MATH 663, ALGEBRAIC TOPOLOGY I- COURSE OUTLINE
28 lectures (First: 8/24, last: 12/5, no lecture: 10/10 (fall break), 11/23 (Thanksgiving)

TOPICS PLANNED:

1. Singular homology (VICK Ch. 1, 34 pp; MASSEY Ch. 2&3): 3 lectures
2. CW complexes and cellular homology (VICK, Ch. 2, 31pp; MASSEY Ch. 4): 3 lectures

2a: Intro to Morse Theory (MILNOR, HIRSCH): 2 lectures

3. Arbitrary coefficients and cohomology (VICK, Ch. 3, 21 pp; MASSEY Ch. 5&7): 4 lectures
4. Homology of products, products in cohomology (VICK, Ch. 5, 24 pp; MASSEY 8,10): 4 lec
5. Manifolds, Poincare duality (VICK, Ch 6, 44pp; MASSEY, Ch. 9): 6 lec.
6. De Rham cohomology: BOTT-TU, Ch. 1, 1-5, 50 pp): 3 lec.
7. De Rham's Theorem: MASSEY, Appendix: 2 lectures

References:

J. W. Vick, *Homology Theory: An Introduction to Algebraic Topology*, 2nd ed. Springer GTM, no 145 (1994)

W.S. Massey, *Singular Homology Theory*. Springer, GTM no. 70 (1980)

R. Bott, L.Tu, *Differential Forms in Algebraic Topology*. Springer, GTM no. 82 (1982)

P.J. Hilton, J. Wylie: *Homology Theory, An Introduction to Algebraic Topology*. Cambridge UP (1960)

A.Hatcher, *Algebraic Topology*.

MATH 664, planned topics:

Homotopy, connections with cohomology/ Hodge theorem/ Characteristic classes/Obstruction theory and homotopy classes/ Steenrod's problem/Morse homology/ Persistent homology