

## Basic Information

**This is a course, which contributes to MSc award in Biology**

<b>Course period</b>	From October 1st till February 1st, 1 semester (16 weeks)
<b>Study credits</b>	3 ECTS credits
<b>Duration</b>	144 hours
<b>Language of instruction</b>	English
<b>Academic requirements</b>	<ul style="list-style-type: none"><li>- BSc degree in Biology, Chemistry, Physics or Environmental Sciences or equivalent (transcript of records),</li><li>- Good command of English (certificate or other official document)</li></ul>

## Course Description

The discipline "Methodology and Philosophy of Sciences" plays a unifying and centralizing role in the system of natural sciences. This course is designed to establish the relationship between natural science and humanities and to help students master the methodology of scientific research.

The course consists of two parts (modules). The first part gives a detailed definition of the natural sciences, the most important concepts and models, and their reflection in the system of approaches and methods used in physics, biology, chemistry and related sciences. The main objective of the philosophical part of the course is to combine specific natural science knowledge and skills with their philosophical interpretation. Philosophical knowledge, being universal, generalizing the data of natural and humanitarian sciences, forms a theoretical view of the world (a dominant paradigm). Philosophy comprehends the process of cognition, establishes a connection between sensory and logical, empirical and theoretical, thereby forming a culture of professional scientific thinking of master students and serving as the basis for their specific scientific research.

## **Special Features of the Course**

Philosophy of science is broadly divided into two subfields. The task of the first is to study the nature and methodology of science in general. The task of the second is to study the concepts and foundations of particular fields within science. This course covers topics in the first subfield, including philosophical attempts to describe scientific explanations, laws of nature, and the process whereby theories in science are confirmed by evidence. The nature of scientific theories are also considered within the course: what they are, how they change, and how they can be interpreted.

## **Course Aims**

The course is aimed to introduce students to the major fields of study in contemporary philosophy of science and how it relates in particular to other approaches to the study of science and technology.

## **Course Objectives**

The course has been designed to:

- to familiarize students with the basic concepts of methodology and philosophy of natural sciences, as well as ideas about the place of philosophical knowledge in the system of natural sciences;
- to give in-depth idea about how philosophical interpretation of knowledge has changed in the course of the evolution of natural science;
- to analyze the issues of natural science using the system of philosophical categories and modern foundations of ontology, and epistemology;
- to develop the ability of students to assess the impact of the results of their own research and the research itself on the state of nature, civilization and man;
- to develop the skill of reflection on the ability and readiness to engage in research activities;
- to ensure the application of philosophical ideas and principles in the master's thesis;
- to develop the ability to logically formulate, present and defend reasonably their own vision of the problems under consideration, as well as mastering the techniques of polemics, discussion, dialogue.

## **Learning Outcomes of the Course**

After completing the course students should be able to:

- to carry out a critical analysis of problem situations on the basis of a systematic approach, to develop an action strategy;
- to use and apply fundamental scientific concepts and modern methodological approaches to formulate and solve new non-standard tasks in the field of professional activity;

- to demonstrate ability to critically analyze and communicate issues involving interactions among sci, tech, & society..

## Course (module) Structure

Learning Activities	Hours
Lectures	16
Practice sessions / Seminars,	16
Self-study Assignments	76
Final Exam (including preparation)	36
<b>Total study hours</b>	<b>144</b>

## Course Outline

Week	Lectures	Practical work / Assignments	Hours
1-2	Module 1 «Philosophy of Sciences»		20
	<ul style="list-style-type: none"> <li>• Responsive lecture «Phylosophy and Science: ways of interactions»</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-course test</li> <li>• Self-Study Assignment 1.1</li> <li>• Seminar «The problem of the place of philosophy in natural science»</li> <li>• Home Assignments № № 1.1-1.2</li> </ul>	
3-6	<ul style="list-style-type: none"> <li>• Lecture «The problem of the truth and the objectivity in modern natural science»</li> <li>• Lecture «Logic and Empiricism»</li> </ul>	<ul style="list-style-type: none"> <li>• Seminar «Analysis of the concepts of the true knowledge in relation to modern natural science.»</li> <li>• Seminar «Induction and Confirmation»</li> <li>• Home Assignments № № 2.1-2.4</li> </ul>	28
7-10	<ul style="list-style-type: none"> <li>• Lecture «Genesis and evolution of the</li> </ul>	<ul style="list-style-type: none"> <li>• Seminar «The ideas</li> </ul>	

	<p>scientific picture of the world»</p> <ul style="list-style-type: none"> <li>Lecture «K. Popper and T. Khun Philosophy»</li> </ul>	<p>scientific knowledge evolution in the context of the evolution of scientific thinking styles.»</p> <ul style="list-style-type: none"> <li>Seminar «Peculiarities of the implementation of the principles of evolution, consistency, determinism and self-organization in modern natural science.»</li> <li>Self-Study Assignments №№3.1- 3.4</li> </ul>	28
11-16	Module 2 «Methodology of Sciences»		
	<ul style="list-style-type: none"> <li>Lecture «Methodology of Scientific Research»</li> <li>Lecture «Sociology, Science and Technology»</li> <li>Lecture «Ethical problems of modern natural science»</li> </ul>	<ul style="list-style-type: none"> <li>Seminar «Methodology of scientific research.»</li> <li>Seminar «The influence of scientific research and its results on the nature and civilization.»</li> <li>Seminar «The problem of social and professional responsibility of a scientist.»</li> <li>Self-Study Assignments №№4.1- 4.6</li> </ul>	32
	• Final Exam		36

## Assessment

The overall course percentage grade will consist of the final test results (20%) and the combined grades of 2 modules assignments (80%).

The score for each module is the sum of the following assignments:

Module 1 (60% from 80%):

- lecture attendance (each 4%, 20% total),

- written answers to Self-Study Assignments (each 4%, 40% total ).

Module 2 (20% from 80%):

- lecture attendance (each 3%, 9% total),
- written answers to Self-Study Assignments (each 2,75%, 11% total).

The overall course percentage grade will be converted into a letter grade as follows:

A = 91-100%

B = 81-90%

C = 71-80%

D = 61-70%

E = less than 61%.

## **Attendance Policy**

Since almost every class contains material, which is not presented in literature in compact form, attendance of all of them is highly desirable.

## **Web page of the course**

The webpage of the course «Methodology and Philosophy of Science» is available through E-learning SibFU web site: [www.e.sfu-kras.ru](http://www.e.sfu-kras.ru). You must be logged in to access this course. Course Guide and all accompanying materials are also available at the course web-page.

## **Core reading**

1. Bird, A. (1998) Philosophy of Science, Routledge.
2. Godfrey-Smith, P. (2003) Theory and Reality, Univ. of Chicago Press.
3. Kuhn, T. (1996) The Structure of Scientific Revolutions, 3rd Ed., Univ. of Chicago Press.
4. Sismondo, S. (2010) An Introduction to Science and Technology Studies, Wiley-Blackwell.

## **Facilities, Equipment and Software**

The program is designed with a strong emphasis on theoretical knowledge. Lectures and seminars take place in rooms equipped with interactive tablets and direct projection boards.