OFFICIAL SYLLABUS

MATH 555 – Functional Analysis with Applications

Adopted: Fall 2002
(Committee: Drs. Jarosz, Ledzewicz, Pelekanos (chair), Rigdon)

Catalog description.

Normed and Banach spaces, inner product and Hilbert spaces, Open Mapping and Closed Graph Theorem, Hahn-Banach Theorem, dual spaces and weak topology. Prerequisites: MATH 421 and MATH450.

Textbook.

Introductory Functional Analysis with Applications, by Erwin Kreyszig, New York, NY, John Wiley & Sons, 1978. ISBN: 0-471-50731-8.

Course Objective.

The students should gain not only understanding of basic results in Functional Analysis but also learn about several specific examples of Banach spaces, their duals, and applications.

Course Outline and Topics

Chapter 1. *Metric Spaces* (1.5 – 2 weeks).

Chapter 2. *Normed Spaces. Banach Spaces* (2 – 3 weeks).

Chapter 3. *Inner Product Spaces. Hilbert Spaces* (3 – 4 weeks).
Section 3.7 on Legendre, Hermite, and Laguerre Polynomials is optional.

Chapter 4. *Fundamental Theorems for Normed and Banach Spaces* (6 weeks).
Sections 4.10 and 4.11 are optional

Optional: selected sections from Chapters 5-9.

Any instructor should cover all of the material specified, additional sections are optional.