數學系課程核心教材內容

課程名稱：(中文）偏微分方程導論 (英文）Introduction to Partial Differential Equations				開課單位	學士班
				課程代碼	2104201
學分數	3	必/選修	選	開課年級	四

教學目標：Some properties of important types of PDE.

課程概述：We grab the basic idea and concepts. After that, we study the first order, second order linear equations.

先修科目或先備能力：Calculus

建議參考書目	An Introduction to PDE, by Yehuda Pinchover and Jacob Rubinstein Partial Differential Equations, An Introduction by Walter Strass.

課程大綱

單元主題	內容綱要	上課週數
Introduction	Classification, Differential equations as mathematical models, Simple examples	1~2 weeks
First-order equations	Quasilinear equations, The method of characteristics, Examples, The Lagrange method, Conservation laws and shock waves, The eikonal equation, General nonlinear equations	6~7 weeks
Second-order linear equations	Classification, Canonical form of hyperpolic (and parabolic, elliptic) forms	2-3 weeks
The one-dimensional wave equation	Canonical form and general solution, The Cauchy problem and dAlembert's formula, Domain of dependence and region of influence, The Cauchy problem for the nonhomogeneous wave equation	3-4 weeks
The method of separation of variables	eat equation, Elliptic equation, The energy method method and uniqueness	2-3 weeks
Sturm-Liouville problems	Sturm-Liouville problems, Sturm-Liouville eigenfunctions and eigenvalues, Nonhomogeneous boundary conditions	1-2 weeks