Topics in Banach Space Theory (I)- Fall 2018

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Required Text: *Topics in Banach Space Theory*, by Fernando Albiac and Nigel Kalton.

Major Goal of the Course: This course is intended for graduate students who have already had basic knowledge in functional analysis; the aim is to give a reasonably brief and self-contained introduction to classical Banach spaces theory. The students are expected to learn Latex through self-study and use Latex to finish two projects. In class presentations of their projects are also required. The goal is to build up a solid background for students in functional analysis, PDE and broad areas of analysis to start their dissertation.

Course Materials: Chapter 1-2 are intended to introduce the methods of bases and basic sequences and to study the isomorphic structure of the sequence spaces ℓ_p and c_0. Chapter 3 studies some special types of bases, such as unconditional bases, boundedly-complete and shrinking bases. The James space will be also investigated. Chapter 4-5 concentrate on $C(K)$-spaces and $L_1(\mu)$-spaces. Basic isometric theory, the Dunford-Pettis property and weakly compact operators will be explored. Chapter 6 focuses on L_p spaces, conditional expectations and the Haar basis.

Grading Policy: Grades will be calculated according to the following percentages:

Two Presentations	20% each	A = 85-100%
Two Projects	20% each	B = 75-84%
Attendance	20%	C = 65-74%
		D = 55-64%
		F = below 55%

Course Plan:

[Week1-2:] Schauder bases, equivalence of bases, constructing basic sequences and the Eberlein-Smulian Theorem

[Week 3-4:] The isomorphic structure of the ℓ_p-spaces and c_0, complemented subspaces of ℓ_p and c_0

[Week 5-7:] Unconditional bases, boundedly-complete and shrinking bases, the James space

[Week 8-9:] $C(K)$-spaces, isometrically injective spaces

[Week 10-12:] $L_1(\mu)$-spaces, weakly compact subsets of $L_1(\mu)$, the Dunford-Pettis property, weakly compact operators

[Week 13-14:] L_p-spaces, conditional expectations, the Haar basis, averaging in Banach spaces, subspaces of L_p

[Week 14-:] Project presentations

Projects and Presentations: Two projects will be announced in class during the semester. All the projects need to be written in Latex. Each student will be required to make a 20-minute presentation on each project. **No late projects will be accepted without written verification of a University excused absence.**