MA 633, Spring 2018
Theory of Partial Differential Equations

This course is a continuation of MA 533. The focus will be on week solutions of elliptic partial differential equations of second order. The topics to be covered in this course include

1. Introduction to Functional Analysis (2 weeks).

2. Introduction to Sobolev spaces: weak derivatives, approximation by smooth functions, trace theorems, and Sobolev inequalities (3 weeks).

3. Weak solutions of elliptic equations: definition, existence and uniqueness (2 weeks).

4. Properties of weak solutions: the regularity, the maximum principle, the Harnack inequality, Hölder continuity (5 weeks).

5. Eigenvalues and eigenfunctions of the second-order elliptic operators (2 weeks).

Time and Place:

10:00-10:50 AM, MWF, CB 211

Instructor:

Dr. Zhongwei Shen, Professor of Mathematics

POT 737, Phone 257-3231, E-mail: zshen2@uky.edu

Text:

Partial Differential Equations by Lawrence C. Evans.

Tests:

There will be a midterm exam (in-class, Wednesday, March 7, 2018) and a Final Exam in this course. The final exam (Thursday, 8:00-10:00 AM, May 3, 2018) will be comprehensive.

Grading System:

$$\begin{cases} \text{Midterm} & 20\% \\ \text{Homework} & 50\% \\ \text{Final Exam} & 30\% \end{cases}$$

The course grading scale is the usual 100-90%, 89-80%, 79-70%,... for A, B, C,..., etc.

Make-up Tests:

Students should contact the instructor to arrange a make-up exam if they have a valid excuse. Students who know in advance they will be absent for an exam should contact the instructor at least a week before the exam date.

Office Hours:

I will be in my office at these times specifically to help you:

Monday, Wednesday, Friday: 11:30 AM – 12:30 PM.

You may also see me by an appointment.

Homework:

Homework will be assigned weekly and due on the day designated. All problems will be graded. Late homework will not be accepted without a valid excuse. It should be emphasized that students are expected to spend a substantial amount of time outside of the class both on homework and on understanding their class notes. Working together on the homework is allowed, but should be acknowledged. Internet as well as solutions handed out in previous years for this course should NOT be consulted while working on homework problems.

Attendance:

Regular attendance is expected. Excessive absence will result in your being dropped from the course with a grade of E or W which ever is most appropriate.