## History and Philosophy of Sciences: Mathematics (C004084)

**Course size**      *(nominal values; actual values may depend on programme)*

**Credits 6.0**      **Study time  165 h**

**Course offerings and teaching methods in academic year 2023-2024**

| A (semester 1) | Dutch | Gent | seminar |
| | | | lecture |
| | | | group work |

**Lecturers in academic year 2023-2024**

| | | |
|---|---|---|
| Van Dyck, Maarten | LW01 | lecturer-in-charge |
| Beck, Pieter | LW01 | co-lecturer |
| Thas, Koen | WE01 | co-lecturer |
| Van Maldeghem, Hendrik | WE01 | co-lecturer |

| Offered in the following programmes in 2023-2024 | crdts | offering |
|---|---|---|
| Master of Science in Teaching in Science and Technology(main subject Mathematics) | 6 | A |
| Master of Science in Mathematics | 6 | A |

**Teaching languages**

Dutch

**Keywords**

Science, history, scientific methods, philosophy of science, history of mathematics

**Position of the course**

This course offers a general introduction to the history of science and to basic concepts of philosophy of science. (Additional courses focus on a particular scientific discipline: mathematics). Insight is gained into the specific characteristics of the scientific method and into the similarities and differences with non-scientific forms of acquiring knowledge. As such, this course also provides an understanding of several essential questions of the philosophy of science (e.g. the problem of demarcation, the problem of induction, the foundations of science, etc.).

**Contents**

The historical part of the course is devoted to the origins and history of scientific methods. Particular attention is paid to the development of mathematics in Ancient Greece (Thales, Pythagoras, Archimedes, Euclid and others). The Greek mathematicians' emphasis on proof is contrasted with other forms of knowledge acquisition and construction, such as mythology. The special character of philosophy, developed together with mathematics, is also explained, showing that already Plato and Aristotle had divergent views on methodological aspects of what was first called natural philosophy and later science. Next, the importance of Greek medicine (Hippocrates, Galenus) and of Arabic mathematics and science is discussed and situated in the medieval, theological traditions, after which the developments in the Renaissance are indicated (Copernicus, Vesalius, Harvey, Bruno, Bacon a.o.) The origin and evolution of the experimental method in physics is explained and placed in its historical and social context.

In second part focusses on further developments in mathematics. Attention is also paid to specific problems of the philosophy of science within these disciplines and to the possible social and ethical problems associated with them.

**Initial competences**

Bachelor in a scientific discipline.

**Final competences**

    1  Understand how the sciences developed historically, how they gradually acquired their contemporary characteristics and what their distinguishing features and methodologies are.

    2  Understanding the philosophical questions of science that constantly arise in the development of the sciences (What is reliable observation? How to derive a general understanding from a limited number of observations? What is a good experiment? What is a fact? A hypothesis? A theory? How are theories adjusted? etc.).

    3  Understanding the historical roots of the sciences (Presocratic philosophers, Aristotle, Archimedes, Euclid and others).

    4  Understanding the relationship between religion and science and of the issues relating to the emergence and development of the modern sciences (development of experimental methods, Francis Bacon, Copernicus, Vesalius, Galileo, Kepler, Newton, etc.).

    5  Understanding the differences and possible similarities between scientific approaches and non-scientific forms of acquiring knowledge (dogmatic thinking, pseudoscience, etc.).

    6  Acquiring detailed knowledge of the development of a specific discipline, in connection with the external factors that shaped it.

**Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

**Conditions for exam contract**

This course unit cannot be taken via an exam contract

**Teaching methods**

Group work, Seminar, Lecture, Independent work

**Extra information on the teaching methods**

We aim at a combination of (guided) self-study and project work, supported by the standard electronic educational tools.

**Learning materials and price**

Written syllabus

**References**

**Course content-related study coaching**

**Assessment moments**

end-of-term and continuous assessment

**Examination methods in case of periodic assessment during the first examination period**

Oral assessment, Written assessment

**Examination methods in case of periodic assessment during the second examination period**

Oral assessment, Written assessment

**Examination methods in case of permanent assessment**

Assignment

**Possibilities of retake in case of permanent assessment**

examination during the second examination period is possible

**Extra information on the examination methods**

General part: Written examination
Domain specific part: Assignment and presentation

**Calculation of the examination mark**

50 % general part + 50% domain specific part