

# Normal Processes

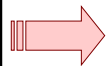
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## Outline

- Normal Processes
- First Order Density
- n<sup>th</sup> Order Density
- Covariance Matrix

### Normal Process - X(t)



**X(t<sub>1</sub>), X(t<sub>2</sub>), ..., X(t<sub>n</sub>) are jointly normal**

### 1<sup>st</sup> Order Density

$$f(x; t) = \frac{1}{\sqrt{2\pi C(t, t)}} e^{-\frac{[x - \eta(t)]^2}{2C(t, t)}}$$

**Note: Linear Combinations of normal processes are also normal**

### n<sup>th</sup> Order Density

$$f(x_1, \dots, x_n; t_1, \dots, t_n) = \frac{1}{(2\pi)^{\frac{n}{2}} |\Lambda|^{\frac{1}{2}}} \exp\left\{-\frac{1}{2} \sum_i \sum_j A_{ij}^{-1} (x_i - \eta(t_i))(x_j - \eta(t_j))\right\}$$

### Covariance Matrix

$$\Lambda = [C(t_i, t_j)]$$

$$|\Lambda| = \det|\Lambda|$$