**EE 5302:** Random Signals and Noise

Summer 2016

**Instructor:** Mostafa Ghandehari

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**Office Hours:** By appointment

**Section Information:** EE 5302-001,002

**Time and Place of Class Meetings:** NH 105, MW 1:00 - 2:50pm

**Description of Course Content:** Probability, random variables, and stochastic processes in physical systems. Topics include probability space, discrete and continuous random variables, density and conditional density functions, functions of random variables, mean-square estimation, random signals, system response, optimum system design, and Markov processes.

**Student Learning Outcomes:**

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| **SL. No.** | **Learning Objectives** | **Expected Student Learning Outcomes** | **Evaluation Method** |
| 1 | Basic Concepts of Probability Theory | Ability to use counting methods for calculating probability. Understanding of axioms of probability, Baye’s Rule, sequential experiments. | Homework Asignments, Exams, |
| 2 | Random Variables - Discrete and Continuous | Notion of Random variables, cumulative distribution functions and probability density functions of random variables and a few important random variables | Homework Assignments, Exams |
| 3 | Multiple and Vector Random Variables | Knowledge of multiple random variables, mean squared estimation | Homework Assignments, Exams |
| 4 | Central Limit Theorem | Knowledge of Central Limit Theorem and a deep understanding of Normal Distribution | Homework Assignments, Exams, |
| 5 | Random Processes | Knowledge of Continuous and Discrete Random Processes, Stationarity, Time Averages, Erogdicity, Power Spectral Density | Homework Assignments, Exams |
| 6 | Linear Systems | Knowledge of Response of Linear System to Random Processes, Optimum Linear System, Power Spectral Density of Linear Systems | Homework Assignments, Exams |
| 7 | Markov Process | Knowledge of Various Orders of the Markov Process | Homework Assignments, Exams |
| 8 | Modeling Techniques | Proper modeling techniques to generate random variables, map them through functions. | Homework Assignments, Exams |

**Requirements:** Class attendance is highly encouraged. Previous history suggests that a lot of student’s difficulty with the course is caused by missed classes and then the inability to catch up with the material.

**Required Textbooks and Other Course Materials:** Probability and Random Processes for Electrical Engineering, Third Edition, Alberto Leon-Garcia

**Descriptions of major assignments and examinations and Grading:**

Homework Assignments - 10% of grade

Project - 10% of grade

Midterm Exam 1 - 25% of grade

Midterm Exam 2 - 25% of grade

Final Exam - 30% of grade

**Attendance:** Attendance in all classes is highly recommended. When a student might miss a class or two, such absences must be cleared with ahead of time with the instructor so that you can be advised on how to handle the lectures that you missed.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://wweb.uta.edu/ses/fao>).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Academic Integrity:** At UT Arlington, academic dishonesty is completely unacceptable and will not be tolerated in any form, including (but not limited to) “cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts” (UT System Regents’ Rule 50101, §2.2). Suspected violations of academic integrity standards will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

**Student Support Services**:UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may contact the Maverick Resource Hotline by calling 817-272-6107, sending a message to [resources@uta.edu](mailto:resources@uta.edu), or visiting [www.uta.edu/resources](http://www.uta.edu/resources).

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory will be asked to complete an online Student Feedback Survey (SFS) about the course and how it was taught. Instructions on how to access the SFS system will be sent directly to students through MavMail approximately 10 days before the end of the term. UT Arlington’s efforts to solicit, gather, tabulate, and publish student feedback data is required by state law; student participation in the SFS program is voluntary.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.