Syllabus

Instructor

Name : Craig Blocker  
E-Mail : blocker@brandeis.edu  
Office : Room 323, Physics building  
Phone : 781-736-2879  
Office Hours : M, W, Th 10 – 11 am and 12 – 1 pm

In addition to these office hours, you are welcome to come to my office any time I am in, or you can make an appointment by phoning or emailing me.

Course Overview

This course covers the General Theory of Relativity. We will study physics in curved space-time, how matter and energy curve space-time, and various astrophysical and cosmological tests and applications.

Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, homework, discussion sections, preparation for exams, etc.).

Latte

I will use Latte to post everything for this course. This includes reading assignments, homework assignments, solutions to assignments, scores on assignments and exams, and extra material.

Grading

Your grade will be based on homework scores, a midterm exam, and a final. I will calculate a weighted score for the course (50% for homework and 25% for each exam) and assign
grades based on your score. I will nominally aim for a class grade point average that is in keeping with average university grades, that is, around a 3.15 to 3.2. If I think the class did better or worse than expected, I will adjust the GPA.

As you can see from the weights, I think homework is important. I strongly encourage you to work with your fellow students on problem sets, keeping in mind that you must understand things for yourself. Since I expect students to work together, I expect to get similar solutions to problems, but you must write up your solutions yourself, that is, no photocopying or direct copying of someone else’s work.

Each homework assignment will have a due date, usually a week after it is given out. Homework will be considered late if I receive it after the solutions are posted, which could be any time after 5:00 pm on the due date. Late homework will be graded and will receive 50% of score it otherwise would have received. You may turn in partial homework sets. Thus, if there is a problem that you just can’t get, you can turn in everything else on time and then turn in the troublesome problem after viewing the solutions. As with working with your fellow students, you must write your solutions, that is, read and understand the solution and then write it in your own way. If you are having difficulty with a problem, you should talk to your classmates, the teaching assistant, and/or me.

As with most physics classes, the material is very cumulative, that is, understanding the later material requires you to understand and retain the earlier material. Thus, I very strongly recommend that you DO NOT fall behind in your work in this course.

The midterm will during the scheduled class time on Thursday, Oct. 20, and the final will be during the final exam period (see schedule below). The exams will be closed book and closed notes. However, for each exam, you may bring one 8\(\frac{1}{2}\) × 11 sheet of paper with anything written on it you like (both sides). Calculators may be used on exams for arithmetic calculations. No electronic devices may be used during the exams, including cell phones, MP3 players, and computers.

Text

The required text for this course is *Gravity – An Introduction to Einstein’s General Relativity*, James B. Hartle, Addison Wesley, ISBN 0-8053-8662-9. We will cover about three quarters of the book, although I haven’t decided on the final set of topics or order.

I also recommend the mathematical physics book *Mathematical Methods in the Physical Sciences* (3rd edition), Mary L. Boas, John Wiley & Sons, Inc., ISBN 978-0-471-19826-0. It is a valuable resource for many areas of math useful to physicists, including several that we will learn about in this course. Several recent physics graduates have said that it is a very helpful reference to have.
Math

The mathematics of general relativity is differential geometry. I assume you have not studied this, and we will cover the needed ideas in class. I do assume you are very fluent in differential and integral calculus.

Schedule

This class meets M, W, Th 11:00 to 11:50 am. The exceptions to the usual class meeting times are

- Sep. 5, no class (Labor Day)
- Oct. 3, no class (Rosh Hashanah)
- Oct. 12, no class (Yom Kippur)
- Oct. 17, no class (Sukkot)
- Oct. 25, class (Brandeis Monday)
- Oct. 24, no class (Shmini Atzeret)
- Nov. 23-24, no classes (Thanksgiving)

The midterm will be Thursday, Oct. 20. The final will be a three hour exam during the regularly scheduled time for this block (Block D) during the final exam period. Tentatively, this is Thurs., Dec. 15, 9:15 to 12:15 am.

Documented Disabilities

If you have a documented disability with an appropriate accommodation for this course, please give me documentation as soon as possible.