

Course Content

Course Title (English)	Stochastic Signals and Systems
Course Title (Chinese)	隨機信號和系統
Credit	3
Instructor	Prof. Ju-Hong Lee 李枝宏 教授
Outline	<p>This is an overview of the topics that are covered in the course:</p> <p>Probability Theory: random variables, probability distributions, moments, multivariate distributions, functions of random variables, parametric estimation, maximum-likelihood estimation.</p> <p>Random Processes: moments of random processes, ergodicity, the Poisson process, the Wiener process and white noise, stationarity, estimation, linear systems and random processes, power spectrum.</p> <p>Optimal Filtering: minimum mean square error, parametric estimation, optimal finite-observation linear filters, Kalman filters.</p> <p>The contents of the course are as follows:</p> <p>I. Probability and Random Variables</p> <ul style="list-style-type: none">a) Transformations and Operations on Random Variablesb) Vector Random Variables and Sequence of Random Variables.c) Minimum Mean-Square Estimation, the Orthogonality Principlesd) The Multivariate Distribution. <p>II. Random Processes and Spectral Analysis</p> <ul style="list-style-type: none">a) Stationary Concepts, Correlation Functions.b) Time Averages, Ergodicity.

	<p>c) Correlation Functions and Power Spectrum of Stationary Processes.</p> <p>d) Noise Mechanisms, the Gaussian and Poisson Processes.</p> <p>e) Representations of Random Processes, Orthogonal Expansions.</p> <p>III. Transformations and Operations on Random Processes</p> <p>a) Linear Systems with Random Inputs.</p> <p>b) Representation and Processing of Narrowband Random Processes.</p> <p>c) Finite-State Linear Systems Driven by White Noise.</p> <p>IV. Optimum Linear Systems</p> <p>a) The Formulation of Optimum Systems.</p> <p>b) Optimum Linear Systems that Maximize Signal-to-Noise Ratio.</p> <p>c) The Orthogonality Principles in Linear Mean-Square Estimation.</p> <p>d) Least Mean-Square Error Filtering, Estimation, Prediction, and the Wiener Filter Theory.</p>
<p>Goal</p>	<p>本課程之目標為提供相關科系學生必須具備之機率和信號與系統理論基礎以瞭解隨機信號之特性以及處理隨機信號之最佳線性系統之設計理論。</p> <p>The main goal of this course is to provide those including undergraduate and graduate students with the theoretical fundamentals and the applications related to the work dealing with the characteristics and processing of stochastic signals.</p> <p>Several topics will be presented to help students to establish their academic background required for taking advanced courses or pursuing researches.</p>
<p>English Teaching</p>	<p><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>
<p>Teaching Material</p>	<p><input checked="" type="checkbox"/> English <input type="checkbox"/> Chinese</p>