UCLouvain

lchm2261b

2020

Polymer Chemistry and Physical Chemistry (part 2 : Polymer Physical Chemistry)

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

2 credits	22.5 h + 7.5 h	Q1

Teacher(s)	Jonas Alain ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	This course provides an introduction to the characterization of macromolecules in solution. The course is made of flipped classrooms. All topics are not necessarily covered each year. The course discusses the notions of ideal and real chains, the size of macromolecules in solution, the notions of excluded volume and second virial coefficient, the thermodynamic properties of polymer solutions, and different techniques of characterization of polymers in solution (osmometry, viscometry, size exclusion chromatography, static light scattering).
Aims	1 The course aims at providing a deep knowledge of chain growth polymerisation methods, as well as of polymer solutions. At the end of the course, the students will be able to analyse results from experimental methods of determination of the molecular characteristics of a polymer (molar mass, distribution of molar mass, radius of gyration), and to predict its behaviour in solution (solubility, swelling, second viral coefficient, interaction parameter, phase separation). They will also be capable to solve small problems of practical relevance in the field of polymer engineering using these and complementary notions. 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'. - - - - *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	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** *Part of the grade will be given based on the answers to the preparative quizzes of the flipped classrooms. This part will be graded based on effort, not correctness of the answers. Part of the grade will be given by the continuous evaluation of the student progress at the end of each flipped class. This part will be graded based on the correctness of the answers. The last part of the grade will be based on an oral exam on more theoretical questions on the course; the list of possible questions will be given to the students at the beginning of the course. In case of sanitary issue, part of the evaluation might be replaced by a problem (case study).*
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** *The physical chemistry part of LCHM2261 is made of a small number of classes in **flipped classroom co-modal format**, in which the students resolve small problems and discuss concepts with the teacher, based on a prior reading of a section of the lecture notes and/or on watching podcasts. Before each class, the students have to answer a few questions on their preparative reading (quizzes); their answers are used by the teacher to identify misconceptions and tune the content of the classes. A small interrogation at the end of each class contributes to the continuous evaluation of the students. In case of sanitary issues, case studies could be proposed, consisting of a problem inspired by real cases and requiring to analyze virtual data, using among others the characterization techniques described in the lecture notes. In such a case, the case studies would replace part of the classes.*
Content	1. *Thermodynamics of solutions of small molecules - reminders* 2. *Osmometry* 3. *Solvent quality and swelling of macromolecular chains in solution* 4. *Viscometry and size exclusion chromatography* 5. *Phase diagrams of polymer solutions* 6. *Solubility parameters* 7. *Osmometry of macromolecular solutions* 8. *Static light scattering by macromolecular solutions* *At the end of the course, the students will be able to analyze results from experimental methods of determination of the molecular characteristics of a polymer, and to predict its behaviour in dilute solution.*
Inline resources	*Lecture notes, podcasts and experimental data will be available on the website of the course.*

	Website of the course: *https://moodleucl.uclouvain.be/course/view.php?id=7093*
Bibliography	L'ouvrage de référence suivant couvre *une partie* des concepts de LCHM2261B / the following textbook deals with *part* of the concepts of LCHM2261B: Paul C. Hiemenz & Timothy P. Lodge, Polymer Chemistry, 2nd edition, CRC Press:Boca Raton, 2007.
Faculty or entity in charge	CHIM

Force majeure

Teaching methods	The teaching methodology is not dependent of sanitary conditions, contrarily to what was initially written.
Evaluation methods	The evaluation of the students will be the one initially planned, irrespective of the sanitary conditions, contrarily to what was initially written.

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Chemistry	CHIM2M	2		🔍
Master [120] in Physical Engineering	FYAP2M	2		🔍