Daily Schedule

Day-by-day schedule in Fall 2016

Classes are 80 minutes long. Section references below are to the textbook [Bass], unless stated otherwise.

Who will teach: Days 1-5 (Tyson), Days 6-13 (Laugesen), 14-17 (Tyson), 18-24 (Laugesen), Days 25-29 (Tyson)

Day 1 - Aug 23
Course overview.
Introduction to sigma-algebras (first page of Sec. 2.1). Sec. 2.1 (sigma-algebras). Before Day 2, read [Folland] Sec. 0.5 on the Extended Real Numbers.

Day 2 - Aug 25
Sec. 2.2 (monotone class theorem - statement only; read handout on the proof).
Sec. 3.1 (definition and properties of a measure)
Sec. 4.1 - Outer measures

Before Day 3, read [Folland] page 21, which shows that if you have an algebra, then to check the sigma-algebra conditions you need only consider disjoint unions. We will use this fact in Chapter 4.

Day 3 - Aug 30
Sec. 4.1 - Outer measures, cont.
Sec. 4.2 - Lebesgue-Stieltjes measures

Day 4 - Sep 1
Sec. 4.3 - Lebesgue measure: examples and regularity
Sec. 4.4 - Lebesgue non-measurable sets
Sec. 4.5 - Carathéodory Extension Theorem

Day 5 - Sep 6
Hausdorff measure

Supplementary notes on Hausdorff measure.

Day 6 - Sep 8
Sec. 5.1 - Measurability
Sec. 5.2 - Approximation by simple functions

Day 7 - Sep 13
Sec. 5.3 - Lusin's theorem
Sec. 6.1 - Integral of nonnegative (simple) function
Sec. 6.1 - Integrable real or complex valued functions

Day 8 - Sep 15
Sec. 7.1 - Monotone convergence theorem
Sec. 7.2 - Linearity of the integral

Day 9 - Sep 20
Sec. 7.3 - Fatou's Lemma
Sec. 7.4 - Dominated Convergence Theorem, and applications

Day 10 - Sep 22
Differentiation through the integral; [Folland] Theorem 2.27
Chapter 8 - Properties of Lebesgue Integrals

Day 11 - Sep 27
Chapter 8 - Properties of Lebesgue Integrals, cont.
Chapter 9 - Riemann integrals

Day 12 - Sep 29 - Midterm 1

Day 13 - Oct 4
Chapter 10 - Types of convergence

Day 14 - Oct 6
Sec. 11.1 - Product sigma-algebras and measures

Lebesgue measure on R^n (definition)

Day 15 - Oct 11
Sec. 11.2 - Fubini's Theorem
Properties of Lebesgue measure on R^n (statements only, from [Folland] Sec. 2.6 and 2.7)

Day 16 - Oct 13
Sec. 15.1 - L^p norm, Holder and Minkowski inequalities

Sec. 15.2 - Completeness

Day 17 - Oct 18
Sec. 15.3 - Convolutions

Mollification and density in L^p(R^n) (see class notes here)
Day 18 - Oct 20
Sec. 19.1 - Hilbert spaces (class notes here)

Day 19 - Oct 25
Sec. 19.2 - Subspaces and orthogonal decomposition (class notes here)

Day 20 - Oct 27
Sec. 19.3 - Orthonormal sets (class notes here)

Day 21 - Nov 1
Sec. 19.4 - Fourier series and applications (class notes here)

Day 22 - Nov 3
Properties of Fourier series
Integration on groups - a taste of what lies ahead

Day 23 - Nov 8 - Midterm 2
Day 24 - Nov 10
Sec. 12.1 - Positive and negative sets, signed measures
Sec. 12.2 - Hahn decomposition of X
Sec. 12.3 - Jordan decomposition of a signed measure

Day 25 - Nov 15
Stein & Shakarchi - Cantor-Lebesgue function
Sec. 13.1 - Absolute continuity
Sec. 13.2 - Radon-Nikodym decomposition of absolutely continuous measure

Day 26 - Nov 17
Sec. 13.3 - Lebesgue decomposition of a positive measure
Sec. 15.4 - Bounded linear functionals

Day 27 - Nov 29
Sec. 14.1 - Maximal functions
Sec. 14.2 - Derivative of the integral

Day 28 - Dec 1
Sec. 14.3 - Increasing and bounded variation functions

Day 29 - Dec 6
Sec. 14.4 - Absolutely continuous functions

Earlier years: Fall 2015 Schedule