ECE310 – Applications of Engineering Mathematics
Spring 2020 Syllabus

Description of Course

This course covers linear algebra, probability, and statistics. Linear algebra topics include: matrix operations, systems of linear equations, determinants, Gauss-Jordan elimination, vector spaces, basis and dimension, projections, determinants, eigenvalues and eigenvectors. Probability and statistics topics include: probability, random variables, density and distribution functions, sample mean and variance, point estimation, confidence intervals, and hypothesis testing. An introduction to Matlab and Matlab projects.

Location and Times

ECE 310, Applications of Engineering Mathematics

Class Times & Room:	Monday, Wednesday, Friday 1:00PM - 1:50PM R P Harvill Bldg, Rm 101 Monday 12:00PM-12:50PM Music Room 146

Instructor and Contact Information

Instructor:	Dr. Siyang Cao
Office:	ECE 356D
Phone:	520-621-4521
E-mail:	caos@email.arizona.edu
Office hours:	Monday 2:00PM-3:00PM Wednesday 2:00PM-3:00PM (Can schedule by appointment)
Web:	http://d2l.arizona.edu

Teaching assistants

TBD

Course Format

Four 50 minute lectures per week

Texts

Advanced Engineering Mathematics, Erwin Kreyszig, Wiley, John & Sons, Incorporated, ISBN: 9781118981344.

We will only need to use a few chapters of this book. I have made arrangements with the publisher to create a custom version that only contains these chapters. This version is available at the bookstore. The full version is of course acceptable and contains the same material but is significantly more expensive.

Matlab

Zybooks: Programming in Matlab

Course Web Site

http://d2l.arizona.edu

Course Prerequisites or Co-requisites

Math 254 Differential Equations, ECE 220 Basic Circuits, and ECE 275 Computer Programming for Engineering Applications.

Course Objectives

Students completing this course are expected to have a good understanding of the principles of linear algebra and probability theory, and the practical experience of using engineering software to solve problems involving these principles.

Course Outcomes

Upon completion of this course, students will have:

- an ability to perform matrix algebra
- an understanding of rank, basis, linear transformations, vector spaces, eigenvalues
- an ability to solve systems of linear equations
- an ability to describe basic principles of probability theory
- an understanding of random variables, probability distributions, means and variances

- an understanding of statistical principles for point estimation, confidence intervals, and hypothesis testing
- practical experience of using Matlab to solve linear algebra and probability problems

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: https://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02

Participating in course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures. Students who miss class due to illness or emergency are required to bring documentation from their healthcare provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

Course Communications

E-mail communication using the official UA email address is essential.

Examinations and Assignments: Schedule/Due Dates

There will be three midterm exams. The ***tentative*** dates of the midterm exams are:

Monday, February 17, 2020
Wednesday, March 25, 2020
Monday, April 27, 2020

A make-up exam will be given only in the case of illness and medical emergency (doctor's note required), and only if I am notified in advance of the exam by telephone.

There will be homework assigned on a weekly/bi-weekly schedule on lecture topics. Due dates of the homework will nominally be one week from the assignment date and will be posted for each homework. All homework submission will be electronically through D2L. All or a subset of each homework set will be graded. One late homework is acceptable, but even then a 50% deduction will be applied. Condensed solutions will be posted a few days after the due date. If you find a grading error, please send an email to the instructor and I will forward it to the grader. It may take some time to resolve the problem.

There will also be weekly Matlab assignments including participation assignments, challenge assignment, and project assignments. Participation assignments will need to be completed before Matlab labs. Challenge assignments will be due one week from the lab date. Due date for each assignment will be posted.

Final Examination

The final exam will be according to the University of Arizona Final Exam Schedule available at http://www.registrar.arizona.edu/schedules/finals.htm

Grading Scale and Policies

Graded work will include exams, homework problems, and Matlab assignments. Your total number of points compared to an absolute scale will determine your final grade, i.e. no curving of grades (The number or % of A's, B's, etc. is not fixed). The following weights will be used to determine your point total:

Exam 1	15%
Exam 2	15%
Exam 3	15%
Final Exam	35%
Homework	10%
Matlab Assignments	10%

A term point total of 90 or above is guaranteed an A, 80 or above at least a B, 70 or above at least a C, 60 or above at least a D.

Dispute of Grade Policy: Any suspected grading errors must be reported no later than the next class meeting after the exam is returned to you.

Withdrawals

Requests for incompletes (I) and withdrawal (W) must be made in accordance with University policies which are available at https://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and https://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal respectively.

Note that students wishing to drop the course AT ANY TIME must take appropriate action. Ceasing attendance does not automatically drop you from the course. IF YOU ARE STILL ON THE CLASS ROLL AT THE END OF THE SEMESTER, YOU WILL RECEIVE O'S FOR ANY WORK NOT COMPLETED AND WILL BE GRADED ACCORDINGLY.

Classroom Behavior

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (i.e. texting, chatting, reading a newspaper, making phone calls, web surfing, etc).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self. See: http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Accessibility and Accommodations

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit http://drc.arizona.edu/.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

The University Libraries have some excellent tips for avoiding plagiarism available at: https://new.library.arizona.edu/research/citing/plagiarism

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination, http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Confidentiality of Student Records

https://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Scheduled Topics

The topics that will be discussed in this course are as follows:

Linear Algebra:	**Probability, Statistics:**
Matrices, Vectors: Addition and Scalar Multiplication Matrix Multiplication Linear Systems of Equations, Gauss Elimination Linear Independence, Rank of a Matrix, Vector Space Solutions of Linear Systems: Existence, Uniqueness Determinants, Cramer's Rule Inverse of a Matrix, Gauss-Jordan Elimination Vector Spaces, Inner Product Spaces, Linear Transformations Eigenvalues, Eigenvectors Some Applications of Eigenvalue Problems Symmetric, Skew-Symmetric, and Orthogonal Matrices Eigenbases, Diagonalization, Quadratic Forms Complex Matrices and Forms	Data Representation, Average, Spread Experiments, Outcomes, Events Probability Permutations and Combinations Random Variables, Probability Distributions Mean and Variance of a Distribution Binomial, Poisson, and Hypergeometric Distributions Normal Distribution Distributions of Several Random Variables Introduction to Statistics Random Sampling Point Estimation of Parameters Confidence Intervals Testing Hypotheses.