

MATH-4211 GENERAL RELATIVITY I
FALL 2024

Instructor: Prof. Xin Yang LU

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Classes: reading course

Office Hours: MW 4.30-5.30 in RB2015, or by appointment via email. Delivery either in person, or via Zoom. If you come in person, please confirm by email first.

DESCRIPTION

- **Textbook:** Spacetime and Geometry: An introduction to general relativity, by S. Carroll. (Cost: 90 dollars - prices are subject to market fluctuations). Any version, or second hand copy, would work.
- **Content:**
 - Space and time.
 - Lorenz transformations.
 - Vectors and dual vectors.
 - Tensors.
 - Maxwell's equations.
 - Energy and momentum.
 - Classic field theory.
 - Gravity as geometry.
 - Manifolds, vector and tensors thereon.
 - Metrics.
 - Differential forms.
 - Integration.
 - Covariant derivatives.
 - Parallel transport and geodesics.
 - Properties of geodesics
 - The expanding universe.
 - The Riemann curvature tensor.
 - Symmetries and killing vectors.
 - Maximally symmetric spaces.
 - Geodesic deviations.
- **Midterm:** 1 midterm exam counting for 35% of the final grade.
- **Final Exam:** There will be a final exam which will count for 65% of the final grade. There will be *NO* 100% final option.
- **Policies:**
 - Important announcements will be made through MyCourseLink to registered students via MyCourseLink. You are responsible for reading the info posted on MyCourseLink.
 - I attempt to reply to e-mail in a timely fashion, but do not expect immediate responses. In all email you send me make sure to add MATH5110 in the subject line.

- **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>