

Syllabus

Statistics lectures will be by Prof. Hinz, most of instrumentation by Prof. Rieke with assistance from Prof. Hinz and guest lecturers
Course organization and grading policies are [here](#).

Date	Topic	Notes	Assignments	Solutions	Extras
23 Aug	General statistics: probability, distributions, statistical significance, simple fits, goodness of fit tests				
25 Aug	Statistical tests, statistical expectations, correlation				HMWRK corrected
30 Aug	Hypothesis Testing, Correlation				
1 Sept	Error Estimation, Bayesian Analysis, Rejecting Outliers				
6 Sept	Monte-Carlo, Boot-Strap, and Jack-Knife Methods				
8 Sept	Markov Chain Monte Carlo				
13 Sept	Fourier Techniques, Filtering, Unevenly Sampled Data				
15 Sept	Principle component analysis				
20 Sept	Radiometry, basic optics, photon noise				
22 Sept	Telescope design, matching to instruments, OTF, telescope optimization, radio and X-ray telescopes, modern space and ground-based telescopes				
27 Sept	Principles of photo-detectors, IBC detectors				
29 Sept	Photodiodes, IR array readouts, CCDs, general characteristics of photo-detector arrays				
4 Oct	CCDs and CMOS detectors, guest lecture				
6 Oct	Discussion				
11 Oct	Exam				
13 Oct	Imagers: optical design (optical and infrared), image characteristics and artifacts, data reduction				
18 Oct	Astrometrical measurements, applications of astrometry				
20 Oct	Photometry				
25 Oct	Physical photometry, absolute calibration, Radio and X-ray calibration, accuracies, specialized photometry - differential, high speed, high accuracy, planetary transit, photometry databases				
27 Oct	Polarimetry principles, stokes parameters, data reduction, polarimeters				
1 Nov	Spectrometers: prism, grating principles, grating examples				
3 Nov	High resolution, multiobject, IFU, line fitting and extraction				
8 Nov	Fabry-Perot, FTS, interference filters				
10 Nov	Adaptive optics, principles, wavefront sensing, deformable mirrors, laser guide stars, multiconjugate				
15 Nov	AO, finish: Interferometers/Coronagraphy, high contrast imaging				
17 Nov	Submillimeter, bolometers, MKIDs				
22 Nov	Radio, heterodyne receivers				
29 Nov	Radio interferometry, aperture synthesis, VLBI				
1 Dec	X-ray instrumentation				
6 Dec	Receiver arrays, radio lab				
13 Dec	Final Exam: Tuesday, December 13, 8:00 am - 10:00 am				

Text for statistics part of course: "Practical Statistics for Astronomers," J. V. Wall & C. R. Jenkins, Cambridge University Press

<http://www.amazon.com/Practical-Statistics-Astronomers-Cambridge-Observing/dp/0521732492>

<http://www.barnesandnoble.com/w/practical-statistics-for-astronomers-jasper-wall/1103364052?ean=9780521732499&itm=1&>

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<http://www.powells.com/biblio/61-9780521732499-1>

Text for instrumentation part of course: "Measuring the Universe," G. H. Rieke, Cambridge University Press

http://www.amazon.com/Measuring-Universe-A-Multiwavelength-Perspective/dp/0521762294/ref=sr_1_3?ie=UTF8&qid=1344631938&sr=8-3&keywords=%22measuring+the+universe%22

<http://www.cambridge.org/us/academic/subjects/astronomy/observational-astronomy-techniques-and-instrumentation/measuring-universe-multiwavelength-perspective>

<http://www.barnesandnoble.com/w/measuring-the-universe-george-h-rieke/1111323536?ean=9780521762298>

or the campus bookstore.

Other Resources

Entrance Image: A. E. Douglass with the Steward 36-Inch Telescope in the dome, 1922. The mirror had not yet been installed in the telescope. Image from "Tree Rings and Telescopes," by G. E. Webb.