

數學系課程核心教材內容

課程名稱：(中文) 應用數學導論 (一) (英文) Introduction to Applied Mathematics (I)			開課單位	應數碩博班
			課程代碼	2105501
學分數	3	必/選修	選修	開課年級
一				
<p>教學目標：Introduce Fourier series and their applications to the boundary value problems in science and engineering.</p> <p>課程概述：Sturm-Liouville Problems, Fourier series, Fourier integrals, Bessel Functions, Legendre Polynomials</p> <p>先修科目或先備能力：</p>				
建議參考書目	<p>“Fourier Series and Boundary Value Problems”, Fifth Edition, James Ward Brown and Ruelv. Churchill</p>			

課程大綱

單元主題	內容綱要	上課週數
Fourier Series	Inner products and orthonormal sets, Generalized Fourier series, Fourier series, Convergence of Fourier series, Differentiation and integration of Fourier series	4
Sturm-Liouville Problems	Sturm-Liouville problems, Orthogonality and uniqueness of eigenfunctions	1
Fourier Method	Linear operators, Principle of superposition, Method of separation of variables, A temperature problem, A vibrating string problem, Resonance, Fourier series in two variables	3
Fourier Integrals and Applications	Fourier integral formula, Fourier integral theorem, A temperature problem	3
Bessel Functions and Applications	General solutions of Bessel equation, Orthogonal sets of Bessel functions, Fourier-Bessel series, A temperature problem, A vibrating membrane problem	3
Legendre Polynomials and Applications	Solution of Legendre's equation, Orthogonality of Legendre polynomials, Legendre series, A steady temperature problem.	2