Spring 2020 Math 752, Section 01, Algebraic Topology

Instructor: Prof. Ilya Kapovich

M 7:35pm-9:25pm, HE 922

- Textbooks: No required textbooks. The course will largely rely on the lecture notes. Recommended books: *Algebraic Topology, An Introduction*, by William S. Massey, Springer-Verlag; and *Basic Concepts of Algebraic Topology* by Fred H. Croom, Springer-Verlag
- Prerequisites: Math 340 or Math 751, or an equivalent
- Office hours: Mondays 5pm-7pm in my office HE 917. [I may also be available at other times, by appointment.]
- Instructor contact info: e-mail ik535@hunter.cuny.edu (preferred way of reaching me), office phone 212-772-5303
- My office location: Hunter East 917
- Instructor webpage: http://math.hunter.cuny.edu/ilyakapo/
- There will be homework, due in class approximately once every two weeks. The homework will be both collected and graded (several selected problems from each homework will be graded).
- The final exam for this course (most likely take-home) will follow the Hunter College final exam schedule, date TBD.
- In addition to the required course components (final exam, homeworks), you can earn extra credit by doing a course-related project. These projects are optional. A project involves writing a 5-8 page project paper and doing a blackboard presentation (approximately 30 minutes long) on that paper.
- How this course is graded: The final exam counts as 45% of the grade, and the homework is 55% of the grade. An extra credit course project counts as an additional possible 15% of the grade.

**Course description**

The course will cover the basic concepts of algebraic topology, with some applications. We will try to cover the following topics (to the extent that time allows):

- Review of some general topology concepts, particularly the quotient topology and the disjoint union topology. What does it mean to glue two polygons along an edge?
- Classification of compact surfaces (following Massey’s book).
- Homotopy and the fundamental group.
- Seifert-van Kampen theorem, with some applications
- Covering maps and covering spaces
- Index of a self-map of a circle; winding number of a curve. Applications to fixed point theorems in dimension 2 and to the Fundamental Theorem of Algebra.
- Simplicial Homology
- Induced maps on homology, betti numbers and the Euler-Poincare formula for the Euler characteristic.
• Degree of a map, higher-dimensional fixed point theorems, Invariance of Domain Theorem
• If time permits, some additional topic(s), e.g. knots and knot polynomials.