

The University of Arizona
ASTR 204: Great Debates in Astronomy
Dr. Richard Poss
Spring 2016

Description:

Science is not a debating contest, and scientific truth is not determined by rhetorical prowess. Nevertheless, there have always been crucial questions concerning the nature of the universe and our place in it about which experts disagree. In this course we will examine some of the pressing questions in astronomy and how they might be resolved. The focus will be on the clash of different approaches and methods as astronomers have struggled to resolve contradictions in our understanding of the natural order. Each class session will be a combination of lecture and participatory discussion.

Texts: We will make use of the standard D2L website. There you will find texts, images, discussions, assignments, and links to articles.

Course Schedule: (*This class meets 2:00 to 2:50pm, M W F in Steward 202.*)

Wed.	Jan. 13	Introduction and Overview: What Can We Expect in This Class?
Fri.	Jan. 15	What is Science? Scientific Method. Types of truth.
Mon.	Jan. 18	<i>Martin Luther King Day – No Classes</i>
Wed.	Jan. 20	Varieties of Marginal Science
Fri.	Jan. 22	Marginal Science and Pseudo Science.
Mon.	Jan. 25	Logical argument and logical fallacies.
Wed.	Jan. 27	More logical fallacies.
Fri.	Jan. 29	Archaeoastronomy: Chaco Canyon and Stonehenge
Mon.	Feb. 1	Ancient Greek Astronomy and the Philosophical Background
Wed.	Feb. 3	Copernicus: The Geocentric vs. Heliocentric Debate
Fri.	Feb. 5	Tycho Brahe and Johannes Kepler
Mon.	Feb. 8	Galileo and the Telescope
Wed.	Feb. 10	Trial of Galileo: Guilty or Not Guilty?
Fri.	Feb. 12	Exam #1
Mon.	Feb. 15	The Shapley – Curtis Debate
Wed.	Feb. 17	Hubble and the Expanding Universe
Fri.	Feb. 19	The Big Bang, Dark Matter, Dark Energy

Mon. Feb. 22 The Inner Solar System
 Wed. Feb. 24 The Outer Solar System
 Fri. Feb. 26 Threats from space: "How may I kill thee, Earth? Let me count the ways..."

Mon. Feb. 29 The "Killer Asteroid" Debate: How often do they hit?
 Wed. March 2 What can we do? Solar system structure and dynamics.
 Fri. March 4 Meteors, comets, asteroids, Lagrange points.

Mon. March 7 The Plurality of Worlds Debate. How to find an exoplanet.
 Wed. March 9 Radial Velocity. Transits, Gravitational Microlensing.
 Fri. March 11 The Kepler Mission.

March 12 – 20, 2016 Spring Break – No Classes

Mon. March 21 A Brief History of Rocketry
 Wed. March 23 Tsiolkovsky, Goddard, Von Braun.
 Fri. March 25 The Mercury and Gemini programs.

Mon. March 28 **Exam #2**
 Wed. March 30 The Apollo program. Spacelab, the Shuttle program.
 Fri. April 1 The Mir space station and the ISS. Private space enterprise in the U.S.

Mon. April 4 SpaceX, Dragon, Blue Origin, New Shepherd, Cygnus.
 Wed. April 6 The Human vs. Robotic Exploration Debate.
 Fri. April 8 Arguments and Counter-Arguments.

Mon. April 11 The Role of Mars in space exploration.
 Wed. April 13 Mars in the American Imagination: Lowell to Viking.
 Fri. April 15 Pathfinder, HiRise, Phoenix missions.

Mon. April 18 Curiosity Mission, recent results.
 Wed. April 20 Debates over Environmental Issues in Outer Space
 Fri. April 22 Space debris, back-contamination, Nuclear power in space.

Mon. April 25 Astrobiology and its ramifications.
 Wed. April 27 "Nature" and "Wilderness" beyond the Earth.
 Fri. April 29 Ethics of Terraforming.

Mon. May 2 Drake, Fermi, SETI and its implications,
 Wed. May 4 Review and Evaluation. Papers Due.

Thur. May 5 Reading Day

Final Exam: Friday, May 6, 1-3pm, in Steward 202

University of Arizona
Astronomy 204: Great Debates in Astronomy

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Office Hours: Monday/Wednesday 3-4pm, Tuesday 3:30 to 4:30pm, and by appointment.

CLASS POLICIES:

CLASS PARTICIPATION: It is important to keep up with the day-to-day business of the class. Expect occasional short quizzes or writing exercises over the previous day's material. Try to marshal your thoughts (favorable or unfavorable) about the material before coming to class. Then argue your point of view when class begins. **You are encouraged to get to know each other during the semester, and to study together if possible.**

ATTENDANCE: Regular attendance is essential. Your attendance and your participation in class discussion are important, and are taken into consideration in preparing your grade. In addition, the exams and writing topics are all geared to class discussion. If you are not present and alert, it will not be possible to do well in this course.

GRADING: Your grade is based on the two mid-term exams, the homework assignments, the final exam, participation in class, and in-class quizzes and writing assignments.

Exam #1	20 %
Exam # 2	20 %
Paper	30 %
Final Exam	20 %
Class Participation (including quizzes and writing exercises)	10 %
	100 %

ESSAYS: There will be at least one argumentative essay paper. The topic will be worked out over the course of the semester. Essays must be *your own thoughts*. Students will submit an electronic copy (as a pdf. or doc. file) to the Drop Box on D2L. Papers will be double-spaced, typed, and free of grammatical and spelling errors.

EXCUSED ABSENCES: All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

INTEGRITY: Absolute academic integrity is expected of every student in all academic activities. All students are expected to be aware of and follow the *University of Arizona Code of Academic Integrity*. The *Code* prohibits all forms of academic dishonesty, including cheating, plagiarism, and fabrication. The repercussions for all of those found guilty of violating the *Code* will include loss of credit for the work (grade=0) and may include failure of the course or more extreme measures.

CONDUCT: *No laptops are allowed during class.* Class time is devoted to debate, discussion, or lecture. No Ipads, tablets, texting or cell phones are allowed during class. Cell phones must be turned off when class begins. (University policy also prohibits food or drink in classrooms.) When another student is speaking to the class, please give them your attention. You are expected to treat your fellow students with dignity and respect.

THREATENING BEHAVIOR: The University prohibits threatening behavior, which it defines as "Any statement, communication, conduct or gesture, including those in written form, directed toward any member of the University community that causes a reasonable apprehension of physical harm to a person or property." If you would like more information, it can be found here:
<http://policy.web.arizona.edu/threatening-behavior-students>

STUDENTS WITH DISABILITIES: If you anticipate barriers related to the format or requirements of this course, please meet with me so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; drc.arizona.edu) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations.

MISSED TESTS: No makeup tests will be administered. The exams are already scheduled and posted on the class schedule. If you know that you will miss a test (before the test), you must make arrangements (for valid reasons) for an exam at a time and date *prior to* the written test. Missing one of the midsemester exams is an automatic loss of 20% of your grade. Missing the final is a loss of 20%.

GRADES: You have one week from the time an exam is returned to challenge any perceived errors. Although rare, there are occasions when grading errors occur, and you should review your returned work.