Astronomy 142: Student Evaluation

Your feedback on Astronomy 142 will be valuable in helping to shape the way the course is taught next time. Thinking over the content of the course and evaluating its strong and weak points is also valuable as part of reviewing for the final exam. I therefore request that you set aside 20 minutes during your review for the final to complete this evaluation. Please bring it with you to the final, where I will have an envelope for collecting them. Your evaluation should be anonymous, and you may write it or type it as you prefer. I will not read any evaluations until after I have completed grading the course.

For your evaluation, please tell me anything you wish about what aspects of the course you liked and what aspects could be improved. I list some questions below to prompt your thinking. *Please write or type your evaluation on a separate sheet.*

1. What material did you find most valuable? What did we spend too much time on? What do you wish we had spent more time on?

2. What aspects of the lectures were most valuable? What aspects could be improved? Would a different balance between blackboard and Power Point be more effective?

3. Did you find the book a useful part of the course? Was the intersection between the book, the lectures, and the assignments adequate? Were the supplementary materials (course notes, other handouts, web page) valuable/sufficient?

4. Were the homework assignments useful for learning the course material and teaching you new things? What would make them better?

5. Any comments on the exams?

For your reference, I have attached on the back side of this evaluation the learning objectives for GEC courses in the Natural Sciences and the specific learning objectives that I identified for this course when I first proposed it. Feel free to comment on the degree to which the course did or did not achieve these objectives.

If you enjoyed the course, please encourage other students to take it! I hope that it will be taught once or twice per year going forward. It will probably have a different instructor next year, but I will probably teach it again in two years. If you are interested in taking another astronomy course, I am happy to give you advice. Options include special topic courses on Life In the Universe (A141) and Cosmology (A143) and the general lecture or (better) honors sections of Astronomy 161 or 162.

Learning Objectives for Natural Sciences GEC Courses

The general learning objectives for GEC courses in the Natural Sciences are:

1. To understand the basic principles and central facts of the physical and biological sciences, and their interrelationships.

2. To understand when, where, and how the most important principles and facts were discovered, thus understanding the key events in the history of science both as events in human history and as case studies in the methods of science.

3. To understand the interaction between science and technology.

4. To understand the social and philosopical implications of major scientific discoveries.

The specific learning objectives of *Astronomy 294A: Black Holes* are:

• Qualitative physical understanding of Newton's and Einstein's theories of gravity, space, and time, the similarities and differences between them, and the senses in which Einstein's theory has superseded Newton's.

• Understanding of how Einstein's theory leads to the prediction of black holes and of the properties it predicts black holes to have.

• Understanding of the interplay between gravity, pressure, and nuclear energy generation in governing the life cycle of stars, and of how and why the deaths of massive stars are expected to lead to the formation of black holes.

• Understanding of how astronomers discovered the first empirical evidence for black holes and of how they have set out to demonstrate the existence of black holes as conclusively as possible.

• Understanding of why supermassive black holes are thought to be the central engines of quasars, the most luminous objects in the cosmos, and of the observational methods that are used to study quasars and the dormant black holes they have left behind in the centers of galaxies.

• Understanding of the ways that advanced space missions currently under development might lead to deeper understanding of black holes, by measuring X-rays from gas falling towards the event horizon and by measuring gravity waves — propagating ripples in spacetime — produced by colliding black holes at the far edge of the universe.