

EE 562a

Lecture Notes

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1.0 Introduction to Random Processes

In this class we will study the theory of random or stochastic processes. Some applications in detection and estimation theory will be provided. The theory we learn in this course has applications in communications, signal and image processing, control theory and other areas. Several distinct mathematical concepts will be covered.

A random process is a finite or possibly infinite collection of random variables. A random process $X(u, t)$ assigns a function $X(u_0, t)$ to each outcome $u_0 \in U$. Here U is a sample space and $t \in T$ (an index set).

For fixed $t_0 \in T$, $X(u, t_0)$ is a random variable. For fixed outcome $u_0 \in U$, $X(u_0, t)$ is a sample function. $X(u_0, t_0)$ is a scalar.

We will revisit this more formally later.