

The University of Arizona
ASTR 320: Philosophical and Historical Aspects of Astronomical Thought
Dr. Richard L. Poss
Fall 2014

Text:

Heather Couper and Nigel Henbest, *The History of Astronomy*, Firefly Books, 2009.

Description:

ASTR 320 is an interdisciplinary examination of the growth and development of astronomy from the prehistoric era to the present time. After establishing a firm grasp on scientific method, the class examines the preliterate cultures of the non-Western world, and proceeds to the explosion of philosophical and scientific thought in ancient Greece. From there we trace the causes of the Copernican Revolution in the context of the larger European Renaissance, and follow its effects through to modern times. The development of instrumentation, from refracting telescopes to Newtonian reflectors, to larger and more precise telescopes, spectroscopic and other forms of analysis, and the application of mathematics and computers to the activity of astronomy are examined. We will follow the evolution of cosmological theories of the universe up to the present time. The focus will be on the clash of views and methods as astronomers struggle to resolve problems in our understanding of the nature of the universe. The arrangement is basically chronological, and will extend from European Prehistory to the present. Each class session will be a combination of lecture and participatory discussion.

Course Outline: *This class meets 11am to 12:15, Tuesday/Thursday, in Steward 204.*

Tues. Aug. 26	Introduction and Overview: What can we expect from this class?
Thur. Aug. 28	Philosophy of Science. History of Astronomy. (6-9)
Tues. Sept. 2	Archaeoastronomy around the world. (10-33)
Thur. Sept. 4	Southwestern Archaeoastronomy: The Chacoan Culture. (34-57)
Tues. Sept. 9	Prehistoric Astronomy: Stonehenge and European Megalithic Culture.
Thur. Sept. 11	Ancient Greeks: From <i>mythos</i> to <i>logos</i> . Thales and Anaximander.
Tues. Sept. 16	Eudoxus, Hipparchus, Aristarchus. Pythagoras, Euclid. (58-79)
Thur. Sept. 18	Plato, <i>Timaeus</i> and Aristotle, <i>De Caelo</i> . Ptolemy and the <i>Almagest</i> .
Tues. Sept. 23	Astronomy in the Middle Ages.
Thur. Sept. 25	Exam #1.
Tues. Sept. 30	The Renaissance Adventure. Humanism and Exploration.
Thur. Oct. 2	Copernicus, <i>De Revolutionibus</i> . (80-102)

Tues. Oct. 7	Tycho Brahe and Kepler (102-131)
Thur. Oct. 9	Galileo and the telescope. Experimental methods. (132-146)
Tues. Oct. 14	Trial of Galileo. Cardinal Bellarmine and the Inquisition. (146-155)
Thur. Oct. 16	Huygens, Halley, Isaac Newton. (156-199)
Tues. Oct. 21	William and Caroline Herschel. Stellar Astronomy. (182-199)
Thur. Oct. 23	Flamsteed. The Search for the Parallax. Nebulae.
Tues. Oct. 28	Progress in telescope design. Fraunhofer, spectroscopy. (200-221).
Thur. Oct. 30	Shapley-Curtis, Hubble, Cepheid Variables.
Tues. Nov. 4	Exam #2.
Thur. Nov. 6	Thomas Young and wave theories of light. (222-241) Velocity of sound, light. Ether.
Tues. Nov. 11	<i>Veterans Day – No Classes</i>
Thur. Nov. 13	The Michelson-Morley Experiment. Special Relativity. Cultural Aspects of Relativity
Tues. Nov. 18	General Relativity and Gravitation.
Thur. Nov. 20	Galaxies and the Expanding Universe. (242-259)
Tues. Nov. 25	Extrasolar planets, Astrobiology, and SETI. (260-277)
Thur. Nov. 27	<i>Thanksgiving Holiday – No Classes</i>
Tues. Dec. 2	Student Project Presentations.
Thur. Dec. 4	Student Project Presentations.
Tues. Dec. 9	Review and Evaluation. Paper Due.
Thur. Dec. 11	Reading Day

Final Exam Review Session: TBA

Final Exam: Tuesday, Dec. 16, 2014, 10:30 – 12:30, in Steward 204.

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Office Hours: 3:00-3:50 Monday/Wednesday, 1:30-2:30 Tuesday, and by appointment.

CLASS POLICIES:

CLASS PARTICIPATION: It is important to keep up with the day-to-day reading assignments, reading the selections **before** coming to class. Always bring your text to class with you. Expect occasional short quizzes or writing exercises over the day's reading assignment. 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 final grade. In addition, the exams and paper 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 exams, the term paper, the final exam, participation in class, and reading quizzes and writing exercises. Expect occasional quizzes over the material or exploratory writing exercises. These need not be announced in advance. You will be expected to make a brief presentation to the class on the results of your research paper.

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

PAPER: There will be a research paper on a topic to be worked out over the course of the semester. Students will submit both an electronic copy to the drop box on D2L and a hard copy to the instructor. The paper will be typed, double-spaced, and free of grammatical and spelling errors.

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.

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.

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: 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.