Instructor: Howard Haber
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REQUIRED TEXTBOOK:

Relativity, Gravitation and Cosmology, by Robert J. A. Lambourne

Recommended Outside Reading:

Concerning tests of general relativity

Was Einstein Right?, by Clifford M. Will

Clifford M. Will, "The confrontation between general relativity and experiment," *Living Rev. Relativity* **17**, (2014), 4 [arXiv:1403.7377 [gr-qc]]

Other introductory texts:

Relativity, Gravitation and Cosmology—A Basic Introduction, by Ta-Pei Cheng

Gravity: An Introduction to Einstein's General Relativity, by James B. Hartle

General Relativity, by I.R. Kenyon

More advanced texts:

An Introduction to General Relativity, Spacetime and Geometry, by Sean M. Carroll

Introducing Einstein's Relativity, by Ray D'Inverno

Gravitation and Spacetime, by Hans C. Ohanian and Remo Ruffini

Gravitation, by Charles W. Misner, Kip S. Thorne and John Archibald Wheeler

Introduction to General Relativity, by Lewis Ryder

Gravitation and Cosmology, by Steven Weinberg

Einstein Gravity in a Nutshell, by Anthony Zee

Fall 2014 Course Outline

Topic	Reading
1. Introduction to Tensors	Chapter 10 of Boas
2. Covariance of Physical Laws	Chapter 2.1
3. Special Relativity	Chapters 1 and 2
4. The Equivalence Principle	Chapter 4.1.1
5. Space and Spacetime Curvature	Chapter 3
6. Tensors in Curved Spacetime	Chapter 4.1.2
7. The Geodesic equation	Chapter 3.3
8. Einstein's Field Equations	Chapters 4.1.3, 4.2 and 4.3
9. Schwarzschild Spacetime	Chapter 5
10. Black Holes	Chapter 6
11. Testing General Relativity	Chapters 7.1–7.3
12. Gravitational Radiation	Chapter 7.4
13. Relativistic Cosmology	Chapter 8

The readings above refer to the textbook by Lambourne unless otherwise noted. For an introduction to tensors, please review Chapter 10 of Mary L. Boas, *Mathematical Methods in the Physical Sciences*, 3rd Edition (John Wiley & Sons, Inc., Hoboken, NJ, 2006).

Course Requirements

The basic course requirements consist of regular problem sets (40%), a take-home midterm exam (25%) and an in-class (open book/open notes) final exam (35%) [percentage of the course grade indicated in parentheses]. Prerequisites for the course are: Physics 116A and B, 105 and 110A and B or equivalent. No prior knowledge of differential geometry is required.