Optical Spectroscopy of Materials (EO27300)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course Specifications
Valid as from the academic year 2021-2022

Course size
Credits 4.0
Study time 120 h
Contact hrs 45.0 h

Course offerings in academic year 2021-2022
A (semester 1)  English  Gent

Lecturers in academic year 2021-2022
Poelman, Dirk  WE04  lecturer-in-charge
Vrielinck, Henk  WE04  co-lecturer

Offered in the following programmes in 2021-2022

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<td>Bridging Programme Master of Science in Photonics Engineering</td>
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<td>European Master of Science in Photonics</td>
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<td>Master of Science in Photonics Engineering</td>
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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

(Approved)
This course unit cannot be taken via an exam contract.

**Teaching methods**
Guided self-study, lecture, practicum, project

**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**

**Course content-related study coaching**

**Evaluation methods**
end-of-term evaluation and continuous assessment

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

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

**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.