Lectures on
Homotopy Theory and Geometry

Lectures are aimed at graduate students. Mondays 1 –2:30 starting Sept. 10 in P-131 of Math Tower.

Prelimiary List of Topics (subject to change as the semester progresses)

- Lecture 1: Obstruction Theory, Eilenberg-MacLane spaces, and Postnikov towers.

- Lecture 2: Simplicial sets and simplicial homotopy theory

- Lecture 3: Spectral Sequences, double complexes, Cech to singular SS, Atiyah-Hirzebruch SS, Serre SS, Hodge-to-deRham SS.

- Lecture 4: Topics in cohomology — Cup products, higher order products, Milnor construction and cohomology of groups, equivariant cohomology.

- Lecture 5: Steenrod squares, chain approximations to diagonal, higher order step functions, Adem relations and Cartan formulae, cohomology of $K(Z/2,n)$.

- Lecture 6: Manifold topology: Poincaré duality, intersection theory, transversality, Sard's theorem

- Lecture 7: Quillen's Rational Homotopy Theory

- Lecture 8: Differential forms and deRham's theorem

- Lecture 9: Differential forms and rational homotopy theory

- Lecture 10: Kähler metrics on smooth complex projective varieties

- Lecture 11: Rational Homotopy Theory of smooth complex projective varieties.

John Morgan