

# Course syllabus

Course title	Philosophy of science: an overview for cognitive science
Instructor(s)	Witold M. Hensel, Ph.D.
Contact details	w.hensel@uw.edu.pl
Affiliation	Faculty of Philosophy, University of Warsaw
Course format	seminar
Number of hours	30 hours
Number of ECTS credits	<b>3 ECTS credits</b>

24 hours: time spent in class  
32 hours: preparation for classes (including obligatory reading assignment)  
34 hours: preparation for in-class presentations and a short paper at the end of the semester

## Brief course description

The course provides an introduction to the philosophy of science understood as an examination of the most basic concepts and principles at work in scientific inquiry. The philosophical problems that are going to be discussed as part of the course include such questions as: What are the aims of science and how we can establish whether they are being accomplished? What epistemic values guide the scientific process? What is the scientific method and what are its limitations? What is the structure of scientific theory? What counts as a scientific explanation of a phenomenon? How do all these accounts and concepts apply to contemporary cognitive science?

**Full course description** The course provides a basic introduction to the main philosophical questions concerning scientific knowledge and methodology. It surveys a variety of positions on standard issues in the philosophy of science, centered around the following themes:

1. The aims of science and the role of epistemic values

Although scientific research is commonly described as a goal-directed activity, it is less clear what the basic aims of scientific inquiry are or how these aims should be ranked. This has methodological consequences because scientific results and research programs are assessed in terms of epistemic virtues that are defined as conducive to the attainment of specific aims. We are going to survey the basic aims of science proposed in the literature, such as truth, explanation,

accuracy and prediction, and look at how they inform scientific practice.

2. Scientific method

Science is often defined by appeal to its method but it is controversial what this method is and, indeed, whether it even exists. We are going to look at various reconstructions of the scientific method, and their relative merits and shortcomings.

3. The structure of scientific theory

Scientific results form a hierarchically organized system. We are going to look at the logical structure of this system and try to articulate various relations holding between its components. We will also discuss how proposed reconstructions of the structure of scientific theory reflect views on the aims of science and scientific method.

4. The nature of scientific explanation

Explanation is often depicted as a prominent aim of scientific investigation but there is no agreed-upon model of explanation. We are going to look at some proposals in this connection, esp. ones applicable to cognitive science or informed by it.

5. Philosophical perspectives on cognitive science

What does cognitive science look like when observed through the lenses provided by philosophy of science? Is it experiencing a replicability and generalizability crisis that can be overcome by modifying certain research practices? Or perhaps things are exactly as they should be... How can we tell?

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#### Learning outcomes

- Make use accurately of the terminology specific to philosophy of science (K\_W08, K\_U07)
- Identify philosophical issues about methods of science, including cognitive science (K\_W01)
- Discuss orally and in writing central issues, concepts and arguments in philosophy of science (K\_U01, K\_U07)
- Recognize the philosophical issues specific to cognitive science and be able to evaluate the strengths and weaknesses of typical answers given to them (K\_W01, K\_U01)
- Apply to the achievements in cognitive science the terminology and concepts of philosophy of science (K\_W07, K\_W08, K\_U01)
- Evaluate the relevance of some arguments in philosophy of science (K\_U01, K\_U07)
- Compare and contrast alternative theories or approaches to scientific method and explanation (K\_U01, K\_U07)
- Understand moral responsibilities of a scientist (K\_W10, K\_W11, K\_K02, K\_K05, K\_K06)

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#### Learning activities and teaching methods

**Group discussions:** Students are expected to interact with instructor and classmates, elaborating on topics connected to the problems discussed in the obligatory reading.

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**In-class presentation:** At the start of the semester, students are expected to sign up for a 45-minute presentation, which depending on the number of students in the group, may be broken down into two or three shorter presentations.

**Short paper:** a commentary (main body of up to 1000 words) on a selected paper.

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List of topics/classes  
and bibliography

**I. The Aims of Science and the Role of Epistemic Values**

- Popper, K. (2002). *Three views concerning human knowledge*. In K. Popper, *Conjectures and Refutations*, Routledge, London, 130-160.
- van Fraassen, B. (1987). *The Scientific Image*, chapter 4. *Empiricism and scientific methodology*, Clarendon Press, Oxford, 70-96.
- Douglas, H. (2013). The value of cognitive values. *Philosophy of Science*, 80(5), 796-806.

**II. Scientific Method 1**

- Chalmers, A. (2014). *What is This Thing Called Science?*, University of Queensland Press, chapters 4-12.

**III. The Structure of Scientific Theory**

- Craver, C.F. (2001). *Structures of Scientific Theories*. In P.K. Machamer & M. Silberstein (eds.), *Blackwell Guide to the Philosophy of Science*, Blackwell, Oxford.
- Craver, C.F. (2005). Beyond reduction: Mechanisms, multifield integration and the unity of neuroscience. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 36(2), 373-395.

**IV. Scientific Explanation**

- Craver, C.F. (2013). *Functions and mechanisms: A perspectivalist view*. In P. Huneman (ed.), *Functions: Selection and mechanisms*, Springer, Dordrecht, 133-158.
- Churchland, P.M. (1995). *On the Nature of Explanation: A PDP Approach*. In J. Misiek (ed.), *The Problem of Rationality in Science and its Philosophy. Boston Studies in the Philosophy of Science*, vol. 160. Springer, Dordrecht.

**V. Scientific Method 2**

- Laudan, L. (1984). *Science and Values*, University of California Press, Los Angeles, CA, chapters 1-3, 1-66.
- Żytkow, J.M., & Simon, H.A. (1986). A theory of historical discovery: The construction of componential models. *Machine Learning*, 1, 107-136.

**VI. Philosophical Perspectives on Cognitive Science**

- Bird, A. (2018). Understanding the replication crisis as a base rate fallacy. *The British Journal for the Philosophy of Science*. [doi: 10.1093/bjps/axy051](https://doi.org/10.1093/bjps/axy051)
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- Yarkoni, T. (2020). The generalizability crisis. *Behavioral and Brain Sciences*, 1-37. doi:10.1017/S0140525X20001685
  - Rubin, M. (2019). The costs of HARKing. *The British Journal for the Philosophy of Science*. [doi:10.1093/bjps/axz050](https://doi.org/10.1093/bjps/axz050)
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#### Assessment methods and criteria

In-class participation (weighted 30%)  
Short paper (weighted 30%)  
In-class presentation (weighted 40%)

#### Grading

The minimum passing grade is 60%.  
60% - 3 (sufficient)  
68% - 3,5 (satisfactory)  
74% - 4 (good)  
82% - 4,5 (better than good)  
90% - 5 (very good)  
95% - 5! (excellent)

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#### Attendance rules

Students may have two unexcused absences. If one or two additional excused absences occur, extra work may be done as a make-up. Failure to complete said work or more than two unexcused absences will result in failure to complete the class.

Absence does not exempt a student from the work required for satisfactory completion of the course. Merely attending class does not constitute participation. To participate is to arrive at class punctually and to regularly contribute to collegiate discussion. Students' participation in class will be closely monitored throughout the semester.

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#### Prerequisites

Basic knowledge of methodology of empirical or social sciences is required.

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#### Academic honesty

Students must respect the principles of academic integrity. Cheating and plagiarism (including copying work from other students, internet or other sources) are serious violations that are punishable and instructors are required to report all cases to the administration.

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#### Remarks

The reading assignments are subject to changes reflecting the interests of the students. These changes, if made, are going to be proposed by the instructor or the students and discussed in class.

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