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

Syllabus

Term 152 (2015-2016)

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

Instructor: Prof. A. Boucherif.

Textbook: Green s Functions and Boundary Value Problems, 3rd Ed., I. Stakgold, and
M. Holst, John Wiley & Sons, New York, 2011.

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 3**: Boundary Value Problems-Quick review

*   **Chapter 6**: Fredholm and Volterra 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**: Solvability of Nonlinear Equations (Topological Degree, Bifurcation)