

# KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

## Department of Mathematics & Statistics

MATH572-Numerical Analysis of Partial Differential Equations

Course Syllabus

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**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.

**Assessment:**

- Midterm Exam 30%
- Homework and other Assignments: 30%
- Final Exam: 40% (Comprehensive; Date and Location: To Be Announced)

**Instructor:**

Dr. Manal Alotibi ([manal.alotibi@kfupm.edu.sa](mailto:manal.alotibi@kfupm.edu.sa))

**Office hours:**

Monday and Wednesday: 11:30 am -2:30 pm (or set an appointment if needed)

**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