GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Optical Spectroscopy of Materials (C003128)

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

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	practical
			lecture
			independent work

Lecturers in academic year 2024-2025

Poelman, Dirk	WE04	lecturer-in-charge
Vrielinck, Henk	WE04	co-lecturer

Offered in the following programmes in 2024-2025	crdts	offering
Master of Science in Teaching in Science and Technology(main subject Physics and Astronomy)	4	A
Master of Science in Photonics Engineering	4	A
Master of Science in Physics and Astronomy	4	A
Master of Science in Physics and Astronomy	4	A
Exchange Programme in Physics and Astronomy (Master's Level)	4	A

Teaching languages

English

Keywords

Optical spectroscopy, vibrational spectroscopy, luminescence, Raman spectroscopy, spectrophotometry, ellipsometry, thin film optics

Position of the course

Make the students acquainted with a number of important spectroscopic techniques for the investigation of the electronic and the vibrational properties of solid materials. This includes both the theoretical background of the techniques and their practical application.

Contents

- UV-VIS-NIR Spectrophotometry: Introduction; Applications: thin film optics
- Spectroscopic ellipsometry
- Infrared and Raman Spectroscopy: Introduction; Vibrational transitions in materials; Electronic transitions in materials
- Luminescence Spectroscopy: PL (photoluminescence); CL (cathodoluminescence)

Initial competences

Having successfully followed the course ISolid State Physics

Final competences

1 Estimate the complex refractive index of an arbitrary material from optical measurements.
2 Understand the concepts optical density, infrared- and Raman-active modes, excitation spectrum, emission spectrum, configuration coördinate diagram.
3 Have insight in the relation between resolution, dynamic range, measurement time and signal to noise ratio in optical measurements.
4 Interpret infrared absorption spectra of solid materials.
5 Understand the origin of different luminescent processes in solids.
6 Understand the possiblities and limitations of ellipsometric measurements in

comparison with photometric measurements.

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, Practical, Independent work

Extra information on the teaching methods

The course partly consists of lectures where the experimental techniques and the interpretation of the measurements are described.
Next to this, the students have a number of lab sessions (in groups) where they conduct measurements (under guidance). They make a lab report (individually or in group) on their measurements.

Study material

Type: Syllabus

Name: Optical spectroscopy of materials
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Pages : 60
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No

Type: Handouts

Name: Optical spectroscopy of materials
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No
Usability and Lifetime within the Course Unit : intensive
Usability and Lifetime within the Study Programme : intensive
Usability and Lifetime after the Study Programme : occasionally

References

G. Blasse, B.C. Grabmaier, Luminescent Materials, Springer, Berlin (1994)

Course content-related study coaching

Interactive support using Ufora (forums, e-mail); personal support after electronic appointment (no fixed consulting hours) or before and after lectures

Assessment moments

end-of-term and continuous assessment

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

Oral assessment

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

Oral assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

Periodic evaluation: oral exam discussing the contents of the theoretical lectures and the interpretation of measurements (based on the written lab reports).

Calculation of the examination mark

50% on work reports; 50% on oral exam