Physics 471

Introduction to Relativity and Cosmology
Fall Semester 2010

Room:	Seaver Hall 109
Time:	**MW 3:00 - 4:15 PM**
Instructor:	Dr. Gabriele Varieschi
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Office hours:	T 4:00-5:30 pm; F 11:00-12:30 am; and by appointment.

Required Text: **James B. Hartle – Gravity, An Introduction to Einstein's General Relativity – Addison Wesley – ISBN 0-8053-8662-9**

Other useful books: B. Ryden – Introduction to Cosmology, Addison Wesley (another introduction to cosmology at undergraduate level)

(not required) S. Weinberg – Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity – Wiley (1972) (a leading graduate level textbook)
S. Weinberg – Cosmology – Oxford University Press (2008) (an advanced graduate level textbook of recent publication)

Objectives and Topics: We will cover several chapters of the book in the following order:
Part I - Newtonian physics and special relativity: inertial frames and Galilean principle of relativity; Einstein's principles of special relativity; relativistic kinematics and dynamics.
Part II – Curved space-time and general relativity: the equivalence principle; metric and geodesic equation; curvature and Einstein equations; Schwarzschild solution and black holes.
Part III – Cosmology: the expanding universe; cosmological models; alternative theories of gravity.
Prerequisite or concurrent enrollment: PHYS 301, or PHYS 321, or PHYS 361.

Learning Outcomes: Understand the foundations of the relativity problem within the framework of classical Newtonian mechanics. Conceptually understand Einstein's revolutionary ideas which led him to formulate the theory of special relativity in 1905, followed later by the general gravitational theory. Be able to solve problems of increasing complexity dealing with the applications of these ideas to physics. Understand how Einstein's theory of gravitation can also be the basis of our current cosmological models: the standard model (Big Bang) and possible alternative models.

Tests: There will be two tests during the semester. They will all count toward your final grade, so please try not to miss any of them.

Test Dates: TBA

Final Exam: Wednesday, Dec 15, 2:00-4:00 pm, Seaver 109.
The final exam is cumulative and is equivalent to 2 tests.

Homework:	Homework assignments will be given, typically one for each chapter of the book. Problem sets will be collected, graded, and will count toward the final grade. Solutions to the problems will be reviewed in class, with student participation.

Grading:

Class Attendance & Participation	10 %
Homework	18 %
Test 1	18 %
Test 2	18 %
Final Exam	36 %

Test Grading (approx.): <50%=F; 50-54%=D; 55-69%=C range; 70-84=B range; >84=A range.

Academic Honesty: Academic dishonesty will be treated as an extremely serious matter, with serious consequences that can range from receiving no credit for assignments/tests to expulsion. It is never permissible to turn in any work that has been copied from another student or copied from a source without properly acknowledging the source. It is your responsibility to make sure that your work meets the standard of academic honesty set forth in the "LMU Honor Code and Process" in the Undergraduate Bulletin 2008-2010.

Syllabus changes: If necessary, this syllabus and its contents are subject to revision; students are responsible for any changes or modifications announced in class.

Have a good semester. Good luck !