



Faculty of Science

MNXA19, Science: The Scientific Method, 7.5 credits

Naturvetenskap: Den vetenskapliga metoden, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2015-12-02. The syllabus comes into effect 2016-01-01 and is valid from the spring semester 2016.

General information

The course is an interdisciplinary course at the faculty of Science. The course is also an elective course for first-cycle studies for a Bachelor of Science with a specialisation in physics.

Language of instruction: Swedish and English

Main field of study

Specialisation

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.

The aims of the course are that upon completion of the course, the student should be able to:

Knowledge and understanding

- 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

- 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

- 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.

Grades

Grading scale includes the grades: 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 one of the courses: FYS258 The scientific method 7.5 credits, FYTA13 The scientific method 7.5 credits, MNXA09 The scientific method 7.5 credits or SASN01 The scientific method 7.5 credits.