

USC Viterbi School of Engineering

ITP 168x: Introduction to MATLAB

Fall 2016 – Mon, Wed 6:30-7:50 pm

Location: GFS 118

Instructor: Serkan Kalender, Ph.D.

Office Hours: Wed 8-10 pm and by appointment

Contact Info:

e-mail: serkank@deltatau.com

Phone: 818-826-3979

Teaching Assistant: T.B.D.

Course Objective:

Fundamentals of MATLAB: a high-performance numeric computation and visualization environment. Overview of linear algebra and matrix manipulation; using 2-D and 3-D plotting routines; programming in MATLAB; basic numerical analysis

Concepts

Overview of MATLAB features, problem-solving methodology. arrays; use of files, functions and data structures; programming; plotting; solution of linear algebraic equations; statistics and probability; numerical methods for calculus and differential equations; and basics of symbolic methods, 2D and 3D visualization of scientific data

Prerequisite(s):

Math 118x or MATH 125 (Recommended)

Required Textbook:

None

Recommended Textbook:

“Mastering MATLAB” Duane Hanselman, Bruce Littlefield. Pearson Education.
ISBN: 9780136013303

Website

All course material will be on Blackboard (<http://blackboard.usc.edu>).

Grading Breakdown

Assignment	% of Grade
Labs	20
Homework	25
Midterm Exam	25
Final Exam	30
Total	100

Assignment Submission Policy:

Labs

Labs are assigned during class and must be completed before the end of the class period.

A late submission for a lab will be given a score of 0. No student is allowed to anticipate labs, or to begin work on labs before the class has started. No make-up labs will be given without **prior** approval and then only for emergency purposes.

.

Homework

Homework assignments that are turned in late will be accepted, but they will be marked down for each passing day.

Make-up Policy:

No make-up exams will be given without **prior** approval and then only for emergency purposes.

Computer Software and Labs

Students will be required to complete assignments and projects using MATLAB. This software is available in the on-campus computer labs as well as through the Laptop Loaner program sponsored by the University. A list of on-campus

computing centers can be found here: (http://www.usc.edu/its/spaces/computing_centers/index.html). In addition, MATLAB R2013a may be downloaded from the USC ITS website. It is the student's responsibility to obtain a working copy of the software and a working computer to perform the in-class lab assignments.

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

Disclaimer:

The instructor reserves the right to change, revise, and / or update the syllabus at any time during the semester if the need arises.

Introduction to MATLAB

ITP 168x (2 Units)

Course Outline

Week 1 – Introduction

- Basics of MATLAB
- Overview of features

Week 2 – MATLAB and problem solving

- Defining the problem
- Algorithm Development
- Coding
- Debugging
- Documenting

Week 3 – Arrays

- Defining and initializing an array
- 2D and multidimensional arrays
- Processing array elements
- Sorting arrays

Week 4 – Matrix Operations

- Manipulating matrices
- Matrix functions

Week 5 – Programming in MATLAB

- Programming syntax
- MATLAB interpreter
- Decision making using *if*
- Using loops for repetitive tasks
- Nested looping

Week 6 – Files and I/O

- Input and output statements
- Formatting output
- File I/O
- Reading and writing to files

Week 7 – Functions

- categories of built-in functions
- user defined functions

Week 8– Data Structures

Midterm Exam

Week 9 –Plotting and Model Building

- 2D graphs
- 3D plots, viewing angles
- Data visualization
- Data animation

Week 10 – Linear algebra & MATLAB and other languages

- Solving systems of equations
- Importing and exporting data to other programs

Week 11 –Statistics, Probability & Interpolation

- Solving basic problems in statistics and probability
- Random number generation
- Applying interpolation techniques

Week 12 – Differential equations

- Linear and non-linear ODEs
- Linear and non-linear PDEs

Week 13 – Graphical User Interfaces

- Designing GUIs
- Programming GUIs as toolkits for customized programs

Week 14 – Symbolic manipulation

- Writing and manipulating symbolic mathematics

Week 15 – Advanced topics

- MATLAB toolkits for specific fields

Week 16 – Final Exam