Syllabus for Math 502, Functional Analysis, Fall 2013

There are two texts for this course, Analysis by Lieb and Loss, which is denoted below by $L^2$, and Real analysis by Folland, which is denoted below by $F$. There will occasionally be notes posted in class on topics that are not covered in either text, at least not in a convenient form. (Though Folland has has a whole Chapter on topology, the parts of we need to get going on functional analysis are scattered throughout it.)

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**WEEK 1: Jan 23 :** Introduction to the course.  
**Reading:** Topology notes posted online.

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**WEEK 2: Jan 28, 30:** Topology Continued  
**Reading:** Topology notes posted online. Also, as a supplement, Sections 4.1-4.4 and 4.6-4.7 in $F$.

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**WEEK 3: Feb. 4, 6:** $L^p$ spaces, introduction.  
**Reading:** 2.2-2.4, and 2.7 in $L^2$, 6.1 and 6.2 in $F$.

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**WEEK 4: Feb 11, 13:** Duality, weak topology.  
**Reading:** 2.5, 2.6 and 2.9-2.11 in $L^2$ and 6.4 in $F$.

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**WEEK 5: Feb 18, 20:** Bounded operators on $L^p$, interpolation.  
**Reading:** 6.3 in Folland.

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**Reading:** 2.12 -2.20 in $L^2$, 5.3 in F.

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**WEEK 7: Mar 4, 6:** Hilbert Space  
**Reading:** 5.5 in $F$, 2.21 in $L^2$.

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**Reading:** Chapter 5 in F.

- **First Midterm Exam** Wed Mar 13. This will be based on the material from weeks 1 through 6.

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**WEEK 9: Mar 25, 27:** Radon measures, Riesz-Markov Theorem  
**Reading:** 4.5 (on locally compact Hausdorff spaces) and 7.1-7.3 in $F$, 6.22 in $L^2$.

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**WEEK 10: Apr. 1, 3:** Radon measures continued.  
**Reading:** 7.4 in $F$, and class notes, to be posted, and 3.1-3.4 in $F$. 

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WEEK 11: Nov. 8, 10:  Signed measures differentiation theorems
Reading: 3.1-3.3 in $F$.

WEEK 12: Apr. 15, 17:  Fourier analysis
Reading: 3.4-3.6 in $F$, 5.1-5.4 in $L^2$.

Reading: 8.1-8.5 in $F$, 5.5-5.10 in $L^2$.

WEEK 14: Apr 29, May 1:  Applications an review.
Reading: Class notes.

WEEK 15: May 6:  Applications and review

FINAL EXAM: