Course: MATH 7035/8035

Title: Isometries of function spaces

Catalog description: Brief introduction to locally convex spaces and the Krein-Milman theorem, Integral representations, Choquet simplexes, Isometries of affine function spaces, the algebraic reflexivity problem, spaces of Lipschitz functions, extremal structure of spaces of vector-valued functions, isometries of spaces of vector-valued Lipschitz functions. PREREQUISITES: A functional Analysis course (such as MATH 7351), or permission of instructor.

Detailed Prerequisites: The students are expected to be familiar with Vector spaces, Banach spaces, Hilbert spaces; linear functionals and operators in such spaces; some spectral theory. This course can be audited by the graduate students of the Physics department with a strong background in Mathematics.

Course objectives: At the end of the course students should become familiar with some standard techniques of the geometry of Banach spaces, particularly those dealing with the extremal structure of the dual unit ball of the space of several vector valued function spaces.

Course requirements/grading policy: Evaluation of the students enrolled at either 7000 or 8000 level will be based on attendance, participation, and regular homework assignments. Students enrolled at the 8000 level will also be participating on some team projects.

Reference materials:
Detailed Lecture notes will be made available to students and will be on the Web page of the Department for use by other interested students. The following reference texts may also be of use:
1. Functional Analysis, by W. Ruden.
2. Lectures on Choquet Theory, by R.R. Phelps.
3. Isometries on Banach Spaces: Vector Valued Functions Spaces, by R. Fleming and J. Jamison.

Course Outline:
1. Review of Locally convex spaces and the Krein-Milman theorem.
2. Integral representations.
3. Choquet simplexes, the metrizable case.
4. First assignment due.
5. Isometires of affine function spaces.
6. The algebraic reflexivity problem a la Molnar and Zalar.
7. Algebraic reflexivity for affine function spaces.
8. Second assignment due.
9. Spaces of Lipschitz functions.
10. Extremal structure of spaces of vector-valued functions.
11. Third Assignment due.
12. Isometries of spaces of vector-valued Lipschitz functions.

Instructor of Record: Fernanda Botelho (mbotelho@memphis.edu)