

Math 172 – Lebesgue Integration and Fourier Analysis

András Vasy, Winter 2014-2015:

RUNNING SYLLABUS, AS OF FEBRUARY 19, 2015

Subject to change!!!

January 5.	Introduction; measure theory preliminaries (Ch. 1.1)
January 7.	Exterior measure (Ch. 1.2)
January 9.	Exterior measure, continued (Ch. 1.2)
January 12.	Measurable sets, Lebesgue measure (Ch. 1.3)
January 14.	Measurable sets, Lebesgue measure, continued (Ch. 1.3)
January 16.	Measurable sets, Lebesgue measure, continued (Ch. 1.3)
January 21.	Measurable functions (Ch. 1.4)
January 23.	Measurable functions, continued (Ch. 1.4)
January 26.	The Lebesgue integral: basic properties and convergence theorems (Ch. 2.1)
January 28.	The Lebesgue integral: basic properties and convergence theorems, continued (Ch. 2.1)
January 30.	The Lebesgue integral: basic properties and convergence theorems, continued (Ch. 2.1)
February 2.	The space L^1 of integrable functions (Ch. 2.2)
February 4.	The space L^1 of integrable functions, continued (Ch. 2.2)
February 6.	Midterm
February 9.	Fubini's theorem (Ch. 2.3)
February 11.	Fubini's theorem, continued (Ch. 2.3)
February 12, 1:15pm.	The Fourier series, motivation (Lecture Notes, and Vol. I, Ch. 1)
February 13.	Inner product spaces (Lecture Notes, and Vol. I, Ch. 3.1)
February 18.	The Hilbert space L^2 and the Fourier series (Lecture Notes and Ch. 4.1-4.3)
February 20.	Convergence of the Fourier series (Lecture Notes, and Vol. I, Ch. 2 and Ch. 3.2)
February 22.	Convergence of the Fourier series, continued (Lecture Notes, and Vol. I, Ch. 2 and Ch. 3.2)
February 25.	Application: Weyl's equidistribution theorem (Lecture Notes, and Vol. I, Ch. 4.2)
February 27.	Application: the Poisson kernel and the Dirichlet problem in the unit disk (Lecture Notes, and Vol. I, Ch. 2.5); The Fourier transform (Lecture Notes, and Vol. I, Ch. 5.1)
March 2.	The Fourier inversion formula (Lecture Notes, and Vol. I, Ch. 5.1)
March 3, 1:15pm	Application of the Fourier transform to PDE (Lecture Notes, and Vol. I, Ch. 5.2); The L^1 and L^2 theory of the Fourier transform (Lecture Notes, Ch. 2.4 and Ch. 5.1)
March 4.	The L^1 and L^2 theory of the Fourier transform, continued (Lecture Notes, Ch. 2.4 and Ch. 5.1); Poisson summation (Lecture Notes, and Vol. I, Ch. 5.3)
March 6.	Tempered distributions (Lecture Notes)
March 9.	No class
March 11.	No class
March 13.	Summary and outlook

Note: Vol. I refers to the 'Fourier Analysis' book of Stein and Shakarchi. The lecture notes are those of the instructor. All other references are to the 'Real Analysis' book of Stein and Shakarchi.