

**University of Guelph  
College of Biological Science  
Molecular and Cellular Biology**

**COURSE OUTLINE  
MEMBRANE BIOCHEMISTRY (BIOC\*4580)  
Winter 2016**

## **Course description**

This course is a molecular examination of the structure and functions of cell membranes, cell surfaces and associated structures. Topics may include: membrane lipids; membrane protein structure; membrane transporters; ATP production; cytoskeleton; cell surface carbohydrates; membrane biogenesis; signal transduction.

**Prerequisites: BIOC\*3560 or BIOC\*3570**

## **Teaching team**

### **Professors:**

weeks 1-6: Dr. John Dawson; Office - SSC 2248, jdawso01@uoguelph.ca, ext. 53867. Office hours: by appointment

weeks 7-12: Dr. Matt Kimber; Office – SSC 2254, mkimber@uoguelph.ca, ext. 52568. Office hours: by appointment

## **Course schedule**

Lectures 11:30 AM – 12:20 PM Monday, Wednesday, & Friday, ROZH 102

## **Learning Outcomes**

By the end of the course, the student will show a detailed understanding of cell membranes, cell surfaces, and associated structures by:

- 1) Understanding the structures, functional roles and biogenesis pathways of the major components of the membrane - lipids, carbohydrates and proteins;
- 2) Explaining the molecular basis of the biochemical behaviours of membranes, and showing how these behaviours in turn explain key aspects of cellular physiology;
- 3) Understanding the experimental approaches and tools used to investigate membrane systems;
- 4) Understanding the role of the membrane in transport and signal transduction;
- 5) Understanding the organization and role of the cytoskeleton and extra-cellular matrix;
- 6) Being able to apply this knowledge to new problems & situations.

Students will also practice working in teams in the classroom to gather information and apply knowledge to new data in preparation for assessments.

## Course Resources

### **Required Text:**

**"Lehninger Principles of Biochemistry" by Nelson & Cox (6th edition, 2013)**

This is an excellent text for many senior level courses in biochemistry and other molecular bioscience fields, and is also very useful as a reference text at the graduate level. Reading lists for this textbook will be provided. Copies of this book are on 2-hour Reserve in the McLaughlin library, as well as in the stacks, and it is available for sale in the Campus Bookstore. The 5<sup>th</sup> edition (2008) of this book is still very useful, whereas the 4th edition (2005) will not contain the new structural and proteomics information that has become available in the past few years.

### **This course will be run using Courselink.**

Check the Courselink site for this course for updates, information, and announcements. Depending on the Professor, homework sheets, lecture notes, additional readings, or links to external resources will be posted in Courselink.

### **In class use of electronics:**

Some lessons may require the use of internet-enabled devices to research information. We may also be using services such as GoogleDrive or Twitter to collect class information in lessons or outside of class.

## Course Content

Week		Topics Covered
1 - 2	JD	Membrane Structure and Membrane Lipids
3	JD	Membrane Protein Purification and Characterization
4	JD	The Cytoskeleton
5 - 6	JD	Biogenesis and Trafficking of Membrane Components
<a href="#">Winter break – no classes</a>		
7	MK	Cell-surface Carbohydrates and the Extra-Cellular Matrix
8	MK	Membrane Protein Structure
9	MK	Structural, Topological and Bioinformatics Methods
10 - 11	MK	Membrane Transport
12	MK	The Membrane and Signal Transduction

## Methods of Assessment

Assessment	Weight	Date	Course Content	Learning Outcome Addressed
In class quiz #1	15%	January 29, 2016	Activities from weeks 1-3	1,2,3,5,6
In class quiz #2	15%	February 26, 2016	Activities from weeks 4-6	1,2,3,5,6
In class quiz #3	20%	March 23 <sup>rd</sup> , 2016	Activities from weeks 7-9	1,2,3,5,6
Final Exam	50%	April 13, 2016	Cumulative	1-6

### Quizzes:

These will be written during a lecture period, and will be of 40-45 minutes duration. Students who foresee potential problems with any of the scheduled dates are advised to contact the instructor as soon as possible. If quizzes are missed because of **illness or other valid reasons such as compassionate considerations**, the marks allotted for that quiz will be transferred to the final examination. Make-up quizzes will not be provided. **Quizzes missed for no valid reason will result in a grade of zero.**

**Answers to the in-class quizzes will be posted on Courselink after the marked quizzes are returned.**

### Final examination:

Short answer questions, essay questions, and problems dealing with the entire semester's material. **The College of Biological Science policy stipulates that all students must write the final exam at this time.** Students who are unable to write the final exam at the scheduled time because of conflicts, or other valid reasons, should contact their Academic Counsellor, and request a deferred final examination.

## Course and University Policies

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### **When You Cannot Meet a Course Requirement**

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for [Academic Consideration](#).

If you are unable to complete an in-class quiz, the value of that quiz will be set onto the final exam. For example, a student unable to complete a quiz worth 15% of the final grade would have the value of the final exam increased by 15%, to a total of 65% of the final grade.

### **Accessibility**

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services (formerly the Centre for Students with Disabilities) as soon as possible.

For more information, contact [Student Accessibility Services](#) at 519-824-4120 ext. 56208 or email [csd@uoguelph.ca](mailto:csd@uoguelph.ca).

### **Academic Misconduct**

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](#) is detailed in the Undergraduate Calendar.

### **E-mail Communication**

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

### **Drop Date**

The last date to drop one-semester courses, without academic penalty, is the 40<sup>th</sup> class day. The deadline for dropping courses in Winter 2016 without penalty is March 11, 2016

### **Copies of out-of-class assignments**

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

### **Recording of Materials**

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## Campus Resources

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### **If you are concerned about any aspect of your academic program:**

Make an appointment with a [Program Counsellor](#) in your degree program.

### **If you are struggling to succeed academically:**

There are numerous academic resources offered by the [Learning Commons](#) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.

### **If you are struggling with personal or health issues:**

[Counselling services](#) offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. [Student Health Services](#) is located on campus and is available to provide medical attention.

For support related to stress and anxiety, besides Health Services and Counselling Services, [Kathy Somers](#) runs training workshops and one-on-one sessions related to stress management and high performance situations.

### **If you have a documented disability or think you may have a disability:**

[Student Accessibility Services](#) (SAS) formerly Centre for Students with Disabilities can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability.