

# FRONTIERS IN ASTRONOMY — AST 25

## COURSE SYLLABUS

**Description:** Three unit lecture course. A study of new solar system hypotheses, relativity and warped spacetime, black holes, dark matter, dark energy, quasars, gravitational waves, grand unified and supersymmetry theories, particle physics, string theory, and other recent developments in cosmology (Prerequisites: Astronomy 5, 10, or equivalent.)

**Meeting times:** M/W from 12:30 PM to 1:50 PM; Sewell Hall (Planetarium, S202).

**Textbook:** Any basic astronomy textbook no more than 5 years old (recommended). Readings from other hardcopy and electronic sources will be assigned during the semester.

**Other materials** SC001 and SC002 star charts.

**Instructor:** Prof. Barry Rice  
916-660-7942; x7942; brice@sierracollege.edu

**Office:** V322B

**Office/hours:** Office hours are announced in class; other visits are by appointment.

### Drops, Adds, and Attendance

If the class enrollment is filled, students that miss the first day of class are at peril of being dropped. I may or may not drop students who stop attending class—see the Sierra College catalog for the definition of excessive absences.

It is your responsibility to add or drop classes. Check your *Schedule of Classes* for the drop date deadline.

### My Expectations

All students are expected to give their best effort in class participation and in accomplishing assigned tasks. We will be discussing complex theoretical ideas, many with powerful scientific, philosophical, and even religious implications. Even though these discussions may become challenging, I expect students will be respectful of diverse opinions and perspectives.

### Your Expectations

You can expect me to lead you through a review of many interesting new developments in astronomy and related physics. We will ground our discussion with a review of some basic astronomy and physics, but will then move to much more complex theoretical topics. What is the past and future of our Universe? What is dark matter? Is the Universe populated with Higgs particles? Can string theory explain our observations? What is dark energy, and is it explained by such exotic theories as vacuum energy?

This course is very young, and your suggestions as to topics can help guide it. I have allocated time at the semester's end to address subjects you would like to learn about.

If you are experiencing severe difficulty with me as an instructor, and are unable to reconcile the situation with me, bring your concerns to the attention of the Science and Math Division Dean.

### Student Safety

All students should be aware of the proper procedures under emergency conditions in the classroom or building. This awareness includes how and where to meet during an evacuation, and location and use of the building first aid kit, fire extinguishers, and phones. These procedures will be reviewed during the first day of class.

## Astronomy Department Web Support

As the semester progresses I will post class materials such as lecture notes, class handouts, and other materials at <http://astronomy.sierracollege.edu/Courses/Astronomy25/Astronomy25.htm>. Please check your assignment scores for accuracy; report any errors to me.

### Grading

1. The final grade in this class is based on total "assigned" points (300):
  - A = 90% or more of total points assigned (= 270)
  - B = 80% or more, but less than 90%, of total points assigned (= 240)
  - C = 70% or more, but less than 80%, of total points assigned (= 210)
  - D = 60% or more, but less than 70%, of total points assigned (= 180)
2. A midterm exam will be given on the date shown on the *General Schedule of Activities*. [Total: 60 points; 20%]
3. A final exam will be given during the last day of class. [Total: 60 points; 20%]
4. Two quizzes will be given during the semester. [Total: 2×15 points = 30 points; 10%]
5. Homework sets based upon assigned reading, class discussions, and self-guided research will be assigned. Late homework sets are not accepted. [Total: 75 points; 25%]
6. Special activities will be conducted during class sessions, and you must be in attendance to participate. These may be announced ahead of time. [Total: 30 points; 10%]
7. You will give a 4-6-minute presentation to the class during the last five weeks of the semester, and will lead a question and answer session afterwards. Your grade will be determined by student and instructor input. See the *Class Presentation* handout for more details. [Total: 20 points; 6.67%]
8. You will be required to evaluate the class presentations of your classmates. While your evaluations will be provided to your classmates after I review them, your identity will not be revealed. The evaluation points you earn is based upon the percentage of students you evaluate: full points for evaluating all your class mates. [Total: 10 points; 3.33%]
9. You will write a participate in an in-class project in the planetarium that will probably involve a short (1-page) paper, and a map-using project [Total: 15 points; 5%].
10. A variety of extra credit projects are available. See the "living" *Extra Credit Opportunities* document for possibilities and more details. All extra credit projects must be handed in to me in class, due by the day indicated on the *General Schedule of Activities* [Total: up to 15 points].
11. Additional bonus points may be awarded for various events that may arise during the semester. Bonus points are not subject to point limits imposed upon extra credit.

## **Policies and Procedures**

1. Exams and in-class exercises cannot be made up. If a time conflict exists, notify me before the test/quiz date. However, even with prior notification, I am not obliged to extend any test/quiz deadline. In addition, I reserve the right to refuse student admission to an in-class event for excessive tardiness (defined as more than 5 minutes after the test/quiz begins).
2. Unless it is noted explicitly by the instructor, no assignments or extra credits can be submitted in handwritten form; all such assignments must be submitted as computer-printer documents. Emailed submissions are not allowed.
3. Homework assignments are due at the beginning of class. Student entering late may hand in the assignment upon arrival, but no more than 5 minutes after class begins. Late exercises of any kind are not accepted.
4. Students are expected to check the grading accuracy of their exams/quizzes, exercises, and bonus/extra credit, as reflected on their posted grades. Students are given seven days after a given deadline to bring any errors to my attention. Grade accuracy will not be discussed after the final grade-reporting deadline established by the Sierra College Admissions and Records office. This deadline is usually set in the week after the last class.
5. Students will adhere to the ethical behavior as detailed in the *Sierra College Student Handbook*. Cheating, plagiarism, or any other forms of dishonesty are considered grounds for an immediate course grade of F (with academic dishonesty) and possible dismissal from Sierra College. Here are a few examples of academic dishonesty:
  - a) The use of answer keys from previous semesters;
  - b) Exchanging answers with other students during exams/quizzes;
  - c) The use or visible proximity of any electronic or related device during exams/quizzes;
  - d) The use of “crib sheets” written on anything, including your skin, rubber bands, etc.;
  - e) The unattributed copying of materials created by other people (i.e., plagiarism).

## **COMPLETE THE INFORMATION CARD**

Give your completed information card to the instructor before leaving class on the first day. Make a note of the 2-digit number on the card and write it down in your text or notebook. This is your *Astronomy 25 course ID number* and will be used to record and post your scores throughout the course session.

## **Course Student Learning Outcomes**

1. Students will critique new findings in the frontiers of astrophysics, assessing and appraising their conceptual frameworks.
2. Students will evaluate concepts in cosmology, relating concepts in underlying physics and observations to scientific frameworks of our universe's formation and evolution.
3. Students will synthesize information from various sources (classroom instruction, online resources, etc) to produce a coherent understanding of galactic/extragalactic astronomy.

*Thank you for electing to take Astronomy 25. I hope you will enhance your knowledge and appreciation of our bizarre Universe!*