September 16, 2012

MATH 245A - FALL 2012

MWF 2:00 MS 5148, and Thursday 2:00 MS 5148

First Class Thursday Sept. 27.

Office hours:

J. Garnett: MWF 1:30 in MS 7941

Nick Cook: Tuesday 10:00 and Thursday 1:00 in MS 6142.

Texts: 1. T. Tao, *An Introduction to Measure Theory,*, AMS Graduate Studies in Mathematics, Volume 126, (978-0-8218-6919-2)

2. E. M. Stein and R. Shakarchi, *Real Analysis, Measure Theory, Integration, and Hilbert Spaces*, (0-691-11386-6) (recommended). We will cover all of the small Tao book and Chapters 1, 2, 3, and 6 of Stein-Shakarchi. in 245A.

Grade: Homework 40%, final 40%, midterm 20%.

Exams: Final Wednesday, December 12, 2012 11:30 AM - 2:30 PM. No books or notes, but you may bring a 4 x 6 file card with notes written on both sides.

Midterm October 25 in TA section. No books or notes, but you may bring a 4 x 6 file card with notes written on both sides.

Homework: Assigned biweekly and due at the beginning of the TA section. You may work together on the homework problems, and you are encouraged to do so, but you must write up your solutions yourself without copying. Extra credit will be given for homework in printed format, like pdf.

You must present at least one homework problem at the blackboard in quiz section. There will be 6 - 8 homework sets, including some very challenging problems.

Prerequisites: Courses 131A, 131B and 121, or the equivalent. Graduate students must demonstrate some preparation on the departmental "Basic" exam (given Sept. 18 and required for 245A). Undergraduate students must obtain instructor's permission to enroll. All students are expected to already know how to write a correct, concise proof.

Homework 1: Due Thursday, Oct. 11. All from Tao, *An Introduction to Measure Theory*

1. 1.13, 1.1.4 and 1.1.7
2. 1.18, 1.1.9 and 1.1.10
3. 1.1.11
4. 1.1.14
5. 1.1.15, 1.1.16 and 1.1.18.
6. 1.2.1
7. 1.2.5, 1.2.9, 1.2.10.
8. 1.2.12 and 1.2.13
9. 1.2.24
10. 1.2.25
11. 1.2.26
12. 1.2.27

Homework 2: Due Oct. 25.

1. 1.2.15, 1.2.17, 1.2.20;
2. 1.2.21, 1.2.22;
3. 1.2.23, 1.2.24;
4. 1.3.3, 1.3.4, 1.3.5;
5. 1.3.8;
6. 1.3.14, 1.3.15, 1.3.16, 1.3.17;
7. 1.3.18;
8. 1.3.21.

Homework 3: Due. Nov. 8. 1.3.24, 1.4.17, 1.4.18, 1.4.19, 1.4.21, 1.4.30, 1.4.37, 1.4.38, 1.4.44, 1.4.46, 1.4.47, 1.4.50, 1.5.1, 1.5.2, 1.5.3.

Homework 4: Due Nov. 15. 1.5.7, 1.5.8, 1.5.10, 1.5.11, 1.5.14, 1.5.17, 1.5.18.

Homework 5: Due Nov. 21. 1.6.7, 1.6.8, 1.6.9, 1.6.12, 1.6.13, 1.6.20, 1.6.21.

Homework 6: Due Dec. 6. 1.6.26, 1.6.27, 1.6.32, 1.6.52, 1.7.2, 1.7.10, 1.7.16, 1.7.17, 1.7.23, 1.7.26. Also read Proposition 1.6.41 and make a proof of it using the full Vitali covering lemma instead of Cousin's theorem. Hint: The definition of $\delta(x)$ in the proof should go into the definition of the Vitali cover.