GHENT UNIVERSITY

# Course Specifications

Valid as from the academic year 2024-2025

## Solid State Physics (C001063)

**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 2026-2027**

| | | | |
|---|---|---|---|
| A (semester 2) | Dutch | Gent | lecture |
| | | | excursion |
| | | | seminar |

**Lecturers in academic year 2026-2027**

| | | |
|---|---|---|
| Detavernier, Christophe | WE04 | lecturer-in-charge |
| Dendooven, Jolien | WE04 | co-lecturer |

| **Offered in the following programmes in 2026-2027** | **crdts** | **offering** |
|---|---|---|
| Bachelor of Science in Physics and Astronomy | 6 | A |
| Preparatory Course Master of Science in Physics and Astronomy | 6 | A |
| Preparatory Course Master of Science in Physics and Astronomy | 6 | A |

**Teaching languages**

Dutch

**Keywords**

Principles of solid state physics, metals, semiconductors, superconductors, lattice dynamics.

**Position of the course**

This course unit belongs to the learning pathway "Structure of Matter" in the Bachelor program Physics and Astronomy.
The course is aimed at acquiring the basic principles of solid state physics. This should enable the students to start more specialized topics in this field during their Master years. Moreover, it should allow them to obtain a deeper insight into the important technological applications of solid state physics.

**Contents**

- Lattice dynamics
- Thermal properties of solids - heat capacity and thermal conductivity
- Free electron model for metals
- Energy band structure of solids
- Semiconductors - free carrier concentration - generation and recombination
- Superconductivity: overview of experimental phenomena, basic theory, junctions of superconductors, high-Tc superconductors
- Surfaces and interfaces : surface crystallography, thermionic emission, surface states, characterisation techniques, epitaxial growth
- Optical properties of solids - Lorentz oscillator model - interaction with phonons, free electrons, interband transitions in semiconductors, luminescence, color centers.

**Initial competences**

Basic knowledge of : mechanics, electricity, magnetism, waves, vibrations, thermodynamics, quantummechanics, statistical physics, chemistry.

**Final competences**

1 The course leads to acquiring a basic understanding of solid state physics.
2 It also leads to acquiring a physical way of thinking and of solving problems.

3 Other goals include an introduction to the use of scientific literature.
4 An understanding of the relevance of solid-state physics in the context of micro- and opto-electronic technology.

**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**

Seminar, Excursion, Lecture

**Study material**

Type: Syllabus

Name: Vastestoffysica
Indicative price: Free or paid by faculty
Optional: no
Language : Dutch
Number of Pages : 226
Oldest Usable Edition : 2024
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

**References**

Introduction to Solid State Physics, Kittel, John Wiley and Sons, New York,7th ed. 1996.

**Course content-related study coaching**

The teacher is available to answer questions before and after the classes, or by appointment.

**Assessment moments**

end-of-term 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**

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

not applicable

**Extra information on the examination methods**

Theory: written preparation followed by an oral discussion (no course material allowed).
Exercises: written, course notes can be used for reference.

**Calculation of the examination mark**

100% periodic evaluation