SONOMA STATE UNIVERSITY
EE 314, Advanced Programming, Modeling, and Simulation
Fall 2017

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Email: bhhb@sonoma.edu
Office Hours: MTW 11:00 AM – 12:00 PM or by appointment

Lecture: Mon. & Wed. 1:00 pm – 2:50 pm, Salazar Hall 2009A

Course catalog 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.

Prerequisites: CS 115
Corequisite: MATH 345E, ES 345E, ES 220 or consent of instructor

Student Learning Objectives
- To develop a conceptual understanding of Matlab programming
- To understand and apply the skills necessary to develop programs in Matlab to solve practical and design problems

Textbook and other materials:
Edward B. Magrab, An Engineer’s Guide to Matlab, 3rd edition, 2010 (a free PDF can be found online)
Matlab student version ($100) https://www.mathworks.com/academia/student_version.html

**Please bring a laptop with Matlab installed to class.** If you do not have access to a laptop, the ES department or SSU Library can provide a loaner for your use this semester. Contact the instructor if you need help with this.
Grading: In-class work (15%), weekly homework (35%), midterm (20%), final (30%).

Letter grades: A (93-100), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D+ (67-69), D (63-66), D- (60-62), F (<60)

Academic Dishonesty: In all cases of academic dishonesty, for example cheating, plagiarism, or sabotage, the instructor will issue a grade for the work involved. Since the grade is often a “zero”, its assignment can result in a failing grade for the course. The complete campus policy on academic dishonesty may be found at http://www.sonoma.edu/uaffairs/policies/cheating_plagiarism.htm

Learning Disabilities: Students requiring special accommodations should meet with the instructor during office hours to discuss how to meet your needs this semester. Prior to meeting with the instructor, be sure you have met with the SSU Disability Student Services office and are familiar with their policies.

http://www.sonoma.edu/uaffairs/policies/disabilitypolicy.htm

Other SSU policies: Be sure you understand the policies that affect you as a student at SSU for this course.

Add/Drop Policy: http://www.sonoma.edu/catalog/08-10/17regulations.pdf#adddrop

Grade Appeal Policy: http://www.sonoma.edu/uaffairs/policies/gradepolicy.htm
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<td>Optimization</td>
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Course Learning Objectives (CLOs)

A. Understanding the motivation for the use of numerical techniques and Matlab in engineering problems and design
B. Understanding the Matlab environment and familiarity with standard practices and syntax
C. Understanding of data types, variables, arrays, matrices, and how they can be manipulated in the Matlab environment
D. Understanding of basic program design and approaches to problem solving that allow use of numerical techniques
E. Ability to apply program design; data types, manipulation to real-world problems, and to design
F. Ability to present numerical engineering work in a professional document

Assessment Methods

1. Assessment of Student Learning
   1.1. In-class discussion of concepts
   1.2. In-class worked programming examples applied to engineering problems
   1.3. Homework: written responses and explanation of numerical concepts applied to engineering problems
   1.4. Homework: written analytical problem solving and design based on numerical techniques
   1.5. Exams: midterm and final requiring written explanations of concepts and analytical problem solving with numerical techniques
   1.6. Research paper: overview of a current industry or research trend, conceptual and analytical description of the topic, application of numerical techniques to demonstrate concepts and make design decisions

2. Course Quality Assessment
   2.1. Student survey of course quality (mid semester and end of semester)
   2.2. Peer instructor assessment and feedback

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<tr>
<td>C</td>
<td>1.1, 1.2, 1.3, 1.5</td>
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<tr>
<td>D</td>
<td>1.1, 1.2, 1.3, 1.4, 1.5, 1.6</td>
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<td>E</td>
<td>1.2, 1.3, 1.4, 1.6</td>
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<tr>
<td>F</td>
<td>1.3, 1.4, 1.6</td>
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Course Outcomes (COs)
In this course the students will:

1. Know the motivation for numerical problem solving techniques as a supplement to analytical engineering problem solving and design
2. Know the underlying principles and syntax of applying numerical techniques in Matlab
3. Know how to solve problems and design using numerical techniques in Matlab
4. Know typical problems and limitations when using numerical techniques

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<tr>
<th>ABET Student Outcomes</th>
<th>Course Learning Objectives</th>
<th>Level of Support</th>
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<td>(a) An ability to apply knowledge of mathematics, science, and engineering</td>
<td>C, D, E</td>
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<td>(b) An ability to design and conduct experiments, as well as to analyze and interpret data</td>
<td>C, D, E</td>
<td>3</td>
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<td>(c) An ability to design a system, component, or process to meet desired needs</td>
<td>E</td>
<td>2</td>
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<td>(d) An ability to function on multidisciplinary teams</td>
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<td>(e) An ability to identify, formulate, and solve engineering problems</td>
<td>D, E</td>
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<td>(f) An understanding of professional and ethical responsibility</td>
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<td>(g) An ability to communicate effectively</td>
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<td>(h) The broad education necessary to understand the impact of engineering solutions in a global and societal context</td>
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<td>(i) A recognition of the need for, and an ability to engage in life-long learning</td>
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<td>(j) Knowledge of contemporary issues</td>
<td>D, E</td>
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<td>(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice</td>
<td>C, D, E</td>
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<td>A knowledge of probability and statistics, including applications appropriate to Electrical Engineering program</td>
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<td>knowledge of basic sciences, advanced mathematics and engineering and ability to apply that knowledge to analyze and solve practical problems in the field of electronics and communications as appropriate to Electrical Engineering program</td>
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<tr>
<td>expertise to design and conduct scientific and engineering experiments, analyze data and interpret results as appropriate to Electrical Engineering program</td>
<td>D, E</td>
<td>2</td>
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