McGill University
Department of Mathematics and Statistics
MATH 271 Linear Algebra and PDEs
Fall 2024

Instructor: Prof. Charles Roth
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Prerequisites
MATH263 and MATH264

Refrences:

1. Detailed Complete Notes Online

2. MATH271 Course Pack

3. Fourier Analysis, M. Spiegel (Schaum's)

4. Advanced Engineering Mathematics by D.G. Zill and M.R. Cullen

Delivery: In person.
Lectures: Tuesday and Thursday 10:05 am - 11:25 am MDHAR G-10.
Tutorials: Monday 2:35 pm - 3:25 pm LEA 14
Monday 10:35 am - 11:25 am BURN 1B39
Monday 9:35 am - 10:25 am BURN 1B39
Students are very strongly urged to attend tutorials regularly. The purpose of the tutorials are to:

1. Answer questions about the course.

2. Review materials from MATH263 and MATH264 whenever necessary.

3. Expose the students to additional problems solved by the tutors with emphasis on applications, whenever possible.

Course Outline:

1. Partial Differential Equations
The derivations of the fundamental partial differential equations governing engineering systems: fluidflow, diffusion of heat and steady state temperature distribution, electromagnetic theory and vibrations.Poisson (Laplace), Diffusion, Wave equations, Boundary conditions, uniqueness of solutions, solutionsof boundary value problems using Fourier series

2. Linear Algebra
Vector spaces, inner product spaces, eigenvalues and eigenvectors, Hermitian operators, Fourier expansions

3. Sturm-Liouville Theory
Applications and solutions of boundary value problems in spherical and cylindrical coordinates, Legendrepolynomials and Bessel functions, generalizatio

4. Linear Systems of Ordinary Differential and Difference Equations
   Solutions by eigenvalues and eigenvectors, as well as by diagonalization. Cayley-Hamilton theorem,functions of matrices,e^{AT}. The exponential matrix method, solution by elimination. Applicationsparticularly to systems of vibrating mass

The department **HelpDesk** is also available to you. Schedules and more information will follow.
Term Exam
   Date, time and place to be announced. Please note that both the term and final exams will be based extensively on the assignments with appropriate modifications.

Grading Scheme

- Term Exam: 40% or 30%

- Final Exam: 60% or 70%

Whichever yields the higher mark Dates and times to be announced. Please note that the term exam and final exam will be based extensively on the assignments, with appropriate modifications. **Assignemtns taken from the Course Pack:**

1. Set 1: 1,2,3,4,19,11,14, and 17

2. Set 2: 13-19

3. Set 3: 1-6, 10-13

4. Sets 4 and 5: All, including the additional examples in Appendix 3.

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism, and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see http://www.mcgill.ca/integrity for more information).

Right to submit in English or French

   In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.
   In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject of change.