Fall 2015 Course Outline

Topic	Reading
1. Introduction to Tensors	Chapter 10 of Boas
2. Covariance of Physical Laws	Chapters 1.1 and 2.1
3. Special Relativity	Chapters 2, 3 and 12
4. The Equivalence Principle	Chapter 4
5. Space and Spacetime Curvature	Chapter 5
6. Tensors in Curved Spacetime	Chapter 13
7. A Geometric Theory of Gravity	Chapter 6
8. Einstein's Field Equations	Chapters 14.1 and 14.2
9. Schwarzschild Spacetime	Chapters 7.1 and 14.3
10. Testing General Relativity	Chapters 7.2 and 7.3
11. Black Holes	Chapter 8
12. Relativistic Cosmology	Chapters 9 and 14.4
13. The Early Universe	Chapters 10 and 11
14. Gravitational Radiation	Chapter 15

The readings above refer to the textbook, *Relativity, Gravitation and Cosmology: A Basic Introduction* (2nd edition), by Ta-Pei Cheng unless otherwise noted. Some of the topics from Chapters 10, 11 and 15 will be covered, if time permits.

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.