COURSE OUTLINE - CHEM 427-01/620-04

1. General Information

- Advanced Topic in Chemistry/polymer chemistry & Nanotechnology, 3 credits, Fall 2019
- Tuesday and Thursday, 11:45-13:00, Loyola campus, CC 312.
- **Dr. John Oh**, Faculty of Arts & Science, Chemistry & Biochemistry. Office: SP 275.09
- Course email: john.oh@concordia.ca
- Office hours: Thursday (2-4 pm) or by appointment (e-mail in advance)
- Course web page available on Moodle (www.myconcordia.ca)

2. Course Description

This course will deal with advanced knowledge in polymer chemistry, materials science, and biomedical engineering. *CHEM222 is a prerequisite.*

The course will offer the introductory polymer chemistry with an emphasis on polymer synthesis. Various methods to synthesize polymers will be discussed; they include classical step growth, free radical, ring opening polymerization, and other polymerizations; and modern living anionic, cationic, and living controlled/radical polymerization. Further, this course will discuss the design and development of functional polymers as building blocks to develop nanomaterials for bio-related applications, particularly drug delivery applications. Topics include amphiphilic block copolymers, self-assembly, micellar nanocarriers, cellular imaging, multifunctional drug delivery, and crosslinked nanogels/hydrogels. Lectures only

Polymer synthesis:
Polymer basic- nomenclature, properties, molecular weight
Classical step-growth & chain-growth polymerization
Anionic & cationic polymerization
Living/controlled radical polymerization- ATRP, RAFT, NMP
Other important polymerization methods: ROP, ROMP, etc
Block copolymerization - optional

Polymers for bio-related applications:
Block copolymer general and self-assembly
Polymer-based drug delivery general
Amphiphilic block copolymer nanostructures
Stimuli-responsive degradation platforms/controlled release
Crosslinked nanomaterials-drug delivery & tissue engineering (upon availability)

3. Textbooks and Materials

1) Recommended:

- *Introduction to Polymers*, 3rd Edition, R.J. Young and P.A. Lovell; CRC Press
- *Introduction to polymer chemistry*, 2nd Edition, C.E, Carraher, Jr.
- *Block copolymers: synthetic strategies, physical properties, and applications*, N. Hadjichristidis, S. Pispas, and G.A. Floudas

2) **Course website (Moodle on your Myconcordia Portal): Lecture slides and handouts**

4. Grading

Undergraduate (CHEM 427)

Mid-term Exam:	20%	(In October 22, during class for 1 hr 15 min)
Final Exam:	50%	(in December for 3 hr long, scheduled by Exams Office)
Presentation/abstract:	30%	

Graduate (CHEM 620)

Mid-term Exam:	10%	(In October 22, during class for 1 hr 15 min)
Final Exam:	35%	(in December for 3 hr long, scheduled by Exams Office)
Presentation/abstract:	30%	
Term report	25%	

Presentation would be 20 min long including questions/answers (15 min presentation and 5 min Q/As). Topics will be chosen by students and the presentation should describe the synthesis and applications of polymers and polymeric materials. Ideally, students will read 3-4 core research papers on the topic of their interests.

- Evaluation criteria: Organization, presentation, art works, and questions/answers.
- Research papers: could be published in reputational journals such as ACS, Wiley, RSC, Elsevier, Nature, Science, etc (no internet description).

One-page abstract including graphic abstract-10%

- Format: less than 300 words (single line spacing, 12 pont/Times New Roman (or 11 pont/Arial))
- Title, ID, and name should be indicated
- Criteria of text: overview, problem or why the topic is interested or important, methodology, summary, and future perspectives.
- Graphic abstract: graphic illustration to highlight your presentation (just copy/paste of figures in the papers will be penalized)
- Deadline: before or on the class when your presentation is scheduled.
- Penalty for late submission: 20%; two day late submission: 50%; after two day: 100%.

Term report (graduate students only): 3 page long (single space, 12 pont/Times New Roman (or 11 pont/Arial), 1 inch margin of four sides, and no more than 2 figures) – electronic submission as a pdf file, due on two days (by 5 pm) after final exam. **Penalty** for late submission: 20%; two day late submission: 50%; after two day: 100%.

Note: When your final exam is better than midterm exam, the grading will be followed with **5%/65%** (for undergraduates) and **0%/45%** (for graduates) midterm/final exam.

Grading scale: **0 F; 50.0 D-; 53 D; 57 D+; 60 C-; 63 C; 67 C+; 70 B-; 73 B; 77 B+; 80 A-; 85 A; 90 A+.**

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

5. Detailed lecture schedule (subjected to change)

Lecture 1-5	Polymer synthesis
Lecture 6-9	Bio-related applications
Lecture 10-13	Presentations

Guest lecture will be given during class(es).

MANDATORY QUIZ AND SEMINAR

As part of this course, you are ***required*** to i) attend a Chemistry and Biochemistry Departmental Seminar on the academic conduct code and the appropriate use of information sources and ii) pass the online quiz associated with this seminar (the passing grade for the quiz is 100%). (**Note:** This is **not** the University's quiz you may have been asked to take when you first registered and logged into the myConcordia portal; the one you must take is similar, but graded by the Department of Chemistry and Biochemistry, and you do not have access to it until after you have attended the seminar.) The aim of this seminar is to clarify the academic conduct code in terms of what practices will be considered unacceptable with regards to work submitted for grading in Chemistry and Biochemistry courses. **You are only exempt from repeating the seminar and the quiz if you have done both in Fall 2014 or more recently,*** otherwise you are required to repeat both this term. This short seminar (1 hour) will be held at the following times (note that late-comers will **not** be admitted):

Date (Fall 2019)	Time	Room
Monday, Sept. 16	16:45-17:45	CC 111
Tuesday, Sept. 17	16:45-17:45	CC 308
Tuesday, Sept. 17	20:45-21:45	HB 130
Wednesday, Sept. 18	16:45-17:45	CC 308
Wednesday, Sept. 18	20:45-21:45	HB 130
Thursday, Sept. 19	16:45-17:45	HC 155
Friday, Sept. 20	16:45-17:45	HC 157

As space for each of the seminars is limited by the room size, please **sign up** to your preferred time as soon as possible (slots fill up quickly). Sign-up sheets are available two weeks in advance of the seminars outside SP 201.01 (Departmental office). Only sign up in **available slots**: rooms must not be filled over capacity!

If you do not complete this course requirement, your final grade for the course may be lowered by one full letter grade with an incomplete (INC) notation until such time as this requirement is completed. Please refer to the undergraduate calendar (section 16.3.5) for details on removal of an incomplete notation.

* You are exempt if you can locate your ID in the pdf file located on the Departmental web site (http://www.concordia.ca/content/dam/artsci/chemistry/docs/Compliance-list.pdf).

PLAGIARISM AND OTHER FORMS OF ACADEMIC DISHONESTY

The Academic Code of Conduct can be found in section 17.10 of the academic calendar (http://www.concordia.ca/academics/undergraduate/calendar/current/17-10.html). Any form of unauthorized collaboration, cheating, copying or plagiarism found in this course will be reported and the appropriate sanctions applied. The mandatory seminar is a clear and fair opportunity to learn what our faculty regards as academic misconduct. Failure to take part in this learning opportunity and thus ignorance of these regulations is no excuse and will not result in a reduced sanction in any case where academic misconduct is observed.