



# UNIVERSITY OF CALGARY

## DEPARTMENT OF BIOLOGICAL SCIENCES COURSE OUTLINE

### 1. **Course:** BIOCHEMISTRY 471 – PHYSICAL BIOCHEMISTRY

Lecture Section(s): L01      MWF      12:00-12:50      ST 130      FALL 2014

LECTURER(S):      Dr. R. Edwards      BI 443      220-5350      redwards@ucalgary.ca  
                         Dr. E. Prenner      BI 145A      220-7632      eprenner@ucalgary.ca  
                         Dr. S. Noskov      BI 447      210-7971      snoskov@ucalgary.ca

Course website or Desire 2 Learn (D2L) course name: F2014 BCEM471L01

Biological Sciences Department      BI 186      403-220-3140      biosci@ucalgary.ca

### 2. **Prerequisites:** Biochemistry 341 or 393; Chemistry 353 or 355; one of Mathematics 249, 251, 281 or AMAT 217 and one of Mathematics 253, 267, 277, 283, 211, 213 or AMAT 219; and Physics 211 or 221 and 223.

### 3. **Grading:** The University policy on grading and related matters is described sections [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

<b>Assignments</b>	<b>(9 x 2% each)</b>	<b>18%</b>	
	<b>Midterm I (Tues. Oct. 8)</b>	<b>25%</b>	<b>(During Tutorial)</b>
	<b>Midterm II (Tues. Nov. 5)</b>	<b>25%</b>	<b>(During Tutorial)</b>
	<b>Final Exam</b>	<b>32%</b>	

There will be a final exam scheduled by the Registrar's office

Each piece of work (assignment, midterm tests or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

### 4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.6](#) of the University Calendar

### 5. **Course Materials:** Assignments and Recommended Readings will be posted on D2L

### 6. **Examination Policy:** Students should also read the Calendar, [Section G](#), on Examinations.

### 7. **Writing across the curriculum statement:** e.g. "In this course, the quality of the student's writing in assignments and examinations will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.

### 8. **ETHICS IN THE BIOLOGICAL SCIENCES**

Studies in the Biological Sciences involve the use of living and dead organisms. Students taking laboratory- and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

## 9. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Academic Misconduct:** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K. Student Misconduct](#) to inform yourself of definitions, processes and penalties
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Academic Accommodation Policy:** Students with documentable disabilities are referred to the following links: [Calendar entry on students with disabilities](#) and [Student Accessibility Services](#).
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also
- (f) <http://www.ucalgary.ca/secretariat/privacy>.
- (g) **Student Union Information:** [VP Academic](#) Phone: 220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca).  
SU Faculty Rep. Phone: 220-3913 Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca); [Student Ombudsman](#)
- (h) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (i) At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses ([www.ucalgary.ca/usri](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

Department Approval \_\_\_\_\_ Date \_\_\_\_\_

## COURSE OUTLINE

### BIOCHEMISTRY 471 PHYSICAL BIOCHEMISTRY

TERM: Fall 2014 SECTION NO: 01

PREREQUISITE(S): Biochemistry 341 or 393; Chemistry 353 or 355; one of Mathematics 249, 251, 281 or AMAT 217 and one of Mathematics 253, 267, 277, 283, 211, 213 or AMAT 219; one of Physics 211 or 221 and 223.

Students may not register in a course unless they have a grade of at least C- in each prerequisite course.

**COURSE COORDINATOR: Dr. R. Edwards**

LECTURER(S):	Dr. R. Edwards	BI 443	220-5350	redwards@ucalgary.ca
	Dr. E. Prenner	BI 145A	220-7632	eprenner@ucalgary.ca
	Dr. S. Noskov	BI 447	210-7971	snoskov@ucalgary.ca

LECTURES: M W F 12:00 ST 130

TUTORIAL: T 15:30 ST 130

TEXT: Recommended: Recommended Readings will be posted on D2L

RESERVE READING ROOM: See page on D2L.

MARK DISTRIBUTION:

A. Composition of Final Grade

Assignments	18 %
Midterm I (Oct 8)	25 %
Midterm II (Nov. 5)	25 %
Final Exam	32 %

B. Final Exam

There will be a final examination scheduled by the Registrar's Office.

C. Components of course for which a passing grade is essential  
**N/A**

D. Grade Scale

≥86%	⇒ A
82	⇒ A-
78	⇒ B+
74	⇒ B
70	⇒ B-
66	⇒ C+
62	⇒ C
58	⇒ C-
54	⇒ D+
50	⇒ D
< 50%	⇒ F

### BCEM 471 – Physical Biochemistry – Tentative Schedule

Week	Month	Day	Instructor	Lectures	Tutorial , Exams, and Assignments
1	Sept	08	RAE	Introduction to the Course	
1	Sept	09	RAE	→	Tutorial on Problem Solving
1	Sept	10	EJP – 1	Intro to Spectroscopy	
1	Sept	12	EJP – 2	Principles of Spectroscopy	Begin Assignment #1
2	Sept	15	RAE – 1	QM for biochemists	
2	Sept	16	EJP	→	Tutorial – Practice Prob. & Assign-1
2	Sept	17	RAE – 2	FEM models of conjugated systems	
2	Sept	19	RAE – 3	QM models of aromatic systems	Submit Assign #1 & Begin Assign #2
3	Sept	22	RAE – 4	Atomic & molecular wavefunctions	
3	Sept	23	RAE	→	Tutorial – Practice Prob. & Assign-2
3	Sept	24	RAE – 5	The Huckel model applied to UV-Vis Spectra	
3	Sept	26	RAE – 6	Harmonic oscillator & vibrating molecules	Submit Assign #2 & Begin Assign #3
4	Sept	29	EJP – 3	IR Spectroscopy	
4	Sept	30	RAE	→	Tutorial – Practice Prob. & Assign-3
4	Oct	1	EJP – 4	Applications of IR Spectroscopy	
4	Oct	3	EJP – 5	Applications of UV/Vis Spectroscopy	Submit Assign #3
5	Oct	6	EJP – 6	Synopsis and Review	
5	Oct	7	RAE/EJP	☼☼ Midterm Exam ☼☼	Midterm Exam-1 during Tutorial
5	Oct	8	EJP – 7	Intro to Fluorescence	
5	Oct	10	EJP – 8	Principles of Fluorescence	Begin Assign #4
6	Oct	13	-	☺☺ Thanksgiving – No Lecture ☺☺	
6	Oct	14	EJP	→	Tutorial – Practice Prob. & Assign-4
6	Oct	15	EJP – 9	Fluorescence Spectroscopy	
6	Oct	17	EJP – 10	Applications of Fluorescence	Submit Assign #4 & Begin Assign #5
7	Oct	20	EJP – 11	Dynamic Light Scattering	
7	Oct	21	EJP	→	Tutorial – Practice Prob. & Assign-5
7	Oct	22	SN – 1	Solids, Liquids, and Gases	
7	Oct	24	SN – 2	1 <sup>st</sup> Law of Thermo	Submit Assign #5 & Begin Assign #6
8	Oct	27	SN – 3	2 <sup>nd</sup> Law of Thermo	
8	Oct	28	SN	→	Tutorial – Practice Prob. & Assign-6
8	Oct	29	SN – 4	3 <sup>rd</sup> Law of Thermo	
8	Oct	31	SN – 5	Calorimetry and Its Applications (ITC & DSC)	Submit Assign #6
9	Nov	3	SN – 6	Synopsis and Review	
9	Nov	4		☼☼ Midterm Exam ☼☼	Midterm Exam-2 during Tutorial
9	Nov	5	SN – 7	Free Energy & spontaneity	
9	Nov	7	SN – 8	Ideal gases & solutions (Henry's & Raoult's Laws)	Begin Assign #7
10	Nov	10		☺☺ Reading Day – no lecture ☺☺	
10	Nov	11		☺☺ Reading Day – no tutorial ☺☺	
10	Nov	12	SN – 9	Standard States of solids, liquids, and gases	
10	Nov	14	SN – 10	Dependence of Free Energy on Temp. & Conc.	Submit Assign #7 & Begin Assign #8
11	Nov	17	SN – 11	Van't Hoff and Clausius-Clapeyron Equation	
11	Nov	18	SN	→	Tutorial – Practice Prob. & Assign-8
11	Nov	19	SN – 12	Electrolyte Solutions & Debye-Huckle Theory	
11	Nov	21	SN – 13	Thermo applied to Multiple Equilibrium & Buffers	Submit Assign #8 & Begin Assign #9
12	Nov	24	RAE – 7	Water and Hydrogen Bonding	
12	Nov	25	SN	→	Tutorial – Practice Prob. & Assign-9
12	Nov	26	RAE – 8	The Hydrophobic Effect	
12	Nov	28	RAE – 9	Thermodynamics applied to Proteins	Submit Assign #9
13	Dec	1	RAE – 10	Thermodynamics applied to Lipids & Detergents	
13	Dec	2	RAE	→	Tutorial – Practice Problems
13	Dec	3	RAE – 11	Thermodynamics applied to Nucleic Acids	
13	Dec	5	RAE – 12	Synopsis and Review	

Three Hour Final Exam to be scheduled by the Registrar.