Math 872 Topology II

Section 001: TuTh 2:00 - 3:15   Webinar (via Zoom)

Zoom link info: **Meeting ID:** 996 0399 5594   **Passcode:** 18951945

Instructor: Mark Brittenham
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WWW pages for this class: http://www.math.unl.edu/∼mbrittenham2/classwk/872s21/

Given the current state of things, we will run the course through its Canvas site. But (for reasons of public sharing, basically), I will mirror everything to the public-facing page above, as well. On Canvas, and at the above link, you will find copies of every handout from class, lists of homework problems assigned, dates and review sheets for exams, etc.

Office Hours: To be determined. Office hours will be run through the same Zoom link as the class, and, following a recommendation from individuals at the university, will employ a waiting room format (so that people don't just suddenly pop into the middle of an ongoing conversation...). In general, if you wish to talk in real time outside of office hours and class, we can arrange a time to talk via Zoom.

Prerequisite: Math 871 (Topology I), or equivalent, or permission of instructor.

Texts: *Topology*, by James Munkres (2nd edition, Prentice Hall), and

Algebraic Topology, by Allen Hatcher (Cambridge University Press).

Algebraic Topology is also available in electronic form, from author's website,
http://www.math.cornell.edu/∼hatcher/AT/ATpage.html .

This continuation of Math 871 will primarily focus on <u>algebraic</u> topology. More precisely, it is intended to provide you with in introduction to the basic concepts, techniques, and goals of this branch of topology. We will in general follow the first several chapters of Hatcher's text. In particular, we will cover these topics found on the Math 871-872 qualifying exam:

Fundamental groups: Fundamental group, induced homomorphism; free group, group presentation, Tietzes theorem, amalgamated product of groups, Seifert - van Kampen Theorem; cell complex, presentation complex, Classification of surfaces.
Covering spaces: Covering map, Lifting theorems; covering space group action; universal covering, Cayley complex; Galois Correspondence Theorem, deck transformation, normal covering; applications to group theory.
Homology: Simplicial homology, singular homology, induced homomorphism, homotopy invariance; exact sequence, long exact homology sequence, Mayer-Vietoris Theorem. Applications.

Problem sets will be assigned (approximately) each week. It is an essential ingredient to the course - as with almost all of mathematics, we learn best by doing (again and again and ...). A subset of each problem set will be collected and graded. Cooperation with other

students on these assignments is acceptable, and even encouraged. You should, however, work at least half of the problems chosen for collection without consulting other students. This will help to make sure you are understanding the process of finding the solution on your own - after all, you get to bring only one brain to exams (and it can't be someone else's). These problem sets will account for 60 % of your final grade.

In addition to the problem sets, two **exams** will be given during the semester on dates which will be determined in consultation with the class. These exams will also be administered online, and the exact format (self-timed in a single sitting, or more 'traditional' take-home with a due date) will be determined after consultation with the class. The main difference between the exams and the problem sets is that you be more constrained in the kinds of resources you can consult with (e.g., not with each other!) while formulating your solutions. Each exam will account for 20 % of your final grade.

Because nearly all of the students in this class are involved with the teaching of one of the mathematics department's 100-level courses, which hold their common final exams on Tuesday, May 4, and which likely hold their last midterm exam during the (Tuesday and Wednesday of the) 13th or 14th week of class, while our assigned final exam time is 1:00 to 3:00 pm on Monday, May 3, some care seems in order over the timing of the second of these exams. We will discuss possible options at the appropriate time.

Your course grade will be based upon these two components, and will be converted to a letter grade, taking into account the overall average of the class. However, a score of 90% or better will guarantee some kind of **A**, 80% or better at least some sort of **B**, 70% or better at least a flavor of **C**, and 60% or better at least a **D**.

Departmental Grading Appeals Policy: The Department of Mathematics does not tolerate discrimination or harassment on the basis of race, gender, religion, or sexual orientation. If you believe you have been subject to such discrimination or harassment, in this or any other math course, please contact the department. If, for this or any other reason, you believe your grade was assigned incorrectly or capriciously, then appeals may be made (in order) to the instructor, the department chair, the department grading appeals committee, the college grading appeals committee, and the university grading appeals committee.

ADA Notice: The University strives to make all learning experiences as accessible as possible. If you anticipate or experience barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can discuss options privately. To establish reasonable accommodations, I may request that you register with Services for Students with Disabilities (SSD). If you are eligible for services and register with their office, make arrangements with me as soon as possible to discuss your accommodations so they can be implemented in a timely manner. SSD contact information: 117 Louise Pound Hall (402-472-3787).

Counseling and Psychological Services: UNL offers a variety of options to students to aid them in dealing with stress and adversity. Counseling and Psychological and Services

(CAPS) is a multidisciplinary team of psychologists and counselors that works collaboratively with Nebraska students to help them explore their feelings and thoughts and learn helpful ways to improve their mental, psychological and emotional well-being when issues arise. CAPS can be reached by calling 402-472-7450. Big Red Resilience and Well-Being (BRRWB) provides one-on-one well-being coaching to any student who wants to enhance their well-being. Trained well-being coaches help students create and be grateful for positive experiences, practice resilience and self-compassion, and find support as they need it. BRRWB can be reached by calling 402-472-8770.

Academic Honesty: Academic honesty is essential to the existence and integrity of an academic institution. The responsibility for maintaining that integrity is shared by all members of the academic community. The University's Student Code of Conduct addresses academic dishonesty. Students who commit acts of academic dishonesty are subject to disciplinary action and are granted due process and the right to appeal any decision.

Face Coverings: To protect the health and well-being of the University and wider community, UNL has implemented a policy requiring all people, including students, faculty, and staff, to wear a face covering that covers the mouth and nose while on campus. The classroom is a community, and as a community, we seek to maintain the health and safety of all members by wearing face coverings when in the classroom. Failure to comply with this policy is interpreted as a disruption of the classroom and may be a violation of UNLs Student Code of Conduct.

Individuals who have health or medical reasons for not wearing face coverings should work with the Office of Services for Students with Disabilities (for students) or the Office of Faculty/Staff Disability Services (for faculty and staff) to establish accommodations to address the health concern. Students who prefer not to wear a face covering should work with their advisor to arrange a fully online course schedule that does not require their presence on campus.

Course Evaluation: The Department of Mathematics Course Evaluation Form will be available through your Canvas account during the last two weeks of class. You will get an email when the form becomes available. Evaluations are anonymous and instructors do not see any of the responses until after final grades have been submitted. Evaluations are important—the department uses evaluations to improve instruction. Please complete the evaluation and take the time to do so thoughtfully.

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Some important academic dates

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Jan. 25	First day of classes.
Feb. 5	Last day to withdraw from a course without a **'W'**.
Mar. 26	Last day to change to or from P/NP.
Apr. 16	Last day to withdraw from a course.
May 1	Last day of classes.
May 3 - May 7	Final exam week.
May 3	(Probably) <u>not</u> the date of the Math 872 final examination.