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# *Math 596 – The finite element method and its application*

## *Spring 2020*

### **Instructor**

Professor Youngjoon Hong

Office: GMCS-578

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Lectures: TTH 12:30pm-13:45pm in NE-172

Office hours: TTH 9:30am-10:30am in GMCS-578

I'll try to respond within 24-48 hours to emails. For quick questions, the turnaround time may be much shorter. For questions that involve, say, the clarification of course concept, you may want to come to my office. I will be available during my office hours. Grades will be posted on Blackboard.

### **Course - Practical information**

Website: [hong.sdsu.edu](http://hong.sdsu.edu)

Textbook: "Understanding and Implementing the Finite Element Method" by Mark Gockenbach

Prerequisite: Math 254, Math 330, and Math 337, or consent of instructor

Calculator: No Calculators will be allowed during the exams

Documents: No documents, of any kind, will be allowed during the exams

### **Grading**

Homework: Several homework assignments (including programming projects) will be given throughout the semester.

Final: There will be a final project.

Final grade: Final percentages will be computed according to the following rule:

$$50\% (\text{homework}) + 50\% (\text{final})$$

The final grades will be chosen according to the following scale:

- A: 90% and above
- B: 80% and above
- C: 70% and above
- D: 60% and above
- F: otherwise

Extra credit: Please do not ask for extra credit. The only way to be successful in this course is to keep up with it as opposed to trying to make up for missed or poorly done work weeks later.

Grading complaints: If you believe a problem on a homework or exam has been graded incorrectly, or that your score was not correctly recorded, you must bring this to the attention of the instructor **within 14 calendar days** of the date of the exam or homework, and before the date of the final exam. Grading complaints not initiated within this period of time will **not** be considered.

## Student responsibilities

Cheating: Any kind of cheating will result in an "F" grade. Cheating will also be reported to Student Affairs.

Homework Assignment: Beside the fact that the homeworks will be graded, their purpose is to let you understand and practice the concepts explained in this class. The homeworks can also be viewed as an auto-evaluation process in the sense that if you are not capable of solving the exercises it means you need to further review some concepts.

Student with Disabilities: If you are a student with a disability and believe you will need accommodations for this class, it is **your responsibility** to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services **as soon as possible**. Please note that accommodations are **not** retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated

Phone: Cellular phones should be turned off before entering the classroom

## Learning objectives

In this class, you will study:

- Some model PDEs
- The weak form of BVP
- The Galerkin method
- Piecewise polynomials and the FEM
- Convergence of the FEM
- Mesh data structure
- Programming the FEM
- Solving the finite element equations and applications

## Course outline

The Finite Element Method is a powerful engineering analysis tool, and has been widely used in engineering since it was introduced in the 1950s. This course presents the basic theory and simple application of the Finite Element Method (FEM) along with the common FEM terminology. The emphasis of this course is the fundamental concepts of finite element analysis. A basic programming technique is also presented in this course along with their features and capabilities. This course includes several homeworks and final project, which is designed to enhance the understanding of course materials.

*This syllabus is subject to change based on the needs of the class*

## UNIVERSITY POLICIES

**Accommodations:** If you are a student with a disability and are in need of accommodations for this class, please contact Student Ability Success Center at (619) 594-6473 as soon as possible. Please know accommodations are not retroactive, and I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Ability Success Center.

**Student Privacy and Intellectual Property:** The [Family Educational Rights and Privacy Act](#) (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. I will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

**Religious observances:** According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

**Medical-related absences:** Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. [Student Health Services](#) (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the [Student Ability Success Center](#).

**SDSU Economic Crisis Response Team:** If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit [sdsu.edu/ecrt](https://sdsu.edu/ecrt), email [ecrt@sdsu.edu](mailto:ecrt@sdsu.edu), or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

**Resources for students:** A complete list of all academic support services--including the [Writing Center](#) and [Math Learning Center](#)--is available on the Student Affairs' [Academic Success](#) website. [Counseling and Psychological Services](#) (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at [http://go.sdsu.edu/student\\_affairs/cps/therapist-consultation.aspx](http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx) between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

**Academic Honesty:** The University adheres to a strict [policy prohibiting cheating and plagiarism](#). Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;

- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

**Classroom Conduct Standards:** SDSU students are expected to abide by the terms of the [Student Conduct Code](#) in classrooms and other instructional settings. Prohibited conduct includes:

- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University, or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
  1. physical abuse, threats, intimidation, or harassment.
  2. sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.