# ESE/EEO 306: Random Signals and Systems

## Summer 2025

**Catalog Description:**
Random experiments and events; random variables and random vectors; probability distribution functions; random processes; Binomial, Bernoulli, Poisson and Gaussian processes; system reliability; Markov chains; significance testing; detection of signals; estimation of signal parameters; properties and applications of autocorrelation and cross-correlation functions; power spectral density; response of linear systems to random inputs.

**Topics:**

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| Module 1 | **Probability Basics:** Random experiments, sample space, probability measure and axioms of probability.<br>**Conditional Probability:** Conditional probability, total probability theorem, Bayes theorem and independence. |
| Module 2 | **Combinatorics:** Permutations, combinations, and binomial theorem.<br>**Discrete Random Variables:** Properties of discrete random variables; examples of discrete random variables: Bernoulli, Binomial and Geometric; Poisson random variable and its applications |
| Module 3 | **Continuous Random Variables**: Properties of continuous random variables; examples of continuous random variables: Uniform, Exponential and Normal. |
| Module 4 | **Joint Random Variables & Expectations:** Jointly distributed random variables and their properties; marginals and independence; expectations of one random variable and joint random variables. |
| Module 5 | **Random Processe**s: Properties of random processes; Bernoulli, Binomial and Poisson random processes. |