Astronomy 688m: High Energy Astrophysics

Instructor:

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Class web page: http://www.astro.umd.edu/∼miller/teaching/astr688m

Schedule:

Lectures on Wednesday and Friday from 12:30 to 1:45, CSS 0201.

Textbooks:

Required: *High Energy Astrophysics* by Longair.
Recommended: *Black Holes, White Dwarfs, and Neutron Stars* by Shapiro and Teukolsky, and *Gravitation* by Misner, Thorne, and Wheeler.

Course Grading

Homework	25%
Midterm Exam	25%
Final Exam	35%
Individual Project	10%
Class Participation	5%

Feel free to discuss homework with other students, but you must work out and write up the solutions yourself. I will grade each problem (in the homework and in the exams) on a four-point scale. One point is awarded if you demonstrate understanding of the physical issues associated with the problem. One point is awarded if you use the correct equations. Two points are awarded for correct solution of the equations. If you come up with an answer that is obviously incorrect (e.g., a velocity 1000 times the speed of light!), but correctly say why it is incorrect and approximately what the right answer is, you will get one of those possible two points. For some of the problems (which will be marked clearly), to get full credit you will need to not only get the right answer, but show that your answer has the correct limits, symmetry, etc. as dictated by the problem. The midterm and final will both be in-class, and we can negotiate whether they are open-book or closed-book.

Homework will be assigned approximately every two weeks (or less, for short assignments), on Wednesdays. The homework will be due at the beginning of class one or two Wednesdays later, and I will return the graded homework to you by the following Wednesday. The reason I want you to turn in your homework at the beginning of class is so that you can absorb the content of that lecture instead of worrying about the problems! I will therefore enforce this policy strictly, and will take off points for, e.g., homework turned in at the end of class.

The individual project will be a report on one current topic in high energy astrophysics. I'll want you to have selected the topic you'll discuss by the week after the midterm, so that we can talk about it and make sure it's a good project. The report will be both a written report (4-5 pages in double-spaced 12pt format) and an oral report, which will be given in class at the end of the semester. For this project you will be graded on both content and presentation in the oral and written reports. Class participation will be determined by attendance and by participation during classes; I will ask many questions during class, and while I don't expect you to get the "right" answer every time I do want you to try.

Letter Grades

I will guarantee that you will receive no worse than the following letter grades for a given percentage of the total available points:

85%–100%	A
70%–85%	B
55%–70%	C
40%–55%	D

I may grade on a curve if the class average is significantly lower than suggested by the table.

Late Policy and Make-Up Policy

Partial credit for late homework assignments may be given if you give me a valid reason by the Friday before the assignment is due. No credit will be given for homework turned in more than a week after the due date (i.e., after the end of class the following Wednesday). If you cannot make the midterm or the final exam, then we can arrange a different time if you tell me at least a week before the exam (to be fair to other students, the alternate time should be before the scheduled time).

Tentative Course Outline

August 30: Overview and administrative matters.
September 1–13: Particles, their interaction, and detection.
September 15–27: General relativity.
September 29–October 11: Black holes.
October 13: Midterm.
October 18: Frontiers: observational signatures of strong gravity.
October 20–November 1: Neutron stars.
November 3: Frontiers: magnetars.
November 8–10: Clusters of galaxies.
November 15: Frontiers: cooling flows.
November 17: Cosmic rays.
November 22: Fontiers: ultra-high energy cosmic rays.
November 24: Thanksgiving break.
November 29: Frontiers: gamma-ray bursts.
December 1-6: Presentation of projects.
December 8: Recap and discussion of unclear issues.
December 20: Final exam (date can be changed).