Course Syllabus
MATH 4998/8800 - General Topology
Fall 2014

CRN: 89091/89092
Class Meeting: MWF 11:00 AM - 11:50 AM, Sparks Hall 311

Instructor: Dr. Jeremy Brazas
Office: College of Education Building (corner of Decatur/Pryor) 710
Office Hours: MW 3:00 - 4:30 PM
Office Phone: 404-413-6458
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Department Phone: 404-413-6400

Prerequisites: Grade of C or higher in MATH 3000.


Other useful references:

No-show policy: If you do not attend class during the first week of the semester, you will be administratively dropped from the course.

Prerequisite policy: Undergraduate students must have received a C or higher in Math 3000. A course in analysis and/or modern algebra is preferrable but not necessarily required.

Course content: This course will provide an introduction to general topology. The class will begin with a brief review of basic set theory and metric spaces. Topics covered include topological spaces, continuous functions, topological properties (connectedness, compactness, countability, separation axioms), some of the major theorems in general topology, the fundamental group and covering spaces.

Grading: Your grade will be determined (as a weighted average) by your performance on a midterm exam, final exam, a semester research project, average of weekly written homeworks, and attendance/class participation. The weight of each of the components of your grade is as follows:

30 % Weekly Homework
25 % Midterm Exam
25 % Final Exam
15 % Semester Project
5 % Attendance/Participation
At the end of the semester your letter grade will be assigned as follows:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>97-100 %</td>
<td>A+</td>
</tr>
<tr>
<td>93-96 %</td>
<td>A</td>
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<tr>
<td>90-92 %</td>
<td>A-</td>
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<tr>
<td>87-89 %</td>
<td>B+</td>
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<tr>
<td>83-86 %</td>
<td>B</td>
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<tr>
<td>80-82 %</td>
<td>B-</td>
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<tr>
<td>77-79 %</td>
<td>C+</td>
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<tr>
<td>70-76 %</td>
<td>C</td>
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<tr>
<td>60-69 %</td>
<td>D</td>
</tr>
<tr>
<td>Below 60 %</td>
<td>F</td>
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**Weekly Homework:** There will be homework problem sets assigned throughout the semester. Most of these problems will be taken from our course textbook (Munkres’ “Topology”). Students are encouraged to work together on these assignments, however, copying is not allowed. Any work turned in must be your own - you should be able to justify each step if asked about it. The grading policy for homework will be announced in class.

**Midterm Exam:** A take-home exam will serve as our midterm exam for the semester. The takehome midterm exam will be handed out in class on Friday, October 10th and will be collected one week later, Friday, October 17th. No late exams will be accepted. The exam is open-text and open-notes, but students are not permitted to work together or to discuss any aspect of the exam with any other person. This means students should feel free to use our course textbook but should not use any other reference material (including the internet) other than their class lecture notes.

**Final Exam:** The final exam for this course will be a take-home exam much like the midterm exam. The same “open text” policies apply to this exam. Though the final exam will cover content from the entire course, the emphasis will be on material covered after the midterm.

**Semester Project:** Each individual student will chose a separate topic related to topology, research that topic, and give a 10-15 minute presentation on their topic to the class in the last week of the semester. Students are expected to turn in a set of organized “lecture notes” to accompany their presentation. Topics must be chosen and approved by the instructor by November 7th. Presentations will be scheduled during the last 4 weeks of the semester (a sign-up list for dates and times will be posted on my office door). See below for a list of potential project topics.

**Cheating/Plagiarism:** Cheating/plagiarism will not be tolerated on any work. A first occurrence will result in a grade of 0 on the assignment for all concerned parties as well as an Academic Dishonesty form being filed with the Dean of Students. Any extra credit for a student caught cheating will be voided. A second occurrence will result in a grade of F for the course for the concerned parties and a second Academic Dishonesty form being filed. See the University’s policy on Academic Honesty at http://www.gsu.edu/ wwwdos/codeofconduct.html.

**Attendance/Participation:** This is a small subjective portion of your grade based on your overall effort in the course. Typically a student who attends class regularly and makes a serious effort to learn the material will get full credit. Keep in mind that while attendance may not be formally taken, if you miss a class you will still be responsible for all material of the lecture, all announcements made in class, and any assignments due.
Inclement weather policy: If the University is closed due to inclement weather, any exam that may have been scheduled as due for that date will be due on the next available class date.

Make-up Policy: There are no makeup homework assignments or exams. If an extended illness or a serious personal problem interferes with your coursework this semester, please let me know. I will do what I can to help regarding the course.

Conduct Policy: Appropriate conduct towards your instructor and fellow students is expected from all students. Arrive on time, and do not leave early. If you must leave early for some reason, please inform me prior to class and do so as quietly as possible.

Electronic devices: You are expected to silence any cell-phones, pagers, computers or other electronic devices during class. Text messaging, instant messaging, emailing, etc. during class is strictly prohibited and is grounds for dismissal. If you are using your cell phone, using your computer for tasks that are not math related, talking, or otherwise disrupting students, you will be asked to leave. You are expected to turn off your cell phones or put them in silent mode before entering the classroom - having these items “go off” in class is considered disruptive behavior and can result in your being administratively dropped/withdrawn from the course. In fact, any type of inappropriate conduct may result in your being administratively withdrawn from the course. See the University Disruptive Behavior Policy (paragraph 1050.30 in the Undergraduate Catalog, available at http://www.gsu.edu/enrollment/catalogs.html) or On Campus, the official student handbook (http://www.gsu.edu/wwccam/).

Withdrawal Policy: If you withdraw from this class on or before the Midpoint of the semester (Tuesday, October 14th), you will receive a WP regardless of your performance. The computer will then turn this into a W or a WF depending on how many cumulative withdrawals you have in the University. Voluntary withdrawals after the Midpoint are no longer allowed.

Additional notes:

1. Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State University. Upon completing the course, please take time to fill out the online course evaluation.

2. Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

This syllabus provides a general plan for the course; deviations may be necessary.
Choosing a semester project topic: The topic you choose should be something that you find interesting. Below is a list of possible topics to pick from, however, you may also research a topic of your own choosing (it must approved by me). Feel free to ask me if you are not sure what to pick.

- Finite topological spaces (studying the question: how many distinct topologies can you put on a set with \( n \) elements?)
- Filters and ultrafilters
- Uniform spaces
- Inverse (aka projective) limit spaces (e.g. solonoids, pseudo-arc, fractal-type spaces)
- Category theory in topology and beyond
- Compactly generated spaces
- Paracompact spaces
- Complete metric spaces
- Function spaces (topology of point-wise convergence and compact-open topology)
- Hairy Ball Theorem
- Ham Sandwich Theorem
- Jordan Curve Theorem
- Brower’s Fixed-Point Theorem
- Proving the Fundamental Theorem of Algebra with the fundamental group
- Higher Homotopy groups \( \pi_n(X,x_0), n \geq 2 \)
- Knot Theory (knots, links, braids, tangles...)
- Simplicial complexes
- An introduction to topological manifolds
- An introduction to differential topology
- Graph theory and topology
- Topological groups/rings/fields
- The Hawaiian earring
- The topology of the \( n \)-sphere \( S^n \) or real projective \( n \)-space \( RP^n \)