

MA 307: Topology
Alabama School of Math and Science

Spring 2016

Instructor: Sarah Brewer

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Course Web Site: brewermath.com (redirects to mathemartiste.com)

Office: S201

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Office Hours: MonWedThursFri 2:45-3:40 (8th per), Thurs 11-11:55, 3:45-4:40 (4th & 9th per) and by appointment

Course Description: Topology is the study of surfaces in space and certain properties of those surfaces that remain unchanged under deformation. Students will learn proof techniques in point-set topology, learn how to classify surfaces based on genus, Euler characteristic, and other methods of geometric topology, and study topics in algebraic topology such as homeomorphism and homotopy. Because this course is proof-intensive, BC Calculus or Counting & Probability are recommended prior to enrollment, although not required.

Prerequisites: "A" in Precalculus or permission of the instructor.

Texts:

Topology, 2nd ed. by Munkres, 1.1-1.2, 1.5-1.7, 2.12-2.18, 2.20, 2.22, (3.23-3.24, 3.26), 9.51-9.52, (9.55, 9.58)

Algebraic Topology by Hatcher, available at <http://www.math.cornell.edu/~hatcher/AT/AT.pdf> , Ch 0, 1.1, (1.2-1.3, 2.1)

Grade Determination:

Homework (weekly) – 10 to 50 points each

Exams (3) – 50 to 100 points each

Quizzes (biweekly) – 10 to 50 points each

Final presentation & written report – 100 points

Homework: Assignments should be labeled neatly with your name, date, textbook chapter & section, and problem numbers. Homework will be graded for accuracy, clarity of writing, and may need to be written and rewritten several times before final submission. Results of theorems proved in class may be used without justification (but should be referred to by Theorem number); all other steps should be justified. You are encouraged to consult the instructor for help, but you must write up your own final assignments. You are discouraged from internet research to help you solve homework problems, and should only write your own ideas in ways that you understand them and are mathematically correct.

Late homework will not be accepted.

Quizzes will be given regularly and will be a combination of theory memorization (rules, definitions, theorems, and proofs) and problems similar to and directly from homework assignments. There will be no make-up quizzes. If you miss a quiz with an excused absence, you will have fewer total possible points. Quizzes missed due to unexcused absences will receive a grade of 0. The lowest quiz grade will be dropped.

Tests will consist primarily of material covered since the prior test, but will also include some review questions. Since there are only three tests, there will be no "drop test."

Tentative test dates: Week 3, Week 6, Week 9

Academic Integrity: Students and student work will be held to a very high standard in this course. If at any point I suspect that work you submit is not entirely your own, the matter will be brought to the disciplinary committee as per the Student Handbook Plagiarism policy. You will receive a zero for that assignment, and may be withdrawn from the course.

Make-up policy: Any quizzes or tests missed due to unexcused absences will receive a grade of zero. There will be NO make-up quizzes. Homework assigned during a student's absence must be turned in when the student returns to class. All assignments can be found in the course notes. Arrangements to make-up tests must be done BEFORE the test is missed. In case of unexpected illness, this can be done via email.

Note: make-up assignments will be much more difficult than the original.

Cell phone policy: Phones should be SILENT (not on vibrate) and away. I reserve the right to confiscate any phone that I deem a distraction. Use of cell phones during quizzes or tests will result in a grade of zero.

Attendance and Tardiness Policy: Three tardies count as one unexcused absence. A student with three unexcused absences may be assigned a grade of WF for the course. Students are responsible for acquiring any missed notes and assignments (as these are posted on the web, this should not be a problem).

Tentative Schedule

Week 1 – Feb 29-Mar 4

- Ch 1 Set Theory and Logic
- 1.1 – Fundamental Concepts
- 1.2 – Functions

Week 2 – Mar 7-11

- 1.5 – Cartesian Products
- 1.6 – Finite Sets
- 1.7 – Countable and Uncountable Sets

Week 3 – Mar 14-18

- Ch 2 Topological Spaces and Continuous Functions
- 2.12 – Topological Spaces
- Test 1

Week 4 – Mar 21-24 (Short Day)

- 2.13 – Basis for a Topology
- 2.14 – The Order Topology

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Week 5 – Apr 4-8

- 2.15 – The Product Topology on $X \times Y$
- 2.16 – The Subspace Topology
- 2.17 – Closed Sets and Limit Points

Week 6 – Apr 11-15

- 2.18 – Continuous Functions
- 2.20 – The Metric Topology
- 2.22 – The Quotient Topology
- Test 2

Week 7 – Apr 18-22

- Classification of Surfaces

Week 8 – Apr 25-29

- Ch 9 The Fundamental Group
- 9.51 – Homotopy of Paths
- Ch 0 – Homotopy

Week 9 – May 2-6

- 9.51 – Homotopy of Paths
- Ch 0 – Homotopy
- Cell Complexes
- Test 3

Week 10 – May 9-13

- Homotopy
- Fundamental Group

Week 11 – May 16-20 (Short Day)

- 9.52, 1.1 – Fundamental Group

Exams – May 23-26

- Presentations

*note that test dates are tentative, and are only included on this schedule to give you an idea of how tests will be spaced according to the material that has been covered