Introduction to MATLAB
Fall 2012 Syllabus

Instructor

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Course Information

Friday, Oct. 5, 3:30pm-5:00 pm
Location: 105 B&E (aka the Gatton computer lab)

Course Description

Intended for students with little or no experience with the software, *Introduction to MATLAB* is a short course covering its basic operations and features. In addition, we will work through several simple applications, to give you a head start on developing tools for your own projects.

Students should be experienced with Windows: navigating directories, opening and saving files, etc. Some familiarity with linear algebra (i.e., matrix operations) is helpful, but not necessary.

Learning Objectives

After this course, students should be able to:

- Import/export data
- Create and manipulate variables
- Program and run simple scripts (M-files)
- Use graphics tools to display data
- Use the built-in help features

Cheat Sheets

While you are learning MATLAB, you may find it useful to have a cheat sheet of commonly used commands. The last two pages of this syllabus list the commands we will use in this class. In addition, here are links to more comprehensive cheat sheets for MATLAB:

http://web.mit.edu/18.06/www/Spring09/matlab-cheatsheet.pdf

http://www.karenkopecky.net/Teaching/eco613614/Matlab%20Resources/MatlabCheatSheet.pdf

References and Resources

The MathWorks. The official website for MATLAB is at http://www.mathworks.com/. Various tutorials can be found under Support > MATLAB > Demos and Webinars. User guides can be found under Support > MATLAB > Documentation.

Hart, David and Clinton Wolfe, 1999. "Getting Started with MATLAB," Indiana University, University Information Technology Services, available online at http://www.indiana.edu/~statmath/support/bydoc/ (accessed 8/28/2009).

Miranda, Mario J. and Paul L. Fackler, 2002. *Applied Computational Economics and Finance*, Cambridge, MA: MIT Press. A textbook discussing computational methods and solutions to dynamic problems generally, as well providing MATLAB tools in the CompEcon Toolbox, which is available online http://www4.ncsu.edu/~pfackler/compecon/toolbox.html.

LeSage, James P. Econometrics Toolbox. (http://www.spatial-econometrics.com/) This website provides a MATLAB toolbox implementing a variety of functions for econometric analysis, including spatial econometrics. The site contains various guides, including LeSage, James P., 1999. *Applied Econometrics Using MATLAB*. This book/working paper provides general guidance for using MATLAB in econometric applications. The link for the book is: http://www.spatial-econometrics.com/html/mbook.pdf

Frain, John C., 2010. "An Introduction to MATLAB for Econometrics," TEP Working Paper No. 0110. This guide describes the use of MATLAB in econometric applications, and discusses LeSage's Econometrics Toolbox in particular. http://www.tcd.ie/Economics/staff/frainj/main/MSc%20Material/MATLAB/matlab.pdf

Octave home page. (http://www.gnu.org/software/octave/) This website is the official home for the free software, Octave.

This syllabus, the lecture notes, and the sample files for *Introduction to MATLAB* can be found on the instructor's website:
http://www.ca.uky.edu/agecon/index.php?p=852

Cheat Sheet

The following list contains some commonly used commands and operators for MATLAB, especially those that you will see in this class.

Basic Operations		
+	Add	
-	Subtract	
*	Multiply	For non-scalar, A*B means matrix multiplication
/	Divide	For non-scalar, A/B means A*inv(B)
^	Power (exponent)	For non-scalar, A^3 means A*A*A
.*	Element-by-element multiplication	
./	Element-by-element division	
.^	Raise each element to a power	
Functions and Pre-Defined Variables		
pi	3.14…	
i	sqrt(–1)	*j* is also sqrt(–1)
exp(x)	Exponential: e^x	
log(x)	Natural log: ln *x*	
sqrt(x)	Square root of *x*	
Defining Variables/Matrices		
x = <expression>	Defines variable *x* as result of <expression>	E.g. *x* = 1 + 2 yields *x* = 3.
A = [1 2 3; 4 5 6]	Defines 2×3 matrix *A*	
;	In matrix, marks end of row	
A = 0:10	A = [0 1 2…10]	
B = 0:2:10	B = [0 2 4…10]	
linspace(0,10,50)	Creates vector with 50 elements, equally spaced from 0 to 10.	
zeros(m,n)	*m*×*n* matrix filled with 0s	
ones(m,n)	*m*×*n* matrix filled with 1s	
rand(m,n)	*m*×*n* matrix with random draws from uniform [0,1]	
randn(m,n)	*m*×*n* matrix with random draws from normal (0,1)	

Matrix Operations		
A’	Transpose of A	
det(A)	Determinant of A	
inv(A)	Inverse of A	
H(2,3)	Element of matrix H in the 2^{nd} row and 3^{rd} column.	
H(1, :)	First row of matrix H	Colon (:) indicates a range
H(:, 3)	Third row of matrix H	
H(2:3, 9:11)	2×3 sub-matrix of H	
Plotting Graphs		
plot(y)	Plots *y* vs its index	
plot(x,y)	Plots $y = f(x)$	
plot3(x,y,z)	Curve in 3-D space	
surf(A,B,C)	Surface in 3-D space	*mesh*(*A*,*B*,*C*) is similar
hold on	Allows multiple graphs on same figure	*hold off* means new graph will replace old one
General Commands		
clear x	Deletes/resets value of *x*	
clear	Deletes/resets all variables	
;	At end of line/expression, suppresses output	
help ABC123	Provides description of command/function *ABC123*	