Course: Mat 821: Functional Analysis
Room: Sullivan Building 311
Schedule: MW 6:30 - 9:30
Instructor: L. Pedro Poitevin, Assistant Professor
Office: Sullivan Building 308B
Office hours: MTuWTh: 5:30 - 6:30
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Course description: An introduction to the basic concepts and methods of functional analysis, including the Hahn-Banach Theorem, the Baire Category Theorem and its consequences, a thorough investigation of numerous examples of Banach spaces with an emphasis on their geometry. Some applications to physics and economics will be discussed.

Course goals:

1. To cover the classical theorems of functional analysis in an elementary context (without measure-theoretic considerations);

2. To train students in the use of the basic techniques of the subject.

Learning objectives: A student who passes this course should be able to:

1. Prove and apply the Hahn-Banach theorem.

2. Prove and apply the Baire category theorem and its multiple consequences, including the open mapping theorem, the closed graph theorem, and the uniform boundedness principle.

3. Demonstrate a good understanding of the fundamental difficulties in the program of classifying all possible Banach spaces.

4. Demonstrate a solid grasp of Hilbert space as an especially simple type of Banach space.
**Textbook:** Kreyszig, Erwin *Introductory Functional Analysis with Applications*, John Wiley & Sons. (Recommended)

**Class format:** Half of class time will be devoted to lecture, and the remaining half will be devoted to solving exercises with the help of the instructor.

**Exams:**

- Midterm  *Tentatively*  Wednesday, June 6 (in class)
- Final  Wednesday, June 27: (in class)

**Homework:** Homework will be collected and graded weekly. Students will be individually responsible for submitting homework, but they will specify all sources of help for the completion of their assignment. These could include other students in class, textbooks consulted, etc. Students should keep a complete record of all problems attempted (with solutions, if found) during the semester.

**Grading scheme:** I reserve the right to change the following grading scheme, but it will very likely stand:

- Homework  50 %
- Midterm  20 %
- Final  30 %

**Statement on equality of access:** Salem State College is committed to providing equal access to educational experience for all students in compliance with Section 504 of The Rehabilitation Act and The Americans with Disabilities Act and to providing all reasonable academic accommodations, aids and adjustments. Any student who has a documented disability should speak with the instructor immediately. Students with disabilities who have not previously done so should provide documentation to and schedule an appointment with the Office for Students with Disabilities and obtain appropriate services.