

ASTRON 1263: Techniques of Astronomy (2016 Fall Term)

Course Web Site: <http://courseweb.pitt.edu> should be checked frequently to view announcements and download some course material. Login using your Pitt email username and password.

Primary Lecture Instructor: Prof. David Turnshek, 306 Allen Hall, turnshek@pitt.edu.

Lectures: 6:00 - 6:50 pm in 105 Allen Hall, but we may meet elsewhere occasionally; a change in meeting location would be announced on courseweb.

Primary Observatory Instructor: Prof. John Stein, Allegheny Observatory, jstein@pitt.edu.

Observatory Manager: Mr. Lou Coban, Allegheny Observatory, coban@pitt.edu.

Allegheny Observatory (AO) Lab: 7:00 - 11:00 pm on Monday or Thursday nights. The lab meets during both clear and cloudy weather. You should already be signed up for either a Monday or Thursday night; I will ask some of you to switch nights to achieve similar numbers of students on Mondays and Thursdays. On your designated lab night you will board a bus near the Allen Hall entrance at 7:00 pm and return by 11:00 pm. History suggests that on many nights clouds will prevent observations. Therefore, later in the term, we may have to make accommodations to give “unlucky” students opportunities to collect data on the AO telescopes. We plan to make the MIRA software used at AO available in Thaw 210 so that you can work with your AO data, as needed.

Office Hours: All “office hours” are by appointment and should be set up by email.

Required Course Materials: an AO Lab Notebook of your choice to be turned in for grading

Reference Materials: (1) MIRA software help pages and (2) *To Measure the Sky: An Introduction to Observational Astronomy* (by Frederick R. Chromery), which will be available at AO and placed on reserve in Benedum Library.

Grading: 45% of the grade will be based on lectures and 55% will be based on AO work. AO observations will be done in teams, but grading will be for individuals. Grading is as follows:

- 15% Lecture Class Homework (3 assignments)
- 15% Lecture Class 1st Exam (Oct 3, but may be changed)
- 15% Lecture Class 2nd Exam (Dec 1)
- 5% AO Attendance
- 5% AO Lab Notebook
- 10% AO Observing Exercise 1 (astrometric calibration of 16” and 13” telescope CCDs)
- 10% AO Observing Exercise 2 (two-color photometry of different stellar types with 16”)
- 15% Main Observing Project – various
- 10% Presentation of your portion of your Main Observing Project (Dec 5 and Dec 8)

AO Lab Notebook: Each student is required to keep an AO Lab Notebook for grading. While observing projects are done in groups, each student must have their own notebook. The notebook must document details of Observing Exercise 1, Observing Exercise 2, and the student’s Main Observing Project. These details should include your observing log table (name of object observed, RA, Dec, date/time of observation in local time and UT, telescope used, instrument used, filter used, exposure time, name of raw data file produced), how the raw data files were processed and the names of the processed data files, a description of the measurements made on the processed data files with results, and relevant images/graphs. A brief summary of the findings should be stated.

Broad List of Lecture Topics (adapted from various web sources and Pitt faculty):

1. Basics of Observational Astronomy
2. Telescopes and Instruments
3. Astronomical Coordinates and Time
4. Errors in Astronomical Measurements
5. Standard Stars and Calibrations
6. Optical (Visible) CCD Imaging Photometry
7. Optical/UV Spectroscopy
8. Examples
9. The SDSS imaging and spectral databases, and some other astronomical databases
10. Various wave bands: gamma-ray, x-ray, UV, optical (visible), IR, microwave, radio

Possible Main Observing Projects (should understand/present info observed object):

1. Titan's orbit around Saturn, and Saturn's mass (Saturn's distance is given)
2. W UMa type star light curve: 44 Boo B (1503+4739), V1191 Cyg (2016+4157), VW Cep (2037+7536), AB And (2311+3653), or WZ Cep (2322+7254)
3. color-magnitude diagram of a cluster
4. transit of an exoplanet (requires transit ephemeris and precision photometry)
5. distribution of lunar crater sizes (only near terminator; the Moon's distance is given)
6. color pictorial of different types of Messier Catalog objects
7. image stacking/rejection with 30" Thaw Telescope to achieve high quality images
8. Design your own project.

W-Option for ASTRON 1263: Student majors can take the W-Option to meet their writing requirement. To do this they sign up for PHYS 1661 (1 credit), which occasionally meets (9:00 am, Wed, 106 Allen Hall). During the PHYS 1661 meetings, general instruction on writing scientific papers is given by another faculty member. During the lecture portion of ASTRON 1263, some time will be spent discussing the components of a proper astronomy research paper (or proposal). This will be particularly important for students who have elected the W-option for ASTRON 1263. Those students should be prepared to write a paper about their Main Observing Project in a formal way. The paper should include the following: abstract, introduction of the topic stating the aim of the paper, description of the observations, data processing, data analysis, discussion and summary of results, and references. Tables, images, and graphs should be included as needed. Your 1-credit PHYS 1661 W-Option grade will be based on the paper alone. We will review drafts of your paper throughout the term (e.g., the introduction should be written before the end of September).

Academic Integrity: "Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries, telephones and programmable calculators."

Disabilities: If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services (140 William Pitt Union) no later than the 2nd week of the term at 412-648-7890 to schedule an appointment. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations.