

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

**COURSE OUTLINE  
Dynamics of Cell Function and Signaling - MCB\*3010  
Winter 2018**

**Course Description**

The course examines the dynamic properties of cells as they relate to cell-cell and cell-substrate interactions and elaborates on the fundamentals of intercellular signal transduction during these interactions. Topic will include the function and regulation of signaling modules, the cytoskeleton, and membrane component in the context of cellular interactions with other cells and with the extracellular matrix. These concepts will be integrated to develop a deeper understanding of dynamic cellular function within different tissue environments and physiological settings. (Prerequisites: BIOC\*3560 and MCB\*2050; minimum grade 050)

**Instructor**

Dr Renuka Karunagoda, Office – SCIE 4441, [renukak@uoguelph.ca](mailto:renukak@uoguelph.ca), office hours – by appointment

**Course Schedule**

Lectures- 8:30–9:50 Tuesday & Thursday, CRSC 116

**Learning Outcomes**

By the end of this course, the students will be able to

1. Discuss the major types of signaling molecules and the receptors with which they interact
2. Describe molecular mechanisms of cellular signalling
3. Discuss various molecular systems that control key cellular processes
4. Describe intercellular signal transduction during cell-cell and cell-substrate interactions
5. Critically assess the methods and approaches used to analyze cell signaling pathways
6. Analyze signaling cascades and diverse cell types as central components of physiological processes
7. Apply the knowledge of cellular functions and signaling and their molecular mechanisms to develop a deeper understanding of the stages of embryonic development

**Course Resources**

**Courselink:** This course will make use of the University of Guelph’s course website on D2L (via Courselink). Please check Courselink page for MCB\*3010 regularly.

**Textbooks:**

For lectures, there is no required textbook as we will be using scientific articles from different resources.

Recommended textbooks – ‘The World of the Cell’ (2011) (9<sup>th</sup> Ed.). Hardin, J., Bertoni, GP and Kleinsmith LJ. Pearson Education Inc. Benjamin Cummings San Francisco  
‘Molecular Biology of the Cell’ (2016) (6<sup>th</sup> ed.). Alberts, Johnson, Lewis, Morgan, Raff, Roberts, Walter. Garland Science.

Journal articles

YouTube videos

Library resources

### **Undergraduate academic calendar:**

The source of information about the University of Guelph procedures, policies and regulations which apply to undergraduate programs. It can be found at [Undergraduate Calendar](#).

### **Course Structure**

The course is taught in four modules. For each module there will be five lectures and a test. Each test is worth 25% of the total grade. There is no final exam. The lectures use PowerPoint presentations, video clips and journal articles. There is no required course textbook, as lecture materials are taken from various sources. Reading materials, lecture notes and course outlines will be posted as on the course website through Courselink the day before the lecture. Some class period will be devoted to learning by discussing papers from the primary literature, interpreting data and generating hypotheses. However, if you do not attend lectures or do not participate in class activities, it will be difficult to learn concepts and critical thinking skills that you need to be successful in the course.

### **Tentative lecture schedule**

<b>Week</b>	<b>Date</b>	<b>Lecture</b>
1	January 9, 11	Introduction to the course Cell signaling - concepts
2	January 16, 18	Molecular mechanisms of cell signalling
3	January 23 January 25	Cell-cell and cell-substrate interactions <b>January 25 - Module 1- Test</b>
4	January 30 February 1	Cytoskeleton – structure, dynamics and regulation
5	February 6, 8	Cellular movements: motility and contractility
6	February 13 February 15	Molecular machines <b>February 15 - Module 2- Test</b>

Week	Date	Lecture
	<b>February 19-23</b>	<b>Reading week – No lectures</b>
7	February 27 March 1	Extracellular matrix (ECM) – structure and function
8	March 6, 8	Beyond the cell: cell adhesions, cell junctions
9	March 13  March 15	Cadherins, selectins, ICAMs and integrins  <b>Module 3- test –March 15</b>
10	March 20, 22	Cell differentiation and tissue development: cadherin and embryo compaction
11	March 27, 29	mRNA and protein Movement during embryonic development in <i>Drosophila</i>
12	April 3  April 5	Cell Dynamics in gastrulation, differentiation and apoptosis  <b>Module 4- test –April 5</b>

### Methods of Assessments

Form of assessment	Weight of assessment	Due Date of assessment	Course content/ activity	Learning outcomes addressed
Test - Module 1	25%	January 25	Week 1-3	1-7
Test - Module 2	25%	February 15	Week 4-6	1-7
Test - Module 3	25%	March 15	Week 7-9	1-7
Test - Module 4	25%	April 5	Week 10-12	1-7

### Description of assessments

This course does not have a final exam. Achieving the learning outcomes of the course will be assessed continuously throughout the course. The course is taught in four modules, and there are four tests to assess the knowledge and skills developed during each module. The tests are non-cumulative, and scheduled during the regular class time. Each test comprises of multiple-choice questions and short-answer questions. All students have to take all four tests to pass the course.

## **Important Dates**

January 9 (Tuesday) – Lectures start  
January 25 (Thursday) – Module 1 – Test 1  
February 15 (Thursday) – Module 2 – Test 2  
February 19-23 – Reading week  
March 15 (Thursday) – Module 3 – Test 3  
April 5 (Thursday) – Module 4 – Test 4

## **Course and University Policies**

### Missed exams:

If you know you will not be able to attend the exam due to an illness or compassionate reasons, you have to inform me BEFORE the exam and provide me with an approved medical note or proper documentation within a week of the test. An alternate date for a make-up test will be arranged with proper documentation. Please make sure that you take the make-up test on the specified date. If you miss the make-up test (except under exceptional circumstances, such as medical or family emergency), you will receive a '0' mark for the test.

Please refer to the Courselink often for lecture notes, announcements etc. I will be posting lecture notes on Courselink before the lecture. However, there will be additional material that will be discussed during the class which may NOT be on posted lecture notes. This means the slides DO NOT represent a complete set of lecture, and DO NOT substitute for coming to class and taking your own notes.

### Important information:

Attending all classes is very important, as I will give information and hints during the lectures on how to be successful in the exams. Please make every attempt to attend lectures. Active participation in classes is always expected.

If you have any questions about the course, please talk to me during the office hours. You could contact me through e.mail, if it is not really necessary to meet.

Please respect to the fact that I want to conduct my class in a comfortable learning environment for everybody. I expect you all to treat each other with respect. Please do not talk in the class, in a way that disturbing others and do not use cell phones/laptops/tablets etc. to surf on internet, unless you are searching for something related to the course.

## **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 in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for [Academic Consideration](#).

## **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. To confirm the actual date please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see the [Undergraduate Calendar](#).

### **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.

## **Grading**

Grades will be assigned according to the standards outlined in the University of Guelph Undergraduate Calendar.

## **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.