

MATH 575

Course: Math 575 Numerical Solution of Partial Differential Equations

Instructor : Young-Ju Lee

Office Hour : MW 3:00 pm - 4:00 pm or by appointment at Hill 238

Class : MW6 5:00 pm - 6:20 pm at HILL-525

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Text book:

- Finite Elements: Theory, fast solvers, and applications in solid mechanics by Dietrich Braess, Cambridge University Press, (paperback), 2007 (3rd edition).

Course Description:

575. Numerical Solutions of Partial Differential Equations. The course goals consist of design, analysis and implementation of the most commonly used numerical methods for solutions to partial differential equations. We will discuss various discretization schemes such as finite difference, finite element and finite volume methods as well as iterative solvers such as multigrid methods. The course will maintain a balance between in-depth mathematical theories for algorithmic techniques and computer implementations and students will have the opportunity to study not only theoretical backgrounds in developing and understanding the numerical algorithms, but also a hands-on experience to implement the methods.

Matlab (or scilab) will be used for the computational component of the course and a number of source codes will be provided to minimize the coding efforts from students.

Prerequisites:

Advanced Calculus, Linear Algebra, and familiarity with differential equations.

Online component:

Homework assignment will given for each 3 to 4 class periods.

Programming component:

Part of your work in this course will involve implementing numerical algorithms by using computer code. I will oftentimes make the code available to

you in matlab programming language, and you will be able to use it with little modification. If you prefer a different programming language, you may write the code from scratch yourself.

Exams, Test Dates and Homeworks:

- Midterm : TBA (30 %)
- Final : TBA (40 %)
- Homeworks (30 %)

Academic integrity statement : Academic dishonesty will not be tolerated in any form. See the link given in the course website for the university's policies. Cheating includes (but is not limited to) copying somebody else's homework, copying somebody else's quiz, copying somebody else's quiz corrections, copying somebody else's web posting, and stealing any materials related to this course. The definition of copying is more broad than verbatim duplicate. In other words, taking someone else's work or ideas and in any way passing them off as your own, even if you change the wording, is cheating.

Collaboration Policy:

1. Homework is an important part of graduate mathematics courses. Most students will find that some problems will require persistent effort to solve. This process is an integral component of developing a mastery of the material presented, and students who do not dedicate the necessary time and effort towards this will compromise their performance in the exams in this course, and their ability to apply this material in their subsequent work.
2. After working conscientiously on a problem for over one hour, a student may consult with other current students to develop an approach to the problem. However, the written solution should be an independent and individual effort that mirrors the student's understanding of the problem and its solution.
3. As a general guide, a student should be able to independently reproduce any solution that is submitted as homework. Copying of solutions is not permitted and will be considered a violation of these guidelines.

Calculators : Scientific and Graphing Calculators may not be used on the exams.