5B1466 Fourier Analysis, KTH spring 2006.

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Literature: E. M. Stein and R. Shakarchi, Fourier Analysis, An Introduction. Princeton University Press 2003.

Lectures:

1. 30 January. Ch. 1, pp. 1-28. Overview and background. Heat and wave equations.
2. 6 February. Ch. 2, pp. 29-67. Fourier series, summation kernels, convergence of Fourier series.
3. 20 February. Ch. 2, cont. Convolution, approximation by smooth functions.
4. 27 February. Ch. 3, pp. 69-82, Hilbert space theory for Fourier series.
5. 6 March. Ch. 4.1-4.2, Isoperimetric inequality and Weyl's equidistribution theorem; Ch. 4.4, Heat equation on the circle.
6. 13 March. Divergent Fourier series, Ch. 3.2.2. and Continnuous nowhere differentiable functions, Ch. 4.3.
7. 20 March. Ch. 5, pp. 129-145. The Fourier transform on $\mathbb{R}$.
8. 27 March. Ch. 5, cont., pp. 145-161. Applications.
9. 3 April. Ch. 6, pp. 176-184, 196-207. The Fourier transform on $\mathbb{R}^d$.
10. 10 April. Ch. 7, pp. 218-236. The Fourier transform on $\mathbb{Z}_n$.
11. 8 May. Recapitulation/repetition.
12. 15 May. Ch. 8, pp. 241-275. Dirichlet's theorem.
13. 22 May. The Fourier transform on finite groups.
14. 29 May. The Fourier transform on finite groups.

Homework:
Deadline 20 February: Exercise 1.10, 1.11, 2.2, 2.5, 2.15, 2.17.
Deadline 20 March: Exercise 3.11, 3.14, 3.20, 4.4, 4.7.
Deadline 8 May: Exercise 5.4, 5.6, 5.15, 5.23, 6.5, 6.8, 7.6, 7.8.
Oral exams on theory in May and June.

Last up date 20 March 2006.