# Hunter College of The City University of New York

**MATH 454 Calculus on Manifolds** 3 hrs, 3 cr.

**Textbook***: Calculus on Manifolds* by Michael Spivak, Westview Press

**Euclidean Space**

- Subsets on Euclidean space
- Inner product and norms
- Functions and continuity

**Differentiation**

- Basic theorems
- Inverse functions
- Implicit function theorem

**Integration**

- Measure zero and content zero
- The Riemann integral
- Necessary and sufficient conditions for integrability
- Fubini's Theorem
- Change of variables

**Integration on chains**

- Algebraic preliminaries
- The tensor and exterior algebras
- Stokes' theorem for chains

**Manifolds**

- Fields and forms on manifolds
- Stokes' theorem on manifolds
- The volume element
- The classical integral theorems