

**MAST 330**  
Differential Equations  
*Fall 2018*

**Instructor:** Dr. A. Shnirelman, Office: LB 927-17 (SGW), Phone: (514) 848-2424, Ext. 5222  
Email: [alexander.shnirelman@concordia.ca](mailto:alexander.shnirelman@concordia.ca)

**Text:** *Elementary Differential Equations and Boundary Value Problems*, by W. E. Boyce and R. C. DiPrima, 10th Edition, Willey.

**Assignments:** Assignments are given weekly, and returned the next week. Solutions are posted after the assignments are returned.

**Quizzes:** Quizzes are given weekly.

**Calculators:** Only calculators approved by the Department (with a sticker attached as a proof of approval), such as **Sharp EL 531** or the **Casio FX 300MS**, available at the Concordia Bookstore, are permitted for the class test and final examination. See <https://www.concordia.ca/content/dam/artsci/math-stats/docs/AppCalculatorList.pdf> for a list of Approved and Not-Approved calculators.

**Grading:** The final grade is a maximum of two: either 10% assignments, 30% midterm, and 60% final exam, or 100% final exam. Quizzes may give up to 5% bonus.

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.

The following table gives an approximate idea on the topics covered and their distribution in time.

Week	Topics	Sections
1	Introduction. Example: pressure profile in an isothermal atmosphere. General notion of a first order ODE. Geometric picture, direction field. Simple equations solved by integration.	1.1-1.2
2	First order linear equations; integrating factor. Real life problems: radioactive decay, bacterial growth, capital increase. Approximate solution of linear equations by linearization.	2.1
3	Autonomous equations. Examples: logistic growth, heat explosion.	2.5
4	Separable equations, and equations reduced to the separable ones. Example: pressure profile in a nonisothermal atmosphere.	2.2

5	Exact equations; integrating factor. Existence and uniqueness theorem for ODE.	2.6-2.8
6	Linear homogeneous 2-d order equations; simple, double, and complex roots. Linear independence, Wronskian.	3.1-3.4
7	Nonhomogeneous equations; undefined coefficients, variation of parameters.	3.5-3.6
8	Mechanical and electric vibrations. Forced oscillations, resonance and beats.	3.7-3.8
9	Midterm test. General theory of $n$ -th order linear equations. Homogeneous equations with constant coefficients.	4.1-4.2
10	Method of undetermined coefficients, variation of parameters.	4.3-4.4
11	Systems of linear equations. Homogeneous systems with constant coefficients. Eigenvectors and eigenvalues. Simple, multiple, and complex eigenvalues. Classification of linear systems in the plane.	7.1-7.6
12	Nonhomogeneous systems; variation of parameters.	7.7-7.9
13	Power series solution of 2-d order equations	5.1-5.3

**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](http://concordia.ca/students/academic-integrity)." [Undergraduate Calendar, Sec 17.10.2]