire knowledge). All these concepts admit of many possible interpretations and definitions, and give rise to several epistemological controversies. This course represents a unique opportunity, for all the Bicocca PhD students, to reflect on the meaning of these concepts as they are used in their research field and in science at large.

The lessons will be centered on students and give priority to discussion. More specifically, in each lesson,

1. The teacher will provide some definitions and epistemological considerations made in the epistemological literature and raise some questions 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 teacher will provide supplementary materials and texts through the e-learning platform.

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

Participants (min/max): 5/30

CFU / Hours

CFU: 1

Hours: 8

Teaching period

May 6th, 3 pm – 5 pm

Title of the lesson: Science

Abstract. "Science" definitely 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 verificationism and Popper's falsificationism – will be critically analysed and discussed, in search of more promising solutions.

May 13th, 3 pm – 5 pm

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 20th, 9 am – 11 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.

June 1st, 4 pm – 6 pm

Title of the lesson: Models

Abstract. Scientists explain and predict natural phenomena using models, which are often human-made, technologically sophisticated artifacts. The term “model” is pervasively used in science – but what exactly counts as a model of a phenomenon? What makes something a “good” model of something else? And what epistemic functions do models play in science? Some definitions proposed in the literature will be discussed, and it will be argued that models are not used only to represent parts of reality, but also to stimulate natural systems in scientifically interesting ways.

Sustainable Development Goals

QUALITY EDUCATION
