ECE 353 – Introduction to Probability & Random Signals

Catalog Description: Introductory discrete and continuous probability concepts, single and multiple random variable distributions, expectation, introductory stochastic processes, correlation and power spectral density properties of random signals, random signals through linear filters.

Credits: 3 **Terms Offered:** Winter, Spring

Prerequisites: ECE 351 and (MTH 254 or MTH 254H).

Courses that require this as a prerequisite: ECE 461, ECE 462, (indirectly) ECE 560

Structure: Two 75-minute lectures per week

Instructors: R. Raich and M. Magaña

Course Content:

- Probability concepts for discrete and continuous random variables
- Distribution and density functions of single random variables (rvs)
- Specific rv distributions: Gaussian, uniform, Rayleigh, exponential, binomial, Poisson, etc.
- Operations on rvs: transformations, expectation
- Multiple (vector) rvs and joint distributions/densities and statistical independence
- Central limit theorem
- Operations on multiple rvs: linear transformations, joint expectations
- Random processes(sigs.): temporal auto/cross correlation functions, power spectral density
- Random signals/processes: ergodicity/time averages
- Random processes (signals) through linear systems/filters

Measurable Student Learning Outcomes:

At the completion of the course, students will be able to…

1. **Apply** the concept of probability to experiments that have random outcomes (ABET outcomes: A, B, L, m, n)
2. **Recognize** a random variable and its properties (ABET outcomes: A, L, m, n)
3. **Recognize a** bi-variate random vector and its properties (ABET Outcomes: A, L, m, n)
4. **Apply** the concept of statistical estimation (ABET outcomes: A, b, L, n)
5. **Identify** random phenomena incorporating the element of time that are embedded in real-life physical processes in electrical engineering systems (ABET outcomes: A, e, L, m, n)

Learning Resources:

- A.H. Haddad, *Probabilistic Systems and Random Signals*, Prentice Hall, 2006, ISBN 0-13-009455-2 (required).

Students with Disabilities:
Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

Link to Statement of Expectations for Student Conduct:
http://oregonstate.edu/admin/stucon/achon.htm

Revised: 5/24/07
Revised Students with Disabilities: 2/15/11
Revised Course Learning Outcomes: 3/15/13
Revised Course Learning Outcomes: 10/13/14