

## Solid State Physics (C001063)

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

Credits 6.0      Study time 180 h      Contact hrs 52.5 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	Dutch	lecture	30.0 h
		seminar: coached	22.5 h
		exercises	

Lecturers in academic year 2018-2019

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

Offered in the following programmes in 2018-2019

	crdts	offering
<a href="#">Bachelor of Science in Physics and Astronomy</a>	6	A
<a href="#">Preparatory Course Master of Science in Physics and Astronomy</a>	6	A

Teaching languages

Dutch

Keywords

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

Position of the course

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

- Interatomic binding in solids
- 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-T<sub>c</sub> superconductors
- Surfaces and interfaces : surface crystallography, thermionic emission, surface states
- Defects: pointdefects, color centers, diffusion, dislocations and stacking faults, amorphous materials
- Crystal growth: growth methods
- Optical properties of solids - Lorentz oscillator model - interaction with phonons, free electrons, interband transitions in semiconductors, luminescence

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

Lecture, seminar: coached exercises

Learning materials and price

Syllabus available

Price : distributed by the student union at copy cost.

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.

Evaluation methods

end-of-term evaluation

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

Written examination, oral examination

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

Written examination, oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

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