Department of Mathematics & Statistics
Concordia University

MAST 331
Mathematical Modeling
Winter 2022

Note: **Unless further university directives, this course will be delivered in person, but the midterm and the final exam will be online. All course material, including announcements, will be posted on Moodle**.

Instructor: Dr. Nataliia Rossokhata

Email: nataliia.rossokhata@concordia.ca
Note: The system does not allow one to reply to emails received from Moodle. If you write, please do so from your own email account.

Lectures: Mondays and Wednesdays, 14:45am–16:00am

Office Hours: Tuesdays, Thursdays: 10:30am – 11:30am

Textbook: ***Encounters with Chaos and Fractals***, by Denny Gulick, 2nd Edition, Chapman & Hall CRC Press, 2012

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

The digital and print version of the textbook will be available at:

https://www.bkstr.com/concordiastore/home

Note: Students should order textbooks as early as possible, especially for print versions in case books are backordered or there are any shipping delays.

Assignments: Assignments are very important as they indicate the level of difficulty of the problems that students are expected to solve and understand independently. Students are expected to submit assignments weekly as a single PDF file on Moodle site. Solutions must be written up carefully, showing all work for full credit. **Late assignments will not be accepted.**

Midterm Test: There will be one midterm test during lecture time in week 7 or 8, covering material of the first 6 weeks of the course. The test will be given **online through the COLE platform with online proctoring.**

PLEASE NOTE: It is the Department policy that tests missed for any reason, including illness, cannot be made up. If you miss a test, the Final Exam will count for 80% of your final grade.

Final Exam: At the end of course, there will be final examination during the period assigned by Concordia's Exam Office. The exam will be given **online through the COLE platform with online proctoring.** It will cover material from the entire course. For more details, see **ADDENDUM** at the end of this Course Outline.

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 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% Assignments, 20% Midterm test, 60% Final Exam.
(b) 20% Assignments, 80% Final Exam.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Calculators: Only calculators approved by the Department are permitted in the midterm test and final examination. The calculators are the **Sharp EL531** and **Casio FX 300MS**, available at the Concordia Bookstore. See for details**:**
http://www.concordia.ca/artsci/math-stats/services.html#calculators

Plagiarism: Cases of plagiarism (including the assignments, the mid-term test and the final exam) will be treated according to the University policy.

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, Dymanics 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)

Academic Integrity and the Academic Code of Conduct
This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: concordia.ca/students/academic-integrity." *[Undergraduate Calendar, Sec 17.10.2]*

Please note that you may not share recordings of your classes and that the instructor will only share class recordings for the purpose of course delivery and development. Any other sharing may be in violation of the law and applicable University policies, and may be subject to penalties.

Behaviour
All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property
Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances
In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.

Addendum:

This course will be taught in person, but final exam will be online. The final online exam will be provided through the Concordia Online Exams (COLE) platform. More information about the COLE system may be found at the COLE website. Additionally, an online proctoring tool called Proctorio will be used to provide proctoring during the exam. This type of proctoring is known as auto-proctoring, as there is no invigilation during the exam. Instead, your professor will review the recording after the exam.

Please note the following with respect to online live proctored exams:

- That the exam will take place during the exam period at the designated date and time set by the professor (midterm) or the Exams office (final). All exam times will be set to Eastern Standard/Daylight Time.

- That Proctorio is used to help uphold academic integrity. Proctorio's Terms of Service may be reviewed at https://proctorio.com/terms. Recordings made and information collected during the exam may be used for this purpose, in accordance with the Academic Code of Conduct.

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- That your image, voice and screen activity, including IP address, may be recorded throughout the duration of the exam.

- That you are required to turn on your webcam and it must be pointed toward your face and workspace at all times during the exam, failing which your exam may be deemed invalid.

- That you must show your Concordia University Identification card to validate your identity. Alternative government-issued photo identification will be accepted, though it is not recommended. Only identification in English or French will be accepted.

- That any recording made will only be viewed by authorized university personnel and personnel authorized pursuant to University policies (no external entity has authorization to review the recording).

- That you will be responsible for ensuring appropriate, properly functioning technology (webcam, a microphone, appropriate browser and an ability to download any necessary software, as well as a reliable internet connection with a minimum of a 3G connection).

- That you are very strongly recommended to enter the virtual test site found at the COLE website and become familiar with the software that will be used for your exam before starting the exam.

- That you will need a quiet place within which to take the exam. Earplugs may also be used to allow you to focus for the duration of the exam. Noise cancelling headphones are not allowed.

Students who are unable to write an exam because they are unable to meet the above conditions and requirements are advised that they will need to drop the course. More information can be provided on the next or alternative offering of this course by consulting the Department. Students are advised that the drop deadline (DNE) for this course is **20, January 2022**.

Students who require additional accommodations for their exams due to a documented disability should contact the Access Centre for Students with Disabilities as soon as possible (acsdinfo@concordia.ca).

If you face issues during the exam, you should inform your professor of those issues immediately. Please note that there are in-exam supports you should spend time getting to know. Visit the COLE website for more information.