

FAU 2014

Syllabus

Statistics lectures will be by Prof. Hinz, most of instrumentation by Prof. Rieke with assistance from Prof. Hinz and guest lecturers

Date	Topic	Notes	Assignments	Solutions	Extras
26 Aug	General statistics: probability, distributions, statistical significance, simple fits, goodness of fit tests	📄	📄		
28 Aug	Statistical tests, statistical expectations, correlation	📄			
2 Sept	Hypothesis Testing, Correlation	📄			
4 Sept	Error Estimation, Bayesian Analysis, Rejecting Outliers	📄	📄		
9 Sept	Monte-Carlo, Boot-Strap, and Jack-Knife Methods				
11 Sept	Markov Chain Monte Carlo				
16 Sept	Fourier Techniques, Filtering, Unevenly Sampled Data				
18 Sept	Principle component analysis				
23 Sept	Radiometry, basic optics, photon noise				
25 Sept	Telescope design, matching to instruments, OTF, telescope optimization, radio and X-ray telescopes, modern space and ground-based telescopes				
30 Sept	Principles of photo-detectors, IBC detectors				
2 Oct	Photodiodes, IR array readouts, CCDs, general characteristics of photo-detector arrays				
7 Oct	CCDs and CMOS detectors, guest lecture				
9 Oct	Discussion				
14 Oct	Exam				
16 Oct	Astrometrical measurements, applications of astrometry				
21 Oct	Imagers: optical design (optical and infrared), image characteristics and artifacts, data reduction				
23 Oct	Photometry				
28 Oct	Physical photometry, absolute calibration, Radio and X-ray calibration, accuracies, specialized photometry - differential, high speed, high accuracy, planetary transit, photometry databases				
30 Oct	Polarimetry principles, stokes parameters, data reduction, polarimeters				
4 Nov	Spectrometers: prism, grating principles, grating examples				
6 Nov	High resolution, multiobject, IFU, line fitting and extraction				
11 Nov	Fabry-Perot, FTS, interference filters; start on Adaptive optics, principles, wavefront sensing, deformable mirrors, laser guide stars, multiconjugate				
13 Nov	AO, finish; Interferometers/Coronagraphy, high contrast imaging				
18 Nov	Submillimeter, bolometers,				
20 Nov	Radio, heterodyne receivers				
25 Nov	Receiver arrays, radio lab				
2 Dec	Radio interferometry, aperture synthesis, VLBI				
4 Dec	X-ray instrumentation				
9 Dec	Discussion				
17 Dec	Final Exam: Wednesday, December 17, 10:30 am - 12:30 pm				

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-iasper-wall/1103364052?ean=9780521732499&itm=1&usri=9780521732499>

<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.