

- (1) the sheaf of infinitely differentiable functions on Euclidean space
- (2) the definition of a differentiable manifold, a differentiable map
the tangent-space of a manifold, the tangent vectors (using paths)
- (3) C^∞ submanifolds of C^∞ manifolds
- (4) examples: covering spaces of C^∞ manifolds are C^∞ manifolds
certain quotients of C^∞ manifolds are C^∞ manifolds; projective space, Grass-
mannians.
Fiber bundles, homogeneous spaces.
- (5) Vector bundles, tangent bundles, cotangent bundles, normal bundles,
- (6) The tubular nbhd thm.
- (7) Proper submersions are fiber bundles (the Ehresmann theorem)
- (8) Partitions of unity, sections of bundles
Sard's theorem, transversality, regular values,
- (9) intersection of submanifolds versus *cup products of cohomology classes
transverse inverse images versus pull-back on cohomology
- (10) Whitney's embedding theorem
- (11) vector bundles, *characteristic classes, the Atiyah-Bott periodicity
- (12) Integration, Stokes theorem, Poincare lemma, *De Rham cohomology
- (13) the one-parameter flow associated to a vector field, the Frobenius theorem on
involutive subbundles of the tangent bundle

Topics relying on the Fall course are marked with an *

Followed by a discussion on Morse theory, the cobordism ring and the statement
of Thom's theorems