LTCC Proposed Course

Title: Elliptic Partial Differential Equations

Basic Details:

- Core Audience (1st yr or 2nd/3rd yr: pure, app. or stats):
- Course Format (**Extended**: 5 x 2hr lectures)

Course Description:

- **Overview:**
  Partial differential equations are widely used as a tool in many fields including geometry and physics. The course will be an introduction to elliptic partial differential equations and its existence and regularity theory. We aim to cover the maximum principle, Schauder theory, and De Giorgi-Nash-Moser estimate. Application of the theory to minimal surface equations will also be illustrated.

- **Keywords:**
  Regularity theory, Schauder theory, De Giorgi-Nash-Moser estimate, Harnack Inequality

- **Syllabus:**
  In this course, we cover the following topics.
  1). Review of key properties of harmonic functions
  2). Maximum principle
  3). Schauder theory
  4). De Giorgi-Nash-Moser iteration
  5). Application (to minimal surface equation)

- **Recommended reading**:
  Partial Differential Equations, Lawrence C. Evans
  Elliptic Partial Differential Equations second edition, by Qing Han and Fanghua Lin

- **Prerequisites:** Analysis, an introductory course in partial differential equations.

Format:

- Electronic lecture notes will be provided after each lecture. Exercises will be given during the lecture notes after the relevant materials, an overall problem sheet will be given for the module and the final assessment is a take-home exam for working out a subset of the problem sheet questions.

Lecturer Details:

- Lecturer: Shengwen Wang
- Lecturer home institution: QMUL
- Lecturer e-mail: shengwen.wang@qmul.ac.uk