AS 710 – Observational Techniques
Syllabus – Fall 2013

Instructor
Prof. Elizabeth Blanton
Room: CAS 519
Email: eblanton@bu.edu
Phone: 617-353-2633
Office hours: M 12:30 – 2:00 pm, Th 1:00 – 2:30 pm, or by appointment

Class Hours and Location
M 9:30 – 11:00 am; CAS 502
W 2:00 – 3:30 pm; CAS 502

Principal Texts

To Measure the Sky: An Introduction to Observational Astronomy, Chromey, ISBN 978-0-521-74768-4

The Elements of Technical Writing, Blake & Bly, ISBN 0-02-013-085-6

Other Texts

The following other texts may also be useful to consult:

Data Reduction and Error Analysis for the Physical Sciences, Bevington & Robinson, ISBN 0-07-911243-9

Astrophysical Techniques, 5th ed., Kitchin, ISBN 1420082434

Course Catalog Description

Telescopes, light detection, and analysis tools and techniques of experimental astronomy. Signal-to-noise calculations. Photometric and spectroscopic instrumentation and applications. Use of the observatory, CCD light detectors, modern software analysis tools, image processing. Proposal writing and science writing.

My Vision

I want this course to be practical and to help you conduct observational research in the future. The course will be project-based, where you will gain hands-on experience with data. In addition to attending lectures, you will complete projects using data gathered from a small, rooftop telescope, the Discovery Channel Telescope outside Flagstaff, and archival databases. The focus of the class will be on optical astronomy, but we will also discuss techniques used with observations at other wavelengths. In addition, the course will include a component on science writing, including proposals for observing time and papers for publication.

Labs / Projects

There will be four labs (or projects) due over the course of the semester. Write-ups for these labs will be formal and presented in Astrophysical Journal manuscript style using LaTeX. The labs will be:

1.) Night Sky Brightness (using CAS rooftop 14'' telescope)
2.) CCD Characterization (using CAS rooftop 14'' telescope)
3.) Archive Project (chosen in consultation with me, using data from the SDSS or Chandra archive)
4.) Optical Imaging with the DCT (4.3 m Discovery Channel Telescope)

Observing Proposals

Observing proposals will be written for imaging observations with the Large Monolithic Imager (LMI) on the 4.3 m DCT. A panel of your peers will review and rank your proposals.

Observing Run at the DCT

The class will go on an observing run to the 4.3 m Discovery Channel Telescope (DCT) near Flagstaff, AZ. I have secured four nights of observing for imaging for my research. The class will accompany me, learn how to operate the telescope and assist with this research. In addition, we may be able to spend a small amount of time taking images of targets selected from the most highly ranked proposals from the class. The dates for the run are Oct. 31, Nov. 1, Nov. 2, and Nov. 3. We will split into two groups, with half of the class attending the first two nights and the other half of the class the last two nights. You will be pioneers in this – this is the first AS 710 class to go to the DCT.

Homework

There will be approximately 6 homework assignments given over the course of the semester, mostly comprised of exercises from the textbook.

Oral Presentation

Near the end of the semester, you will be required to give a 15 min. presentation (10 min. + 5 min. for questions) on a specific mission, telescope, or detector (or some combination of these). The topic should be chosen in consultation with me, and can be chosen from a ground- or space-based observatory.

Final Exam

There will be an in-class, cumulative, written final exam. Date and time are TBD.

Grading

Labs / Projects + Proposal	50%
Homework	20%
Oral Presentation	10%
Final Exam	15%
Attendance + Participation	5%

Topic List

Light
Coordinate Systems
Time
Statistics / errors / signal-to-noise
Science writing (journal papers, observing proposals)
CCDs
Photometry
Telescopes
Optics
Spectroscopy
Techniques at other wavelengths (radio, X-ray, etc.)