Topic Course: Numerical Analysis II
Finite Element Methods and Weak Galerkin Finite Element Methods
Syllabus

Course Information
Course: Math 5345
Semester: Spring 2019
Section: 001
Class time: MWF 2:00pm-2:50pm
Classroom: Math 011

Instructor Information
Name: Chunmei Wang
Office: Math 240
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Email: chunmei.wang@ttu.edu
Office Hours: MWF 1pm-2pm or by appointment

Textbook
No particular textbook will be used. The lecturer will prepare the notes of the course.

Course general description
This special topic course focuses on finite element methods for numerically solving partial differential equations and the recent developments in finite element methods including the weak Galerkin finite element methods and primal-dual weak Galerkin finite element methods.

Expected Student Learning Outcomes
Students will learn finite element methods and mixed finite element methods for partial differential equations; they will learn the recently developed numerical methods including weak Galerkin finite element methods and primal-dual weak Galerkin finite element methods; they will learn to analyze the finite element approximations and their theoretical convergence properties; they will be expected to implement the numerical methods introduced in the course using Matlab, C, C++ or Fortran.

Prerequisites:
MATH 5355 or consent of department

Tentative course outline
Chapter 1. Weak formulation of Partial Differential Equations (3 hours)
Chapter 2. Finite Element methods and Error analysis (12 hours)
Chapter 3. Mixed finite element methods (12 hours)
Chapter 4. Weak Galerkin finite element methods (12 hours)
Chapter 5. Primal-Dual Weak Galerkin finite element methods (9 hours)

Assessment of Learning Outcomes
The exams consist of three individual projects.

Attendance Policy
Attendance is required and checked for all classes. The student who misses a class meeting is responsible for any assignments and/or announcements made. Students who have perfect attendance will be given 5 bonus points to be added to the total number of points earned in this course. Students who miss less than three classes will receive 5 bonus points. Students who miss three or more classes will receive no bonus points. Since these are bonus points, there will be no “excused” absences when calculating bonus points with the exception of absences due to religious observance and officially approved trips described below.

- **Absence due to religious observance** - The Texas Tech University Catalog states that a student shall be excused from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. (p.57)
- **Absence due to officially approved trips** – The Texas Tech University Catalog states that the department chairpersons, directors, or others responsible for a student representing the university on officially approved trips should notify the student’s instructors of the departure and return schedules in advance of the trip. The instructor so notified must not penalize the student, although the student is responsible for material missed. Students absent because of university business must be given the same privileges as other students (e.g., if other students are given the choice of dropping one of four tests, then students with excused absences must be given the same privilege). (p.57)

**Grading**
There will be three projects assigned during the whole semester. The first project will be assigned on February 22nd which will be due on March 22nd. The second project will be assigned on March 22nd which will be due on April 22nd. The last project will be assigned on April 22nd and will be due on May 10th. The first two projects are assigned as mid exams which account for 30% each of the total credit. The last project is assigned as the final exam which accounts for 40% of the total credit. Grades will be based upon the grades of the three projects.

**Academic Integrity**

**Academic Misconduct:**
- The university’s statement on academic integrity can be found in the Texas Tech University Catalog (p.57) and (OP 34.12):
  “It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension.”

- The descriptions of Cheating and Plagiarism can be found in the Texas Tech University Catalog: (p.57)

**Civility in the Classroom:**
- More information is available on-line at http://www.depts.ttu.edu/studentjudicialprograms/AcademicIntegrity.pdf

**Students with Disabilities:**
The students should inform the instructor of your special needs as soon as possible. The university approved statement can be found in OP 34.22:
Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor’s office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office in 335 West Hall or 806-742-2405.