Physics 629 Observational Techniques

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Overview: This is a graduate-level course on the tools and techniques of modern observational astronomy. It will cover all regions of the spectrum, but will give the greatest emphasis to the optical, ultraviolet, and x-ray wavelengths at which the Rutgers faculty observe.

The best way to learn how to take and reduce (i.e., analyze) data is to do it yourself, so this course will include: (1) observing with the 0.5 m optical telescope and the 3.0 m radio telescope on the roof; and (2) reducing archival data from major ground-based and space-based observatories. Most of the data reduction will be carried out with the IRAF data reduction package on the Sun Unix computer system.

Lectures: Monday and Wednesday, 4th period (1:10 - 2:30 PM)
Some late-night observing will be necessary when using the optical telescope and you will need to be flexible because of the weather. We will also be sharing the radio telescope with the undergraduate Observational Radio Astronomy course. Because of the significant lab component of the course, I will occasionally only lecture once per week. A listing of the lectures (which is subject to change) is available on the class home page.

Home page: http://www.physics.rutgers.edu/grad/629/

Text: *Astrophysical Techniques (4th edition)*, C.R. Kitchin, 2003, Institute of Physics Publishing

Other useful references are:
Observational Astrophysics (2nd edition), P. Lena, F. Lebrun, & F. Mignard, 1998, Springer
Astronomy Methods, A Physical Approach to Astronomical Observations, H. Bradt, 2004, Cambridge Univ. Press (an advanced undergraduate text, though still useful)

Detectors:
Detection of Light: from the Ultraviolet to the Submillimeter (2nd edition), G. Rieke, 2003, Cambridge Univ. Press
Handbook of CCD Astronomy, S. B. Howell, 2000, Cambridge Univ. Press.
A Practical Guide to CCD Astronomy, P. Martinez & A. Klotz, 1997, Cambridge Univ. Press

Coordinate Systems & Spherical Astronomy:
Spherical Astronomy, W. M. Smart, 1977

Optical Spectroscopy:
Optical Astronomical Spectroscopy, C.R. Kitchin, 1995, Institute of Physics Publishing
Observation and Analysis of Stellar Photospheres, D. F. Gray, 1992, Cambridge Univ. Press

Radio and X-ray Astronomy:
Tools of Radio Astronomy (2nd edition), K. Rohlfs & T.L. Wilson, 1996, Springer
Exploring the X-ray Universe, P.A. Charles & F.D. Seward, 1995, Cambridge University Press

General Reference:
Allen's Astrophysical Quantities, A. N. Cox (ed.), 2000, AIP
Astrophysical Formulae, K. R. Lang, 1999, Springer
Astrophysical Concepts, M. Harwit, 1988, Springer
Handbook of Space Astronomy and Astrophysics, M. V. Zombeck, 1990, Cambridge Univ. Press
Astronomical Almanac (and its *Explanatory Guide*), US Naval Observatory, yearly

Office hours: Call, email, or stop by my office whenever you like (though please try to avoid the time just before lectures).

Labs, Assignments, and Observing Proposal: I will maintain a web-based sign-up sheet for observing with our local telescopes. The observing will be done in pairs; data reduction will be done individually. Everyone will hand in their own write-up. If you are having difficulty with an assignment, you are encouraged to talk to me about it.

Near the end of the semester, you will write an observing proposal for a major ground- or space-based telescope (i.e., Gemini, VLT, SALT, WIYN, HST), based on a topic of your choosing.

Grades:

Labs/Assignments	80%
Final Observing Proposal	20%