Chemistry of Nanostructures (C002963)  

Course Specifications  
Valid as from the academic year 2015-2016

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 2017-2018  
A (semester 1)  
self-reliant study activities 15.0 h  
lecture 15.0 h

Lecturers in academic year 2017-2018  
Hens, Zeger WE06 lecturer-in-charge  
Brainis, Edouard WE06 co-lecturer

Offered in the following programmes in 2017-2018  
crds 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 phenomena 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.  

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.

(Approved)
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.