King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
SYLLABUS 142

Course:	Math 572
Title:	Numerical Analysis of Partial Differential Equations 25072
Textbook:	Partial Differential Equations with Numerical Methods by StigLarsson and Vidar Thomee
Catalogue 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: convergence, stability, and error estimates. Projection methods and fundamentals of variational methods. Ritz-Galerkin and weighted residual methods.
Course webpage:	http://faculty.kfupm.edu.sa/math/ffairag/math572_142

Scheduled Meeting Times

Type	Time	Days	Location	Instructors
Class	8:00 pm - 9:15 pm	TU	Building #4 105	DR. FAISAL A. FAIRAG
Final Examination	7:00 pm - 10:00 pm	SAT		May 23, 2015

DR. FAISAL A. FAIRAG

Office: 5-432 Tel: 860- 4463 E-mail: ffairag**@kfupm.edu.sa**
webpage http://faculty.kfupm.edu.sa/math/ffairag

Syllabus

Week	TOPICS
1	Finite Difference Method for Poisson Equation
2-4	Finite Element Method for Poisson Equation
5	Classification of second -order linear PDE
6	Solution Methods: Iterative Techniques Solving systems of Linear and Nonlinear equations (Iterative Methods)
7-8	Finite Difference Method for Elliptic equations (consistency - convergence - stability)
9	Finite Difference Method for Parabolic equations
10	Finite Difference Method for Hyperbolic equations

11-13	Finite Element Methods for Elliptic Equations; VariationalFormulation
14	Finite Element Methods for Parabolic Equations
15	Finite Element Methods for Hyperbolic Equations

Grading Policy

Homework and Assignments	Mini-project	Exam1	Exam2	Final Exam
200	**200**	**160**	**160**	**280**

References

1	The Mathematical Theory of Finite Element Methods by Susanne C. Brenner and L. Ridgway Scott
2	Numerical Analysis of PDE by Hall and Porsching
3	Finite Difference Methods by Mitchell and Griffiths
4	Finite Element and Fast Iterative Solvers by Elman , Silvester and Wathen
5	Numerical Methods for Partial Differential Equations: an Overview and Applications BY André Jaun http://www.lifelong-learners.com/pde/