

## Optical Spectroscopy of Materials (E027300)

**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 2023-2024**

A (semester 1)	English	Gent	practical	0.0h
			independent work	0.0h
			lecture	0.0h

**Lecturers in academic year 2023-2024**

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

**Offered in the following programmes in 2023-2024**

	crdts	offering
<a href="#">Bridging Programme Master of Science in Photonics Engineering</a>	4	A
<a href="#">Master of Science in Photonics Engineering</a>	4	A

**Teaching languages**

English

**Keywords**

optical spectroscopy, vibrations, luminescence, Raman spectroscopy

**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
- Infrared and Raman Spectroscopy: Introduction, Vibrational transitions in materials, Electronic transitions in materials
- Luminescence Spectroscopy: PL (photoluminescence), CL (cathodoluminescence)

**Initial competences**

solid 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 coordinate diagram.
- 3 Have insight in the relation between resolution, dynamic range, measurement time and signal to noise ratio in optical measurements.
- 4 Interpret the infrared absorption spectra of solid materials.
- 5 Understand the origin of different luminescent processes in solids.
- 6 Understand the possibilities 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.

**Learning materials and price**

Course notes available; price ~ 10 Euro

**References**

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

**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**

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 written lab reports; 50% on oral exam.