April 2, 2012

MATH 133 - SPRING 2012

Introduction to Fourier Analysis

MWF 1:00 MS 6221, and Thurs 1:00 MS 6221

Office hours: J. Garnett MW 2:30 and 5:00 in MS 7941, and by appointment

Wenying Gan Thursday 11:00 - 1:00 in MS 3905.TA is TBA

Text: E. M. Stein and R. Shakarchi, *Fourier Analysis, An Introduction* (required).

Material: Chapters 1 - 5 of Stein-Shakarchi. Wave equation, heat equation, convolutions, approximate identities, Cesàro means, Fejér's theorem, Dirichlet problem for the disc, L^2 convergence and Hilbert space, applications: isoperimetric inequality, Weyl's theorem on equidistributed points, nowhere differentiable functions. Fourier transforms on $\mathbb{R}$ and $\mathbb{R}^d$, Plancherel's theorem, the Weierstrass approximation theorem, the Heisenberg uncertainty principle, applications to partial differential equations. Further topics as time allows.

Grade: Homework 40%, final 40%, midterm 20%. Each student must present at least one homework problem at the blackboard in quiz section.

Exams: Midterm April 30 in class. Final June 13, 11:30 - 3:30

Homework: Assigned biweekly, due at the beginning of quiz section every second week. You may work on the homework problems together, but you must write up your solutions alone. You will be asked to present your homework solutions at the blackboard in class.

Note: This course has the same instructor as Math 131C, but 133 and 131C will have very different topics and well separated midterm, final exam and homework days. It is possible to take either course or both courses.

Homework 1: Due April 12. Page 23; 6, 7, 8, 10, 11. Page 58; 1, 2.

Homework 2: Due April 26. Page 58; 4, 5, 7, 8, 9, 10, 12, 13, 14, 16.

Homework 3: Due May 10. Page 58; 6, 18. Page 87; 3, 4, 6, 7, 8, 11, 12, 13, 14.

Homework 4: Due May 24. Page 87; 15, 16. Page 120; 3, 4, 5, 6, 7, 10.

J. Garnett