UNIVERSITY OF CALGARY
FACULTY OF SCIENCE

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

COURSE OUTLINE

1. **Course:** BCEM 551, Structural Biology - Fall 2019

   Lecture 01: MWF 12:00 - 12:50 in SA 121

Instructor	Email	Phone	Office	Hours
Dr Hans Vogel	vogel@ucalgary.ca	403 220-6006	BI 423	TBA
Dr Marie Fraser	frasm@ucalgary.ca	403 220-6145	BI 413	TBA

   Course Site:

   D2L: BCEM 551 L01-(Fall 2019)-Structural Biology

   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 471.

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:

Component	Weight	Date
Dr. Vogel's midterm	45%	Oct. 21, 2019 (in ST131)
Dr. Fraser's assignments	10%	
Dr. Fraser's final exam	45%	Scheduled by the Registrar's Office

   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.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	92 %	86 %	81 %	77%	74%	70 %	66 %	62%	58%	54 %	50 %

   This course has a registrar scheduled final exam.

4. **Missed Components Of Term Work:**

   In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see Section M.1; for more information regarding the use of statuary declaration/medical notes, see FAQ). Absences must be reported within 48 hrs.

   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 themselves with these regulations. See also Section E.3 of the University Calendar.

5. **Scheduled Out-of-Class Activities:**

The following out of class activities are scheduled for this course.

Activity	Location	Date and Time	Duration
MT Exam	ST 131	Monday, October 21, 2019 at 6:00 pm	3 Hours

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a conflict with the out-of-class-time-activity, please contact your course coordinator/instructor no later than **14 days prior** to the date of the out-of-class activity so that alternative arrangements may be made.

6. **Course Materials:**

Recommended Textbook(s):

Gale Rhodes, *Crystallography Made Crystal Clear*: Elsevier.

Chary, K.V.R. and Govil, G., *NMR in Biological Systems*, Springer (available from Dr. Vogel)

7. **Examination Policy:**

Non-programmable calculators, rulers, protractors and compasses are allowed on tests or 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.

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.

a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **10 business 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 re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections I.1 and I.2 of the University Calendar

b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

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 counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) 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 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) 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. 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.

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 of the University Calendar.

g. **Safewalk:** Campus Security will escort individuals day or night (See the Campus 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 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: ombuds@ucalgary.ca.

j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned

off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.

k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

l. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law.

2019 TENTATIVE LECTURE SCHEDULE

Sept. 6	Introduction to Structural Biology	MEF1
9	Introduction to NMR	HJV
11	NMR nuclei	HJV
13	NMR: magnets and imaging	HJV
16	NMR chemical shifts	HJV
18	NMR: relaxation I	HJV
20	NMR: relaxation II	HJV
23+25+27	NMR of amino acids, peptides & proteins	HJV
30	NMR of amino acids, peptides & proteins	HJV
Oct. 02	NMR structure calculations	HJV
04	Larger NMR structures	HJV
07	Larger NMR structures	HJV
		HJV
09	NMR of ligand binding	HJV
11	NMR of ligand binding	
14	Thanksgiving – No lecture	
16	NMR of drug design	HJV
18	NMR Structural Aspects Review	HJV
	Midterm – Oct. 21, 6-9 pm	HJV
21	Overview of protein crystallography	MEF2
23	Protein crystals	MEF3
25	Geometric principles of diffraction	MEF4
28	Geometric principles of diffraction	MEF5
30	Collecting X-ray diffraction data	MEF6
Nov. 1	Symmetry exercise	MEF
4+6	Mathematics. Diffraction data to electron density	MEF78
8	Obtaining phases: Introduction and isomorphous replacement	MEF9
Nov. 10-16	Reading Week – No Lectures	
18	Obtaining phases: Anomalous scattering	MEF10
20	Obtaining phases: Molecular replacement	MEF11
22	Table 1: How crystallographers describe their data	MEF
25	Table 1: How crystallographers describe their data	MEF12
27	Electron density maps: Obtaining the molecular model	MEF13
29	PDB files and model validation	MEF14

Dec. 2	Table 2: How crystallographers describe their models	MEF
4	Table 2: How crystallographers describe their models	MEF15
6	Review	MEF

Course Outcomes:

- Describe how NMR techniques are used to determine protein structures and study protein dynamics
- Recognize the safety issues involved in NMR experiments
- Explain how crystallography is used to determine structures of macromolecules
- Compare the roles of crystallography and NMR techniques in studying ligand and drug binding
- Master vocabulary, concepts, and skills required to pursue in-depth study in structural biology methods
- Critically analyze a structural biology paper taken from the recent peer-reviewed literature based on the technique of NMR or crystallography

Department Approval:	Electronically Approved	Date: 2019-09-05 15:59
Associate Dean's Approval for out of regular class-time activity:	Electronically Approved	Date: 2019-09-05 16:22