

Astronomy 5682 Review Guide for Final Exam

The final exam will be Tuesday, April 30, 2:00 - 3:45, in our usual classroom.

I will be available to answer questions on Monday, April 29, 3-5 pm. Try my office, 4041 McPherson, but if there are more than a couple of students we will move down to the conference room, 4030 McPherson. I encourage you to come at 3:00 if possible, so that you can learn from each others' questions. If you are not available during that time interval, you can make an appointment by email.

You may bring the page of handwritten notes that you brought to the midterm and an *additional* page (both sides) of handwritten notes, and a calculator.

The exam will focus on material that has come up in the second half of the course, beginning with §5 of the course notes. However, this material builds on the first part of the course, and you should certainly be familiar with the FRW metric, the Friedmann equation, and their uses. You should also re-read §1 of the course notes carefully — this time through, you should have a good understanding of what everything means.

Two important themes of the final exam will be: (a) the history of the universe, and (b) the empirical basis of the standard big bang model and the “inflation + Λ CDM” model. On the first theme, you should pay particular attention to the physics of big bang nucleosynthesis, the cosmic microwave background, the transition from a radiation-dominated universe to a matter-dominated universe to a Λ -dominated universe, and the inflation epoch.

On the second theme, pay particular attention to how big bang nucleosynthesis and the CMB provide evidence for a hot early universe, to how we use standard candles and standard rulers to measure the expansion rate and expansion history of the universe, to the information encoded in cosmic microwave background anisotropy, and to empirical evidence for dark matter and dark energy.

The most useful things to review are the lecture notes and the solutions to the problem sets, including, from the first half of the course, Problem Set 2 on dark matter and Problem Set 4 on solutions to the Friedmann equation. Make sure you understand my solution sets, regardless of how you did on the assignment. I also strongly recommend looking at the online lecture notes in addition to your own notes from class.

When writing down equations for your notes, pay attention to the *physical interpretation* of each equation: what principles does it represent, what are the quantities that enter, what are their units, and how can the equation be used? Remember to include the “useful form” of the Friedmann equation from §9, p. 2, and the formula for the comoving distance from §9, p. 3.

The exam will include a mix of qualitative questions and problems to solve.

The back side of this handout contains a student evaluation questionnaire, which you should complete during your review for the final. Please ALSO complete the SEI checklist evaluation online. However, I prefer that you use this freeform evaluation rather than submit comments via SEI.

Student Evaluation: A5682, Spring 2013

Please set aside 20 minutes during your review for the final to write this evaluation, and bring it with you to the final. Ideally you should do this towards the end of your review, since that will already have given you a chance to reflect on the course. Writing the evaluation may itself be a helpful part of your review. If you don't bring the evaluation to the final, I will ask you to complete it as soon as you are done with the exam so that I collect them all by the end.

Tell me anything you would like to tell me about the course. I am interested in knowing what aspects of the lectures, assignments, notes, and readings you found most useful and/or problematic. You could also comment on what aspects of the material you found most useful or interesting, what material you think we spent too much time on, and what material you think we should have spent more time on (or should have covered but didn't). I would also like to hear any suggestions you have for ways that I could improve the course when I teach it next time.

You are welcome to type your evaluation to help keep it strictly anonymous. You can use this sheet or a different sheet. I will not read any evaluations until I have assigned course grades.