

**Syllabus**  
**General Relativity I**  
**Physics 6553 / Astro 6509 --- Fall 2022**

**Professor:**

Tom Hartman

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Office: PSB 434

Office hours: Tuesday, 4:15-5:15pm

**Grader:**

TBA

**Lectures:** T-Th 1:00-2:15pm in Rockefeller 103

**Website:** see [canvas.cornell.edu](https://canvas.cornell.edu)

This course is an introduction to the theory of general relativity. We will cover physical motivation, differential geometry, geodesic motion on curved manifolds, the Einstein equations, and experimental tests of general relativity; and discuss applications to black holes, gravitational waves, and cosmology.

No prior experience with general relativity or differential geometry is assumed. Graduate-level knowledge of Lagrangian mechanics and electromagnetism is required (or can be taken concurrently). Undergraduates should discuss with the instructor before taking this course.

**Main textbook**

*Spacetime and Geometry: An Introduction to General Relativity* by Carroll (any edition)

**Other useful texts**

Introductory/physical: *Gravity: An Introduction to Einstein's General Relativity*, by Hartle

Advanced/mathematical: *General Relativity* by Wald

**Policies**

- Grades will be based on problem sets (around 60%) and a final exam (around 40%)
- Problem sets every 1-2 weeks will be posted on the course website. Turn them in at the homework box near the physics department office.
- You are encouraged to work together on solving the homework problems, but write up the solutions yourself. List your collaborators at the top.

- Use of Mathematica (or similar) is encouraged. However, in this course, don't use any specially designed General Relativity packages to do things like calculate curvature tensors, etc; write the code yourself!
- One late homework (up to 7 days late) is OK, no questions asked and no prior permission needed. Beyond that (more than one, or more than one week late), late homeworks receive 50% credit.