



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
History and Philosophy of Science	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: Dr. Jonas Ciurlionis	Department of Philosophy, Vilnius University, Universiteto 9/1
Other(s):	

Study cycle	Type of the course unit (module)
First	

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Face to face	Spring and Fall semesters	English

Requirements for students	
Prerequisites: English level B2	Additional requirements (if any):

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	130	48	82

Purpose of the course unit (module): programme competences to be developed		
The course is aimed at introducing students to: main theories of philosophy of science; historical development of scientific ideas; paradigms of formulation, functioning and change of scientific theories with special emphasis on the comparativistic analysis; specifics of logic and methodology of scientific research; historical boundaries of scientific research. The goal of the course is also to develop: understanding of scientific theoretical systems and methods and abilities to apply them in students' own field of research; transferable skills and competencies (e.g. critical thinking). The students after the course are expected to have abilities for: analytical assessment of significance of science in modern society ; orientation in a variety of problems of scientific theories; creative interpretation of complex classical and modern theories of science.		
Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
- Ability to: describe major stages and facts of history of science; understand the relation between philosophy and science in Western tradition; - understanding of importance of philosophical reflections of science and its place in contemporary world;	Lectures, evaluation of scientific theories	exam test, theoretical questions
- Ability to discuss classical and modern scientific problems; - understanding the specifics of scientific and philosophical relation to reality and its development from Ancient Antiquity until present;	Methods of active learning: group discussion, analysis and evaluation of scientific theories	Exam test, theoretical questions, analysis of scientific methodology questions
- Ability to analyze and evaluate texts of scientists and philosophers of Ancient Antiquity, Medieval Ages and Modern times; - Ability to analyze and critically assess scientific	Lectures based on problem analysis, methods of active learning: group discussion, brainstorming, analysis and	Exam test, theoretical questions, analysis of scientific methodology questions

theories and hypotheses and to ability to identify their cultural, social, historical, ideological and other factors; - Ability to analyze and critically assess human expectations, beliefs and motivations towards science;	evaluation of scientific theories	
Ability to self study and gain knowledge about the relation between philosophy and science as well as deepen understanding of their place in the Modern world; ability to gather and research, analyze and apply information and draw conclusions;	Lectures based on problem analysis, methods of active learning: group discussion, brainstorming, analysis and evaluation of scientific theories, independent literature studies, attendance of scientific events.	Exam test, theoretical questions, analysis of scientific methodology questions
- Ability to discuss and cooperate with colleagues considering scientific and philosophical problems.	Lectures based on problem analysis, methods of active learning: group discussion, brainstorming, analysis and evaluation of scientific theories, independent literature studies, attendance of scientific events.	Analytical essay on problems of history and philosophy of science.

Content: breakdown of the topics	Contact hours							Self-study work: time and assignments	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	Contact hours	Self-study hours	Assignments
1. Knowledge in daily life and science. Understanding methodology. Science and metaphysics. Chaos and cosmos. Scientific explanation and causality: determinism and indeterminism. Finalism and causalism. Empirical and theoretical methods of scientific knowledge. Observation, experiment and theory.	2						2	5	Reading. I Prigogine "The End of Certainty" p.89-107 Preparation for a seminar
2. The structure and functions of scientific theory. Theories and models. Problem and hypothesis as forms of knowledge. Problems of hypothesis selection. Change and statics in the world. Paradoxes. Truth of a theory.	2		2				4	5	Reading: Chalmers "What is this thing called science?" p 1-19 Popper "Realism and the aim of science" p 11-158
3. Mathematics and natural sciences. Pythagoras. Platonic notion of foundations of nature.	2						2	5	Plato "Timaeus" p3-35
4. Aristotelian physics and metaphysics.	2		2				4	5	Aristotle "Physics" p. 269-300, "Metaphysics" p. 752-778
5. Issues in cosmology. Aristotle. Ptolemy. Copernicus. Kepler. Galileo.	2						2	5	Reading Nagel „The Structure of Science" p. 106 - 141 Preparation for a seminar
6. Problems of Medieval science. Tradition of St.	2		2				4	5	Feyerabend, Lakatos

Augustine. Aristotelian revival. Via moderna and Ockham's nominalism. Theory of Impetus and problems of motion. Rise of Universities.									„For and Against Method: Including Lakatos's Lectures on Scientific Method and the Lakatos - Feyerabend Correspondence” p. 31 -40
7. Renaissance and birth of modern natural sciences. F. Bacon, Galileo, Descartes, Newton. Problems of science classification.	2						2	5	Cosmology p147-177, 235-277 Descartes “Principles of philosophy” p 79 - 179
8. Space and Time. From psychological to pchysicalistic notion of time. Absolutism vs. Relationism. Descartes. Newton. Leibniz. Kant. Significance of theory of relativity in history and philosophy of science. Matter and field. Problem of division of matter. Particles and waves. Quantum mechanics. Heisenberg's uncertainty principle.	2		2				4	5	Chalmers “What is this thing called science?” p 213-246 Popper “Realism and the aim of science” p.281-301
9. Biology and philosophy. Creationism and evolutionism. La Mettrie. Darwin and theory of evolution.	2						2	5	La Mettrie “Machine Man and other writings” p50- 79”
10. Logical analysis of language and rise of philosophy of science. Normative philosophy of science. Scientific realism and empiricism: logical positivism, constructive empiricism vs. Scientific realism. Positivistic notion of science.	2		2				4	5	Nagel “The Structure of Science” p.141-153
11. Rational reconstruction of development of science. I. Lakatos methodology of historiographic and scientific research programs.	2						2	5	Reading: Feyerabend, Lakatos“For and Against Method: Including Lakatos's Lectures on Scientific Method And the Lakatos Feyerabend Correspondence” p. 40-96 Preparation for a seminar.
12. Inductivism. Probabilistic evaluation of scientific knowledge in logical positivism. Verification and confirmation of logical language. Deductivism. Falsification. Critique of inductivism. Demarcation and meaning in K.R. Popper's Logic of scientific discovery. “Close to truth” and objectivity of knowledge. Development of knowledge.	2		2				4	6	Chalmers “What is this thing called science?” p 59-103 Popper “Realism and the aim of science” p.159-194
13. Descriptive philosophy of science. Reconstruction of development of scientific knowledge: cumulative or scientific revolutions? “Normal science” and “scientific revolution”. T. Kuhn's model of paradigms in history of science	2		2				4	6	Chalmers “What is this thing called science?” p.104 - 212
14. P. Feyerabend and pluralistic model of science. Evaluation and value of theoretical knowledge. Scientific rationality and values. Specifics of philosophy of social sciences.	2		2				4	5	Feyerabend, Lakatos “For and Against Method: Including Lakatos's Lectures

									on Scientific Method and the Lakatos Feyerabend Correspondence” p. 96 - 119
15. Challenges and problems of contemporary science. Relation between contemporary philosophy and science. Technological development.	2						2	5	“The future of Spacetime” p57-109
16. Science and ethics. Responsibility of scientist and problems of scientific ethics. Science and culture. Postmodern society and science.	2						2	5	“The future of Spacetime” p.109-191
Total	32		16				48	82	

Assessment strategy	Weight %	Deadline	Assessment criteria
Exam	40	During the exam	Evaluation of knowledge of course material and compulsory reading Ability to apply theories and methods of science and philosophy in specific analyses: - Understanding and philosophical interpretation of scientific theories and facts covered by the course (20 %) - Understanding of course readings, ability to interpret them, ability to localize theoretical systems in a variety of theories and history of scientific phenomena (20 %.)
Analysis and interpretation of specific texts	40	During seminars	Ability to apply theories and methods of philosophy of science for the analyses of the specific cases: - Analysis of literature of history and philosophy of science (20 %) - Interpretation of texts of history and philosophy of science (20%)
Essay	20	During the semester	Ability to analyse problems of history and philosophy of science during independent and team work. Essays are divided into separate groups of historical periods and themes. Evaluation of: relevancy of the problems (5 %.), application of course material and critical assessment (10 %.), writing (5 %.)

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsary reading				
Feyerabend, P. Lakatos, I.	2000	For and Against Method: Including Lakatos's Lectures on Scientific Method and the Lakatos-Feyerabend Correspondence		Chicago: U-ty of Chicago Press
Chalmers, A. F.	1999	What is this thing called science?		Indianapolis/Cambridge: Hackett publishing
Hetherington, S (ed.)	1993	Cosmology		New York and London: Garland Publishing INC.
Popper, K	2013	Realism and the aim of science		London and New York: Routledge
Optional reading				
Aristotle (ed. By Richard	2001	The basic works of Aristotle		New York: The Modern

McKeon)				Library
Descartes, R.	1991	Principles of Philosophy		Dordrecht:Kluwer Academic Publishers
La Mettrie J.O	1996	Mashine Man and Other Writings		Cambridge:Cambridge University Press
Nagel, Ernest	1979	The Structure of Science		Indianapolis-Cambridge: Hackett Publishing Company.
Plato	1959	Timaeus		New York: Macmillian Publishing Company
Prigogine, Ilya	1997	The End of Certainty		New York: The Free Press
Thorne, Hawking Novikov, Ferris, Lightman	2002	The future of Spacetime		New York-London: W.W. Norton and Co.