

MATHEMATICS 721 A1
Differential Topology I
Fall Semester 2001

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Lectures: MWF 11:00-12:00pm in MCS B29

Text: *Modern Differential Geometry for Physicists*, Second Edition, by Chris J. Isham, ISBN 981-02-3555-0, World Scientific, 1999. This text will be supplemented by additional materials.

My Office Hours: MF 1-2, W 2-3.

Class Web Page: <http://math.bu.edu/people/kimura/Fall01/721/>

Content: A smooth n -dimensional manifold (or smooth n -manifold) is a space obtained by gluing together a collection of copies of $\mathbf{R}^n$ by using smooth maps. Standard examples of smooth n -manifolds are $\mathbf{R}^n$ itself, n -spheres, or n -dimensional real projective spaces.

Many of the notions from calculus on $\mathbf{R}^n$ generalize to smooth n -manifolds. Much of this falls under the heading of *differential topology*, the study of the topology of smooth manifolds by using such analytic tools. We will introduce smooth manifolds, smooth maps, tangent bundles and vector fields, inverse and implicit function theorem, immersions and submersions, distributions and foliations, tensors, differential forms, and integration, geodesics, Lie groups, fiber bundles and connections and curvature. Other topics will be covered if there is time.

Homework: Homework will be assigned periodically. Late homework will not be accepted. Students may discuss homework with each other (and are encouraged to do so) but all written work must be prepared independently.

Exams: There will be a take home midterm and final exam.

Grades: Your final grade is determined by three categories – the midterm, the homeworks, and the final. Grades are based upon the formula:

$$\text{Final Grade} = \frac{1}{3}(\text{Exam Average}) + \frac{1}{3}(\text{Homework Average}) + \frac{1}{3}(\text{Final Exam})$$

Cheating: Plagiarism and cheating will not be tolerated and anyone suspected of such academic misconduct will be referred to the Dean's Office as per the provisions of the CAS Academic Conduct Code.