GHENT UNIVERSITY

Course Specifications

From the academic year 2015-2016 up to and including the

Chemistry of Nanostructures (C002963)

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

Credits 3.0	Study time 90 h	Contact hrs 30.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	English	lecture	15.0 h
		self-reliant study activities	15.0 h

Lecturers in academic year 2018-2019

Hens, Zeger	WE06	lecturer-in-charge
Moreels, Iwan	WE06	co-lecturer

Offered in the following programmes in 2018-2019	crdts	offering
Master of Science in Chemistry	3	A
Master of Science in Chemical Engineering	3	A
Master of Science in Sustainable Materials Engineering	3	A
Master of Science in Chemical Engineering	3	A
Exchange Programme in Chemistry (master's level)	3	A

Teaching languages

English

Keywords

Nanoscience and technology, colloidal nanocrystals, self-assembly, quantum confinement

Position of the course

Chemistry of nanostructures is an optional course of the master in chemistry program, dealing with nanoscience and technology. It addresses physical phemonena at the nanoscale, the synthesis of nanoscale objects and techniques for measurement and manipulation at the nanoscale. The goal of the course is to make students understand (1) the driving force behind miniaturization, (2) how to make nanoscale objects and (3) the dependence of materials properties on size. The course relies strongly on recent literature. During the course, students will learn how to read, understand and use scientific literature. The course addresses the following competences: M.1.1, M.1.2, M. 1.3, M.1.4, M.1.5, M.2.2, M.2.5, M.2.6, M.3.2, M.3.4, M.4.2, M.4.3, M.4.5, M.6.2.

Contents

1. Introduction: nanoscience and technology: what, why and how - observation, measurement and manipulation at the nanoscale.
2. Concepts of bottom-up nanotechnology: syntheses of colloidal nanocrystals - self-assembly as a construction principle.
3. Physical properties of nanoscale materials: electronic energy levels in nanostructures - quantum confinement - optical properties of quantum dots.

Initial competences

Fysische chemie I: chemische thermodynamica, Kwantum chemie, Solid-state chemistry.

Final competences

1 Students can explain the rationale of nanoscience and technology.
2 Students can discuss the main approaches to bottom-up nanotechnology.
3 Students understand colloidal nanocrystals in terms of synthesis, stability and processing.

4 Students have insight in self-assembly as a bottom-up approach to nanostructures.
5 Students can explain why material properties may depend on particle size.
6 Students can relate quantum confinement to the physical properties of semiconductor nanocrystals.
7 Students can read, interpret and discuss present day literature on course-related topics.

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, self-reliant study activities

Learning materials and price

English language course text. A selection of recent papers from literature. Student presentations. Cost: 15 EUR

References

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Course content-related study coaching

Interactive support by means of Minerva. Questions and discussions during and after the classroom lectures. Personal assistance for the preparation of presentations.

Evaluation methods

end-of-term evaluation

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

Oral examination, assignment

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

Oral examination, assignment

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

To be evaluated, each student has to write and present a review discussing a recent publication on a topic in nanoscience related to the course. The review is written in a two-step process. Only after a first version has been peer-reviewed by fellow students, a second version is submitted for evaluation. The evaluation is based on the written report, the presentation and the discussion following the presentation.

Calculation of the examination mark

A single mark is given for the whole of written report, presentation and discussion.