UCLouvain

lgbio2030b

2017

Biomaterials

2 credits	0 h + 20.0 h	Q1

Teacher(s)	Demoustier Sophie ;Dupont Christine ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	General introduction to main classes of biomaterials: structure of natural and synthetic materials (polymers, ceramics and glasses, metals and composites). Properties of biomaterials: mechanical properties, surface vs bulk properties, physical and chemical properties, degradability, etc. This includes the study of living organism-material interactions: protein adsorption, cell adhesion, inflammatory and immune reactions, coagulation, etc. Examples of application of different classes of biomaterials in medicine: cardiovascular and orthopedic devices, dental materials, tissue engineering, etc.
Aims	*The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	• Final written exam (60 % of final grade) • Project evaluation (40 % of final grade): the written report is taken into account, as well as the oral presentation in front of the students participating to the course. • For students registered for a partim (LGBIO2030A, 3 ECTS), the final grade is solely based on the written examination.
Teaching methods	The first part (~16 h) of the teaching unit consists in lectures covering three axes: (i) principles of biology related to host-biomaterial interactions; (ii) general introduction to main classes of biomaterials: structure of natural and synthetic materials (polymers, ceramics and glasses, metals and composites); (iii) properties of biomaterials: mechanical properties, physical and chemical properties, surface properties, and relation between these properties and host-material interactions. The second part (~14 h) of the teaching unit includes a series of application of different classes of biomaterials in medicine, biology and artificial organs: biomaterials for cardiovascular applications, orthopedic prostheses, dental materials, drug delivery systems, biosensors, tissue engineering, etc. This part of the course is illustrated through presentations by experts from research and industry. Moreover, the visit of a company active in the field of biomaterials may be proposed. The third part (~30 h) of the teaching unit consists in a project, prepared by teams of two to three students. On the basis of at least a dozen of scientific papers or book chapters, the students will discuss a current issue in biomaterials science. Regular mentoring session with the teachers are organized, to orient students in their search of appropriate literature, and to help them structuring and writing the report. At the end of the semester, the work is presented to the other students following the same teaching unit.
Content	Part 1 : General introduction to main classes of biomaterials • 1.1 Polymers • 1.2 Metals • 1.3 Ceramics • 1.4 Compositifs • 1.5 Hydrogels • 1.6 Natural Materials Part 2 : Properties of biomaterials • 2.1 Mechanicals properties • 2.2 Surface vs bulk properties • 2.3 Living organism-biomaterial interactions Part 3 : applications of biomaterials in medicine
Inline resources	Moodle http://moodleucl.uclouvain.be/course/view.php?id=7830
Bibliography	Notes de cours sur Moodle Livre de référence (exemplaires prêtés aux étudiants par groupe) : Biomaterials : The intersection of Biology and Materials science : Int. Edition J. Temenoff & A. Mikos, Pearson Education

Other infos	The course can be taken as a partim [LGBIO2030A] (3 ECTS, 30 h + 10 h). In such case, the student does not prepare a project, but participates to project presentation by other student.
Faculty or entity in charge	GBIO

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Chemistry and Bioindustries	BIRC2M	2		