Syllabus

- **Instructors:**

Instructor: Prof. Mojtaba Vaezi
E-mail: mvaezi@villanova.edu
Phone: (610) 519-5658
Office: Tolentine 433A
Office Hours: W 1:30-2:30 p.m. or by appointment

- **Time and Location:**

	Time	Location
Lectures	T 06:10 pm to 08:50 pm	CEER 208

- **Prerequisites:**
ECE 3720 (Eng. Probability & Statistics) or an equivalent course

- **Course Description:**
This is an advanced course on probability, random signals, and stochastic process, and will cover

  - **Probability theory:** discrete and continuous random variables, functions and transformations of random variables, and conditional and joint distributions.
  - **Random processes:** correlation and spectral analysis, the Gaussian process and the response of linear systems to random processes.
  - **Important random processes:** Poisson process, Markov chain, random walk, Wiener process, and Brownian motion.
  - **Statistics:** mean square estimation, parameter estimation, Baysian estimation.

- **Assessment:**

	Weight	Remarks
Homework	5%	8-10 homework; each due in 1 week
Scribing	10+5%	scribing lectures for one chapter
Midterm 1	20%	October 2, 2018 (in class, 1 hour)
Midterm 2	20%	November 6, 2018 (in class, 1 hour)
Final Exam	45%	According to the university schedule

Final grade = $\max(\alpha, \beta)$ where
α = 0.05*HW + 0.15*scribing + 0.2*Midterm 1 + 0.2*Midterm 2 + 0.45*Final
β = 0.05*HW + $\frac{95}{85}$(0.2*Midterm 1 + 0.2*Midterm 2 + 0.45*Final)
(the range of all grades assumed to be from 0 to 100; in the case of scribing there is 5 points bonus.)

The scale used to assign letter grades is:

Letter	Numerical	Letter	Numerical
A	94-100%	B^-	78-82%
A^-	90-93%	C^+	74-77%
B^+	87-89%	C	70-73 %
B	83-86%	F	less than 70%

- **Homework policy:**
  - Assigned on Tuesday, due the following Tuesday at 5pm.
  - Will not be corrected! However submits with an attempt on all questions will obtain a full grade
  - Please submit your homework online in LaTeXand make sure that the answers are in order and the solutions are neat and readable (in case handwritten).

- **Textbook and References:**

  1. A. Papoulis and S. U. Pillai *Probability, Random Variables, and Random Signal Principles*, 4th ed., McGraw Hill, 2002.
  2. H. Stark and J. W. Woods, *Probability, Statistics, and Random Processes for Engineers*, 4th ed., Pearson 2012.
  3. H. Hsu, *Schaum's Outline of Probability, Random Variables, and Random Processes*, McGraw Hill, 1997.
  4. G. Grimmett and D. R. Stirzaker, *Probability and Random Processes*, Oxford Uni. Press.
  5. G. Grimmett and D. R. Stirzaker, *One Thousand Exercises in Probability*, Oxford Uni. Press.

- **Outline:**
  - Introduction to probability and random variables
  - Functions of random variables
  - Expectation and moments
  - Random vectors and random sequences

  - Random processes
  - Markov processes and Markov chains
  - Parameter estimation (if time allows)

- **Other Information:**
  - **Student Code of Academic Integrity:** Academic integrity is a primary value for any institution of higher education. Cheating on tests, plagiarism, and other forms of academic dishonesty and misconduct are completely unacceptable, especially at Villanova which prides itself on its commitment to the Augustinian values of truth, unity, and love. Students are expected to adhere to Villanova's Code of Academic Integrity accessible via the following link: https://www1.villanova.edu/villanova/provost/resources/student/policies/integrity.
  - **Statement on Disability:** "It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. If you are a person with a disability (non-physical) please register with the Learning Support office by contacting Learning.support.services@villanova.edu or 610-519-5176 as soon as possible. Registration is needed in order to receive accommodations. The Office of Disability Services collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with physical disabilities the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact Gregory Hannah, advisor to students with disabilities @ 610-519-3209 or visit the office on the second floor of the Connelly Center."