

數學系課程核心教材內容

課程名稱：(中文) 計算統計 (英文) Computational Statistics				開課單位	統科碩士班
				課程代碼	2315733
學分數	3	必/選修	必修	開課年級	一
<p>教學目標： This is an introductory course on simulation by using Monte Carlo technique or with any Markov chain theory. In this course, we will focus on an abundance of examples and problems, relating the concepts with statistical practice and enhancing the application of simulation techniques to statistical problems of various difficulties.</p> <p>課程概述： In this course we show how to analyze a model by use of a simulation study. We first show how a computer can be utilized to generate random numbers, and then how these random numbers can be used to generate the values of random variables from arbitrary distributions. Using the concept of discrete events we show how to use random variables to generate the behavior of a stochastic model over time. Monte Carlo statistical methods, particularly those based on Markov chains, have now matured to be part of the standard set of techniques used by statisticians. This course is intended to bring these techniques into the classroom.</p> <p>先修科目或先備能力：</p>					
建議參考書目	<p>1. <i>Simulation</i> 4th Ed by Sheldon M. Ross, Academic Press.</p> <p>2. <i>Monte Carlo Statistical Methods</i>, 2nd Ed. by C. P. Robert and G. Casella (2004),</p>				

課程大綱

單元主題	內容綱要	上課週數
Generating Random Variables	(i) Pseudorandom Number Generation (ii) Using Random Numbers to Evaluate Integrals (iii) The Inverse Transform Method for Generating Discrete Random Variables (iv) The Acceptance-Rejection Technique for Generating Discrete Random Variables (v) The Composition Approach for Generating Discrete Random Variables (vi) The Inverse Transform Method for Generating Continuous Random Variables (vii) The Acceptance-Rejection Technique for Generating Continuous Random Variables	6
Monte Carlo Integration Importance Sampling	(i) Introduction to Monte Carlo Simulation (ii) Monte Carlo Integration (iii) Importance Sampling	3

Markov Chain Monte Carlo Methods -MCMC	(i) Introduction to Markov Chain (ii)The Hastings-Metropolis Algorithm (iii) The Gibbs Sampler	3
EM algorithm	(i) Introduction to EM algorithm (ii) EM for censored data (iii) Monte Carlo EM	2
Bootstrap methods and Permutation test	(i) Bootstrap methods (ii) Permutation test	2-3