

SYLLABUS FOR MATH 601 – VECTOR BUNDLES

Spring 2010
Instructor: Daniel A. Ramras

Course Info:

MWF 10:30–11:20 SH 112

Office Hours: WH 205, Time TBA

Text: Characteristic Classes, by John Milnor and James Stasheff

Course Description:

Topics to be Covered:

- Smooth manifolds and their tangent bundles
- Vector bundles, clutching functions, and principal bundles
- Classifying spaces and homotopy theory of bundles
- The Splitting Principle and the Projective Bundle Theorem
- Definitions of Stiefel–Whitney and Chern classes
- Applications of Stiefel–Whitney classes to manifolds
- The Thom Isomorphism Theorem and the Gysin Sequence
- Characteristic classes as obstructions
- K–theory: the Chern Character, the Bott Periodicity Theorem

Possible additional topics:

- Connections, curvature, and Chern–Weil Theory
- Pontryagin classes, transversality, and cobordism

References:

Here are some additional references.

- Fibre bundles, by Dale Husemoller.
- Basic bundle theory and K-cohomology invariants, by Dale Husemoller, et. al.
- Vector Bundles and K-theory, by Allen Hatcher, available at:
<http://www.math.cornell.edu/hatcher/VBKT/VBpage.html>

Course Requirements:

Grading in the course will be based on class participation and homework. There will be three of four homework assignments, and students will be expected to turn in written solutions. Additionally, students will be asked to present their solutions to selected problems in class.