Universidad Católica de Valencia San Vicente Mártir

COURSE GUIDE

Classical Topics in Philosophy of Science

Prof. Álvaro Romero Moreno

Philosophy Degree
3rd Year

CLASSICAL TOPICS IN PHILOSOPHY OF SCIENCE

Preliminary remarks:

The teaching on this course is online. As specified in the Methodology section of this guide, it is interactive e-learning that is undertaken using audiovisual resources.

1.- COURSE DETAILS

Course Name	Classical Topics in Philosophy of Science
ECTS Credits	6
Type of Learning	Basic
Calendar	3rd year- 2nd semester
Module Name	Philosophy of Science
Course Requirements	None
Lecturer	Álvaro Romero Moreno (alvaro.romero@ucv.es)

2.- BRIEF DESCRIPTION OF COURSE CONTENTS

The course is divided into two sections.

The first section addresses key issues relating to the structure of science, such as:

1) What is scientific observation? What is a scientific experiment?
2) From observation sentences, is it possible to construct generalizations which inherit their truth? How do you distinguish between laws of nature and accidental generalizations?
3) What does it mean to explain scientifically? What kinds of scientific explanations exist?
4) What are scientific theories? What is the relationship, if any, between scientific theory and reality?
5) Is it possible to distinguish between scientific knowledge and pseudoscience?

The second section addresses key issues of the dynamics of science, such as:

6) How does science evolve? What if scientific theories, paradigms, research programs or research traditions are replaced by other rivals (if any)?
7) Are there any logical or epistemological criteria which, in the form of rules, determine the choice of one theory over another? What are the differences between rules and values when making such a choice?
8) Does the philosophy of science have an object of study and does it have a place alongside other areas of knowledge, or does it dissolve into scientific disciplines such as psychology, cognitive science, theories of evolution, neurobiology, sociology, etc.. ?

These are some of the questions that will be addressed on this course, dedicated essentially to the analysis of the structure and evolution of science from the most relevant philosophical and scientific perspectives from early last century to the present:

a) Carnap and logical positivism
b) Popper and critical rationalism
c) Kuhn and the politics of consensus
d) Lakatos and the end of instant rationality
e) Giere, Churchland, Lorenz, Vollmer plus many others and the naturalization of the philosophy of science.

3.- COURSE PROGRAM AND CALENDAR

Part 1. STRUCTURE OF SCIENCE

1. Scientific research — January – February

- 1.1. Observe, experiment, contrast
- 1.2. The testability as criterion of scientificity
- 1.3. Types of testing
- 1.4. The experiment and the hypothesis testing
- 1.5. The scientific method

2. Regularities and laws — February

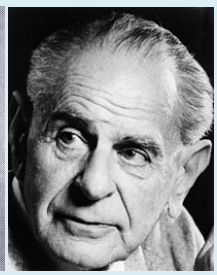
- 2.1. The scientific explanation and laws
- 2.2. Types of scientific explanations
- 2.3. Generalizations: induction or conjecture
- 2.4. Concept of law of nature
- 2.5. Accidental generalizations and laws of nature

3. Scientific theories — February

- 3.1. Concept of scientific theory
- 3.2. Theories and models
- 3.3. The nature of theoretical concepts

Part 2. DYNAMICS OF SCIENCE





4. The problem of induction — February

- 4.1. The popular image of science
- 4.2. Inductive generalization
- 4.3. Bacon and the research for *natura naturans*
- 4.4. John S. Mill and *The System of Logic*
- 4.5. In spite of evening, he twists his neck

5. Science as a Product of Logic and Reason (I): Carnap and the Logical Positivism — March

- 5.1. Carnap and the early Vienna Circle
- 5.2. The Vienna Circle manifesto
  - 5.2.1. The study of the meaning of statements
  - 5.2.2. The foundation of scientific knowledge
- 5.3. The concept of scientific progress

6. Science as a Product of Logic and Reason (II): Popper and Critical Rationalism — March - April

- 6.0. Bio-bibliography of Karl Popper
- 6.1. Corroboration and falsification
- 6.2. Basic statements
- 6.3. Truth and verisimilitude
- 6.4. Objective reality: Worlds 1, 2 and 3
- 6.5. Evolutionary dynamics of scientific theories

7. Reaction (I): Kuhn and scientific revolutions — April - May

- 7.0. Bio-bibliography of Thomas Kuhn
- 7.1. Paradigm and disciplinary matrix
- 7.2. Normal Science and Scientific Revolutions
- 7.3. Incommensurability
- 7.4. Objectivity, value judgments and choice theory

8. Reaction (II): Lakatos and the end of instant rationality — May

- 8.0. Bio-bibliography of Imre Lakatos
- 8.1. Negative and positive heuristics
- 8.2. The end of instant rationality
- 8.3. The game of science

9. The blurring: Substitutive naturalization of philosophy of science — May

- 9.1. Concept and types of naturalization
- 9.2. Substitutive Naturalization:
  - 9.2.1. The radical interpretation of Kuhn
  - 9.2.2. Quine and naturalized epistemology
- 9.3. Cooperative naturalization of philosophy of science
  - 9.3.1. Naturalization from cognitive science
  - 9.3.2. Naturalization from the theories of evolution
  - 9.3.3. Naturalization from neurobiology

4.- REFERENCES

4.1 Basic bibliography

4.1.1.	Course textbook by Álvaro Romero Moreno
4.1.2.	Sanmartín Esplugues, J. (2014). *El exceso de excluir a la razón. Reflexiones para una historia de la filosofía de la ciencia*. México: Centro de Estudios Filosóficos, Políticos y Sociales Vicente Lombardo Toledano, Col. Eslabones en el Desarrollo de la Ciencia.
4.1.3.	Alan F. Chalmers (1976): *What is this Thing Called Science?*, Queensland, University of Queensland Press.

4.1.4.	Antonio Diéguez Lucena (2010): *Filosofía de la Ciencia*, Madrid, Editorial Nueva.
4.1.5.	Carl G. Hempel (1966): *Philosophy of Natural Science*, Englewood Cliffs, N.J., Prentice-Hall.

4.2 Further reading

4.2.1.	Mario Bunge (1969). *La investigación científica. Su estrategia y su filosofía*, Barcelona: Editorial Ariel.
4.2.2.	José A. Díez y C. Ulises Moulines (1997). *Fundamentos de Filosofía de la Ciencia*, Barcelona: Editorial Ariel.
4.2.3.	Thomas S. Kuhn (1962). *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press, 1962 [2a. ed., 1980; versiones españolas (1981) y (2006) *La estructura de las revoluciones científicas*, México: Fondo de Cultura Económica]
4.2.4	Imre Lakatos (1970). "Falsification and the Methodology of Scientific Research Programmes", en Lakatos, I. y Musgrave, A. (eds.), *Criticism and the Growth of Knowledge*, Cambridge University Press [Hay versión española: "La falsación y la metodología de los programas de investigación científica", en Lakatos, I. y Musgrave, A. (eds.), *La crítica y el desarrollo del conocimiento científico*, Barcelona: Grijalbo, 1975].
4.2.5	Karl R. Popper (1982). *Objective Knowledge. An Evolutionary Approach*, Oxford, Clarendon Press [Versión española: (1984) *Conocimiento objetivo*, Madrid: Tecnos]

5. METHODOLOGY

This subject corresponds to 6 ECTS credits, which is equivalent to 150 hours of student's work. That total amount of hours is distributed into 60 hours of teaching (2.4 ECTS) and 90 hours of student's self-study (3.6 ECTS).

In this subject, the teaching process (2.4 ECTS) is based on the following teaching-learning methodology:

1) A **dinamic text**, designed by the professor.
2) **Videoconference**, through which theory lessons are given as well as guided tasks (training taks, text analysis, seminars, etc.) and collective tutorials. Videoconferencing must be always interactive and these sessions last 45 minutes.
3) Attending **Webinars** organised by the faculty and the head of the Department.
4) **Video-lessons** about the most relevant topics for the subject.
5) **Telematic activities through** UCVnet platform (such as taking part in debate forums, solving practical questionnaires etc.), with the lecturer's intervention to correct and provide some guidance to students.
6) **Assessment tests.**

Student's self-study (3.6 ECTS) is distributed in different activities:

- Asincronic re-view of the videoconferences.
- Preparing theory and practical lessons (*flipped classroom*).
- Course assignments.
- Studying and preparing the final assessment test.

6.- COMPETENCIES TO BE ACQUIRED BY THE STUDENT

(The figures refer to the officially approved (by ANECA) list of competencies of this Online Degree in Philosophy)

GENERAL COMPETENCIES [GC]

1 Organization and planning
2 Basic computer skills
3 Problem-solving
4 Decision-making
5 Interpersonal skills
6 Intra- and interdisciplinary team work
7 Ability to communicate with non-experts
8 Ability to work in multicultural and international environments
9 Ethical commitment
10 Ability to apply knowledge to practical situations
11 Ability to learn and teach
12 Ability to adapt to new situations and generate new ideas

SPECIFIC COMPETENCES [SC]

17 To be able to pose philosophical questions
18 To be able to relate different philosophical topics
21 To become acquainted with the central paradigms of scientific thinking
23 To write philosophical essays and show evidence of analytical and synthetic skills
24 To analyze and question in a critical and reasoned way the metaphysical concepts related to the nature of reality and its implications
25 To be able to understand and evaluate philosophical arguments
26 To be able to construct philosophical arguments
27 To be able to attain a high level of reading comprehension of original foreign language philosophical texts
30 To be able to examine and apply philosophical methods
32 To be able to search, select and quote bibliography related to philosophy
33 To be able to arrange and organize a complex set of relevant information from a philosophical point of view
34 To comprehend and assess scientific methodologies in their different scopes
37 To use specialized philosophical terminology and recognize categorical errors
40 Ability to participate in philosophy conferences, cultural activities, meetings and academic debates

41	To recognize and describe the major stages, figures and works of philosophy

7.- LEARNING OUTCOMES

RA_1. That students can organize and plan their activities in relation to the subject [**GC1** y **SC33**]
RA_2. That students acquire the basic computer knowledge and skills required for the online teaching method of the subject [**GC 2**]
RA_3. That students develop the necessary interpersonal skills to complete the intra and interdisciplinary tasks required to be able to communicate with non-experts in the material [**GC 5, 6** y **7**]
RA_4. That students use their ethical commitment to put their theoretical knowledge into practice and adapt to new situations generating new ideas [**GC 9, 10,11** y **12**]
RA_5. That students understand the central paradigms of scientific thought **[SC 17, 18** y **21]**
RA_6. That students understand and value scientific methodology in all its different aspects, using the appropriate terminology [**SC 34, 37]**
RA_7. That students are able to describe the diverse stages, central figures and works of epistemolgy [**SC 41**].

Additional considerations
Students are specifically required to be able to:
a) clearly distinguish between epistemology, gnoseology and the philosophy of science;
b) to understand in depth the diverse existing theories to do with realism and objetivism;
c) reach a deep understanding of the main problems of epistemology: the issues of truth and the demarcation problem.

8.- ASSESSMENT

The General Competence 9 –ethical commitment- will be evaluated through case study, problems, moral dilemmas, etc., discussed in the lessons. The final mark of the subject will be based on the following items: 1) Attendance and participation, 2) Continuous assessment, 3) Final test:

Assessment Tool	Type of Learning	Allocated Percentage
Attendance and participation in synchronic sessions	Online	10%
Submission of requested assignments and periodic evaluation through rapid tests	Online	40%
Final evaluation through practical and written assignments	Face-to-Face	50%