MATH 551 001– Elementary Topology, Spring 2020

INSTRUCTOR
Brian Hepler (Van Vleck Visiting Assistant Professor)
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Office Hours: Mondays 1:30pm-3:30pm (or by appointment) in Van Vleck 625.

Credits
3

Course Designations and Attributes
Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Honors - Honors Optional

Honors Optional
If you are taking this course for Honors, you will be assigned extra homework problems (which are available to non-honors students for extra credit), but will count toward the homework grade for Honors students.

Meeting Time and Location
TR 1:00PM-2:15PM
360 Science Hall

This class meets for two 75-minute class periods each week over the spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2 hours out of classroom for every class period. The syllabus includes additional information about meeting times and expectations for student work.

OFFICIAL COURSE DESCRIPTION
An introduction to the basic ideas and methods of point-set topology.

Requisites
MATH 322, 341, 376, or 421 or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program

GRADING
Homework: 40%
Midterms Exams: 20% each
Final Exam: 40% (cumulative).

The grading is `curved' in the sense that the average is about a B if the grade distribution is sufficiently broad/`normal' and the average is not too high/ too low. There is no set % of A's, B's,… and this curving adapts to the actual cumulative scores to correct for natural variations, in exam difficulty, and grading. We use the full grading scale from 0 to 100% with the (rough) guideline

$$F < 30 < D < 45 < C < 60 < B < 80 < A$$

Assuming the class average is about 60%.

TEXTBOOK
J. Munkres. *Topology*, 2nd ed.
 (Note: the text is also available on reserve through the UW libraries.)

EXAMS
We will have one midterm exam and one two-hour final exam during the final exam period. Makeup exams will be scheduled only with the instructor's consent, and only in cases of illness or family emergency (your final exam can also be rescheduled if you have more than two exams during a 24-hour period). No books, notes, or electronic devices will be allowed during the exams.

Midterm 1: 3/3/20

The final exam is 5/4/2020 from 7:45am-9:45am. Do not make travel plans that conflict with the final exam.

HOMEWORK

There will be approximately 10 homeworks (generally assigned weekly), posted on the canvas webpage, and are **assigned and due in class on Mondays**.

- All homework should be written legibly and in complete sentences.
- Collaboration on homework is permitted (and encouraged), however, all solutions you submit must be written independently (i.e., you may work together to generate solutions to problems, but you should write the solution you submit on your own).
- All homework should be submitted in hard copy at the start of the lecture on the day it is due.
- There will be no credit for copied or unexcused late homework. Valid excuses for late homework are illness or family emergency. Other personal and academic circumstances may be considered on a case-by-case basis.
- Please also note the additional rules regarding homework described in the section on academic integrity below.

COURSE LEARNING OUTCOMES

Students will be able to

- Have a good understanding about the basic set theory notions: sets, Cartesian products, equivalence relations, and countability.
- Have a solid understanding about the definition of a topological space, and its relation with the basis of a topology.
- Understand how an order or a metric on a set generates a topology.
- Have a good understanding about the notion of connectedness and compactness. Able to determine and prove whether simple examples of topological spaces are connected/ compact.
- Able to write rigorous mathematical arguments and proofs based on definitions, axioms, and assumptions.

COURSE OUTLINE

Lecture(week)   Material

1. Definition of topological spaces
2. Basis of a topology
3. Order topology and product topology
4. Subspace topology
5. Closed sets, limit points
6. Continuous maps
7. Product and box topology
8. Metric topology and quotient topology

9. Connected and path-connected spaces
10. Connected subspaces of the real line
11. Connected components
12. Compact spaces
13. Compact spaces (continued)
14. Compact subspaces of the real line.

RULES, RIGHTS & RESPONSIBILITIES

- To see the Guide's Rules, Rights and Responsibilities information, refer to http://guide.wisc.edu/undergraduate/#rulesrightsandresponsibilitiestext.

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential

and protected under FERPA." http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." https://diversity.wisc.edu/