GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2015-2016

Materials in Electronics (E065110)

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

Credits	**6.0**	**Study time**	**180 h**
Contact hrs	60.0 h		

Course offerings and teaching methods in academic year 2016-2017

A (semester 2)	seminar: coached exercises	25.0 h
	practicum	5.0 h
	lecture	30.0 h

Lecturers in academic year 2016-2017

Beeckman, Jeroen	TW06	lecturer-in-charge

Offered in the following programmes in 2016-2017	crdts	offering
Bachelor of Science in Electrical Engineering	6	A
Preparatory Course Master of Science in Photonics Engineering	6	A
Preparatory Course European Master of Science in Photonics	6	A

Teaching languages

Dutch

Keywords

Dielectric materials, metals, semiconductors, magnetic materials, resistors, capacitors, inductors, transistors

Position of the course

This basic course is about materials used in electronic components and systems. The purpose is to provide insight into the relation between physical working principles and the electrical, magnetic, themal... materials properties. This leads to various kinds of material models. Finally, the most common electonic components are treated, based on simplified materials models.
Given the importance of semiconductors for electronics, and the complexity of their material properties, about half of this course is dedicated to semiconductors and basic semiconductor components.
Basic materials models are given for the most important materials properties and the basic components. More specialised materials properties and components are treated rather qualitatively, in order to provide a broad overview of materials and components in electronics.

Contents

- Important classes of physical material models
- Macroscopic description of materials
- Metals (physical models, commonly used materials, resistor)
- Semiconductors (physical models, commonly used materials, diode, bipolar transistor, field effect transistor)
- Dielectrics (physical models, commonly used materials, capacitor)
- Magnetic materials (physical models, commonly used materials, inductor)

Initial competences

Basic physics courses for engineering; electrical networks and circuits

Final competences

1 To be aware of macroscopic material models relevant for materials used in electronics (metals, semiconductors, dielectrics and magnetic materials).
2 To apply physical material models derived from physical miscroscopic material models.

3 To be aware of the "black-box" basic models for common components in electrical engineering (electric, electronic and magnetic components) with respect to the materials that are used in these components.
4 To identify the use and the purpose of materials (metals, semiconductors, dielectric and magnetic materials) in specialized components used in electrical engineering.

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, practicum, seminar: coached exercises

Learning materials and price

Course book (in Dutch), about 7 euro

References

- Principles of Electronic Materials and Devices, Second Edition S.O. Kasap, McGraw-Hill (1997, 2000, 2002)ISBN: 0072456361.

Course content-related study coaching

(Quasi) individual supervision during the exercise sessions. Interactive support through Minerva (forums, e-mail). Personally: after e-mail appointment.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, open book examination

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

Written examination, open book examination

Examination methods in case of permanent evaluation

Assignment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

During examination period: written closed-book exam; written open-book exam. During semester: graded lab sessions, project on topical subject.

Calculation of the examination mark

Evaluation during exam period 80%. Lab sessions & project 20%.