GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2023-2024

History and Philosophy of Sciences: Physics and Astronomy (C003940)

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

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	Dutch	Gent	lecture independent work

Lecturers in academic year 2023-2024

Van Dyck, Maarten	LW01	lecturer-in-charge
Beck, Pieter	LW01	co-lecturer
De Rijcke, Sven	WE05	co-lecturer

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

Teaching languages

Dutch

Keywords

Philosophy of science, history of science, underdetermination, theory-ladenness, history of physics, history of astronomy

Position of the course

This introductory courses teaches the student to think about the natural sciences. We investigate some philosophical questions that are related to the underdetermination of theories by empirical evidence and "theory-ladenness". The goal is to give the student insight in both the possibilities and the limits of scientific evidential reasoning by showing the importance of these philosophical ideas for a proper understanding of the history of the sciences. Next to this, a few themes from the history of physics and astronomy are dealt with.

Contents

***General* part:** The first part introduces the central themes (underdetermination and theory-ladenness) through a study of a few episodes from the history of chemistry. By placing the scientific research in its historical context it is show how empirical observations could only play their evidential role given a number of "background assumptions". The cases discussed are: Lavoisier's oxygen hypothesis, the determination of atomic weights in nineteenth century chemistry, the concept of an element in the table of Mendeleev and the changing relations between chemistry and (sub-)atomic physics.
Domain-specific part: The second part focusses on specific aspects from the history of physics and astronomy. The genesis of Newton's classical mechanics is discussed. Further evolutions within mathematical physics in the period after Newton up till the twentieth century are treated. Philosophical questions having to do with the use of mathematical methods in the study of empirical phenomena are also raised. Next to this, an overview is offered of different methods that have been used throughout history by astronomers to determine astronomical distances, with new estimates having often profound impact on our image of the universe.

Initial competences

asic familiarity with some central concepts and theories in the natural sciences and physics.

Final competences

1 Being able to correctly assess the philosophical and scientific implications of underdetermination of theories by empirical evidence.
2 Being able to correctly assess the philosophical and scientific implications of theory-ladenness.
3 Being able to explain the impact of underdetermination in historical case studies.
4 Being able to explain the impact of theory-ladenness in historical case studies.
5 Develop a reflective attitude that can be incorporated in one's own scientific practice.
6 Possess knowledge about the historical development of physics and astronomy.
7 Have insight in philosophical questions raised by historical developments within physics & astronomy.

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

Lecture, independent work

Learning materials and price

Written syllalubs, scientific papers, historical source-texts, ppt slides

References

Course content-related study coaching

The teacher and his collaboraters provide individual feedback when necessary.

Evaluation methods

end-of-term and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Assignment, oral assessment, written assessment with open-ended questions

Examination methods in case of periodic evaluation during the second examination period

Assignment, written assessment

Examination methods in case of permanent evaluation

Assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

General part: Written examination.
Domain specific part: paper on a specific topic treated in the classes + oral examination.

Calculation of the examination mark

50 % general part and 50 % domain specific part