Course Specifications
From the academic year 2017-2018 up to and including the

Optical Spectroscopy of Materials (C003128)

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

<table>
<thead>
<tr>
<th>Credits</th>
<th>Study time</th>
<th>Contact hrs</th>
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<tr>
<td>4.0</td>
<td>120 h</td>
<td>37.5 h</td>
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Course offerings and teaching methods in academic year 2018-2019

A (semester 1) English

- guided self-study: 6.25 h
- practicum: 17.5 h
- project: 6.25 h
- lecture: 7.5 h

Lecturers in academic year 2018-2019

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

Offered in the following programmes in 2018-2019

- 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 Introduction to 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 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
Syllabus, handouts of presentations, scientific papers: everything is made available through Minerva.

References

Course content-related study coaching
Interactive support using Minerva (forums, e-mail); personal support after electronic appointment (no fixed consulting hours) or before and after lectures

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 work reports; 50% on oral exam