

Materials for Energy Applications (C004523)

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

Credits 6.0

Study time 180 h

Course offerings in academic year 2024-2025

A (semester 1)

English

Gent

Lecturers in academic year 2024-2025

Detavernier, Christophe

WE04

lecturer-in-charge

Dendooven, Jolien

WE04

co-lecturer

Offered in the following programmes in 2024-2025

[Master of Science in Teaching in Science and Technology\(main subject Physics and Astronomy\)](#)

crdts

offering

6

A

[Master of Science in Physics and Astronomy](#)

6

A

[Exchange Programme in Physics and Astronomy \(Master's Level\)](#)

6

A

Teaching languages

English

Keywords

Position of the course

Contents

Introduction: the energy issue: basic aspects, scope, timeframe, challenges

Theoretical aspect: electrochemistry (reduction/oxidation, ionic conductivity, solid-electrolyte interfaces), band diagrams (PN junction, LEDs, diodes), thermal behavior of materials (thermal conductivity, porous materials, microelectronics)

Material-technical aspect: Batteries and hydrogen fuel cells (electrode materials, surface modifications, storage...). Photovoltaics (materials, structures, tandems, anti-reflection coatings...), thermal behavior of materials (emissivity, coatings for windows...). Low power computing and power conversion. Efficiency in (LED) lighting.

Initial competences

Solid-state and Nanophysics

Final competences

- 1 Understanding the importance of material properties and material development in the sustainability issue.
- 2 Identifying connections between fundamental physical principles and energy applications.
- 3 Quantifying material properties.

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

Extra information on the teaching methods

Lectures

Study material

None

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

Written assessment with open-ended questions

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

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

not applicable

Calculation of the examination mark

50/50