$\mathbf{R}$
$\mathbf{R}^n$
$\mathfrak{R}(T)$
$R_\lambda(T)$
$r_\sigma(T)$
$\rho(T)$
s
$\sigma(T)$
$\sigma_c(T)$
$\sigma_p(T)$
$\sigma_r(T)$
span M
sup
$\|T\|$
T^*
$T^\times$
T^+, T^-
T_λ^+, T_λ^-
$T^{1/2}$
$\mathrm{Var}(w)$
$\xrightarrow{w}$
X^*
X'
$\|x\|$
$\langle x, y\rangle$
$x \perp y$
$Y^\perp$
A^C
A^T
$B[a, b]$
$B(A)$
$BV[a, b]$
$B(X, Y)$
$B(x; r)$
$\tilde{B}(x; r)$
c
c_0
$\mathbf{C}$
$\mathbf{C}^n$
$C[a, b]$
$C'[a, b]$
$C(X, Y)$
$\mathfrak{D}(T)$
$d(x, y)$
dim X
δ_{jk}
$\mathscr{E} = (E_\lambda)$
$\|f\|$
$\mathfrak{G}(T)$
I
inf
$L^p[a, b]$
l^p
l^∞
$L(X, Y)$
$M^\perp$
$\mathcal{N}(T)$
0
$\varnothing$

MATH 138/332 – REAL ANALYSIS II

Time and Place: T & R 1:15pm – 2:30pm, Davidson Lecture Hall, Spring 2011

Instructor: Asuman Guven Aksoy

Office: Adams 215, Campus x72769 Off-Campus: dial 607-2769

Email: aaksoy@mckenna.edu

Office Hours: T & R 3:00pm – 5:00pm, and by appointment

Text: *Methods of Modern Mathematical Physics I: Functional Analysis*
Michael Reed and Barry Simon

Topics:

Banach Spaces

- Baire category theorem
- Compactness; Arzela-Ascoli
- Hahn-Banach theorem
- Open mapping theorem, closed graph theorem
- Uniform boundedness principle
- Weak topologies, Alaoglu theorem

Hilbert Spaces

- Orthagonal complements and Direct sums
- Othonormal sets and sequences
- Representation of functionals on Hilbert spaces (Riesz)
- Self adjoint, Unitary and Normal Operators
- Projections

Applications

- Banach fixed point theorem and its application to Differential and Integral equations
- Approximation in Normed spaces
- Spectral Theory of linear operators in Normed spaces
- Compact operators and their spectrum
- (Time permitting) Unbounded linear operators in Quantum Mechanics

References:

- P. Wojtaszczyk, *Banach Spaces for Analysts*
- W. Rudin , *Functional Analysis*
- S. Berberian , *Lectures on Functional Analysis and Operator Theory*
- N. Dunford and J. Schwartz, *Linear Operators*, Vol. 1.
- J. Conway, *A course in Functional Analysis*
- R. Zimmer, *Essential Results of Functional Analysis*
- P. Lax, *Functional Analysis*