

**Klipsch School of Electrical and Computer Engineering  
College of Engineering  
New Mexico State University**

**EE 302: Random Variable and Signal Analysis, 3.0 Credits  
Spring 2006**

**Class Schedule:** MWF 9:30–10:20PM

**Class Location:** Thomas & Brown, Rm 204

**Instructor:**

Dr. Charles (Chuck) Creusere

Room 160D Goddard Hall

Phone: 646–3919

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**Office hours:** M 2:20–3:30, Th 3–4; by appointment (recommended)

**Course Description:**

The application of probability, random variables and random processes to problems in electrical engineering. Topics include modeling random experiments, discrete probability, random variables, probability density functions, functions of a random variable, computing mean, variance, moments and characteristic functions, joint random variables, confidence intervals, and related topics. Applications to be covered include probabilistic modeling of electrical/electronic systems in general and, in particular, the analysis of simple communications systems.

**Prerequisites:** EE211

**Textbook:**

R.D. Yates and D.J. Goodman, *Probability and Stochastic Processes: A friendly introduction for electrical and computer engineers*, 2<sup>nd</sup> Edition, Wiley, 2005, ISBN 0–471–27214–0

**Software:**

MATLAB , (available in all T&B computer labs). Purchase of MATLAB is optional.

**Online Resources:** WebCT

**Course Objectives:**

After completing this course, the student should be comfortable with probability theory, basic statistical estimation, and the application of these to electrical engineering. Specific objectives include:

1. Understanding a set theory approach to probability
2. Understanding discrete and continuous random variables and how they can be used to model and analyze systems
3. Understanding probability density functions, cumulative distribution functions, and probability mass functions and how they can be used to characterize engineering systems
4. Understanding sets of random variable and how they relate to electrical engineering applications
5. Understanding how to estimate random variables and how such estimates can be used to characterize engineering processes
6. Understanding the basics of stochastic processes and their application to signal processing and communications systems
7. Using Matlab to better understand the above-listed concepts and to apply them to selected problems

in electrical and computer engineering.

### Contributions of EE302 to Meeting the Professional Component

*Random Variable and Signal Analysis* is the new undergraduate foundation course in probability theory and stochastic processes within the Electrical Engineering curriculum, designed to replace the existing statistics requirement. It is considered an engineering topics course in the Professional Component. In this class, students will learn basic probability and random process theory, applying this theory to electrical engineering problems as they learn it in both an analytical and a computational framework. A particular focus in our applications will be on the stochastic modelling and simulation of both signals and systems.

### Relationship of the Course to Program Objectives

<i>Course Objective</i>						
	Ib	IIb	IIIa	IIIb	IIIe	IIIk
1		X				
2		X	X		X	
3		X	X			
4		X	X			
5		X	X	X		
6		X	X			
7	X	X	X			X

### Relevant Program Outcomes

- Ib. Use of computers to assist in solving EE problems.
- IIb. Knowledge of probability and statistics and EE applications
- IIIa. Ability to apply knowledge of mathematics, science and engineering
- IIIb. Ability to design and conduct experiments as well as to analyze and interpret data
- IIIe. Ability to identify, formulate, and solve engineering problems
- IIIk. Ability to use the techniques, skills, and modern engineering tools necessary to engineering practice

### Grading:

Homework: There will be weekly homework assignments consisting of textbook problems and/or computer simulation projects. Worth 20% of the final grade. Late assignments will not be accepted. Solutions will be available on the class website.

Miniprojects: These are practical assignments that will given out periodically. These will focus on the use of computers to simulate and solve probabilistically oriented problems in electrical and computer engineering. They will be worth 14% of the class grade in total.

Exams: There will be three midterm exams worth a total of 36% of the final grade. There will be no makeup exams except in the case of serious documented illness. The exam dates and times are to be

determined.

Final: The final, comprehensive examination is scheduled for May 12, 2006 from 8:00–10:00AM. It is worth 30% of the final grade.

Re-grading: If a student feels that the grading on any assignment or exam is in error, they must bring the problem to the instructors attention **within 1 week** of receiving the graded assignment and solutions.

*Calculating Final Grades*: Final grades will be calculated either on an absolute scale or using the clustering methodology explained in class—whichever is more beneficial to the student. Letter grades will not be assigned for individual exams.

### **Policies:**

You may discuss homework and programming assignments with either myself, the TA, or your peers. This discussion could include among other things, various approaches to a homework problem, algorithms for a software project, programming tips, and various theoretical insights. Be aware, however, that all submitted solutions to homeworks and projects must be written or coded (in the case of software) by the individual. There is to be no "sharing" of solutions. **Any plagiarism or cheating will result in an automatic F in the course.**

### **Rescheduled/Canceled Classes:**

I will be attending and presenting at the Data Compression Conference during the week of March 27–31. We will have at least 1 class taught by a graduate student and the others will be made up in some other way.

### **Students with Disabilities:**

If you have or believe you have a disability, you may wish to self-identify. You can do so by providing documentation to the Service for Students with Disabilities (SSD) office located in the Garcia Annex, room 102. The phone number is 646–6840. Appropriate accommodations may then be provided for you.

If you have a condition which may affect your ability to exit safely from the premises in an emergency or that may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the coordinator of SSD. If you have general questions about the Americans with Disabilities Act (ADA), call the ADA coordinator at 646–3635.

**Prepared by:** C. Creusere, 01/19/06