Engineering Probability and Stochastic Processes

EE361 Fall 25

http://www.ee.unlv.edu/~b1morris/ee361

Website Webcampus

Professor:	Brendan Morris	Class:	TuTh 14:30-15:45, CEB 142
E-mail:	brendan.morris@unlv.edu	Office Hours:	TBD
Office:	SEB 3216	Final:	Th 12/11, 15:10-17:10
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Textbook

Signals and Systems, A.V. Oppenheim, A.S. Willsky, and S.H. Nawab, 2e	ISBN: 9780138147570
Schaum's Outlines: Signals and Systems, H. Hsu, 4e	ISBN: 9781260454246
Schaum's Outlines: Probability, Random Variables, and Random Processes, H. Hsu, 4e	ISBN: 9781260453812

Recommended Text

Schaum's Outlines: Probability and Statistics, M Spiegel, 4e	ISBN: 9780071795579
Linear Systems and Signals, B.P. Lathi, 2e	ISBN: 9780195158335

Grading

Final:	25%	Th 12/11 15:10-17:10
Midterm:	25%	Tu 10/14
Quizzes (2):	20%	Tu 9/16, Th 11/13
Homework:	20%	Weekly
Participation:	10%	"In Class"

- This course will utilize a "flipped" classroom. Lectures (video and slides) will be provided online for asynchronous viewing while the "lecture" time will be used as extended office hours and problem solving session.
- Students are expected to come to lecture prepared. We will not do a traditional lecture but instead answer questions and work on problems. You should come with your problems ready to ask. Additionally, lecture reading assignments should be completed before lecture in order to be successful.
- **Class attendance during the "lecture" time is still required**. It will be difficult to be successful if you are not engaged. Make sure you are reading the book and watching recorded lectures.
- Homework will be assigned weekly and may include problems for which Matlab can provide assistance.
- Students may study together in groups but all assignments must be completed individually. Copying homework is unacceptable and will result in a fail in the class with an F grade.
- Homework will be due via Webcampus (Canvas) on the designated date. No late homework will be accepted unless prior notification and arrangements are made.
- Class participation will be recorded through online questions. (Webcampus classXX quizzes).
- Exams are cumulative but will emphasize new material.
- Exams should be i) completed by you alone ii) without the use of any books or reference material other than explicitly allowed iii) without access to internet outside of Webcampus and iv) should not be discussed with any other student until after the exam is closed.

- NOTE: Homework and exams will be submitted online via Webcampus. You must obtain tools to scan or make pdf images of your work.

Catalog Description
Stochastic and deterministic signals and linear systems. Analog and discrete Fourier Series, analog and discrete Fourier transforms, basic probability theory, stochastic processes, stochastic signals and linear systems.

Prerequisites: EE 360 and (MATH 432 or MATH 459 or CpE 260)

Topics
The most up-to-date information regarding the class will be available on the course website – this will include the course schedule and assignments.

`http://www.ee.unlv.edu/~b1morris/ee361`

- Signals spaces, orthogonal signal spaces, signal projections, and correlation.
- Fourier series analysis and synthesis with trigonometric and exponential basis.
- Continuous and discrete time Fourier Transform.
- Introduction to probability, random variables, and random processes including probability space, distribution and density functions, means, variances, correlations and covariances.
- Spectral analysis of random process
- Analysis of linear systems with random signals.

Additional course material not present in the textbook will be distributed to the class when needed. Extra problems can be found in the recommended texts. The Schaum series book has a number of worked problem solutions making it a good investment.

Course Outcomes (Program) [UULO]
Upon completion of this course, students will be able to:

- Determine a linear combination of functions that optimally represents a finite length signal. (1, 6) [1, 2]
- Determine the similarity of two signals using correlation. (1, 6) [1, 2]
- Analyze finite length and periodic, discrete and analog signals using the Fourier Series and transform. (1, 6) [1, 2]
- Determine a linear system's response to a periodic input signal using the Fourier Series. (1, 6) [1, 2]
- Model a random signal by a random process. (1, 6) [1, 2]
- Determine the mean, variance, autocorrelation, cross-correlation, covariance and power spectral density of a random process. (1, 6) [1, 2]
- Analyze a linear system's response to a random signal. (1, 6) [1, 2]

Course Policies

- There will be no make-up exams or late homework without prior arrangements.
- Extensions will only be granted for medical emergencies or due to the observance of a religious holiday. The instructor must be notified of the absence prior to the last day of late registration.
- As a university student it is your responsibility to conduct yourself ethically and with integrity as described in the Academic Misconduct Policy. Cheating and plagiarism will not be tolerated. Any student caught cheating will be given an F grade.
  (`https://www.unlv.edu/studentconduct/student-conduct`)

Electrical Engineering Program Objectives
The Program Educational Objective of the Electrical Engineering program is to create, apply, and disseminate knowledge immediately or within a few years after graduation such that the graduate:

1. can successfully practice and mature intellectually in the field of Electrical Engineering or a related field.
2. can be admitted to and successfully progress through a post graduate program in Electrical Engineering or related program

Electrical Engineering Program Goals
To achieve these objectives and goals, each graduate of the Electrical Engineering Major will attain the following outcomes before graduation:

1. Appropriate technical knowledge and skills
2. Appropriate interpersonal skills
3. The knowledge and skills to be a responsible citizen

Electrical Engineering ABET Student Outcomes
To achieve the above objectives and goals, each graduate of the Electrical Engineering Major will attain the following outcomes before graduation:

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
(3) An ability to communicate effectively with a range of audiences
(4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

University Undergraduate Learning Outcomes [UULO]
The five University Undergraduate Learning Outcomes (UULOs) define what all UNLV students should know and be able to do when they graduate. Because students engage with the UULOs in both their general education and academic majors, the UULOs help make the undergraduate experience intentional and coherent.

Full context online (`https://www.unlv.edu/provost/gen-ed/uulo`)

[1] Intellectual Breadth and Lifelong Learning
[2] Inquiry and Critical Thinking
[3] Communication
[4] Global/Multicultural Knowledge and Awareness
[5] Citizenship and Ethics

Academic Policies for Students
`https://www.unlv.edu/policies/students`