UCLouvain

lmapr2012

2024

Polymers for advanced technologies

5.00 credits	45.0 h + 15.0 h	Q2

Teacher(s)	Demoustier Sophie ;Glinel Karine ;Gohy Jean-François ;Nysten Bernard ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	Topics covered in this course deal with the use of functional polymers for the development of advanced materials/ devices used for organic electronics, energy storage and generation, photonics, storage data, sensing, smart packaging, tissue engineering, biomedical devices, high performance textiles, devices for aeronautics, automotive, etc. Different approaches of nano-/micro-/macro-fabrication, processing and surface functionalization involving the use of polymers will be studied. Polymer materials showing self-repairing, stimuli-responsive, bioactive, shape-memory, (semi-)conductive, ferromagnetic , etc. properties will be addressed.
Learning outcomes	**At the end of this learning unit, the student is able to :** **Contribution of the course to the program objectives**At the end of the course, the student will be able to : • search for information, scientific papers in order to understand a scientific or technological subject and to prepare a report or a presentation on it (axes 3.1, 3.3, 5.4); • write a didactic report for scientists or engineers on a scientific or technological subject (axes 3.3, 5.3, 5.5); • prepare and present a seminar for scientists or engineers on a scientific or technological subject (axes 5.6); • organize themselves and work in group to respect short term deadlines (axes 4.2, 4.4). 1 **Specific learning outcomes of the course** At the end of the course, the student will be able to: • • identify, describe and explain techniques of nano/micro-/macro-fabrication and processing involving use of polymer materials; • identify, describe and explain the applications using functional polymers in the domains of materials science, organic electronics, biomedical engineering and energy; • identify, describe and explain the main characterization techniques used to characterize the properties of functional polymer materials from nanoscale to macroscale; • justify the choice of a fabrication, synthesis or functionalization technique for the conception or the fabrication of a functional device based on polymer material. • read, summarize, understand and criticize a scientific paper dealing with the use of functional polymers
Evaluation methods	Students are evaluated on the basis of 1. their work during the semester and 2. a final examination. The evaluation of the work of the semester is based on the group presentations, reports and laboratories, and on the presence and activity during the whole semester. The final evaluation is an oral examination. It is based on the reading, understanding and criticism of a scientific paper dealing with some topics studied during the semester. The final grade will be based on: - an oral exam at the end of the semester which will count for 50% of the final grade - the word done during the whole semester which will count for 50% of the final grade. The mark attributed to the work done during the quadrimester is acquired for all the sessions of the academic year, by virtue of the article 78 of the RGEE.
Teaching methods	The course is based on projects and laboratories. During the semester, students in groups of three (or four), study, on the basis of the documents provided by the teachers and on their own bibliographic research, three topics selected by the teachers. Each topic is studied during two or three weeks. At the end of each period, all the groups hand in reports and some groups, selected by the teachers, present a 10 or 20 min seminar, according to the teacher's recommendations. Each group performs a laboratory related to the macromolecular nanotechnology during the semester and hands in a report.
Content	Projects, laboratories, seminars on the proposed topics.

Inline resources	Moodle website : https://moodle.uclouvain.be/course/view.php?id=1890
Bibliography	Chapitres de livres, articles de revue, articles scientifiques, rapports des groupes. Tous ces documents sont mis à disposition sur Moodle. Book chapters, reviews, scientific articles and reports done by the groups. All the documents are available via Moodle.
Other infos	It is recommended to have attended to the LMAPR2019 'Polymer Science and Engineering' or equivalent course.
Faculty or entity in charge	FYKI

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Chemical and Materials Engineering	KIMA2M	5		
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [120] in Chemistry	CHIM2M	5		
Master [120] in Physical Engineering	FYAP2M	5		
Advanced Master in Nanotechnologies	NANO2MC	5		