

**SF2705 Fourier Analysis, KTH spring 2008.**

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**Literature:** E. M. Stein and R. Shakarchi, Fourier Analysis, An Introduction. Princeton University Press 2003. Notes on the Fourier transform on finite groups.

**Examination:** Home work plus oral exam on theory.

**Lectures:** Fridays 10-12, in 3733.

1. 25 January. Ch. 1. Overview and background. Heat and wave equations.
2. 1 February. Ch. 2. Fourier series, summation kernels, convergence of Fourier series.
3. 15 February. Ch. 2, cont. Convolution, approximation by smooth functions.
4. 22 February. Ch. 3. Hilbert space ( $L^2$ -)theory for Fourier series.
5. 29 February.  $L^2$ -theory continued. Applications, Ch. 4.
6. 7 March. Ch. 4-4.2 cont. Isoperimetric inequality and Weyl's equidistribution theorem; Ch. 4.4, Heat equation on the circle.
7. 14 March. Ch. 5, pp. 129-145. The Fourier transform on  $\mathbb{R}$ .
8. 28 March. Ch. 5, cont., pp. 145-161. Applications.
9. 4 April. **Note: 9.30-12.15.** Ch. 6. The Fourier transform on  $\mathbb{R}^d$ . Wave equation and spherical means. The Radon transform.
10. 11 April. **Note: 9.30-12.15.** Ch. 7. The Fourier transform on  $\mathbb{Z}_n$  and on (general) finite groups.
11. 18 April. Cancelled.
12. 25 April. **Note: 9.30-12.15.** Ch. 8, Dirichlet's theorem.
13. 9 May. Cancelled.
14. 16 May. **Note: 9.30-12.15.** Dirichlet's theorem. cont.

**Homework:**

Deadline 20 February: Exercise 1.10, 1.11, 2.2, 2.5, 2.15, 2.17.

Deadline 28 March: Exercise 3.11, 3.14, 3.20, 4.4, 4.7.

Deadline 8 May: Exercise 5.15, 5.21, 5.23, 6.11, 6.15, 7.1, 7.8, 7.11.