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Science Methodology

Fall semester, 2020/2021

Cooordinator	**Nadiya Maksymenko**
Credits	2 ECTS (optional course), 12 in-class hours
Lecturers	**Nadiya Maksymenko**, (Karazin Institute of Environmental Sciences, V.N. Karazin Kharkiv National University, Ukraine) **Mykola Nazaruk,** Ivan Franko Lviv National University (LNU), Ukraine **Jakiv Tararoev,** V. N. Karazin Kharkiv National University (KKNU), Ukraine
Level	PhD students
Host institution	Karazin Institute of Environmental Sciences, V.N. Karazin Kharkiv National University, Ukraine
Course duration	October - January

Summary

This 2 ECTS course serves as Skills course of the project INTENSE.

Course "Science Methodology" provides PhD students coming from natural science backgrounds with a basic understanding of philosophy of sciences. In addition, it introduces PhD students the concept of science, various ways of defining science, science and pseudo-science, philosophy and science, methodological topics like what is a concept, fact, model, hypothesis, law, theory, explanation, observation, experiment, objectivity. The course helps to develop analysation and argumentation skills.

Target student audiences

PhD students in environmental sciences, study program – Constructive Geography and Sustainable Use of Natural Resources; Earth Sciences (Code No. 103)

Prerequisites

Required courses (or equivalents):

- Ecology:
- Geograpgy;
- Philosophy.

Aims and objectives

The main task of the course is to give an overview of PhD programs, planning and accomplishment of individual PhD studies, of the relationships between the thesis supervisor(s) and colleagues, and of the scientific methods for planning and carrying out independent research. The course further provides basic information on science funding, evaluation of scientists and on science careers.

General learning outcomes:

The doctoral student is able to make a realistic research plan for the entire course of PhD studies, in particular, posing realistic research hypotheses, plan individual experiments, and can assess the reliability of obtained experimental data. The doctoral student is familiar with the national and international science system, understands the role of science policy, science funding and evaluation and is able to make and review a grant proposal on the topic of own thesis. The doctoral student is able to make a presentation on her/his research topic, and can critically read and review scientific papers and reports.

Overview of sessions and teaching methods

Sessions will combine interactive lecturing, moderated role-play games, and assisted work on individual exercises. The part of the course is built around group case-study assignments: a multi-part project, and an on-line web application addressing a particular issue of philosophy of different science.

Section 1.The methodology is philosophical

Topic 1.1. Methods of scientific knowledge used at the theoretical and empirical level

Topic 1.2. Specificity of science and philosophy

Section 2. General scientific methodology

Topic 2.1. The genesis of scientific knowledge. Ideals and criteria of scientific knowledge

Topic 2.2. Levels and stages of development of scientific knowledge

Section 3. Philosophical understanding of the scientific dimensions of the environment

Topic 3.1. The multifunctional importance of science in the context of the environment

Topic 3.2. Methodological aspects of the scientific doctrine of the environment

Topics of practical works and seminars:

- Workshop 1. Methods of scientific knowledge used at the theoretical and empirical levels.
- Workshop 2. Methodological aspects of the scientific doctrine of the environment.
- Workshop 3. Scientific Publications.
- Seminar. Specificity of science and philosophy
- Seminar. Levels and stages of development of scientific knowledge
- Seminar. The multifunctional importance of science in the context of the environment
- Seminar. Methodological aspects of the scientific doctrine of the environment

Course workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)
In-class activities			
Lectures	Understanding theories, concepts, methodology and tools	Class participation	2
Methodological trainings	Analysis of problem situations in relation to the own research of a PhD student	Class participation and preparedness for discussions	5
Moderated in-class discussions	Understanding of the contexts science methodology and problems in methodology of environmental science	Class participation and preparedness for discussions	5
Independent work			
Reading and discussion of assigned papers for seminars and preparation for lectures	Familiarity with and ability to critically and creatively discuss key concepts as presented in the literature	Class participation creative and active contribution to discussion	20
Course group assignment	Ability to conceptualize and frame of the a scientific methodology for their research, find related literature and data, interpret data, use the concepts, tools and methods covered in the course.	Quality of developed methods and their presentation	28
Total			***60***

Grading

The following table defines the criteria for evaluating the student's work in studying the materials of the course. As a result the student is able to get a maximum score of 100 points. The minimum number of points required to score is 50 points.

In the course of studying the discipline you receive points for performing various tasks in accordance with the course of the discipline. During the semester, your points will be summed. If you receive a low rating (below the minimum score) or did not complete the task within certain time limits, you should contact the teacher as soon as possible to find out the next steps.

№№	Educational activity	Max	Min
1.	Practical work 1	20	10
2.	Practical work 2	20	10
3.	Practical work 3	20	10
4.	Final control	40	20
	Total	100	50

At the end of the course the student will have an pass. Grading system is presented below:

Scores	Mark
50-100	Passed
1-49	Not passed

Course schedule

Dates and time will be provided later.
The overall schedule is provided below:

Day	Time	Topic	Lecturer
Day 1	1 hours	Lecture 1	N. Maksymenko J. Tararoev
Day 2	1 hours	Practical work 1– part 1	N. Maksymenko
Day 3	1 hours	Practical work 1– part 2	N. Maksymenko
Day 4	1 hours	Practical work 2 – part 1	N. Maksymenko
Day 5	1 hours	Practical work 2 – part2	N. Maksymenko
Day 6	1 hours	Seminar	N. Maksymenko J.Tararoev
Day 7	1 hours	Lecture 2	N. Maksymenko J.Tararoev
Day 8	1 hours	Practical work 3– part 1	N. Maksymenko
Day 9	1 hours	Practical work 3 – part2	N. Maksymenko
Day 10	1 hours	Seminar	N. Maksymenko J.Tararoev
Day 11	1 hours	Seminar	N. Maksymenko
Day 12	1 hours	Seminar	N. Maksymenko J.Tararoev
Day 13	1 hours	Final test	J.Tararoev

Structure of the Course

Title of the topic	Total hours	In-class activities, hours		
		Lecture	workshop	independent work
Section 1.The methodology is philosophical				
Topic 1.1. Methods of scientific knowledge used at the theoretical and empirical level	10	1	2	7
Topic 1.2. Specificity of science and philosophy	10		1	9
Total	20	1	3	16
Section 2. General scientific methodology				
Topic 2.1. The genesis of scientific knowledge. Ideals and criteria of scientific knowledge	10	1	2	7
Topic 2.2. Levels and stages of development of scientific knowledge	10		1	9
Total	20	1	3	16
Section 3. Philosophical understanding of the scientific dimensions of the environment				
Topic 3.1. The multifunctional importance of science in the context of the environment	10		2	8
Topic 3.2. Methodological aspects of the scientific doctrine of the environment	10		2	8
Total	20		4	16
Total of course	60	2	10	48

Course assignments

Course assignments will constitute a multi-part project

Literature

Part 1

1. Berkov V.F. Philosophy and methodology of science: a textbook. - M., 2004.
2. Kara-Murza S.G. Ideology and its mother are science. - M., 2002.
3. Kedrov B.M.. Classification of Sciences. K. Marx's prediction of the science of the future - M., 1985.
4. Klevtsova S.Ya. Philosophy of science and technology: a textbook. - Alchevsk, 2005.
5. Semeniuk E.P. Philosophy of modern science and technology: a textbook for universities. - Lviv, 2006.

6. Stepin V.S. History and Philosophy of Science, M., 2011.
7. Stepin V.S. Theoretical knowledge: structure, historical evolution. - M., 2000.
8. Tararoev Ya.V. Ontological foundations of modern physics and cosmology. - M., 2011.
9. Hubner K. The truth of myth. - M., 1996.
10. Chudinov E.M. The nature of scientific truth. - M., 1977.
11. Hill T.I. Modern theories of cognition. - M., 1965.
12. Shtanko V.I. Philosophy and Methodology of Science: A Textbook for Graduate Students of All Specialties - H., 2017.

Part 2

1. Актуальные проблемы философии науки /Отв. Ред. Гирусов Э.В. – Москва.: Прогресс – Традиция, 2007.
2. Афанасьєва Л.В. Філософія науки. Навч. посібник/ Л.В. Афанасьєва, І.В.Букреєва, Л.Ф. Глинська, М.М.Окса. – Мелітополь: Люкс, 2011. – 208с.
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6. Іоан Павло ІІ. Мир із Богом-Творцем – мир із усім творінням // Ойкумена. – 1991. – №1. – С. 93.
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8. Маєр-Абіх К. Повстання на захист природи. Від довкілля до спільносвіту / К. Маєр-Абіх . – Київ: Лібра, 4004. – С. 96.
9. Мельник В.П. Філософія. Наука. Техніка: Методолого – світоглядний аналіз монографія/ В.П. Мельник – Львів: Видавничий центр ЛНУ імені Івана Франка, 2010 – 592с.
10. Мороз С.А., Онопрієнко В.І., Бортник С.Ю. Методологія географічної науки: навч. посібник. – Київ: Заповіт, 1997. – 333с.
11. Назарук М.М. Основи екології та соціоекології: навч.посібн. /М.М. Назарук - Львів: Афіша. – 256с.
12. Нестеренко В.Г. Вступ до філософії: онтологія людини: навч. посібн. для студентів вищих учбових закладів / В.Г.Нестеренко. – Київ:Абрис, 1995. – 336с
13. Петлін В.М. Теорія природних територіальних систем: у 4 –х томах. / В.М. Петлін. - Львів: ЛНУ імені Івана Франка, 2016.
14. Семенюк Е.П. Екологізація суспільства: соціальна роль та моделювання. [Текст]: монографія. / Е.П. Семенюк, Т.В. Олянишен, В.М. Сеньківський, О.В. Мельников, Я.В. Котляревський; слово до читача Ю.Ю. Туниці; МОН молодьспорту України. Нац. Лісотехн. ун-т України. – Львів: Укр. Акад. друкарства, 2012. – 460с.
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Part 3.

1. Weber EJ, Callaham ML, Wears RL, Barton C, Young G. Unpublished research from a medical specialty meeting: Why investigators fail to publish. JAMA. 1998;28:257–9. [PubMed] [Google Scholar]
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5. Ashique KT, Kaliyadan F. Pearls for publishing papers: Tips and tricks. Indian J Dermatol. 2016;61:26–31. [PMC free article] [PubMed] [Google Scholar]
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