

**King Fahd University of Petroleum and Minerals**  
**Department of Mathematics & Statistics**  
**Math 572 – Syllabus**  
**2013-2014, Semester II**  
**Instructor: Kassem Mustapha**

**Title:** Numerical Analysis of Partial Differential Equations

**Textbook:** Partial Differential Equations with Numerical Methods by Stig Larsson & Vidar Thomee

**Description:** Theory and implementation of numerical methods for boundary value problems in partial differential equations (elliptic, parabolic, and hyperbolic). Finite difference and finite element methods and projection methods: convergence, stability, error estimates and computations.

**Main Topics:**

- 1- Two-Point Boundary Value Problem
- 2- Finite Difference Methods for Two-Point Boundary Value Problems
- 3- Finite Element Methods for Two-Point Boundary Value Problems
- 4- Numerical Integration
- 5- Elliptic Problem
- 6- Finite Difference Methods for Elliptic Problems
- 7- Finite Element Methods for Elliptic Problems
- 8- Parabolic Problem
- 9- Finite Difference Methods for Parabolic Problems
- 10- Finite Element Methods for Parabolic Problems
- 11- Hyperbolic Problem
- 12- Finite Difference Methods for Hyperbolic Problems
- 13- Finite Element Methods for Hyperbolic Problems

**Grading Policy:**

1. Assignments: 20 %
2. Home Work: 20 %
3. Midterm Exam: 25 %
4. Final Exam: 35 %

**Office hours:** Sunday-Monday-Thursday, from 10:00 AM to 11:00 AM,

**Office:** Building 5, Room 203-5