數學系課程核心教材內容

課程名稱：(中文) 作業研究導論(一) (英文) Introduction to Operations Research (I)				開課單位	學士班
				課程代碼	2104551
學分數	3	必/選修	選	開課年級	四

教學目標： Introduce the deterministic mathematical model problems and the related theorems, methods and applications.

課程概述：Mathematical Modeling, Linear Programming, Integer Programming, Nonlinear Programming, Network Problems

先修科目或先備能力：Advance Calculus, Linear Algebra

建議參考書目	1. Operations Research: Applications and Algorithms, by Wayne L. Winston, 4^{th} ed., 2003 2. Introduction to Operations Research, by Hillier Lieberman, 8^{th} ed.,2005

課程大綱

單元主題	內容綱要	上課週數
Linear Programming Models	Methodology of Operations Research, Successful Applications of Linear Programming	1~2
Simplex Method	Standard Form of LP, Simplex Algorithm, Revised Simplex Method, Big-M Method, Two-Phase Method, LINDO Computer Package	2~3
Sensitivity Analysis and Duality	Dual of and LP, Economic Interpretation of the Dual Problem, Dual Theorem, Dual Simplex Method, Sensitivity Analysis	2~3
Interior Point Methods and Advanced Topics for LP	Karmarkar's Method, Path Following Method, Column Generation, Dantzig-Wolfe Decomposition Algorithm, Upper Bound Problems	1~2
Network Problems	Transportation Problems, Transportation Simplex Method, Assignment Problems, Transshipment Problems, Shortest Path Problems, Maximum Flow Problems, Minimum Cost Network Flow Problems, Minimum Spanning Tree Problems, The Network Simplex Method	3~4
Integer Programming	Formulating Integer Programming Problems, The Branch-and-Bound Method, Knapsack Problems, The Cutting Plane Method	1~2
Nonlinear programming	Golden Section Search, Unconstrained Minimization Problem, Lagrange Multipliers, The Kuhn-Tucker Condition	1~2

數學系課程核心教材內容

課程名稱：(中文) 作業研究導論(二) (英文) Introduction to Operations Research (II)				開課單位	數學系
				課程代碼	2104552
學分數	3	必/選修	選	開課年級	四

教學目標： Introduce the stochastic model problems and the related theorems, methods and applications.

課程概述：Discrete-time Markov Chains, Continuous-time Markov Chain, Markov Decision Problems, Queuing Theory and Applications.

先修科目或先備能力：Probability Theory, Advanced Calculus, Operations Research (I)

建議參考書目	1. Operations Research: Applications and Algorithms, by Wayne L. Winston, 4th ed., 2003 2. Introduction to Operations Research, by Hillier Lieberman, 8th ed.,2005

課程大綱

單元主題	內容綱要	上課週數
Discrete Random Trials	Review of Probability, Random Variable, Stochastic Process	1
Some Probability Distributions	Binomial Distribution, Geometric Distribution, Negative Distribution, Poisson Distribution, Exponential Distribution	1-2
Discrete-time Markov Chains	Markov Process, Markov Chain, Chapman-Kolmogoroff Equations, State Classification, Steady-State Probabilities, Mean First Passage Time, Absorbing Chains, Applications	5
Continuous-time Markov Chains	Markovian Property for Continuous-time Stochastic Process, Birth and Death Process, Poisson Process, Applications	3
Markov Decision Problems	Dynamic Programming Problems, Stochastic Dynamic Programming, Discrete-Time Markov Decision Process, Policy Iteration Algorithm, Linear Programming Algorithm, Value Iteration Algorithm, Applications	4
Queuing Theory	Queuing Process, M/M/1 Queue, M/M/S Queue, M/G/1 Queue, M/E_k/1 Queue, G/G/1 Queue, k-stage Stage Queuing System	3-4