

MATH 6051 – Mathematical Modelling Fall 2015

Department of Mathematics and Statistics, University of Guelph

Instructor: [A. Willms](#), MACN 512, ext. 52736

Office Hours: Mon. 13:00–15:00

Lectures: Tue. & Thu. 8:30–9:50 in ROZH 107

Web Site: University's CourseLink system, <http://www.courselink.uoguelph.ca/>.

Objectives

This course is a broad survey of a number of different kinds of mathematical models of various phenomena in the physical, biological, and social sciences. The main emphasis will be on model building and critical evaluation of assumptions, with a lesser emphasis on analysis techniques. The course will also provide you with practice in communicating mathematics in the two main ways used at conferences: a poster and a short oral presentation.

Topics

Mathematical topics will include: scaling, non-dimensionalization and the Buckingham Pi Theorem, ordinary differential equations, compartmental models, partial differential equations, difference equations, agent-based models, optimization, ...

Application areas will include: mechanics, heat transfer, electrical circuits, population biology, neuronal ion currents, chemical reactions, protein synthesis, infectious diseases, food science, economics, water waves, ...

Evaluation

Assessment	date	weight
3 Assignments	24 Sept., 8 Oct., 5 Nov., 8:30 a.m.	20%
Poster	20 & 22 Oct., 8:30 a.m.	25%
Oral Presentation	17, 19, & 24 Nov., 8:30 a.m.	25%
Take-home Final Exam	Issued 3 Dec. Due 11 Dec., 4:30 p.m.	30%

Poster and Oral Presentation

For both the poster and the oral presentation, you will be required to select a journal article that develops and analyzes a mathematical model of some phenomenon that is *outside* your own research area. You will then need to present this model, including how it is built, its relationship to the phenomenon being modelled, the modelling assumptions employed, and the analysis of the model.

For the poster, you will prepare your presentation on a 3'x4' sheet and will be required to "walk through" your poster with a small audience.

For the oral presentation, you will prepare a 20 minute talk with visual aids (slides) and will be required to present this to the class.

Academic Misconduct

Please consult the Graduate Calendar for the University's [Academic Misconduct Policy](#).

Regarding assignments, you are expected to hand in your own work. You should feel free to discuss *how* to do the problems with other members of the class, but the work you hand in must be your own.

Electronic Recording

Electronic recording of classes is expressly forbidden without the prior consent of the instructor or presenter. 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.