

MATH 2E03 INTRODUCTION TO MODELLING (Fall 2006)

Time & Place:

- Lectures — Tuesday, Wednesday, & Friday, 9:30–10:20 in HH/305
- Computer Labs — Tuesday 11:30–12:20 in BSB/249

Instructor: Dr. Bartosz ProtasOffice HH 326, Ext. 24116, Email: bprotas@mcmaster.ca

Office Hours: 10:30–11:30am Tuesday and Wednesday

Teaching Assistant: Mr. Xiao Hui Li

Office: HH 403, Ext. 24411,

Office Hours: 3:30–4:30pm Tuesday

Course Webpage: <http://www.math.mcmaster.ca/~bprotas/MATH2E03>

Outline of the Course: The course offers an elementary introduction to mathematical modelling in science and engineering. We will use an array of basic mathematical tools, such as

- differential and integral calculus,
- differential equations,
- linear algebra,
- probability,
- geometry,
- numerical analysis

to describe and study various phenomena in the natural sciences. We will do this by developing mathematical models for several problems arising in physics, chemistry, management and the social sciences. The main focus will be on a general philosophy of the modelling process. During the course we will also provide an introduction to software packages that facilitate modelling, such as MATLAB and MAPLE.

Topics: Following a brief review of the background material and an introduction to the software packages MATLAB and MAPLE, we will analyze nine mathematical models described in Chapters 1 through 9 of the textbook. On average, every model will be discussed during three meetings.

Reference: R. Illner, C. S. Bohun, S. McCollum and Th. van Roode, “Mathematical Modelling — a Case Studies Approach”, American Mathematical Society (Student Mathematical Library), (2005)
Supplementary references will be made available by the instructor.

Software: All of the computational examples will be presented using MATLAB and MAPLE. This software is available on computers in the computer lab. Lab hours (see above) are reserved for unsupervised work, however, unless the computer labs are reserved for large-class tutorials, students should be able to work there also outside the allocated time-slots.

Prerequisites: One of MATH 1AA3, 1NN3, 1XX3, ARTS& SCI 1D06 and credit or registration in one of MATH 1B03, 1D03, 1H03, 1H05, 1HH3, or consent of the instructor.

Assignments: There will be four homework assignments, however, only three best ones will count towards the final grade. Depending on the type of the assignment, they will have to be submitted *either* in hard copy to the locker outside HH/105 (in the basement of Hamilton Hall), *or* electronically to the Email address `math2e03@math.mcmaster.ca`. The instructor will announce the required form of submission when each assignment is posted. The assignments will have to be submitted by the due date and no late submission will be accepted. Both the assignments and solutions will be posted on the course webpage.

Tests: There will be two in-class tests on October 13 and November 17. They will last 50 minutes each and will cover analytical issues only (no programming). Only the McMaster standard calculator Casio fx-991 will be allowed during the tests.

Final Exam: The course will be completed by a three-hour final examination. The date and location of the final exam will be announced by the Registrar's office in mid-term.

Marking scheme:

- Final exam (3 hrs) —50%
- Tests (2×50 min) —20%
- Three best homework assignments —30%

The instructor reserves the right to alter the grade in justified cases. In such situations, however, the grade can only be increased.

Excused Absences: Exemptions from the assignments or tests for valid reasons are possible, but must be requested through the office of the Associate Dean of the Faculty that you are registered with. In the event of an exemption, no make up test or assignment will be administered, but your course grade will be re-weighted by increasing the weight of the final examination to compensate for the missed test or assignment.

Senate Policy Statement: The course is regulated by the following documents: *Statement on Academic Ethics* and *Senate Resolutions on Academic Dishonesty*. Any student who infringes one of these resolutions will be treated according to the published policy. In particular, academic dishonesty includes: (1) plagiarism, e.g. the submission of work that is not one's own, (2) improper collaboration in group work on home assignments, (3) copying or using unauthorized aids tests and examinations. It is your responsibility to understand what constitutes academic dishonesty, referring to *Academic Integrity Policy*.