Biocompatible and nanostructured materials

Lecturer
Stephane GODET (Coordinator)

Course mnemonic
CHIM-H533

ECTS credits
5 credits

Language(s) of instruction
English

Course period
Second term

Campus
Solbosch

Course content

Part 1: Biocompatible Materials

I. Introduction to biocompatible materials

II. Materials : reminder

III. The bone as a nanostructured and hierarchical material: the concept of bioinspired materials and examples.

IV. Materials in medicine

Part 2 Nanostructured materials

I. Bulk Inorganic nanomaterials

II. Bulk Organic nanomaterials

III. Functional nanolayers

Objectives (and/or specific learning outcomes)

This course is an introduction to functional materials and in particular to biocompatible and nanostructured materials. In the case of biocompatible materials, the difficulty of replacing a living tissue is underlined. Indeed, they are most often nano- and hierarchically structured. Some examples and case studies are given for the different material families. In a second part, nanomaterials are envisaged. First, bulk nanomaterials (organic and inorganic) are introduced. A particular attention is paid to their mechanical properties. Second, nanostructured thin films and their related properties are described. Their specific properties (mechanical, magnetic,...) are compared to their bulk counterparts .

Teaching method and learning activities

Ex-cathedra lectures with invited guest speakers in the field, when appropriate. The nanomaterials part also involves lab sessions (production of nanpowders, nanoindentation)

Contribution to the teaching profile

The present course is a course that should open the mind of the students to the very vast world of nanostructured and biocompatible materials and contribute to extend their culture on materials.

This teaching unit contributes to the following competences:

In-depth knowledge and understanding of integrated structural design methods in the framework of a global design strategy

Correctly report on research or design results in the form of a technical report or in the form of a scientific paper

Present and defend results in a scientifically sound way, using contemporary communication tools, for a national as well as for an international professional or lay audience

Collaborate in a (multidisciplinary) team

Think critically about and evaluate projects, systems and processes, particularly when based on incomplete, contradictory and/or redundant information

Consciousness of the ethical, social, environmental and economic context of his/her work and strives for sustainable solutions to engineering problems including safety and quality assurance aspects

The flexibility and adaptability to work in an international and/or intercultural context

An attitude of life-long learning as needed for the future development of his/her career

An integrated insight in chemical process and materials' technology

References, bibliography and recommended reading

Understanding the nanotechnology revolution, E.L. Wolf, M. Medikonda, Wiley-VCH, 2012, ISBN 9783527411092

Nanostructures & nanomaterials: synthesis, properties and applications, Guozhong Cao, Imperial College Press, 2004, ISBN 9781860944802

Other information

Place(s) of teaching

Solbosch

Contact(s)

Stéphane Godet, stephane.godet@ulb.be

Marie-Paule Delplancke; marie-paule.delplancke@ulb.be

Evaluation method(s)

Personal work

Evaluation method(s) (additional information)

The students are asked to present a recent paper from an international journal in the field.

Determination of the mark (including the weighting of partial marks)

Oral exam

20% of total grade for lab reports

Main language(s) of evaluation

English

Programmes

Programmes proposing this course at the Brussels School of Engineering

MA-IRMA | Master of Science in Chemical and Materials Engineering | finalité Professional/unit 2 and MS-NATE | Specialized Master in Nanotechnology | unit U