

Mathematics 6602 Course Syllabus
Mathematical Foundation of Finite Element Methods
Fall 2018

Instructor: Dr. Xiaoming He
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Office Hours: 10am-10:50am, 2-3pm, Monday, Wednesday, Friday or by appointment.

Class: Monday, Wednesday, Friday, 9:00am-9:50am, HSS 102.

Text: *Understanding and Implementing the Finite Element Method* by M. S. Gockenbach, Society for Industrial and Applied Mathematics, Philadelphia, PA, 2006.

Reference:

Computational Partial Differential Equations Using MATLAB by Jichun Li and Yi-Tung Chen, Chapman & Hall/CRC Applied Mathematics & Nonlinear Science, 2008.

Numerical solution of partial differential equations by the finite element method by C. Johnson, Dover Publications, Mineola, NY, 2009.

Homework: A thorough understanding of the homework is a vital component of this course. You should make it a practice to do your homework promptly and you are expected to turn in homework regularly. Five homework assignments and the due dates will be posted on canvas. I will allow you at least one week to ask questions about homework problems after we finish the corresponding lectures.

Exams: The midterm exam and the final exam are take-home exams in project format. The exams and the due dates will be posted on canvas.

Guided Coding: For the finite element methods covered in my lectures, we will have guided coding practice in class to help you code for your own finite element package. This is a critical step for you to become capable of implementing what you have learned in class. It's your responsibility to finish the coding after class based on the guided coding practice in class. The code will be used in the homework assignments and exams.

Independent Study: Each of you needs to select a topic about the finite element method or its application that you want to study independently. You should make use of the algorithm, code or theory you learn in class to complete the study. The topics I will provide may help you generate ideas for your study topic. However, do not feel compelled to pick one of those topics. For example, a related problem from your research work is also good. This is your opportunity to tailor a portion of this course to satisfy your specific interests in numerical analysis. If you are considering a particular topic but are uncertain about its feasibility, please feel free to make an appointment with me to discuss your ideas.

A written description of the topic you propose to study and your plans for carrying out this study are due on November 2, 2018. The study plan you submit should include:

1. a clear statement of the goal (or goals) of your study;
2. a concise description of the steps through which you intend to achieve your study goal;
3. references you plan to consult to aid your studies;

I reserve the right to modify your independent study topic or the details of your study plan if I deem it prudent or necessary. In this event, you will be asked to rewrite or revise your study plan accordingly.

A final written report of your independent study with your code is due on December 7, 2018. The report should include a complete description of the problem, method, code, results, and conclusions. If we can finish the lectures one or two weeks before the end of the semester, then the last one or two weeks will be mainly contributed to the independent study.

Grading: On all of your papers, you are expected to show your work clearly and completely. You will be graded on your work as well as your answers. There will be 500 total points – 100 for the midterm exam, 200 points for the final exam, 100 for the independent study, and 100 in homework. If you score 430 or more of all possible points, you are guaranteed to earn an A; 360 or more guarantees a B; 300 or more guarantees a C; and 250 or more guarantees a D if applicable.

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Academic Honesty: Academic honesty is vital to the intellectual life of the University. Students have a special obligation to be aware of and adhere to the standards of conduct as described on page 27 of the S&T Student Academic Regulations handbook:

<http://registrar.mst.edu/media/administrative/registrar/documents/academicregulations/academic%20regulations%202012-2014%20rev6.pdf>

In particular, this page offers descriptions of what constitutes cheating, plagiarism, and sabotage.