Functional Analysis II, Math 757

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Lectures: MWF 9:40-10:30 in LeConte 315.
Instructor's Office Hours: MWF 10:40-11:40, or by appt. @ LC 402

Overview: Functional Analysis is a vast area of analysis. It obtained its name since initially the sets and spaces which attracted most attention consisted of functions. It was born in the beginning of the 20th century with the work of Fredholm on integral equations and operator theory, the work of Hilbert on spectral theory, the work of Lebesgue, Fréchet and Riesz on abstract topological vector spaces, and the work of Helly, Hahn and Banach on duality. Functional analysis is a blend of analysis, topology and algebra: it is the study of vector spaces with topologies, operators between these spaces, and algebras of operators. These structures are found in many areas of theoretical and applied mathematics and that's why the knowledge of functional analysis is very useful.

Instructional Objectives: The objectives for the class will be to empower students with the tools from functional analysis that are useful in other disciplines of mathematics such as applied mathematics, differential equations and quantum information. The most useful topics and tools will be selected from the following subjects:

    (1) Linear spaces.
    (2) Hilbert space theory and linear operators.
    (3) Banach algebras.
    (4) Elementary C^*-algebra theory.
    (5) Elementary von-Neumann algebra theory.
    (6) Unbounded operators.

Math 756 will focus on subjects (1), (2) and (3). Math 757, (during the spring semester 2025), will focus on topics (4), (5) and (6).

Prerequisites: The class will be appropriate for all graduate students.

Textbook: Typed notes will be distributed.

Grading: The grade will be based on student's work on the suggested exercises in the notes that will be distributed. You are strongly encouraged to came and talk to me about these exercises, the notes that will be distributed, and any other topics that you would like to discuss.