Department of Mathematics & Statistics
Concordia University

> **MATH 370**
> Differential Equations
> *Fall 2021*

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The course will be given in person. The last year recorded lectures and last year notes will be posted on Moodle. They not identical to this year lectures, but cover the same material and are fairly similar.

Office Hours: TBA.
I plan to make some of office hours on Zoom.

Prerequisites: MAST 214, 234, 234 or 264 or MATH 251, 252, 264 or equivalent.

Text: *Elementary Differential Equations and Boundary Value Problems*, 11th Edition, by William E. Boyce and Richard C. DiPrima (Wiley).
You can use an older edition as well. The homework problems will be posted on Moodle.

Assignments: **Assignments will be posted on Moodle weekly. The solutions should be submitted electronically on Moodle by the due date.** Assignments are *very important*; they indicate the level of difficulty of the problems that the students are expected to understand and solve. Therefore, every effort should be made to do and understand them *independently*. The assignments will be corrected and a representative sample graded (some problems may be not graded), with solution sets posted weekly. These grades together are worth a maximum of 20%.

Web Resources: Many excellent animated illustrations to the text are collected at the site www.wiley.com/college/boyce. Regular use of this resource is recommended.

Use of Computer Algebra System: It is optional but much recommended to install and use Maple or Mathematica. These computer tools can be used to verify and illustrate any analytical results you get while doing your assignment problems.

Calculators: Electronic communication devices (including cell phones) are not allowed in examination rooms. Only "Faculty Approved Calculators" (**SHARP EL-531** or **CASIO FX-300MS**) are allowed in examination rooms during mid-term and final.

Test: A midterm test covering the first six weeks will be given in week 7 (or later).

Final Grade: The highest of the following:
- 80% final exam and 20% assignments.
- 25% midterm, 20% assignments, and 55% 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.

Approximate schedule of topics

Week	Sections	Topics
1	1.1 – 1.3	Solutions of some differential equations. Classification of differential equations.
2	2.1 – 2.3	Linear equations; integrating factors. Separable equations; Modeling with first order equations.
3	2.4 - 2.6	Linear and Nonlinear equations. Autonomous equations; population dynamics. Exact solutions; integration factors.
4	2.7 – 2.9	Numerical approximations. Existence theorems. First order equations.
5	3.1. – 3.3	Homogeneous equations, constant coefficients. Linear homogeneous equation solutions: Wronskian. Complex roots of characteristic equation.
6	3.4 – 3.6	Repeated roots; reduction of order. Nonhomogeneous equations; undetermined coefficients. Variation of parameters.
7	3.7 – 3.8	Mechanical and electrical vibrations. Forced vibrations.
8	Chaps. 1 – 3 **Midterm**	**Midterm test, closed book** Scope: Chapter. 1 – 3 inclusive.
9	4.1 – 4.2	General theory of nth order linear equations. Homogeneous equations with constant coefficients.
10	4.3 – 4.4	Method of undetermined coefficients. Variation of parameters.
11	5.1 – 5.3	Review of power series, Series solutions at an ordinary point.
12	7.4 – 7.8	Systems of First Order Linear Equations

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]*

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.

Use of Zoom
Note: Zoom is included as an institutionally-approved technology. This means we have been assured of the privacy protections needed to use freely within the classroom)

Zoom will be used in this course to facilitate learning at a distance. It may be used to record some or all of the lectures and/or other activities in this course. If you wish to ensure that your image is not recorded, speak to your instructor as soon as possible.

Also, 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.

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.