# Course Outline Form: Winter 2016

## General Information

**Course Title: MATH 3510 - Biomathematics**

**Course Description:**
This course will convey the fundamentals of applying mathematical modelling techniques to understanding and predicting the dynamics of biological systems. Students will learn the development, analysis, and interpretation of biomathematical models based on discrete-time and continuous-time models. Applications may include examples from population biology, ecology, infectious diseases, microbiology, and genetics.

**Credit Weight: 0.5**

**Academic Department (or campus):** Mathematics & Statistics

**Campus:** University of Guelph

**Semester Offering:** Winter 2016

**Class Schedule and Location:**

## Instructor Information

**Instructor Name: Monica Gabriela Cojocaru**
**Instructor Email: mcojocar@uoguelph.ca**
**Office location and office hours: MACN 549 – Office Hours: Mondays, 3-5pm.**

## GTA Information: N/A

## Course Content

**Specific Learning Outcomes:**

This cours will focus on modelling and simulation methods for biological phenomena. This course bridges the gap that often exists between mathematical ideas and techniques on the one hand, and the behaviour of real phenomena on the other hand.

Students will develop analytical, geometrical and computational skills to construct and evaluate mathematical models, and to understand and predict how biological systems change in time.
Increase reading comprehension and modelling skills via completion of the project parts of the course.
Improving literacy and writing skills via completion of a written report relating published research with course content taught during the semester.

Training presentation/teaching skills via in-class presentations of researched project work in a manner understandable to the entire class.

Training team work skills via completion of the project part of the course.

**Lecture Content:**

W-2016 content detailed description: This course assumes that most students are familiar with the concept of a differential equation and that they have some knowledge on solving linear differential equations and systems of linear equations.

For the purpose of this outline, we define:
- Week 1 to be the week of Monday, January 11,
- Week 6 to be the week of Monday February 15,
- Week 7 to be the week of Monday February 29, 2016 respectively.

The course content is divided into two parts: Discrete time models (difference equations and applications to biological models: Weeks 1-6 inclusive) and continuous-time models (differential equations and applications to biological models: Weeks 7-12 inclusive).

Lectures on the two large topics above will take place on Weeks 1- Week 5, and Week 7-Week 11 inclusive. Weeks 6 and 12 are reserved for project presentations in class. Details on the projects are given in the next sections below.

**Labs: N/A**

**Course Assignments and Tests:**

| **Assigned work** | **Dates (on Tuesdays)** | **Location** | **Contribution to final mark** |
|---|---|---|---|
| **Homework 1** | **Upload on: Jan 25<br>Hand in: Feb 2** | **Home** | **10%** |
| **Homework 2** | **Upload on: Feb 2<br>Hand in: Feb 9** | **Home** | **10%** |
| **Class presentations Project 1** | **Week 6 (15 minutes each)** | **In class** | **10% - half students will get a mark here** |
| **Homework 1** | **Upload on: March 8<br>Hand in: March 15** | **Home** | **10%** |
| **Homework 1** | **Upload: March 15<br>Hand in: March 22** | **Home** | **10%** |
| **Class presentations Project 2** | **Week 12 (15 minutes each)** | **In class** | **10% - the other half of students get a mark here** |
| **Written project** | **Due date: Last Thursday of class by 5pm** | **Home** | **10% - all members of a team get same grade here** |
| **TOTAL(per student)** | | | **60%** |

**Final exam weighting: 40%**

**Final examination date and time:**

EXAM Wed
02:30PM - 04:30PM (2016/04/20)
Room TBA Room TBA

## Course Resources

**Required Texts: N/A**

**Recommended Texts:**

Mathematical Models in Biology by Edelstein-Keshet. ISBN 9780898715545 SIAM (textbook)

**Other Resources:**

Linda, J. S. Allen, An Introduction to Mathematical Biology, Pearson Prentice Hall, 2007

## Course Policies

**Grading Policies**

All marked assignments will be returned to students within 7 calendar days in class. Alternative pick up location and time: during office hours.

Marking for all student presentations include a 20% peer review grade, as follows:
Presentation mark = 20%*(average of all peer grades) + 80%* instructor's evaluation
Each presentation will be marked according to the following criteria:

1) Talk Organization – properly timing the duration, slides quantity, outline and ease of reading, quality of figures – 30%;
2) Clarity – presentation flow and logic, ease of understanding and following the mathematical content, effectiveness in communicating the main ideas of the talk – 30%;
3) Presenter's understanding of the material as reflected by answering peer and instructor questions – 40%.

The written project will cover the reading the student team has done on the two presentation topics; it will be a maximum of 2 pages long, single spaced, 12 point; it will answer four standard questions related to the model researched by the student team, outlined below: Where is the model used and what are the model assumptions

1) What solution(s) method(s) is (are) employed by the authors

2) What are the main results and their importance
3) How  does the research relate to the course material

The questions are equally weighted in the marking of the project; the projects are marked entirely by the instructor. The marking criteria for the written projects are:

1) Organization and clarity of mathematical and linguistic content – 30%
2) Understanding of the read material as reflected in answering questions 1,2,3 above – 50%
3) Proper use and motivation of bibliographic content (up to 10 papers/books; the bibliographic content is in addition to the 2 pages of the written report) – 20%.

For further grading procedures please refer to:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-grds.shtml

Please note that these policies are binding unless academic consideration is given to an individual student.

**Course Policy on Group Work:**

The course contains 2 in-class presentations organized as follows: the students in class will be randomly paired by instructor in week 3. Teams of 2 students will be formed. Each team will have to organize and present 2 in-class presentations: one in week 6 and one in week 12; each student of the team will do one team presentation, but the team should collaborate on choosing the topic of the presentations, on the making of presentations and on writing the final project.

Students are paired randomly by the instructor, thus having to work with an unplanned environment.

The team is responsible for choosing two topics to present from; the topic in week 6 has to address a biomath model in discrete time; the topic of week 12 has to address a biomath model in continuous time. Examples discussed in class and in homework assignments are excluded; examples taken from journal publications and/or reports or textbooks are welcome.

Deadline for choosing topic 1: End of Week 4
Deadline for choosing topic 2: End of Week 10

Note: in case of an odd number of students in class, one team will have 3 members and 3 presentations accordingly. In the end, all students will have to present once during the course.

Each team member is given the same grade for the written project.

**Course Policy regarding use of electronic devices and recording of lectures**

***Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.***

## Additional Course Information

***Please include any additional course information as required.***

## University Policies

### Academic Accommodation of Religious Obligations

If you are unable to complete a course requirement due to religious obligations, please let the instructor know within the first two weeks of class. See the academic calendar for more information: https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

### Academic Consideration

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 academic calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

### 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:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

**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 the Student Accessibilities Services (SAS) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

**Course Evaluation Information**

Please see http://www.mathstat.uoguelph.ca/files/TeachevaluationformF10.pdf

**Drop date**

The last date to drop one-semester courses, without academic penalty, is ***Friday*, March 11, 2016**. For regulations and procedures for Dropping Courses, see the Academic Calendar: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml