

MA 555
Department of Mathematics, NCSU
Spring, 2008

- **Course:** "Introduction to Manifold Theory"
- **Catalogue description:** Theory of differentiable manifolds. Definitions and examples; tangent vectors and tangent spaces; maps between manifolds, submanifolds, submersions, immersions, product and quotient manifolds; cotangent vectors and cotangent spaces; differentials forms; vector fields on a manifold, integral curves and flows of vector fields, and Lie derivatives; tangent and cotangent bundles.
- **Instructor:**

NAME	OFFICE	OFFICE HOURS	EMAIL	PHONE
L. K. Norris	HA 145	(To be announced)	lkn@math.ncsu.edu	515-7932

- **Textbook:** "Tensor Analysis on Manifolds" by Richard Bishop and Samuel Goldberg (a Dover paperback)
- **Grading:** 1 midterm exam (30%), homework (40%), and 1 final exam (30%)
- **Plan of Study**

#	Chapter.Section	Topic
1	2.1-2.5, 2.7, 2.9	Review of Linear Algebra
2	Notes	Review of Advanced Calculus
3	0.2	Brief survey of topics from topology needed for the course
4	1.1-1.3	Manifolds, definitions and examples. $(R^n, V, GL(n), S^n, \dots)$ differentiable maps and diffeomorphisms
5	1.5-1.7	Structures on manifolds: curves, tangent vectors, tangent spaces, T_pM , and the tangent bundle TM of a manifold M .
6	1.8	The Differential of a Map: coordinate representation, differentials, cotangent vectors and cotangent spaces T_p^*M , and the cotangent bundle T^*M of a manifold M
7	3.1, 3.4 - 3.7	Vector fields on a manifold: integral curves, flows, Lie derivatives, ...
8	1.4, Notes	New manifolds from old manifolds: Submanifolds, product and quotient manifolds, bundles, and the bundle of linear frames LM of a manifold M
9	2.6, 2.8, 2.10 - 2.18	Tensor Algebra
10	3.2-3.3	Tensor fields on a manifold
11	4.1-4.5	Differential forms on manifolds
12	Notes	Canonical forms on Manifolds: The canonical forms on T^*M and LM