

## Mathematics 821, Spring 2018 (Section #67998) Algebraic Topology (3 credits)

**Lectures:** MWF 1:00–1:50pm, 564 Snow Hall

**Instructor:** Prof. Jeremy Martin (you can call me “Jeremy”)

E-mail: [jlmartin@ku.edu](mailto:jlmartin@ku.edu) (the best way to contact me)

Office: 618 Snow Hall, (785) 864-7114

Office hours: Wed 10–11am, Fri 2–3pm, or by appointment (which I am happy to make)

**Course description:** Math 821 will cover elementary algebraic topology: homotopy equivalence, the fundamental group, covering spaces, singular, simplicial and cellular homology, and (if time permits) some cohomology.

**Website:** <http://people.ku.edu/~jlmartin/math821>. I will post most course material on the website, except a few items not to be made public (e.g., solution sets) which I will put on [Blackboard](#).

**E-mail:** I will periodically send class information (announcements, homework hints, etc.) to all students’ KU e-mail accounts. You are responsible for checking your e-mail regularly so as to receive this information.

**Prerequisites:** Math 820 or permission of instructor. Not all of the material covered in Math 820 will be necessary for Math 821, but you should know what an abstract topological space is and what “continuous”, “connected”, and “compact” mean, preferably outside the context of metric spaces. You should also be comfortable working with vector spaces and groups — i.e., you should have taken or be taking Math 790/791, and preferably Math 830 as well. If you know some homological algebra, great, but I don’t expect that you do.

**Textbook:** The official textbook is *Algebraic Topology* by Allan Hatcher (Cambridge U. Press, 2002). The text is available as a free download from the [author’s website](#). Do not print the electronic version on the department MFD; if you want a hard copy, paperback versions are easily available online for around \$40.

Other books that may be helpful:

- (1) J. Munkres, *Topology: A First Course* (Prentice-Hall, 1975). An excellent reference for basic topology. If you are comfortable with the material in the first three chapters of Munkres and you know some algebra, then you should be ready to take Math 821.
- (2) J. Munkres, *Elements of Algebraic Topology* (Addison-Wesley, 1984). I don’t know this book as well first-hand, but Munkres’ basic book is good so this one probably is too.
- (3) The two Munkres books above were printed together as *Topology* (Prentice Hall, 2000).
- (4) G. Bredon, *Topology and Geometry* (Springer, 1993; reprinted 1997). Again, I don’t know this book first-hand, but it has a good reputation. The topics covered and level of exposition are comparable to Hatcher’s book.
- (5) W. Massey, *Algebraic Topology: An Introduction* (Springer, 1977). Another standard book with a focus on covering spaces and the fundamental group; does not discuss homology.
- (6) M.J. Greenberg and J.R. Harper, *Algebraic Topology: A First Course* (Benjamin/Cummings, 1981). A standard textbook with a fairly abstract, algebraic treatment.
- (7) E. Spanier, *Algebraic Topology* (Springer, 1966; reprinted 1981). Ditto.

**Coursework** will consist of problem sets (which are supposed to be hard) and a final exam (which should be easy if you have come to class and done the problem sets).

- **Problem sets** will be due every 2–3 weeks, starting on **Friday, January 31**. I will post problems on the website at least a week in advance. I will give individual written feedback, although I may not grade every problem I assign. Most of the problems will be from Hatcher’s textbook. You are

encouraged to collaborate with other students, but you must write up the problems by yourself and acknowledge all collaborators. You should not consult outside sources such as the Internet. *You must submit typed solutions using LaTeX.* Late homework will not be accepted. Homework is worth 60% of your final grade.

- **The final exam** is scheduled for **Monday, May 7, 10:30am–1:00pm**. The exam is worth 40% of your final grade.

**Blatant skill:** Please attend the [Combinatorics Seminar](#), which meets Fridays from 3–4 in Snow 408.

**Makeup work:** Your enrollment in this course is a commitment to hand in all work on or before its announced due date. If, for some legitimate and unavoidable reason, you are unable to turn in a homework assignment on its due date or to attend a scheduled test, midterm or final exam, you must notify the instructor *in advance* to make appropriate arrangements.

**Incompletes:** A grade of I is a rare occurrence and is reserved for cases in which a student has completed most of the course work at an acceptable level, but is prevented from completing the course due to extraordinary nonacademic circumstances. If you think an incomplete may be warranted, you must talk to me *before* the final exam.

**Academic misconduct:** [KU policy](#) defines academic misconduct as follows: “Academic misconduct by a student shall include, but not be limited to, disruption of classes; threatening an instructor or fellow student in an academic setting; giving or receiving of unauthorized aid on examinations or in the preparation of notebooks, themes, reports or other assignments; knowingly misrepresenting the source of any academic work; unauthorized changing of grades; unauthorized use of University approvals or forging of signatures; falsification of research results; plagiarizing of another’s work; violation of regulations or ethical codes for the treatment of human and animal subjects; or otherwise acting dishonestly in research.”

In particular, while collaboration on the homework assignments is encouraged, you must write up your own homework solutions by yourself and acknowledge all collaborators and sources. You are encouraged to collaborate with other students on the homework assignments. However, intellectual honesty requires that each student write up his or her own solutions and acknowledge all collaborators. **It is a violation of academic integrity to copy another student’s solutions and submit them as your own; to let someone else copy yours; or to copy solutions verbatim from external sources, including websites.** If you are unsure of the appropriate way to use or cite an external source, **ask the instructor** before submitting work.

**Students with disabilities:** [Student Access Services](#) (22 Strong Hall; 785-864-4064; [achieve@ku.edu](mailto:achieve@ku.edu)) coordinates accommodations and services for all students who are eligible. If you have a disability for which you wish to request accommodations, please contact Disability Resources as soon as possible. Please also contact the instructor privately in regard to your needs in this course.

**Religious holidays:** If you plan to observe a religious holiday which conflicts in any way with the course schedule or requirements, contact the instructor at the beginning of the semester to discuss alternative accommodations.

**Intellectual property:** Course materials prepared by the instructor, together with the content of all lectures and review sessions, are the intellectual property of the instructor and are solely for use by students enrolled in the course. Redistributing course materials in any form without the consent of the instructor is prohibited. Likewise, video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. Upon reasonable request, the instructor will usually grant permission to record lectures, on the condition that such recording is used only as a study aid by the student making the recording, and is not modified or distributed in any way.

**Commercial note-taking ventures:** Pursuant to KU's [Policy on Commercial Note-Taking Ventures](#), commercial note-taking is not permitted in Math 724. Lecture notes and course materials may be taken for personal use, for the purpose of mastering the course material, and may not be sold to any person or entity in any form. Any student engaged in or contributing to the commercial exchange of notes or course materials will be subject to discipline, including academic misconduct charges, in accordance with University policy. Note-taking provided by a student volunteer for a student with a disability, as a reasonable accommodation under the ADA, is *not* the same as commercial note-taking and is not covered under this policy.

**Weapons policy:** Individuals who choose to carry concealed handguns are solely responsible for doing so in a safe and secure manner and in strict conformity with [state and federal laws](#) and [KU weapons policy](#). Safety measures outlined in the KU weapons policy specify that a concealed handgun:

- Must be under the constant control of the carrier.
- Must be out of view, concealed either on the body of the carrier, or backpack, purse, or bag that remains under the carrier's custody and control.
- Must be in a holster that covers the trigger area and secures any external hammer in an un-cocked position
- Must have the safety on, and have no round in the chamber.