

Math 9054B/4154B, Functional Analysis Winter 2015

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List of topics for student presentations:

1. **Weyl's asymptotic law**
2. **Nodal sets for Sturm-Liouville eigenfunctions; Sturm Oscillations and comparison results.**
3. **Stone's theorem**
Reference: Methods of Modern Mathematical Physics, Vol. 1 (Reed and Simon)
4. **Fredholm Theory+ Atkinson Theorem**
References:
 - 1- Functional Analysis (Conway)
 - 2- Banach Algebra Techniques in Operator Theory (Douglas)
5. **Harmonic Oscillator, Mehler Formula for the Heat Kernel, Weyl's law, coherent states**
6. **Dirichlet Problem**
References:
 - 1- Methods of Modern Mathematical Physics, Vol. 1, page 204 (Reed and Simon)
 - 2- Functional Analysis, Chapter 7 (Lax).

7. **Ergodic Theory I, von Neumann's Mean Ergodic Theorem**
References:
 - 1- Functional Analysis, Section 35.2 (Lax)
 - 2- Methods of Modern Mathematical Physics, Chapter 2, section 5. (Reed and Simon)
8. **Ergodic Theory II**
Reference: Methods of Modern Mathematical Physics, Chapter 7, section 4 (Reed and Simon)
9. **Trace Class Operators+ Dixmier Trace**
10. **Stone- von Neumann Theorem**
Reference: Functional Analysis, Section 35.6 (Lax)
11. **Friedrichs Extention**
Reference: Functional Analysis, page 402 (Lax)
12. **Sobolev Spaces and Garding Inequality**
13. **Fredholm Determinant**
Reference: Functional Analysis, page 268 (Lax)