

# GLY 6932 (6862): Quantitative Methods in Earth Sciences

## University of Florida

### Fall 2016

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**Website:** e-learning site on Canvas

**Meeting Times:** Tue. & Thurs. Periods 4-5 (10:40 AM – 12:35 PM)

**Location:** CSE E231 (Computer Sciences/Engineering Building)

**Section Number:** 17HE

**Instructor:** Dr. Peter Adams

**Email:** adamp@ufl.edu

**Office:** 279 Williamson

**Office Hrs:** Tues. 3-4pm, or email me for an appointment

#### Textbook(s) and Resources:

1. Data Analysis in the *Earth Sciences Using MATLAB*, by Gerard V. Middleton, Prentice Hall, 2000 (Good resource, but out of print and hard to find)

2. *Getting Started with MATLAB; A Quick Introduction for Scientists and Engineers*, by Rudra Pratap, Oxford University Press, 2009 (A readable, hands-on, introduction to the software with practice exercises and solutions)

[http://www.amazon.com/Getting-Started-MATLAB-Introduction-Scientists/dp/0199731241/ref=sr\\_1\\_1?ie=UTF8&qid=1377107525&sr=8-1&keywords=getting+started+with+matlab](http://www.amazon.com/Getting-Started-MATLAB-Introduction-Scientists/dp/0199731241/ref=sr_1_1?ie=UTF8&qid=1377107525&sr=8-1&keywords=getting+started+with+matlab)

3. *MATLAB & Simulink Student Version; Math software for engineering and science students*, by The Mathworks (Strongly recommended – available at UF Bookstore for ~\$99)

[http://www.mathworks.com/programs/nrd/buy-matlab-student-version.html?ref=ggl&s\\_eid=ppc\\_3304](http://www.mathworks.com/programs/nrd/buy-matlab-student-version.html?ref=ggl&s_eid=ppc_3304)

4. *MATLAB Recipes for Earth Sciences, 2<sup>nd</sup> or 3<sup>rd</sup> Edition*, by Martin H. Trauth, Springer, 2007 (Valuable resource for understanding statistics, time series analysis, and geospatial computations) <http://www.amazon.com/MATLAB-Recipes-Sciences-Martin-Trauth/dp/3642127614>

5. MATLAB tutorials at the MathWorks website (extensive video tutorials, including the “MATLAB Onramp”, as well as examples of code and how to solve problems).

<https://matlabacademy.mathworks.com/>

#### Course Goal and Description

The goal of this class is to provide graduate students with a “toolbox” of skills to analyze data and conduct simple numerical modeling in the Earth and environmental sciences, primarily through the use of the software/programming language MATLAB. We will use our time together to cover new material in a “hands-on” lecture format and refine our skills through practicum. During the first 2/3<sup>rd</sup>s (to 3/4<sup>th</sup>s) of the course, we will explore various techniques in data analysis and scientific computing. During the last 1/3<sup>rd</sup> (1/4<sup>th</sup>) of the course, students will

apply the acquired techniques to their own research projects. During the final week of the semester, students will present the results of their independent research project to the class.

## Grading

The grade earned for this class results from student performance on assigned problem sets (50%), the final project (30%), and class participation (20%). There are no extra-credit assignments. The lateness policy is 10% off for each week that an assignment is late.

## Course Topic Schedule

Week 1: Aug. 23, 25	Intro to Data Analysis, Basic Commands, Simple Plotting, Types of Data, MATLAB Onramp and Scavenger Hunt, ( <i>Middleton Chp. 1</i> )
Week 2: Aug. 29, Sep. 1	Statistics fundamentals: Populations and Samples, Probability, Frequency Distributions, Types of Errors, ( <i>Middleton Chp. 2</i> )
Week 3: Sep. 6, 8	Programming Basics: Writing “good” code, Types of m-files: Scripts vs. Functions, Loops and Control Statements, ( <i>Middleton Chp. 3</i> )
Week 4: Sep. 13, 15	Matrices, Determinants, Matrix Algebra, Covariance Application, ( <i>Middleton Chp. 4</i> )
Week 5: Sep. 20, 22	Bivariate Statistics, Linear Regression, Multiple Regression, Curve Fitting, ( <i>Middleton Chp. 5</i> )
Week 6: Sept. 26, 28	Classification, Principal Components Analysis, ( <i>Middleton Chp. 6</i> )
Week 7: Oct. 4, 6	Time Series Data, Autocorrelation, Complex Plane, Trend and Fourier Analysis, ( <i>Middleton Chp. 7</i> )
Week 8: Oct. 11, 13	Spectral Analysis, Filters, ( <i>Middleton Chp. 7</i> )
Week 9: Oct. 18, 20	Geospatial Data: Grids, Surfaces, Interpolation, Making Maps, Displaying Topography, ( <i>Middleton Chp. 8</i> )
Week 10: Oct. 25, 27	Creating Formatted Output and Handle Graphics
Week 11: Nov. 1, 3	Student Project Work
Week 12: Nov. 8, 10	Student Project Work
Week 13: Nov. 15, 17	Student Project Work
Week 14: Nov. 22	Student Project Work
Week 15: Nov. 29, Dec. 1	Presentations of Student Projects

## **University of Florida Policy on Accommodation for Students with Disabilities**

Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

## **University of Florida Student Honor Code**

Preamble: In adopting this Honor Code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the University community. Students who enroll at the University commit to holding themselves and their peers to the high standard of honor required by the Honor Code. Any individual who becomes aware of a violation of the Honor Code is bound by honor to take corrective action. Student and faculty support are crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon the community acceptance and enforcement of the Honor Code.

***The Honor Code:*** We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied:

"On my honor, I have neither given nor received unauthorized aid in doing this assignment."

(1) All students are required to abide by the Student Honor Code.

(2) The conduct set forth hereinafter constitutes a violation of the Student Conduct Code. Those adjudged to have committed such conduct shall be subject to the sanctions provided in Rule 6C1-4.016, F.A.C.