Department of Mathematics & Statistics
Concordia University

MATH 473 (MAST 666/MAST 841), Sec. A

Partial Differential Equations

Winter 2020

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

Prerequisites: **MATH 264/265** or an equivalent multivariable calculus course.
MAST 330 or an equivalent course in ordinary differential equations.

Recommended Textbooks: Lawrence C. Evans, *Partial Differential Equations*; written notes put online.

Assignments: Assignments are *very important* as they indicate the level of difficulty of the problems that the students are expected to solve and understand. Therefore, every effort should be made to do and understand them *independently*. The assignments will be corrected and graded, with solution sets posted weekly. These grades together are worth a maximum of 20%.

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.

Final Grade: The highest of the following:

- 100% final exam.
- 20% assignments, and 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.

	Topics
1	Linear and quasilinear 1-st order equations. Transport equation. Shock waves and rarefactions.
2	D'Alembert solution to the one-dimensional wave equation. Infinite, semi-infinite and finite string.
3	Separation of variables, Fourier method for the 1-d wave equation.
4	Solution of the wave equation in 2-d and 3-d. Duhamel formula. Energy method, finite speed of propagation.
5	Laplace and Poisson equations in 2-d and 3-d. Green's formula. Hydrodynamical interpretation.

6	Properties of harmonic functions. Maximum principle, mean value theorem, Liouville and Harnack's theorems.
7	Dirichlet's and Neumann's problems for the Laplace equation. Variational method.
8	Heat equation. Solution in the whole space. Energy method for the proof of existence and uniqueness of solution.

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]*