Instructor
Brent Nelson
Evans 851
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Lecture
MWF
2:00 pm - 2:59 pm
Evans 2

Office Hours: Wednesdays 3:30 pm - 5:30 pm, Fridays 1:00 pm - 2:00 pm, and by appointment.

Course Webpage: http://www.math.berkeley.edu/~brent/209.html

Textbook: There will be no official textbook for the course. I will provide notes as we progress through the material. Here are suggested supplementary materials:

- A Course in Operator Theory by John B. Conway (free download through UCB)
- Theory of Operator Algebras I by Masamichi Takesaki (I can loan a copy)
- Notes on von Neumann Algebras by Vaughan F.R. Jones

Course Description: The official course description can be found here. A familiarity with basic functional analysis, Hilbert spaces, bounded operators, C^*-algebras, and the continuous functional calculus will be assumed.

We will begin with the definition of a von Neumann algebra via the strong and weak topologies and introduce a few key examples. Then we proceed to the Borel functional calculus, an extension of the continuous functional calculus to Borel measurable functions. This will inform the notion that the theory of von Neumann algebras is non-commutative measure theory. We will discuss additional topologies on the von Neumann algebra and their connection with the predual. The importance of traces and projections will be discussed and used to explain the type decomposition theory of von Neumann algebras. Time permitting, we may visit Tomita–Takesaki theory, free probability, or other additional requested topics.

In-Class Tone: My aim is to foster an open and inclusive atmosphere in class. Therefore questions, participation, collaboration, and curiosity are strongly encouraged. Math can be hard, especially when we aren't honest with ourselves about whether or not we understand something. Confusion is not a sign of weakness, nor is asking for help. If you need help beyond class time and office hours, please do not hesitate to contact me so that we can work out additional times to meet.

Homework: No official homework will be assigned, though occassionally I will suggest problems or exercises to work on. I am happy to provide feedback on your solutions.

Presentation: Each student will give an in-class presentation. Presentations will be given intermittently throughout the course. I will suggest topics to present, but you are free to present a topic of your choice (pending approval).

Final: There will be **no** final exam for this course.

Grading: Your grade will be determined by your class participation (10%) and presentation (90%).