MATHEMATICS 511 Section 101

Operator Theory and Applications

PREREQUISITES:

- A course in measure theory at the level of UBC's Math 420/Math 507.
- It would be desirable to have also taken a course on Hilbert and/or Banach spaces like UBC's Math 421/Math 510, but this is not essential. I will adjust the level of the course according to what proportion of the class have taken such a course.

INSTRUCTOR:

- Joel Feldman
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- `http://www.math.ubc.ca/~feldman/`
- office hours: Monday 2:30–3:30, Tuesday 2:00–3:00, Thursday 10:00–11:00

TEXT: Michael Reed and Barry Simon, Functional Analysis (Methods of modern mathematical physics, volume 1, Academic Press, 1980). This is an excellent book, but it is also unconscionably expensive. So I have not made it a required textbook.

I will post all handouts, problem sets, etc. on the web at
`http://www.math.ubc.ca/~feldman/m511/`

TOPICS:

1. Review of Hilbert and Banach Spaces:
   Definitions, examples, elementary geometry
   Operators - linear, bounded, compact, hermitian, self-adjoint, unitary
2. The Spectral Theorems:
   I will state several versions of the spectral theorem. The extent to which this is treated as a review, and in particular how many proofs I give, will depend on what proportion of the class has already seen rigorous proofs of one or more variants of the spectral theorem.
3. Unbounded Operators:
   Examples
   Closed and closeable unbounded operators
   Adjoints, symmetric operators, self–adjoint operators, self–adjoint extensions
   Spectral theory for unbounded operators
   Bloch theory and the spectrum of periodic Schrödinger operators

GRADING:

- The grade will be based on regular problem sets.

POLICIES:

- Working together on homework is encouraged, but you should write your solutions on your own.
- Missing a homework normally results in a mark of 0. Exceptions may be granted in two cases: prior consent of the instructor or a medical emergency.