

**MATH-3111-FA PARTIAL DIFFERENTIAL EQUATIONS I**  
**MATH-3131-FA METHODS MATH PHYSICS I**  
**FALL 2023**

**Instructor:** Prof. Xin Yang LU

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**Classes:** MW 5.30-7pm.

**Office Hours:** W 4-5.30pm in RB2015. Please schedule via email. Zoom option available.

DESCRIPTION

- **Textbook:** *Mathematical Methods for Physics and Engineering*, 3rd edition by Riley, Hobson, and Bence. Recommended but not required.

We will cover the following topics:

- Recalling preliminary notions: vector spaces, inner products, norms, matrices, linear applications, change of basis, Gram-Schmidt process, Complex numbers.
  - Fourier transform.
  - Using Fourier transform to solve ODEs/PDEs.
  - Laplace transform.
  - Using Laplace transform to solve ODEs/PDEs.
  - Banach and Hilbert spaces.
  - Differential operators.
  - Eigenvalues/Eigenfunctions.
  - Sturm-Liouville equations.
  - Fundamental solutions and Superposition principle.
  - Legendre/Associated Legendre equations.
  - Spherical harmonics.
  - Chebyshev equation.
  - Bessel equation.
  - Laguerre/Associated Laguerre equations.
  - Hermite equation.
- **Assignments:** 2 assignments during the semester, each one counting for 20% of the final grade. You will have 1 week to do each assignment.
  - **Final Exam:** There will be a formal 3 hours final exam which will count for 60% of the final grade. There will be *NO* 100% final option.
  - **Policies:**
    - Important announcements will be made through D2L to registered students via D2L. You are responsible for reading the info posted on D2L.
    - I attempt to reply to e-mail in a timely fashion, but do not expect immediate responses.
  - **Academic Dishonesty:** All cases of academic dishonesty will be dealt with according to the university's Code of Student Behavior and Disciplinary Procedures, copies of which are available from the university's web-site.
  - **Accommodations:** Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please visit: <http://studentaccessibility.lakeheadu.ca>