

## DEPARTMENT OF MATHEMATICS SYLLABUS

Course # & Name: MAT 129: Fourier Analysis

Recommended Text(s) & Price: "Fourier Analysis and Its Applications" by  
Gerald Folland, AMS (Amer. Math. Soc.), 1992;  
\$72.

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Lecture(s)	Sections	Comments/Topics
Week 1	Chapter 1, Section 2.1-2.2	Overture/Motivations; Fourier series of a periodic function; A convergence theorem.
Week 2	Section 2.3, 2.4, and 2.6	Derivatives, integrals, and uniform convergence; Fourier series on intervals; Remarks including the Gibbs phenomenon.
Week 3	Section 3.1-3.3	Othogonal sets of functions; Inner products; Convergence and completeness.
Week 4	Section 3.4-3.5	$L^2$ spaces; Regular Sturm-Liouville problems.
Week 5	Section 4.1-4.3	Some boundary value problems; 1D heat flow and wave motion.
Week 6	Section 4.4-4.5	The Dirichlet problem; Multiple Fourier series; Good time to do midterm; Coverage should be Chapters 1-4.
Week 7	Section 7.1-7.2	The Fourier transform; Convolution
Week 8	Section 7.3	Applications of Fourier transforms.
Week 9	Section 7.5; Other applications	The Fourier transform of several variables; Various applications.
Week 10	Other applications; Choose from Section 2.5, 6.1-6.2; Section 6.6; Section 7.4; Section 7.6; Section 8.1-8.3	Fourier series and boundary value problems; Orthogonal Polynomials; Haar and Walsh functions; Fourier transforms and Sturm-Liouville problems; Laplace transform and its inversion, etc.

## Additional Notes:

After 7th Week, an instructor can freely choose various applications of interest. Other possible sources are:

- H. Dym and H.P. McKean: *Fourier Series and Integrals*, Academic Press, 1972.
- T.W. Korner: *Fourier Analysis*, Cambridge Univ. Press, 1988.
- E.M. Stein and R. Shakarchi: *Fourier Analysis*, Princeton Univ. Press, 2003.
- J.S. Walker: *Fourier Analysis*, Oxford Univ. Press, 1988