1. **Course**: BCEM 471, Physical Biochemistry -- Fall 2018

<table>
<thead>
<tr>
<th>Instructor Name</th>
<th>Email</th>
<th>Phone</th>
<th>Office</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elmar Prenner</td>
<td><a href="mailto:eprenner@ucalgary.ca">eprenner@ucalgary.ca</a></td>
<td>220-7632</td>
<td>BI 145</td>
<td>After class or by appointment</td>
</tr>
<tr>
<td>Sergei Noskov</td>
<td><a href="mailto:snoskov@ucalgary.ca">snoskov@ucalgary.ca</a></td>
<td>403-210-7971</td>
<td>BI-411</td>
<td>MWF; 13:00-14:30 or by email appointment</td>
</tr>
</tbody>
</table>

Recommended Readings will be posted on D2L

**Course Site:**
D2L: BCEM 471 L01-(Fall 2018)-Physical Biochemistry

**Department of Biological Sciences:**
Office: BIO 186
Phone: 403 220-3140
Email: biosci@ucalgary.ca

**Note:**
Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section 3.5.C in the Faculty of Science section of the online Calendar.

**Prerequisite(s):** Biochemistry 341 or 393; Chemistry 353 or 355; one of Mathematics 249, 251, 265, 275, 281, or Applied Mathematics 217 and one of Mathematics 253, 267, 277, 283, 211, 213, or Applied Mathematics 219; and Physics 211 or 221, and 223.

3. **Grading:**

The University policy on grading and related matters is described in F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

<table>
<thead>
<tr>
<th>Component(s)</th>
<th>Weighting %</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments (7 x 2% each)</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Midterm I</td>
<td>26%</td>
<td>October 16, 2018</td>
</tr>
<tr>
<td>Midterm II</td>
<td>26%</td>
<td>November 6, 2018</td>
</tr>
<tr>
<td>Final Exam</td>
<td>34%</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component 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.

The conversion between a percentage grade and letter grade is as follows.

<table>
<thead>
<tr>
<th>Minimum % Required</th>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95%</td>
<td>90%</td>
<td>85%</td>
<td>80%</td>
<td>75%</td>
<td>70%</td>
<td>65%</td>
<td>60%</td>
<td>55%</td>
<td>53%</td>
<td>50%</td>
</tr>
</tbody>
</table>
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/themself with these regulations. See also Section E.3 of the University Calendar.

5. Scheduled out-of-class activities:
There are no scheduled out-of-class activities for this course.

Not applicable

6. Course Materials:
Assignments and Recommended Readings will be posted on D2L.

7. Examination Policy:
The use of camera devices, MP3 Players and headphones, wireless earbuds or wireless access devices such as smart phones, smart watches, iOS and/or Android, etc., during the examination will not be allowed. All exams are closed book. Students should also read the Calendar, Section G, on Examinations.

Students should also read the Calendar, Section G, on Examinations.

8. Approved Mandatory and Optional Course Supplemental Fees:
There are no mandatory or optional course supplemental fees for this course.

9. Writing across the Curriculum Statement:
For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

In this course the quality of the student's writing in assignments and examinations will be a factor in the evaluation of those reports.

10. Human & living organism studies statements:
Students will not participate as subjects or researchers in human studies.

See also Section E.5 of the University Calendar.

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.

Students are expected to be familiar with Section SC.4.1 of the University Calendar.

11. Reappraisal of Grades:
A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

1. Term Work: The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within 15 days of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a reassessment of the work if, and only if, the student has sufficient academic grounds. See sections I.1 and I.2 of the University Calendar.
2. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](https://www.ucalgary.ca/policies/files/policies/student-handbook-2018-2019.pdf) of the University Calendar.

We acknowledge that there are instances when a student may wish to challenge University decisions about grades or academic policy. The following guidelines and procedures deal with those occasions. See University of Calgary Academic Calendar (2018-2019), Academic Regulations, Section 1 for detailed policies.

12. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

   a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counseling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](https://www.ucalgary.ca/wellness/services/mental-health)) and the Campus Mental Health Strategy website (Mental Health).

   b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call 403-210-9355.

   c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy ([https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf](https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf)) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208.

   d. **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](https://www.ucalgary.ca/policies/files/policies/student-handbook-2018-2019.pdf), Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. These are only examples.

   e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

   f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities.pdf).

   Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email addy@ucalgary.ca or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than 14 days prior to the date in question. See [Section E.4](https://www.ucalgary.ca/policies/files/policies/student-handbook-2018-2019.pdf) of the University Calendar.

   g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](https://www.ucalgary.ca/security/transportation-and-safewalk) website). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

   h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). 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 [Legal Services](https://www.ucalgary.ca/services/privacy) website.

   i. **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3913 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email:
The document contains a schedule for a course, BCEM 471 – Physical Biochemistry, for the fall 2018 semester. The schedule outlines the weekly topics, including:

- Introduction to the Course (Sept 7th)
- Tutorial #1 Problem Solving/ Calculus bootstrap (Sept 11th)
- FEM models of conjugated systems (Sept 12th)
- Tutorial #2; Practice Prob. (Sept 18th)
- Atomic & molecular wavefunctions (Sept 19th)
- The Hückel model applied to UV-Vis Spectra (Sept 21st)
- Intro to Spectroscopy (Sept 24th)
- Principles of Spectroscopy (Sept 28th)
- Midterm Exam #1 during Tutorial #6 (Oct 1st)
- Dynamic Light Scattering (Oct 17th)
- Solids, Liquids, and Gases (Oct 19th)
- 1st Law of Thermo (Oct 22nd)
- Tutorial #7 – Practice Problems (Oct 23rd)
- 2nd Law of Thermo (Oct 24th)
- Free Energy & spontaneity (Oct 26th)
- Calorimetry and Its Applications (Oct 29th)
- Tutorial #8 – Practice Problems (Oct 30th)
- 3rd Law of Thermo (Oct 31st)
- Midterm Exam #2 during Tutorial #9 (Nov 6th)
- Standard States of solids, liquids, and gases (Nov 7th)
- Dependence of Free Energy on Temp. & Conc. (Nov 9th)
- Electrolyte Solutions & Debye-Huckel Theory (Nov 19th)
- Tutorial #10 Practice Prob. (Nov 20th)
- Multiple Equilibrium & Buffers (Nov 21st)
- Water and Hydrogen Bonding (Nov 23rd)
- The Hydrophobic Effect (Nov 26th)
- Tutorial #11 - Practice Prob: (Nov 27th)
- Thermodynamics applied to proteins (Nov 28th)
- Midterm Exam #2 (Nov 30th)

The document also includes instructions for student participation, such as:

- Please participate in these surveys.
- All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor.
- Submit Assign #2 & Begin Assign #3
- Submit Assign #3
- Submit Assign #4 & Begin Assign #3
- Submit Assign #5 & Begin Assign #4
- Submit Assign #6 & Begin Assign #5
- Submit Assign #7 & Begin Assign #6

The document also mentions the internet and electronic device information, stating that all communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Repeated violations may result in a charge of misconduct.
Course Outcomes

- Select appropriate quantum mechanical models (QM), formulate parameters from molecular chemical structures, and calculate the shape and energy of wavefunctions
- Use energy and intensity principles to extract & predict structural and functional information from UV/Vis and IR spectra and engage in the reverse process of predicting spectra from structure
- Evaluate the correlation between predictions and known spectra and formulate new applications of spectral methods to diverse biomolecules
- Select appropriate thermodynamic equations and models to calculate, analyze, and predict the properties and interactions of diverse biomolecules
- Develop conceptual understanding of key models used to describe energy flow in biological systems
- Evaluate the applicability of these theoretical results by comparing and contrasting the calculated/predicted results to experimental results and explain how they correspond (or not) to qualitative and quantitative values and trends
- Describe, based on the structures & thermodynamic properties of H2O & biomolecules, how the properties of water influence the actions and interaction of biomolecules