

## 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