

EE 314

1. **Course Number & Name:** EE 314, Adv. Programming, Modeling, and Simulation
2. **Course Credit and Contact Hours:** 4 Units, 4 hours
3. **Course Coordinator:** Nansong Wu, Ph.D.
4. **Textbook:** Essentials of Matlab Programming by Stephen J. Chapman, 3rd edition, 2017, Cengage Learning, ISBN-13: 978-1305970656.
5. **Supplemental Materials:** Laptop for class activities. Matlab license required.
6. **Specific Course Information:**
 - a. **Description:** Pointers and dynamic allocation of storage; linked lists; an introduction to the object oriented programming (OOP) paradigm; classes and objects; encapsulation; member variables and member functions. Static arrays, dynamic arrays, stacks and queues, linked lists, trees, binary search trees, balanced trees (AVL, red-black, B-trees), heaps, hashing and graphs. System modeling techniques and applications such as generation of noise (random numbers) and correlated signal with different pdfs, measurement of statistical parameters like moments, queuing systems and system simulation.
 - b. **Prerequisites:** CS 115 and ES 220, or consent of instructor.
 - c. **Co-Requisites:** None
 - d. **Status:** Required for EE program, Elective, Selected Elective
7. **Specific Goals for the Course:**
 - a. **Specific outcomes of instruction:** Upon successful completion of this course the students will be able to:
 - i. Apply specific mathematical techniques to engineering problems, such as spectral analysis, obtaining probability density functions, or simulating engineering and scientific process.
 - ii. Create successful engineering computational programs that operate from “sensor to screen.”
 - i. Apply specific mathematical techniques to engineering problems, such as spectral analysis, obtaining probability density functions, or simulating engineering and scientific process.

- ii. Analyze and interpret observations from sensors and/or data obtained from the web.
 - iii. Function as a member of technical teams, where the team members may have vastly differing abilities.
 - iv. Present the results of analyses to stakeholders that have different levels of technical expertise, including engineering professors, other faculty, and members of the general public.
- b. This course supports the following ABET Student Outcomes:**
- i. SO-6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.*

8. Brief List of Topics to be Covered:

- a. The Matlab IDE
- b. Engineering contribution to sustainability
- c. Algorithm development
- d. Engineering analysis of water cycle
- e. Basic data types and operations
- f. Graphical user interfaces
- g. Advanced data types and operations
- h. File (device) input / output
- i. Scripts and data from the web
- j. Functions
- k. Curve fitting
- l. Advanced plotting
- m. Uncertainty
- n. Team functioning