

King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 572 – Syllabus
2015 (142)
Instructor: Dr. Faisal A. Fairag

Title: Numerical Analysis of Partial Differential Equations

Credit: 3-0-3

Textbook: Partial Differential Equations with Numerical Methods by Stig Larsson and 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: convergence, stability, and error estimates. Projection methods and fundamentals of variational methods. Ritz-Galerkin and weighted residual methods.

	Dates (2015)	Topics	Sections
1	Jan 25-Feb 1	One Dimension FEM	2.3 + 5.1 + Appendix A
2	Feb 3	Preliminaries & Classification of 2ed order linear PDE	1.1 + 1.2
3	Feb 8-22	Finite Element Method for Elliptic Equation (2DFEM)	3.5 + 3.6 + 5.2
4	Feb 24- Mar 3	Finite Difference Method for Elliptic equations	3.1+ 3.2 + 4.2
Exam 1 : Sunday Feb 24			
5	Mar 8	IVP for ODE	7.1 + 7.2
6	Mar 10-17	Finite Difference Method for Parabolic equations	8.3 + 8.4 + 9.1 + 9.2
March 22-26: Midterm Vacation			
7	Mar 29- Apr 5	Finite Volume Method for Hyperbolic equations	14.3 + materials
Exam 2 : Sunday Mar 29			
8	Apr 7-19	Finite Element Method for Hyperbolic equations	11.2 + 11.3 +13.1 + 13,2
9	Apr 21-26	Collocation Method	14.1 + materials
10	Apr 28-May 3	Mixed Finite Element Method	5.7 + materials
11	May 5-10	<i>A posteriori</i> error (Adaptive)	5.5
12	May 12	Iterative Techniques, Multigrid, Domain Decomposition	B.4 + B.5
Final Examination 7:00 pm - 10:00 pm SAT May 23			

Grading Policy:

Homework and Assignments	Mini-project	Exam1	Exam2	Final Exam
20	20	16	16	28