

# A Graduate Course on Philosophy of Science

Credits: 2

Instructors: G. Nagarjuna & Shweta Naik

Day & Time: Tuesday, 2 pm to 4 pm

Duration: 18<sup>th</sup> January to 26<sup>th</sup> April, 2022

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## Course Objectives:

- Criteria used for demarcating science from non-science
- Major milestones in the history of science
- Views of some major philosophers: Bacon, Karl Popper, Thomas Kuhn, van Frassen, Ian Hacking etc.
- Understand the issues in Nature of Science, Experimental science, Model Based Reasoning, Theories, Models, and Analogies
- Debates in Structure and Dynamics of Scientific Theories, realism and anti-realism and their implications to STEM education

## Description:

The course will begin with a discussion on the possible criteria of demarcation between science and folklore (common knowledge), non-science, and metaphysics. The distinctions of empiricism vs rationalism, materialism vs idealism will be dealt with in the introduction. Taking detour through various turns in philosophy of science, arrive at logical positivism, and what is normally called the 'standard view'. A criticism of the standard view will be covered in detail. During the course we will also reflect on the nature of science before and after Thomas Kuhn.

## Expected Outcomes:

At end of the course the student would have understood how to distinguish between theory, hypotheses, laws, phenomena, models, and physical systems; develop an appreciation of axiomatic structure of scientific theories; understand what happens to the structure of a scientific theory when conceptual change takes place; the various criteria of demarcating science from other modes of pursuit; implications of nature of science debate on science education.

## Assignments:

The students will be writing several short pieces from the readings and discussions in the class. This is also to train the students to understand and create review, proper citations, research, discussion, argument, conclusion, etc.

## Assessment:

Evaluation will be continuous based on the presentations and participation in the class discussions. Some questions will be posted periodically at the course website, and students are expected to upload the answers on the site. At the end of the course, each student will give a seminar and write a short-term paper based on the given seminar.

## Suggested Readings:

- Philosophy of Science – A Very Short Introduction by Samir Okasha
- What is this thing called science? by Alan Chalmers
- The Structure of Scientific Theories by Frederick Suppe
- Representations and Intervening, by Ian Hacking
- Structure of Scientific Revolutions, by Thomas Kuhn
- Science Teaching, by Michael Matthews
- Prophets Facing Backwards by Meera Nanda
- What is Science? by Sundar Sarukkai