

UNIVERSITY OF CALGARY  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE

1. Course: BCEM 551 – Structural Biology

Lecture Sections:	<b>L01:</b>	MWF	10:00	SA235	Winter 2016
<b>Instructors:</b>	<b>Dr. H.J. Vogel</b>		<b>BI 423</b>	<b>403-220-6006</b>	<b>vogel@ucalgary.ca</b>
	<b>Dr. M.E. Fraser</b>		<b>BI 413</b>	<b>403-220-6145</b>	<b>frasm@ucalgary.ca</b>

D2L course name: 2016W BCEM 551 L01 - Structural Biology  
Biological Sciences Department BI 186; 403-220-3140; biosci@ucalgary.ca

2. **PREREQUISITES:** One of Biochemistry 341 or 393, and one of Biochemistry 471 or Chemistry 371.  
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 in “Academic Regulations, sections F.1 and F.2” of the online University Calendar (<http://www.ucalgary.ca/pubs/calendar/current/f-1.html> and <http://www.ucalgary.ca/pubs/calendar/current/f-2.html>) In determining the overall grade in the course the following weights will be used:

<b>Midterm Exam (Monday, March 07, 2016)</b>	<b>40%</b>
<b>Assignments from Dr. Vogel</b>	<b>10%</b>
<b>Assignments from Dr. Fraser</b>	<b>10%</b>
<b>Final Exam (scheduled by the Registrar's office)</b>	<b>40%</b>

There will be a three-hour final exam scheduled by the Registrar's office.

Percent grades will be translated to letter grades as follows:

<b>A 85%;</b>	<b>A- 81%;</b>	<b>B+ 77%;</b>	<b>B 74%;</b>	<b>B- 70%</b>	
<b>C+ 66%;</b>	<b>C 62%;</b>	<b>C- 58%;</b>	<b>D+ 54%</b>	<b>D 50%;</b>	<b>F &lt;50%</b>

“Each piece of work (assignment, midterm test 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: <http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html>. It is the student's responsibility to familiarize himself/herself with these regulations. See also <http://www.ucalgary.ca/pubs/calendar/current/e-3.html>.
5. Dates and times of class exercises held outside of class hours

<b>Midterm Exam</b>	<b>Monday, March 7, 2016 6:00-9:00 pm</b>	<b>TBA</b>
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**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.

Department Approval: \_\_\_\_\_ **ORIGINAL SIGNED** \_\_\_\_\_ Date: \_\_\_\_\_

Associate Dean’s Approval for  
out of regular class-time activity: \_\_\_\_\_ **ORIGINAL SIGNED** \_\_\_\_\_ Date: \_\_\_\_\_

6. **EXAMINATION POLICY:** No electronic or written aids (eg. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. Students should also read the Calendar, Section G, on Examinations: <http://www.ucalgary.ca/pubs/calendar/current/g.html>.
7. In this course, the quality of the student's writing will be a factor in the evaluation of the student's work. See also <http://www.ucalgary.ca/pubs/calendar/current/e-2.html>.
8. **STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS.** See also <http://www.ucalgary.ca/pubs/calendar/current/e-5.html>.
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 K. Student Misconduct (<http://www.ucalgary.ca/pubs/calendar/current/k.html>) 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 at <http://www.ucalgary.ca/emergencyplan/assemblypoints>.
- (c) **Student Accommodations:** 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 [http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities\\_0.pdf](http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf).
- Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email [addy@ucalgary.ca](mailto:addy@ucalgary.ca) or phone 403 220-3140.
- (d) **SAFEWALK:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk>). Call 403-220-5333 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: 403 220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca)  
SU Faculty Rep. Phone: 403 220-3913 Email: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca) and [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca);  
Student Ombuds Office: 403 220-6420 Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca); <http://ucalgary.ca/provost/students/ombuds>
- (g) **INTERNET and ELECTRONIC COMMUNICATION DEVICE** Information. You can assume that in all classes that you attend, your cell phone should be turned off. 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) Calculators can be used during examinations.
- (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.

UNIVERSITY OF CALGARY  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE  
BIOCHEMISTRY 551  
STRUCTURAL BIOLOGY

TERM: Winter 2016  
SECTION NO: 01

PREREQUISITE(S): One of Biochemistry 393 or 341, and one of Biochemistry 471 or Chemistry 371.

A student may not register in a course unless he/she has a grade of at least C- in each prerequisite course.

COURSE COORDINATOR: Dr. H.J. Vogel BI 423 403-220-6006

INSTRUCTORS: Dr. H.J. Vogel BI 423 403-220-6006 vogel@ucalgary.ca  
Dr. M.E. Fraser BI 413 403-220-6145 frasm@ucalgary.ca

LECTURES: MWF 10:00 – 10:50 SA 235

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

Required: Crystallography Made Crystal Clear, Rhodes, Gale. Academic Press. 3rd Edition (Paperback).

MARK DISTRIBUTION: A. Composition of Final Grade

<b>Midterm Exam (March 07/16)</b>	<b>40%</b>	<b>TBA</b>
<b>Assignments from Dr. Vogel</b>	<b>10%</b>	
<b>Assignments from Dr. Fraser</b>	<b>10%</b>	
<b>Final Exam</b>	<b>40%</b>	

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

2016 TENTATIVE LECTURE SCHEDULE

Jan	11	Introduction to NMR	HJV
	13	NMR nuclei	HJV
	15	NMR: magnets and imaging	HJV
	18	NMR chemical shifts	HJV
	20	NMR: relaxation I	HJV
	22	NMR: relaxation II	HJV
	25	NMR of amino acids, peptides & proteins	HJV
	27	NMR of amino acids, peptides & proteins	HJV
	29	NMR of amino acids, peptides & proteins	HJV
Feb	01	NMR of amino acids, peptides & proteins	HJV
	03	NMR structure calculations	HJV
	05	NMR of carbohydrates	HJV
Feb	08	Larger NMR structures	HJV
	10	NMR of ligand binding	HJV
	12	NMR of ligand binding	HJV
	22	NMR of drug design	HJV
	23	NMR Structural Aspects Review	HJV
	26	Metabolomics with NMR	HJV
	<b>15</b>	<b><i>Family Day – No Lectures</i></b>	
	<b>15-21</b>	<b><i>Reading Days – No Lectures</i></b>	
	29	Metabolomics with NMR	HJV/BM
Mar	02	NMR of living systems	HJV/BM
	04	Overview of protein crystallography	HJV/BM
Mar	7	Overview of protein crystallography	MEF
	9	Protein crystals	MEF
	11	Geometric principles of diffraction	MEF
	14	Geometric principles of diffraction	MEF
	16	Geometric principles of diffraction	MEF
	18	Collecting X-ray diffraction data	MEF
	21	Collecting X-ray diffraction data	MEF
	23	Diffraction data to electron density	MEF
	25	GOOD FRIDAY	
	28	Obtaining phases: Introduction and isomorphous replacement	MEF
	30	Obtaining phases: Anomalous scattering	MEF
Apr	01	Obtaining phases: Molecular replacement	MEF
	04	Table 1: How crystallographers describe their data	MEF
	06	Electron density maps: Obtaining the molecular model. Refinement	MEF
	08	PDB files and model validation	MEF
	11	Table 1: How crystallographers describe their models	MEF
	13	Review of protein crystallography	MEF

***Final Exams: April 16-27, 2016***