

數學系課程核心教材內容

課程名稱：(中文) 數值線性代數導論 (英文) Introduction to Numerical Linear Algebra				開課單位	學士班
				課程代碼	2103521
學分數	3	必/選修	必	開課年級	三
<p>教學目標： Introduce numerical algorithms and basic error analysis for solving the linear systems, nonlinear equations, and eigenvalue problems through programming.</p> <p>課程概述： direct and iterative methods for linear systems, eigenvalue problems, root-finding problems</p> <p>先修科目或先備能力：微積分、線性代數、電腦程式能力</p>					
建議參考書目	Grasselli, <i>Numerical Mathematics</i> , Narosa Book Distributors Pvt Ltd, 2008 Burden and Faires, <i>Numerical Analysis</i> , 8 th ed., Thomson Brooks, 2005 Atkinson and Kendall, <i>Elementary numerical analysis</i> . John Wiley, 2005 Cullen, <i>An Introduction to Numerical Linear Algebra</i> , PWS Pub. Co., 1994				

課程大綱

單元主題	內容綱要	上課週數
Programming review*	C/C++ for numerical computing*	1-2*
Error and computer arithmetics	floating-point numbers, definitions and sources of errors, propagation of errors*, numerical computation of series*	2-3
Direct and iterative methods for linear systems	linear systems and matrix theory, Gaussian elimination, matrix factorizations, error analysis, positive definite matrices*, basic linear iterative methods, convergence theorems	3-5
Eigenvalue Problems	canonical forms*, Gershgorin circle theorem, power method, inverse power method*	2-3
Root-finding	bisection method, method of false position, Newton's method, secant method, fixed point iteration	3
Applications*	finite difference discretization of Poisson's equation*	1-2

*: optional topics