Politechnika Warszawska

COURSE OFFERED IN THE DOCTORAL SCHOOL

Code of the course	4606-ES-0000000-0285	Name of the course	Polish	**Filozofia a nauka i technika**	
			English	**Philosophy, science, and technology**	
Type of the course	Specialized courses				
Course coordinator	Dr hab. Zbigniew Król		Course teacher	Dr Antonio Vassallo	
Implementing unit	WAiNS	Scientific discipline / disciplines*	All		
Level of education	Doctoral studies	Semester	Winter		
Language of the course	English				
Type of assessment	Grading	Number of hours in a semester	30h	ECTS credits	2
Minimum number of participants	12	Maximum number of participants	40	Available for students (BSc, MSc)	Yes

Type of classes		Lecture	Auditory classes	Project classes	Laboratory	Seminar
Number of hours	in a week	2h	2h			
	in a semester	15h	15h			

* does not apply to the Researcher's Workshop

1. Prerequisites

General knowledge in mathematics, physics, astronomy, computer science, formal logic.

2. Course objectives

The course main objectives are:
(a) to highlight the natural openness of science and technology to philosophical issues and to clarify the (often hidden) role of philosophy in the development of sciences;
(b) to introduce the students to the most pressing philosophical questions concerning scientific knowledge and methodology;
(c) to build the analytical and critical skills needed to tackle these questions.
The discussion will in particular address the nature and justification of scientific reasoning, the relationship between laws of nature and explanation, and what it means for a scientific theory to be true. Some specific case studies from science and technology will be analyzed to illustrate and gain insight into these philosophical issues.

3. Course content (separate for each type of classes)

Lecture

1) What is science?
   - The origins of modern science.
   - Why is the philosophy of science important?
   - Science and pseudoscience.
2) Scientific reasoning (1).
   - Deduction and induction.
   - Hume's problem.
3) Scientific reasoning (2).
   - Inference to the best explanation.
   - Probability and induction.
4) Explanation in science (1).
   - Deductive-nomological model.

- The problem of symmetry.
- The problem of irrelevancy.

5) Explanation in science (2).
- Explanation and causality.
- Can science explain everything?
- Explanation and reduction.

6) Realism vs. anti-realism (1).
- Taking a theory very seriously: Scientific realism.
- The "no miracles" argument.

7) Realism vs. anti-realism (2).
- The "observable/unobservable" distinction.
- The non-determinism argument.

8) Scientific progress (1).
- The logical positivist philosophy of science.

9) Scientific progress (2).
- The structure of scientific revolutions.
- Incommensurability and theory-ladenness of data.

10) Objections to science.
- Scientism.
- Science versus religion.
- Is science free from values?

11) Case study 1: Philosophy of physics.
- Are space and time real?

12) Case study 2: Philosophy of biology.
- The problem of biological classification.

13) Case study 3: The philosophy of psychology.
- Is the mind modular?

14) Case Study 4: Computational Philosophy.
- Do we live in a simulation?

Auditory classes
In each class, the students will be presented with a precisely formulated research question centered around the philosophy of science and technology, and will be asked to engage in an open discussion where they will propose their different takes and solutions to the problem considered.

4. Learning outcomes

Type of learning outcomes	Learning outcomes description	Reference to the learning outcomes of the WUT DS	Learning outcomes verification methods*
Knowledge			
K01	The doctoral student knows and understands the basic philosophical positions and methods in the context of modern scientific knowledge and technology, and recognizes the relationship of the development of science and technology to philosophy in a factual and historical context.	SD_W1	Class participation and final project.
K02	The doctoral student knows and	SD_W2	Class participation

	understands the basic theories, positions and issues in the philosophy of science, philosophy of technology and philosophy of mathematics (including computer science). The student knows and understands the peculiarities and role of modern humanities for the development of science and technology.		and final project.
K03	The doctoral student knows and understands the role of ethics in scientific research and technology.	SD_W4	Class participation and final project.
Skills			
S01	The doctoral student is able to see the relationship between fundamental problems of science and technology, and philosophy. The student is able to perceive philosophical problems in their discipline of knowledge. The student can use basic philosophical categories and terms in the context of problems of science and technology.	SD_U2	Class participation and final project.
S02	The doctoral student is able to present his scientific achievements in a broader philosophical and social context and is able to find and identify relevant elements in peer-reviewed works.	SD_U4	Class participation and final project.
S03	The doctoral student is able to present his research results not only to specialists in their field.	SD_U5	Class participation and final project.
S04	The doctoral student is able to understand the English terminology regarding the methodological and philosophical context of their discipline.	SD_U6	Class participation and final project.
Social competences			
SC01	The doctoral student recognizes the importance of knowledge in solving cognitive and practical problems.	SD_K2	Class participation and final project.
SC02	The doctoral student makes a critical assessment of achievements within the represented scientific discipline and of their own contribution to the development of the discipline.	SD_K1	Class participation and final project.
SC03	The doctoral student behaves in a professional manner, observes professional ethics, upholds and develops the ethos of the research and creative communities, including conducting scientific activities in an independent manner.	SD_K5	Class participation and final project.

*Allowed learning outcomes verification methods: exam; oral exam; written test; oral test; project evaluation; report evaluation; presentation evaluation; active participation during classes; homework; tests

5. Assessment criteria

In each class, the students will be introduced to a specific issue and asked to actively engage in group discussions. At the end of the course, each student will write a 10-page essay on a topic agreed in advance with the instructor. The final grade will be a weighted average that considers 50% active participation during classes and 50% project evaluation (10-page essay).

6. Literature

Primary reference:

[1] S. Okasha – "Philosophy of Science: A Very Short Introduction" (Second Edition). Oxford University Press, 2016.

Secondary references:

[1] A. Rosenberg, L. McIntyre – "Philosophy of Science: A Contemporary Introduction" (Fourth Edition). Routledge, 2020.

[2] P. Godfrey-Smith – "Theory and Reality: An Introduction to the Philosophy of Science" (Second Edition). The University of Chicago Press, 2021.

7. PhD student's workload necessary to achieve the learning outcomes**		
No.	Description	Number of hours
1	Hours of scheduled instruction given by the academic teacher in the classroom	30h (15h+15h)
2	Hours of consultations with the academic teacher, exams, tests, etc.	4h
3	Amount of time devoted to the preparation for classes, preparation of presentations, reports, projects, homework	15h
4	Amount of time devoted to the preparation for exams, test, assessments	11h
	Total number of hours	**60h**
	ECTS credits	**2**

** 1 ECTS = 25-30 hours of the PhD students work (2 ECTS = 60 hours; 4 ECTS = 110 hours, etc.)

8. Additional information	
Number of ECTS credits for classes requiring direct participation of academic teachers	1
Number of ECTS credits earned by a student in a practical course	1