

## CHEM 335: Biophysical Chemistry Syllabus for Winter 2018 Term

### GENERAL INFORMATION

Biophysical Chemistry is a one-term, three-credit course required for the Honours and Specialization programs in Biochemistry. This course examines the physical basis for the structure and organization of biomolecules, specifically proteins and lipids. The course also covers major biophysical methods used to characterize biomolecules, as well as the fundamental principles and concepts underlying these methods. It has the following prerequisites: CHEM 234 (Thermodynamics), CHEM 235 (Kinetics of Chemical Reactions), and CHEM 271 (Biochemistry I).

**Course format:** Lectures and Laboratories

**Instructors:** **Dr. Guillaume Lamoureux**

Office: SP 201.09

Office Hours: Friday 10:00 to 11:00 (or by appointment)

Email: [guillaume.lamoureux@concordia.ca](mailto:guillaume.lamoureux@concordia.ca)

(Please put "CHEM 335" in the subject of your email.)

**Dr. Lena Sahlman**

Office: SP 275.35

Office Hours: Tuesday 10:00 to 11:00, Thursday 13:30 to 14:30 (or by appointment)

Email: [lena.sahlman@concordia.ca](mailto:lena.sahlman@concordia.ca)

(Please put "CHEM 335" in the subject of your email.)

**Lectures:** Tuesdays from 18:00 to 20:30

Location: CC 106

**Lab coordinator:** **Mr. Vincent Lau**

Office: SP 201.10

Email: [vincent.lau@concordia.ca](mailto:vincent.lau@concordia.ca)

(Please put "CHEM 335" in the subject of your email.)

**Laboratories:** Section 01: Thursdays from 13:30 to 17:30 (Location: SP 320)

Section 51: Wednesdays from 18:30 to 22:30 (Location: SP 320)

**Textbook:** This course has no textbook. Reading material will be posted to the Moodle website and recommended books will be placed on reserve at the Vanier Library.

## RECOMMENDED READING

The following books are available for short-term (3 hour) loans at the Reserve of the Vanier Library and we strongly recommend that you consult them throughout the course:

- Allen: "Biophysical Chemistry", 2008.
- van Holde, Johnson, and Ho: "Principles of Physical Biochemistry", 2006.
- Creighton: "Proteins: Structures and Molecular Properties", 1993.
- Creighton: "Protein Structure: A Practical Approach", 1989.

Additional reading recommendations, also available at the Reserve of the Vanier Library:

- Price, Dwek, Ratcliffe, and Wormald: "Principles and Problems in Physical Chemistry for Biochemists", Oxford University Press, 2001.
- Bergethon and Simons: "Biophysical Chemistry: Molecules to Membranes", Springer-Verlag, 1990.
- Harding and Chowdhry: "Protein-Ligand Interactions: Structure and Spectroscopy", Oxford University Press, 2001.
- Harding and Chowdhry: "Protein-Ligand Interactions: Hydrodynamics and Calorimetry", Oxford University Press, 2001.
- Buxbaum: "Biophysical Chemistry of Proteins", Springer, 2011.  
Available electronically through the Concordia Library:  
<https://0-link-springer-com.mercury.concordia.ca/book/10.1007%2F978-1-4419-7251-4>
- Lakowitz: "Principles of Fluorescence Spectroscopy", Springer, 2006.  
Available electronically through the Concordia Library:  
<https://0-link-springer-com.mercury.concordia.ca/book/10.1007%2F978-0-387-46312-4>
- Fasman: "Circular Dichroism and the Conformational Analysis of Biomolecules", Plenum Press, 1996.

Lecture slides will be posted to the Moodle site before each lecture. However, these slides will not always be self-explanatory and you are expected to take your own notes.

## WEB RESOURCES

The Moodle website for this course can be accessed through your MyConcordia portal. Information that will be found at the website will include: problems and reading assignments, lecture slides, links to other sites, grades (up to but not including the final exam grades), and a News Forum. Announcements related to the CHEM 335 labs may also be made via the Moodle News Forum. You are expected to use the Moodle course site and are responsible for all material on it.

## COURSE GRADE

The final grade for the course is composed as follows: 20% for the first midterm exam, 20% for the second midterm exam, 40% for the final exam, and 20% for the laboratories. In order to pass the course, you are required to get at least 60% (12/20) on the laboratory component and at least 50% (40/80) on the theory component (midterms and final).

## GRADING SCHEME

A+ 90–100%	B+ 77–80%	C+ 67–70%	D+ 57–60%	F < 50%
A 85–90%	B 73–77%	C 63–67%	D 53–57%	R < 50% for theory
A- 80–85%	B- 70–73%	C- 60–63%	D- 50–53%	<u>or</u> < 60% for labs
				<u>or</u> 2 midterms missed

## EXAMINATIONS

The midterm exams will be held on **February 6th** and **March 13th**. The final exam date is set by the Examinations Office. If you are absent from a midterm exam, you must produce a written note appropriately signed (e.g., by a doctor or an employer) on letterhead paper. This letter must be delivered to the instructor before the end of the week of the missed exam. If the absence is not valid, you will receive a mark of zero for the exam. If the absence is valid, you will be granted permission to write a make-up test a week after the missed exam. No excuses are accepted for missing the make-up test. **If you miss both midterms, for whatever reason, you will automatically receive an “R” grade for the course.** If you are unable to write the final exam, you must make arrangements with the Faculty of Arts and Science in order to write a Deferred/Replacement final exam at a later date.

## LABORATORY INFORMATION

All questions on matters related to the labs should be addressed to Mr. Vincent Lau, the Lab Coordinator. **Laboratories start on Thursday, January 18 for Section 01 and on Wednesday, January 17 for Section 51.** Labs will be performed on a rotation basis such that you perform one lab every other week.

Laboratory performance is graded on the quality of the experimental work and the report. Although experiments are performed with lab partners, you must submit your own, individual lab report for all experiments. Joint lab reports are not acceptable. Do not expect a particular laboratory experiment to be related directly to the material covered in the lectures of the preceding weeks. Consider the laboratory work as an additional, independent learning experience.

**IMPORTANT:** For each experiment you will have to submit a report in the form of data two weeks after the lab was performed. In addition, you will be required to write two longer reports: one report will be submitted for Labs 1, 2 & 3 together, and one report will be submitted for Labs 4 & 5 together.

## LABORATORY MANUAL AND MATERIALS

The lab manual for the five experiments can be found online from the CHEM 335 Moodle website. You do not need to purchase a lab manual but should print out the necessary pages from this website. Other items such as lab coats and safety glasses, which are mandatory, are available at the bookstore.

### **LABORATORY EXEMPTION**

Students who are repeating the course, and have passed the lab component within the past two (2) years, may request a lab exemption. Applications forms for the exemption are available in room SP-201.01, and **must be submitted by January 12**. (Late applications will not be accepted.) Signed and completed forms are to be returned to Ms. Hilary Scuffell (room SP-275.01). Students **MUST** register for the appropriate lab exemption lab/tutorial section; students registered in any other lab/tutorial sections will be required to complete the lab portion of the course (NO EXCEPTIONS). If a lab exemption is granted, the lab grade will be that obtained from the previous attempt.

### **LABORATORY INSTRUCTORS**

Each laboratory section will have a teaching assistant (TA) who is a graduate student or staff member of the Department. You must know their names and the location of their offices. You may need to contact them later for matters related to your labs. Lab reports are to be handed in during the normal laboratory session or at designated hours (for the final reports). If you have permission to hand in a lab report outside of these hours, you must make arrangements to hand it directly to your TA. Lab reports put in envelopes on doors or under lab doors will not be accepted.

### **COURSE WITHDRAWAL**

Student who withdraw from the course must also check out from their lab section. Only registered students may attend the lab and receive a grade for lab work.

### **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 Department of Chemistry and Biochemistry offers a seminar on the academic conduct code and the appropriate use of information sources which aims to clarify what practices will be considered unacceptable with regards to work submitted for grading in Chemistry and Biochemistry courses. Attendance at this seminar is highly recommended and represents 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. This short seminar (1 hour) will be held at the following times (note that latecomers will not be admitted):

<b>Date</b>	<b>Time</b>	<b>Place</b>
Monday, Jan. 22	16:45-17:45	CC-310
Tuesday, Jan. 23	16:45-17:45	CC-310
Wednesday, Jan. 24	16:45-17:45	CC-310
Wednesday, Jan. 24	20:45-21:45	HC-157
Thursday, Jan. 25	16:45-17:45	CC-310
Thursday, Jan. 25	20:45-21:45	CC-310
Friday, Jan. 26	16:45-17:45	CC-310

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).

### CALENDAR OF LECTURES

Please note that this calendar may change as the semester proceeds.

<b>Date</b>	<b>Instructor</b>	<b>Topics</b>
Jan. 9	Lamoureux	Thermodynamics, Properties of amino acids, Interaction forces
Jan. 16	Lamoureux	Protein structure, Protein folding
Jan. 23	Lamoureux	Protein folding, Ligand binding
Jan. 30	Lamoureux	Ligand binding, Computational methods
<b>Feb. 6</b>	Lamoureux	<b>Midterm Exam #1</b> , Calorimetric methods (ITC, DSC)
Feb. 13	Lamoureux	Calorimetric methods (ITC, DSC)
Feb. 20		MIDTERM BREAK (NO CLASSES)
Feb. 27	Sahlman	Introduction to spectroscopic techniques, Infrared spectroscopy
Mar. 6	Sahlman	Infrared spectroscopy, FTIR, Raman
<b>Mar. 13</b>	Sahlman	<b>Midterm Exam #2</b> , Fluorescence spectroscopy
Mar. 20	Sahlman	Fluorescence spectroscopy, Circular dichroism
Mar. 27	Sahlman	Circular dichroism, NMR
Apr. 3	Sahlman	Protein crystallization and protein X-ray crystallography
Apr. 10	Sahlman	Analytical ultracentrifugation, SPR
<b>TBA</b>		<b>Final Exam</b>