Faculty of Science

MNXA29, Science: Exploring the Scientific Method, 7.5 credits

Naturvetenskap: Att utforska den vetenskapliga metoden, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2020-06-11 to be valid from 2020-06-11, autumn semester 2020.

General Information

The course is an interdisciplinary course at the faculty of Science and it is open to students from all faculties.

Language of instruction: English
Specific course elements. such as group discussions, can be held in Swedish if all participants agree on this.

Main field of studies	*Depth of study relative to the degree requirements*
Physics	G1N, First cycle, has only upper-secondary level entry requirements

Learning outcomes

In traditional university teaching, the emphasis is normally on teaching the immediate proficiencies students need to manage their education and often there is little or no time to discuss the more general scientific aims and methods. Although issues such as the important interplay between theory and experiments may be mentioned, there are rarely opportunities to study details in this interplay; the important role of critical thinking may be stated in some courses, but time is seldom allocated to discuss what that actually means; science and scholarship are typically presented in a uniform way, but there is seldom time to actually show the similarities and differences between different disciplines. This course is intended to fill these gaps and to highlight different aspects of science and the scientific method.

Knowledge and understanding
After completing the course the student should be able to:

- give a general overview of the history of science, illustrated by the emergence of a specific scientific theory,
- describe the basic features of the scientific method models by Popper, Kuhn and Feyerabend as well as discuss common criticism against these theories,
- describe how thought experiments and real experiments can interact with phenomenology and model construction in the emergence of scientific theories,

Competence and skills
After completing the course the student should be able to:

- relate a given scientific theory to models of scientific method as well as critically discuss in what way the theory is scientific,
- discuss the relationship between faith and knowledge, and critically examine the concept of non-overlapping magisteria of science and religion,
- discuss possible female and male approaches to scholarship or whether science as such is gender-neutral,
- discuss gender issues in the scientific environment,
- discuss how research is related to other creative activities, such as art, literature and music as well as reflect over what creativity actually is and how ideas are borne,

Judgement and approach
After completing the course the student should be able to:

- independently discuss what separates proper science from pseudoscience and argue against the latter in a scientific and, for the public, understandable way as well as critically discuss the relevance of pseudoscience as description of the reality,
- discuss what separates science from charlatanry and downright cheating, and reason about how one as a scientist protects oneself against such perversions.

Course content

The course covers basic questions about what constitutes science and the scientific method; what are the differences between true science and pseudoscience, from charlatanism and fraud; the relationship between faith and reason, religion and science; anthropocentricity and gender perspectives in science; and the connection between natural science and other creative activities such as painting, sculpture and composition. Selected topics:

- history of science
- theory of science
- pseudoscience and fraud
- faith, religion and science
- gender perspectives
- creativity

Course design

The teaching consists of lectures and mandatory group discussions, seminars and interviews as well as connected mandatory assignments and presentations.

Assessment

The examination consists of oral presentations and written reports and essays, together with oral and written feedback to the other students' presentations and reports.

Students who do not pass an assessment will be offered another opportunity for assessment soon thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass.
Passed presentations, written reports and essays, passed feedback on the other students presentations and reports, and participation in all compulsory parts are required to pass the entire course.

Entry requirements

General requirements for university studies in Sweden

Further information

The course may not be credited towards a degree together with any of the courses: FYTA13 The scientific method 7.5 credits, MNXA09 The scientific method 7.5 credits, SASF10 The Scientific method, or MNXA19 The scientific method 7.5 credits.

Subcourses in MNXA29, Science: Exploring the Scientific Method

Applies from H20

2001 Exploring the Scientific Method, 7,5 hp
Grading scale: Fail, Pass