數學系課程核心教材內容

課程名稱：(中文）統計推論 (英文）Statistical Inference				開課單位	學士班
				課程代碼	2104701
學分數	3	必/選修	選修	開課年級	四

教學目標：
This course is designed for advanced seniors in mathematics or statistics with strong mathematical backgrounds. This course is aimed to provide a solid and well-balanced introduction to probability and mathematical statistics.

課程概述：
Many of the distribution finding techniques, such as transformations and moment generating methods, are in the first three chapters. The concepts of expectation and conditional expectation are treated more thoroughly in the first two chapters. Chapter 4 presents large sample theory on convergence in probability and distribution and ends with the Central Limit Theorem. Chapter 5 introduces sampling, confidence intervals and testing. Maximum likelihood methods have been expanded in Chapter 6. Chapter 7-9 contains material on sufficient statistics, optimal tests of hypotheses, and inferences about normal models.

先修科目或先備能力：統計科學

建議參考書目	*Introduction to Mathematical Statistics* by Hogg Robert, McKean Joseph and Craig Allen

課程大綱

單元主題	內容綱要	上課週數
Probability and Distributions	(i) Conditional Probability and Independence (ii) Transformations for Discrete Random Variables (iii) Transformations for Continuous Random Variables (iv) Expectation of a Random Variable (v) The Composition Approach for Generating Discrete Random Variables	2
Multivariate Distributions	(i) Distributions of Two Random Variables (ii) Expectation for the Distributions of Two Random Variables (iii) Transformations for Bivariate Random Variables (iv) Conditional Distributions and Expectations (v) The Correlation Coefficient (vi) Independence of Random Variable (vii) Extension to Several Random Variables	3

Unbiasedness, Consistency, and Limiting Distributions	(i) Unbiasedness and Expectations of Functions (ii) Convergence in Probability (iii) Convergence in Distribution (iv) Central Limit Theorem	3
Some Elementary Statistical Inferences	(i) Sampling and Statistics (ii) Order Statistics (iii) Confidence Intervals (iv) Introduction to Hypothesis Testing	2
Maximum Likelihood Methods	(i) Maximum Likelihood Estimation (ii) Rao-Cramer Lower Bound and Efficiency (iii) Maximum Likelihood Tests	2
Sufficiency	(i) Measure of Quality of Estimators (ii) A Sufficient Statistics for a Parameter (iii) Properties of a Sufficient Statistic (iv) Completeness and Uniqueness (v) The Exponential Class of Distributions (vi) Minimal Sufficiency and Ancillary Statistics	3
Optimal Tests of Hypotheses	(i) Most Powerful Tests (ii)Uniformly Most Powerful Tests (iii) Likelihood Ratio Tests	2