



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. **Course:** BIOCHEMISTRY 553 – MOLECULAR BIOPHYSICS

Lecture Sections: L01 MWF 11:00-11:50 SA 235 WINTER 2015

Instructor(s): Dr. S. Noskov BI 447 210-7971 snoskov@ucalgary.ca

Course website or Desire 2 Learn (D2L): W2015BCEM553L01
Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

2. **Prerequisites:** Biochemistry 341 or 393; and Biochemistry 471 or Chemistry 371.

Note: Prior completion of Biochemistry 555 is recommended.

See section 3.5.C in the Faculty of Science section of the online Calendar
(<http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html>)

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:

Assignments (4)	32%
Midterm I	34% (Take home exam)
Final Examination	34% (In-class project presentation, April, 2015]

Conversion between course percentage and letter grade for BCEM553

Letter Grade	Course Percentage
A+	Reserved for outstanding distinguished performance
A	>85
A-	80
B+	77
B	74
B-	71
C+	68
C	65
C-	60
D+	55
D	50
F	<50

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. **Scheduled out-of-class activities:** N/A

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **Course Materials:**

Recommended Reading: **Text:** Phillips, Kondev, Theriot, Physical Biology of the Cell. Garland Science, 2008 +
Additional materials available on D2L course site

7. **Examination Policy:** Calculators and open-book allowed during examination. Students should also read the Calendar, [Section G](#), on Examinations.

8. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Misconduct:** 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: Students with Disabilities: <http://www.ucalgary.ca/pubs/calendar/current/b-1.html> [B.1](#) and Student Accessibility Services: <http://www.ucalgary.ca/access/>.
- (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 <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 220-3911 Email: suypaca@ucalgary.ca.
SU Faculty Rep. Phone: 220-3913 Email: sciencerep@su.ucalgary.ca; [Student Ombudsman](#)
- (g) **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.
- (h) **U.S.R.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). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ ORIGINAL SIGNED _____ Date _____

TENTATIVE LECTURE SCHEDULE

Recommended Reading: **Text:** Phillips, Kondev, Theriot, Physical Biology of the Cell. Garland Science, 2008 (2012) + Supplementary Materials posted on the D2L in the course documents section. We have Professors J. McCallum and D. Salahub as guest lecturers.

Jan-12	L1. Introduction to the Course
Jan-14	L2. Models, Hierarchy of Models and Levels of Approximation
Jan-16	L3. Introduction to biological energy conversion: Mechanical, Electrical and Chemical Equilibrium in Cells
Jan-19	L4. Part 1. Mechanical and Chemical Equilibrium: Coupling, chemical machines behind
Jan-21	In-class tutorial
Jan-20	L5. Part 2. Cells as minimizers of free energy.
Jan-23	L6. Random world – Distribution in Biological Chemistry. Relevance to Entropy
Jan-26	L7. Entropy, Constraints and Entropy for Protein/DNA Sequences Alignments
Jan-28	In-class tutorial/Journal Club
Jan-30	L8. Boltzmann Distribution
Feb-2	L9. Boltzmann Distribution: Application to Biological Problems
Feb-4	In-Class Tutorial
Feb-6	L10. Boltzmann Distribution: Allosteric Systems, Helix-Coil Transition
Feb-9	L11. Introduction to Electrostatics: Living in salty solutions
Feb-11	In-Class Tutorial/Journal Club
Feb-13	L12. Foundation of Biological Structure: Proteins, Equilibrium Theories of Folding
Feb-23	L13. Foundation of Biological Structure: DNA and RNA, Theories of Folding
Feb-25	Review for Part 1, Take-home exam due on March 4 th , 2015
Feb-27	In-Class tutorial/Journal Club
Mar-2	L14. Time is important: Kinetics of biological processes
Mar-4	L15. Transition State Theory and Enzyme Kinetics (Assignment 2 is due)
Mar-6	In-Class tutorial
Mar-9	L16. Rate Equations and Dynamics in the Cell
Mar-11	L17. Generation of Biological Electricity: Pumps and Active Proton Transport (Assignment 1 is due)
Mar-13	In-class tutorial
Mar-16	L18. The Hodgkin-Huxley Model of the Action Potential: Cell Level Models
Mar-18	L19. Models of Molecular Motors Dynamics
Mar-20	In class tutorial
Mar-23	L20. Molecular motors–ATPase (Assignment 4 is posted)
Mar-25	L21. Electron transfer reactions
Mar-27	In-class tutorial/Journal Club
Mar-30	L22. Models of biological networks. L1
April-1	L23. Models of biological networks. L2
April-6	L24. Biological Patterns. What to make of them
April-8	In-class tutorial/Journal Club
April-10	Final review/Written assignment for take-home examination due on April 15 th .