Course Announcement Summer session B   May 9 – June 16 , 2006

MTG 5932-01 Topics in Topology:

Introduction to the Theory of 3-manifolds

MTWR 11:00 – 12:20   Room 201

Instructor: W. Heil

Prerequisite: MTG 5326 Topology I or equivalent   (quotient spaces, homotopy, fundamental group).

Objective: To introduce the students to recent results in the theory of 3-manifolds. 3-manifolds arise in many situations. For example the state of an object with constant energy that moves on a 2-dimensional sphere under a gravitational force field is determined by three parameters, two for the position on the sphere and one for the direction of its velocity. The set of all points in this phase space forms a 3-manifold (the so-called 3-dimensional projective space). As an other example consider the central question of Knot Theory which is when two knotted loops in 3-space can be deformed into each other without cutting the loops. Removing a knotted loop k from 3-space results in a 3-manifold, called a knot space of k, and the question can be answered if we can decide when the two resulting knot spaces are topologically the same.

Content: The course will give an Introduction to the Theory of 3-dimensional Manifolds. We will give an overview of the basic facts on prime decompositions of 3-manifolds and the loop and sphere theorems, and then discuss foliations by circles (Seifert Fiber Spaces), incompressible surfaces in Seifert Fiber Spaces and decompositions of closed 3-manifolds by tori (JSJ-splitting).

Text: A good source for the presented topics is Allen Hatcher: Notes on basic 3-manifold topology (http://www.math.cornell.edu/ hatcher/)

Grading: The grade is determined by class attendance, participation in discussions, and the in-class presentation of problems or a topic assigned by the instructor.