

**ECE 5300/6300 PROBABILITY AND RANDOM PROCESSES**  
**Spring 2024**

- Course Description: Random process fundamentals, including spectral analysis, special classes of random processes, linear systems response to random processes, and applications.
- Pre-requisites: Introductory Probability Course such as EE 3384 or EE 4384 or STAT 3330. Introductory course in Signals and Systems. OR Instructor approval.
- Prerequisites by Topic:
1. Probability Theory
  2. Linear Algebra (Algebraic concepts not geometric concepts)
  3. Fourier (CTFT, DTFT, and DFT), Laplace, and Z Transforms
  4. Linear Systems Theory (superposition, convolution, transfer functions)
- Textbook: L.C. Ludeman, **Random Processes: Filtering, Estimation, and Detection**, John Wiley & Sons, 2003.
- Library printed copy on reserve under my name
  - The book is available online via the UTEP subscription to **O'Reilly Online Learning: Academic/Public Library Edition** . You need to connect via the library to be authenticated.  
[https://utep.primo.exlibrisgroup.com/view/action/uresolver.do?operation=resolveService&package\\_service\\_id=8551310680007051&institutionId=7051&customerId=7050&VE=true](https://utep.primo.exlibrisgroup.com/view/action/uresolver.do?operation=resolveService&package_service_id=8551310680007051&institutionId=7051&customerId=7050&VE=true)
  - You can buy it electronically via IEEE  
<https://ieeexplore.ieee.org/book/5271182>
- I will also use materials from some of the references below to complement the textbook.
- Instructor: Dr. Miguel Vélez-Reyes, Professor of Electrical and Computer Engineering  
Office: Engineering Annex A-327  
Phone: (915) 747-5470  
e-mail: mvelezreyes@utep.edu
- Office Hours: Mon-Thu 10:00 am to 12:00 pm and by appointment. An MS Teams group will be created for the course. **I can also answer your questions via e-mail or the MS Teams Chat.**
- YOU HAVE TO READ CLASS ANOUNCEMENTS IN BLACKBOARD. Blackboard sends a reminder emails. All handouts and class documents will be made available via Blackboard. I do not print handouts.**

## References:

1. R.G. Gallager, **Stochastic Processes: Theory for Applications**, Cambridge Press, 2014.
2. J. Walrand, **Lecture Notes on Probability Theory and Random Processes**, ECE Department Univ. of California Berkeley, August 2004, <https://shorturl.at/nU034>.
3. H. Stark and J.W. Woods, **Probability, Statistics, and Random Processes for Engineers**, 4<sup>th</sup> Edition, Prentice Hall, 2011.
4. A. Leon-García, **Probability, Statistics, and Random Processes For Electrical Engineering**, 3<sup>rd</sup> Edition, Addison Wesley, 2008.
5. John A. Gubner, **Probability and Random Processes for Electrical and Computer Engineers**, Cambridge University Press, 2006.
6. J. Shynk, **Probability, Random Variables, and Random Processes: Theory and Signal Processing Applications**, Wiley-Interscience, 2012.
7. S. Kay, **Intuitive Probability and Random Processes using MATLAB**, Springer, 2005.
8. A. Papoulis and S.U. Pillai, **Probability, Random Variables, and Stochastic Processes**, Fourth Edition, McGraw-Hill, 2002.
9. B. Hajek, **Random Processes for Engineers**, Cambridge Press, 2015.
10. V. Krishnan, **Probability and Random Processes**, John Wiley, 2006.
11. S. Miller and D. Childers, **Probability and Random Processes with Applications to Signal Processing and Communications**, Academic Press, 2012.

Grading policy:

Your final grade will be based on two partial exams (40 %), a final exam (40%) literature review (10 %), and homework (10 %). Grades (for sure):

At least 90	A
At least 80	B
At least 70	C
At least 60	D
59 or less	F

There will be a “gray area” between two-letter grades in the final distribution, so that two people getting the same weighted average grade could get different letter grades. If you are in one of these gray areas, whether you get a higher or lower grade depends primarily on two factors: (a) class participation, and (b) whether your performance has been improving or declining.

An **incomplete** grade is given **only** for a valid reason when arrangements have been made with me and, in that case, only if the student was passing the course.

Classroom Etiquette:

Part of being a professional is being on time and being prepared to do your job. This applies to your career as a student as much as it does to your future career as an engineer. You are expected to be in class and prepared to participate at the scheduled start time. Wireless devices (cell phones, PDA's, MP3 players, Smart phones, etc.) are allowed in the classroom. It is recognized that devices of this sort provide emergency access for your family and loved ones. However, please use professional discretion with these devices. This includes shutting them off or setting them in silent mode before coming to class. Do not use text messaging or web browser features while you are in class. If you must answer the phone, please do so after discretely leaving the room. You may return to class once your call is finished.

You can take pictures of the boards during class using your cell phone.

You are not allowed to work on your computer on other activities not related to the class. Do not come to class if you need to use class time to work on something else.

Cheating and Plagiarism:

Cheating is unethical and not acceptable. Plagiarism is using information or original wording in a paper without giving credit to the source of that information or wording: it is also not acceptable. Do not submit work under your name that you did not do yourself. You may not submit work for this class that you did for another class. If you are found to be cheating or plagiarizing, you will be subject to disciplinary action, per UTEP catalog policy.

Student Services:

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to [cass@utep.edu](mailto:cass@utep.edu), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [utep.edu/cass](http://utep.edu/cass)

**Topics:**

1. Review of Probabilities
2. Random processes: characterization, classification, and examples of random processes
3. Linear systems response to random processes
4. Applications

**Computer Usage:** Use of MATLAB in homework to complement class discussions.

**Revised by Dr. Miguel Vélez-Reyes in January 15, 2024.**