MATH 390 - SPRING 2011

Instructor: Jesse Peterson
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Office: SC 1414
Office Hours:
Wednesday 3:10 - 4:00
Friday 1:10 - 2:00
Friday 3:10 - 4:00
Or by appointment

Prerequisites: An introductory course in Functional Analysis.

Recommended books:
An introduction to Ergodic Theory by Peter Walters.
ISBN: 0387951520.

Dynamical Systems and Ergodic Theory by M. Pollicott & M. Yuri.
ISBN: 0521575990

Description:
This will be an introductory course on Ergodic Theory with some advanced topics in Orbit Equivalence/Measured Group Theory. The first half of the course will consist of the general concepts of groups of measure preserving transformations focusing mainly on the group $\mathbb{Z}$. Topics will include:

- Ergodicity
- Von Neumann's Ergodic Theorem
- Birkoff's Ergodic Theorem
- (Weak) mixing actions
- Compact actions
- Furstenberg's Multiple Recurrence Theorem
- Szemeredi's Theorem on arithmetic progressions

In the second half of the course focus on more general countable discrete groups, especially groups like $SL(3,\mathbb{Z})$. Topics will include:

- Orbit Equivalence/Measure Equivalence.
- Bernoulli shift actions
- Gaussian actions
- Kazhdan's property (T)
- Zimmer cocycles
- Popa's Cocycle Superrigidity Theorem

In the second half of the course it will be useful to have had a course in Operator Algebras. However, this is not a prerequisite for the course, and for most of the results and proofs we will not assume this background.

Grades:
Grades will be based on class attendance/participation. There will be no homework or exams.