

SYLLABUS FOR MATH 572 INTRODUCTION TO ALGEBRAIC TOPOLOGY

Spring 2015
Instructor: Daniel A. Ramras

Course Info: M-W 3:00–4:15 LD 018

Office Hours: TBA

Text Book: Algebraic Topology by Allen Hatcher, available on-line:
<http://www.math.cornell.edu/~hatcher/AT/ATpage.html>

Course Description:

The main topics in this course will be covering spaces and homology theory. The flavor of the course will be more algebraic than Math 571, due to the homological algebra required to understand homology theory. However, the geometric side of the subject, and geometric applications, will also be emphasized.

Topics to be Covered:

- Universal covers; classification of covering spaces; covers of simplicial complexes and CW complexes; applications;
- Singular homology theory: long exact sequences, excision, Mayer–Vietoris; the Hurewicz map;
- Cellular and simplicial homology;
- Applications: the Jordan Curve Theorem; the Lefschetz Fixed Point Theorem; Invariance of Domain;
- The Kunneth Theorem; Cohomology and the Universal Coefficient Theorem.

References:

Here are some additional references.

- Munkres, Topology (2nd Edition)
- Seifert and Threlfall, A Textbook of Topology
- Lee, Introduction to Topological Manifolds

Course Requirements:

Grading in the course will be based on class participation and homework (60%), presentations (15%), and a final exam (25%).

Possible topics for presentations include:

- Applications of covering spaces to combinatorial group theory;
- Applications of homology (the Jordan Curve Theorem; the Lefschetz Fixed Point Theorem; Invariance of Domain);
- The Kunneth Theorem; Cohomology and the Universal Coefficient Theorem.
- Poincare duality.

Homework will be assigned approximately every other week, and students will be expected to turn in carefully written solutions. You are encouraged to work with your classmates on the homework, and to talk to me in office hours. However, your solutions must be written in your own words. Since we will spend time in class discussing the homework after it is turned in, it is important that you submit your assignments on the stated due dates. Students will be asked to present their solutions to selected problems in class.

Further Information:

- **Regrade Policy:** If you feel that an assignment has been graded incorrectly, you must submit a written explanation of what you feel is wrong with the grading, along with the original graded assignment. These should be submitted to the instructor by the class period following the return of the assignment.
- **Course Announcements and e-mail:** Some course announcements may be made through Canvas and by e-mail. It is important that you check your IUPUI e-mail account regularly, or forward it to another address.
- **Campus-Wide Policies Governing the Conduct of Courses at IUPUI:** These can be found at http://registrar.iupui.edu/course_policies.html
- **Dishonesty and Student Misconduct:** Cheating will result in a minimum penalty of receiving a grade of F in the course. The IUPUI Department of Mathematical Sciences expects all students to adhere to the regulations put forth in the "IUPUI Code of Student Rights, Responsibilities, and Conduct" concerning academic misconduct or personal misconduct. Procedures for imposing academic and disciplinary sanctions are outlined in the Code. The Code can be found at <http://studentaffairs.iupui.edu/student-rights/student-code/>
- **AES:** Students needing accommodations because of a disability will need to register with Adaptive Educational Services (AES) and complete the appropriate forms issued by AES before accommodations will be given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling 274-3241. Visit <http://aes.iupui.edu/> for more information.
- **What you should know about sexual misconduct:** IU does not tolerate acts of sexual misconduct, including sexual harassment and all forms of sexual violence. If you have experienced sexual misconduct, or know someone who has, the University can help. It is important to know that federal regulations and University policy require faculty to promptly report complaints of potential sexual misconduct known to them to their campus Deputy Title IX Coordinator(s) to ensure that appropriate measures are taken and resources are made available. The University will work with you to protect your privacy by sharing information with only those that need to know to ensure the University can respond and assist. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with a Mental Health Counselor on campus (contact information available at <http://stopsexualviolence.iu.edu/employee/confidential.html>). Find more information about sexual violence, including campus and community resources at <http://stopsexualviolence.iu.edu/>.