

Phys. 452, Spring 2006
Problems: Matlab Skills for Physics
Drs. Stephen Gregory and Stephen Boyd

Purpose and Scope:

This is not so much a computer course as a means of learning how to work more effectively in physics and astrophysics via the computer. Matlab is a 4th generation language that has both power and simplicity, allowing the user to see the science of a problem more clearly.

In general, new information will be presented on Mondays and Wednesdays; Fridays will be reserved for practical work on problems. Grading will be centered on the Friday problem sessions and on take-home exams.

Textbooks:

Introduction to Matlab 7,. By Etter, Kuncicky, and Moore
Numerical Methods for Physics, 2nd Ed., Alejandro L. Garcia

Office Hours: Mon. 9:00 – 10:00 am , Regener 118

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Date	Topic	Reading
Jan. 18	Intro.	Start with the Introduction to Matlab 7 text
Jan. 20	Demonstrations – Matlab in research	
Jan. 23	Data types, scalars, vectors, matrices	2.1 – 2.3.3
Jan. 25	Plots	
Jan. 27	Working with the plot command	
Jan. 30	Key words, built-in functions	3
Feb. 1	Basic matrix operations	4
Feb. 3	Problems	
Feb. 6	m-files, programming	
Feb. 8	Program control, loops	
Feb. 10	Problems	
Feb. 13	Program control, If and while	5
Feb. 15	Data analysis, interpolation, statistics	
Feb. 17	Exam 1	
Feb. 20	Data analysis, curve fits, numerical calc.	6
Feb. 22	Advanced matrix, systems of equations	
Feb. 24	Problems	
Feb. 27	Transformation, eigen functions & values	7
Mar. 1	Basic symbolic manipulations	
Mar. 3	Problems	
Mar. 6	Symbolic calculus	8
Mar. 8	Diff. eq. – Euler and Cromer	Start Garcia text
Mar. 10	Problems	

Mar. 13	Spring Break
Mar. 15	Spring Break
Mar. 17	Spring Break
Mar. 20	Diff. eq. – centered & Verlet
Mar. 22	Diff. eq. – Runge Kutta
Mar. 24	Guest lecture
Mar. 27	Diff. eq. – adaptive time steps
Mar. 29	Diff. eq. – chaotic systems
Mar. 31	Exam 2
Apr. 3	Introduction to images
Apr. 5	Images – 2D to 1D
Apr. 7	Problems
Apr. 10	Image processing
Apr. 12	Complex numbers
Apr. 14	Problems
Apr. 17	Fourier series and transforms
Apr. 19	Power spectra
Apr. 21	Problems
Apr. 24	Filtering
Apr. 26	Convolution, de-convolution, x corr
Apr. 28	Exam 3
May 1	Data acquisition
May 3	TBD
May 5	TBD