

MAST 331
Mathematical Modelling
Fall 2016

Instructor: Dr. N. Rossokhata, Office: LB 915-1 (SGW), Phone (514) 848-2424, Ext. 3231
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Lectures: Tuesdays and Thursdays, 14:45-16:00, Room H-523 (SGW).

Office Hours: Tuesdays, 16:30-17:30 and Fridays, 10:30–11:30.

Text: *Encounters with Chaos and Fractals*, by John Banks, Valentina Dragan, Arthur Jones, Cambridge University Press, 2003.

Suggested Textbook: *Chaos: A Mathematical Introduction*, by John Banks, Valentina Dragan, Arthur Jones, Cambridge University Press, 2003.

Course Content:

1. Periodic Points, Families of Functions, Bifurcations (Ch. 1).
2. One-Dimensional Chaos, Transitivity, Conjugacy, Cantor Sets (Ch. 2).
3. Two-dimensional Chaos, Dynamics of Linear and Nonlinear Functions, Henon and Horseshoe Maps (Ch. 3).
4. Fractals, Capacity Dimension, Lyapunov Dimension, Julia Sets and Mandelbrot Set, Iterated Function Systems (Ch. 4).
5. Systems of Differential Equations, Linear and Almost Linear Systems, the Pendulum, the Lorenz System (Ch. 5).

Calculators: Only calculators approved by the Department (with a sticker attached as proof of approval) are permitted in the class test and final examination. The preferred calculators are the **Sharp EL 531** and the **Casio FX 300MS**, available at the Concordia Bookstore.

Assignments: Assignments are very important as they indicate the level of difficulty of the problems that students are expected to solve and understand them independently. Students are encouraged to use Maple or other such kind of software to do assignments. Students are expected to submit assignments weekly during the last class of the following week. **Late assignments will not be accepted.** Some questions (but not all) will be marked. Solutions, together with this outline, will be posted electronically on the course's Moodle website, which is accessible through your portal.

Mid-term Test: There will be one mid-term test in week 7-8.
PLEASE NOTE: It is the Department's policy that tests missed for any reason, including illness, cannot be made up.

Final Exam: At the end of course, there will be a 3-hour closed book final examination.
PLEASE NOTE: Students are responsible for finding out the date and time of the final exam once the schedule is posted by the Examination Office. Any conflicts or problems with the scheduling of the final exam must be reported directly to the Examination Office, **not** to your instructor. It is the Department's policy and the Examination Office's policy **that students are to be available until the end of the final exam period. Conflicts due to travel plans will not be accommodated.**

Final Grade: The final grade will be the higher of (a) or (b):
(a) 20% for the assignments, 20% for the midterm test, 60% for the final.
or
(b) 10% for assignments and 90% for the final examination.