

Nebraska Wesleyan University
Math 4800: Research Experience
Section 1
Spring 02016

Instructor:	Austin Mohr
Text 1:	Topology Second Edition James Munkres
Text 2:	Counterexamples in Topology Steen and Seebach
Supplemental Text:	General Topology Stephen Willard
Time:	TTh 2p - 3:15p
Room:	Olin 110
Office:	Olin 109D
Office Hours:	MTWThF 11a - 12p or by appointment
Email:	amohr@nebrwesleyan.edu
Cell:	(803)-543-8735
Course Website:	AustinMohr.com/Topology
π-Base:	Topology.JDabbs.com
Math Questions:	Math.StackExchange.com
\LaTeX Questions:	Tex.StackExchange.com
\LaTeX Symbols:	Detexify.KireLabs.org
Final Exam:	Thursday, May 12 at 2p

Course Description

This course will introduce the theory of general topological spaces and explore their many properties. Students will develop original results by seeking out ways to contribute to the database at π -Base.

Grading Scale

This course is offered only on a pass-fail basis. A passing grade requires the satisfactory completion of all assignments.

Assignments

Pre- and Post-Course Reflection

Once before and once after the course, you will be asked to reflect on the research experience in general. The reflection will take the form of a few short answer prompts. Completion of the reflections will require a good-faith effort to address all the prompts.

Independent Study

Before most meetings, you will be expected to complete a short reading and/or writing assignment. These are graded pass-fail based on your willingness to attempt them (not on correctness). For exercises that you cannot complete, you should instead write specific questions to ask during our meeting that will help you improve your understanding.

Many days, independent study will involve working on proofs for your portfolio. The associated class day will require you to speak extemporaneously on your progress. You may choose to share a finished draft for critique of style, or you may choose to show work in progress for assistance in moving forward.

Allow yourself two hours for each independent study. Once you have reached that point, write down your remaining thoughts and questions then stop for the day.

You must complete at least 75% of the independent studies to receive a passing grade.

Proof Portfolio

A main goal of the course is to assemble a proof portfolio of original work to contribute to π -Base. The contributions you can make fall into three main categories for the purposes of grading.

- **Standard Proof:** There are thousands of assertions within π -Base that have no proof. As you browse the site, look for spaces and properties whose definitions you understand but for which there is currently no proof. A standard proof is one that is not too long and only requires ideas we have discussed during class (e.g., <http://topology.jdabbs.com/spaces/15>). Each rigorous, well-written standard proof is worth one point.
- **Challenging Proof:** Some of the spaces or properties may be particularly challenging to understand. If you show me what you are considering, I will take my best guess as to whether it will be challenging or not. It is not always easy to tell before you begin, but generally this will refer to proofs that are longer than usual and/or require learning some definitions beyond the scope of the required reading (e.g., <http://topology.jdabbs.com/traits/1061>). Each rigorous, well-written challenging proof is worth two points. If you find you are unable to complete the proof after much work, you will still be awarded one point for your well-written progress.
- **Other Contributions:** There are other important ways to contribute to the database that do not involve writing proofs. Some examples include searching topology texts and/or websites for new spaces, properties, or theorems. You may also find poorly-written proofs or definitions that need revision for clarity or even correctness. You could also contribute a visual representation of a space to make it easier to understand (e.g., <http://topology.jdabbs.com/spaces/125>). Finally, some proofs may turn out to be so trivial that we cannot even call them “standard” in good conscience (e.g., <http://topology.jdabbs.com/traits/874>). Any of the contributions falling into this category are worth half a point.

A completed portfolio must meet the following criteria:

- Be worth at least eight points under the aforementioned grading scheme
- Contain at least one completed challenging proof
- Contain at most four “other contributions”

Symposium Presentation

You must give a presentation at the NWU Student Symposium in mid-May on one or more of your proofs. The presentation should be 15 – 20 minutes in length and must be completed in Beamer. You may assume you are presenting to a “general mathematical audience” (imagine your audience is filled with math graduates who have simply never studied topology). If you wish, you can also present at the Doane Symposium on Undergraduate Research, but your talk will need to be ready by mid-April.

Accommodations

Nebraska Wesleyan University seeks to maintain a supportive academic environment for students with disabilities. To ensure their equal access to all educational programs, activities, and services, federal law requires that students with disabilities notify the university, provide documentation, and request reasonable accommodations. If you need accommodation in this course, please notify me so that I can verify that the required documentation is filed with the Academic Affairs Office and that your accommodation plan is in place. You should also meet with Prof. Sandy McBride, the Services for Students with Disabilities Coordinator (Old Main 126, 465-2346, smcbride@nebrwesleyan.edu).

Academic Integrity

Academic integrity is one of the basic principles of a university community. Nebraska Wesleyan University encourages and expects the highest standards of academic honesty from all students. The Student Code of Conduct states that “cheating, plagiarism, or other forms of academic dishonesty” are subject to disciplinary action. Refer to the Student Code of Conduct for additional information. Academically dishonest students may receive penalties up to and including receiving an F in the course.

Title IX Resources

As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a reporting responsibility under The Title IX Educational Act of 1972, which prohibits violence, harassment, and discrimination based on sex and gender. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep information you share private to the greatest extent possible. However, for the sake of NWU students safety and welfare, I am required to share information regarding sexual misconduct or information about a crime that may have occurred on NWUs campus with Title IX coordinator or Deputy Title IX Coordinator. Confidential assistance is also available for students. If you or someone you know has been harassed, assaulted, or discriminated against because of sex or gender, the following resources are available:

On-Campus Confidential Resources

- Campus Victim Advocate: Lindsay Spaulding (lindsay@voicesofhopelincoln.org or 402.465.2533)
- Campus Minister: Eduardo Bousson (ebousson@nebrwesleyan.edu)
- Counseling Center: 402.465.2224

Off-Campus Confidential Resources

- 24-hour Crisis Line 402.475.7273
- Voices of Hope (Relationship violence, sexual assault, and abuse support center) 2545 N Street; Lincoln, NE 68510; Office: 402.476.2110

Title IX Resources

- Title IX coordinator: T.J. McDowell (tmcdowe2@nebrwesleyan.edu or 402.465.2149)
- Deputy Title IX Coordinator: Dr. Susan L. Wortmann (swortman@nebrwesleyan.edu or 402.465.2305)