Astronomy 422: Cosmology

Instructor:

Professor: Cole Miller, CSS 1239, (301) 405-1037, miller at astro.umd.edu

Office hours: Wednesday and Friday, 2:00 to 3:00 PM or by appointment.

Class web page: http://www.astro.umd.edu/∼miller/teaching/astr422

I will post lecture notes a few days before each class, and assume you have read them before the actual lecture.

Schedule:

Lectures on Wednesday and Friday from 12:30 to 1:45, CSS 2428.

Textbooks:

Required: *An Introduction to Modern Cosmology* by Andrew Liddle.

Course Grading

Homework	25%
Midterm Exam	30%
Final Exam	40%
Class Participation	5%

Feel free to discuss homework with other students, but you must work out and write up the solutions yourself. Each problem in the homework and in the exams will be graded on a four-point scale. Approximately half of the credit will be for demonstrated understanding of the physical issues and/or equations associated with each problem, and half for correct solution of the problems. 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 partial credit. For some of the problems (which will be marked clearly), to get full credit you will also need to 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. The final exam will be cumulative.

Homework will be assigned approximately every two weeks (or less, for short assignments), on Fridays. The homework will be due at the beginning of class one or two Fridays later, and I will return the solutions and 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.

Class participation will be determined by attendance and by participation during classes; I will ask many questions during class, and although 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. There will be no extra credit.

Late Policy and Make-Up Policy

Partial credit for late homework assignments may be given if you give me a valid reason by the Wednesday before the assignment is due. No credit will be given for homework turned in after the beginning of the following class on Wednesday, because solutions and graded homeworks will be handed out then. 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

Aug 29: Overview, astrophysical problem solving.
Aug 31– Sep 5: Simple observations (Liddle ch. 2).
Sep 7–12: Radiation and Newtonian gravity (Liddle ch. 3).
Sep 14: Homework #1 due
Sep 14–19: Geometry and general relativity (Liddle ch. 4).
Sep 21–26: Simple models and distances (Liddle ch. 5).
Sep 28: Homework #2 due
Sep 28–Oct 3: Observations old and new (Liddle ch. 6).
Oct 5–10: The cosmological constant (Liddle ch. 7).
Oct 12: Homework #3 due
Oct 12–17: The age of the universe (Liddle ch. 8).
Oct 19: Midterm.
Oct 24–31: Dark matter and structure (Liddle ch. 9).
Nov 2: Homework #4 due
Nov 2–7: The cosmic microwave background (Liddle ch. 10).
Nov 9–14: The early universe (Liddle ch. 11)
Nov 16: Homework #5 due
Nov 16: Black holes and galaxy formation.
Nov 21: Nucleosynthesis part 1 (Liddle ch. 12)
Nov 23: No class: Thanksgiving.
Nov 28: Nucleosynthesis part 2 (Liddle ch. 12).
Nov 30–Dec 5: Inflation (Liddle ch 13).
Dec 7: Summary and class-driven questions
TBD: Final exam.