Instructor Name: Dr. Michael Mack

Course Name: Introduction to Matlab

Course Description: This course will provide an introduction to Matlab as well as a survey of intermediate topics including data manipulation, analysis, and visualization, and Matlab programming. Working with example datasets from different disciplines, students will learn to use Matlab through hands on tutorials. The course will begin with an introduction to the Matlab desktop interface and command line tools, importing/exporting data, and elementary descriptive statistics and data visualization. Day two will cover more advanced methods of working with data including sorting and restructuring data, creating a variety of 2-D and 3-D plots, and performing basic inferential statistics. Day three will focus on using Matlab as a computational tool. Topics covered will include linear algebra with matrices, Fourier analyses, and using probability distributions, as well as writing Matlab scripts and functions for complex computations. Day four will feature more advanced topics of scientific computation in Matlab including simulations, bootstrapping techniques, and pattern analytics.

Day 1:
- Launching Matlab and using the command line interface
- Using the built-in help documentation
- Importing/exporting data in various formats
- Creating and manipulating new variables
- Performing basic descriptive statistics and data visualization
- Writing basic Matlab scripts

Day 2:
- Sorting and structuring data
- Making a variety of 2-D and 3-D plots
- Customizing visualizations
- Creating animations
- Performing inferential statistics (t-tests, ANOVA, and regression)
- Working with image data and color maps

Day 3:
- Building complex computations
- Performing linear algebra with matrices
- Running Fourier analyses
- Using probability distributions
- Creating scripts and functions
• Debugging Matlab code

Day 4:
• Creating and running simulations
• Boostrapping techniques for statistical analyses
• Dimensionality reduction (PCA, ICA, MDS)
• Basic pattern analyses (linear regression classifier, SVM, neural networks)