

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
Department of Mathematics and Statistics

Syllabus

Term 111 (2011-2012)

Course #: Math. 612 - Hilbert Space Methods in Applied Mathematics II.

Instructor: Dr A. Boucherif.

Textbook: I. Stakgold, Green s Functions and Boundary Value Problems, John Wiley & Sons, New York, 1979.

References:

1. L. D. Kovach, Boundary Value Problems, Addison Wesley, 1984.
2. J. P. Keener, Principles of Applied Mathematics: Transformation and Approximation, Addison Wesley.
3. B. Friedman, Principles and Techniques of Applied Mathematics,

Objectives: This course is a continuation of Math.611. It covers the areas of Applied Functional Analysis, the theory of Integral Equations, and an introduction to Nonlinear Problems. The emphasis will be on the applications of nonlinear analysis.

Topics to be covered:

- **Chapter 6:** Volterra and Fredholm Integral Equations
Spectrum of a compact self-adjoint operator
Variational Principles and related methods
- **Chapter 7:** Spectral theory of second order differential operators
- **Chapter 9:** Introduction to Nonlinear Problems-Perturbation Theory

Grading Policy

- **Term paper: 60%**
- **Take-Home Final: 30%**
- **Regular Assignments: 10%**