The final exam is scheduled for **Monday, December 14 at 8:30am** in Wean Hall room 5302. The test will be closed book, no notes or other aids. The exam will count about 25 percent toward the course grade.

Test questions may involve statements of major theorems, proofs of results from class, portions of homework problems, or applications of concepts, results, and/or proof techniques developed in the course, related to the topics below. This material is cumulative over the course.

**Lebesgue measure**

**Abstract measures and measurability**
- $\sigma$-algebras, measures. Measurable functions. Measurability of combinations and limits, lim-sups, liminfs.

**Integrals**

**Lebesgue spaces**

**Modes of convergence**

**Signed measures**

**Product measures and integration**

**Differentiation**
- Approximation, covering lemmas. The maximal function, maximal theorem. Lebesgue’s differentiation theorem.

**Lebesgue-Stieltjes measures on $\mathbb{R}$**
- Almost-everywhere differentiability of increasing functions. Total variation, functions of bounded variation. Absolutely continuous functions. Fundamental theorem of calculus for Lebesgue integrals on $\mathbb{R}$.

**Radon measures**
- Outer, inner regularity of measures on locally compact Hausdorff spaces. Riesz representation theorem for positive linear functionals on $C_c(X)$. Lusin’s theorem.