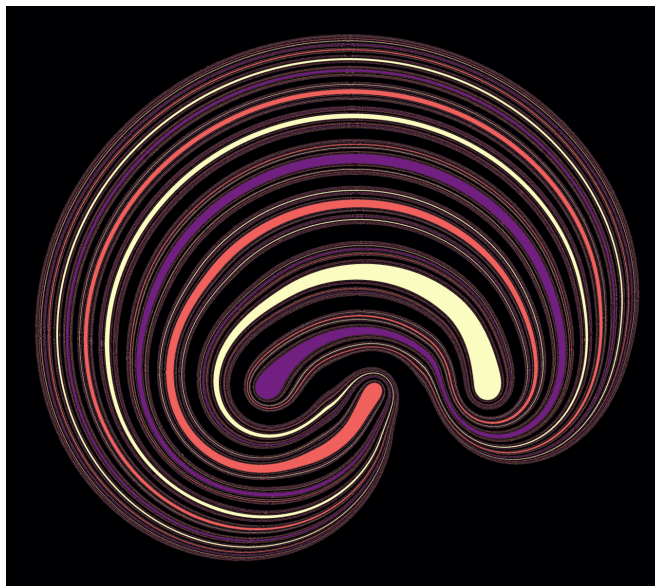


# Math 445 - Introduction to Topology I

Emily Dumas

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## 1. BASIC COURSE INFORMATION

**Course web page** <http://dumas.io/math445/>

Textbook	<i>Topology</i> , 2ed, by James R. Munkres
Location	Taft Hall 308
Meeting Time	MWF 1pm
CRN	39509 (undergraduate), 39510 (graduate)
Email	<a href="mailto:emily@dumas.io">emily@dumas.io</a>
Office Hours	Wed and Fri 2-3pm or by appointment

## 2. COURSE DESCRIPTION

This course provides an introduction to topology, which is the field of mathematics concerned with a formalization of the notion of “shape”. Most of the course will focus on the area within topology known as *point set topology*.

We will define topological spaces and discuss some important examples, such as metric spaces. We will study a variety of properties of topological and metric spaces, including compactness and connectedness. We will also discuss general methods for constructing new topological spaces from existing ones, such as products, quotients, and subspaces.

We will cover chapters 2–4 in the textbook and selected topics from chapters 5–8.

Chapter 1 of the textbook (“Set theory and logic”) contains some preliminary material that is not part of topology *per se*. Much of the material we will use from this chapter is covered in prerequisite courses such as Math 215 and Math 313. If topics from chapter 1 that are not usually covered in earlier courses are needed later in the semester, we will spend some time discussing the necessary background.

### 3. PREREQUISITES

The official prerequisite for Math 445 from the UIC course catalog is:

- Math 313 (Analysis I) with a grade of C or higher.

In practice we will not often use material from Math 313 directly, and a more accurate (but unofficial) statement of the prerequisites for success in the course would be:

- Experience reading and writing rigorous mathematical proofs and manipulating logical statements with quantifiers
- Basic theory of sets and functions (properties of intersection, union, complement; cartesian products; relations, equivalence relations, functions, injections, surjections; countable and uncountable sets)
- Integers, rational numbers, and real numbers (definitions and basic properties)
- The  $\epsilon$ - $\delta$  definition of continuity for a function of a single real variable

### 4. GRADING

The final grade for the course will be based on the homework assignments, an in-class midterm exam, and a cumulative final exam. These components will be weighted as follows:

- 50% Homework
- 20% Midterm (Wed Mar 7, in class)
- 30% Final exam (Mon May 7, 1–3pm)

The homework and exams will be written and graded with the intention of converting percentage scores to letter grades using the following scale: A = 85% – 100%, B = 75% – 84%, C = 65% – 74%, D = 55% – 64%, F = less than 55%.

While applying this scale is the goal, the instructor reserves the right to make small adjustments to the scale (only making it more generous) if that is determined to be necessary at the end of the semester. The same grading scale will be used for all students in the course.

### 5. HOMEWORK

Problems sets will be posted on the course web page, with each problem set indicating the date when it is due. Some problems will be taken from the textbook. The usual schedule will be one problem set per week, due on Monday.

Complete instructions on how to submit homework will be given on the course web page.

Typesetting solutions to problem sets is not required, but handwritten assignments must be legible. (If you plan to go on to graduate school in mathematics, learning to typeset mathematical writing in  $\text{\LaTeX}$  is a good idea, and this might be a good time to learn!)

Students in the course may work on the problem sets in groups. However, each student must:

- (1) Write, understand, and submit their own solutions
- (2) Acknowledge collaborators by name on the assignment (e.g. write “in collaboration with Jane Doe” at the top of the page)

At the end of the semester, each student’s homework grade will be determined by dropping the two lowest problem set scores and then averaging the remaining scores.

Submission of homework on paper is required. Please staple multi-page submissions.

### 6. MIDTERM EXAM

There will be an in-class midterm exam on Wednesday, March 7, during the regular lecture time.

The problems on the midterm will be similar to homework problems, but they will be somewhat shorter to allow for completion of the exam in the 50-minute class period.

Students will not be allowed to use notes or books during the midterm exam.

#### 7. FINAL EXAM

The final exam will be held at the time set by the registrar, which is Monday, May 7, 1:00pm–3:00pm. It is important that students avoid making plans (e.g. travel) that conflict with the exam. The location of the final exam will be set by the registrar about one week before the end of the semester; it will be announced in class and on the course web page.

The final exam will be cumulative, with a slight emphasis on material covered after the midterm exam.

Problems on the final exam will be similar in difficulty to the homework problems. Additional information about the final exam (e.g. number of problems) may be posted to the course web page toward the end of the semester.

Students will not be allowed to use notes or books during the final exam.

#### 8. COMMUNICATION PREFERENCES

Email is the preferred and most reliable method of communication with the instructor outside of lecture and office hours.

#### 9. PARTICIPATION

Students are encouraged to ask questions in lecture about the material currently under discussion, and to answer questions asked by the instructor.

Questions specific to a single student (such as requests to clarify comments on returned problem sets) are better left to office hours.

#### 10. ATTENDANCE

Students are responsible for all of the material covered in the lectures, including any lectures they miss. Any student who misses a lecture is advised to ask classmates for notes and information about any assignments or course announcements. Lecture notes are not provided by the instructor.

#### 11. POLICY ON MISSED OR LATE WORK

In most cases:

- Late homework is not accepted (i.e. a homework assignment not received by the stated deadline will result in a score of zero)
- Missing an exam results in a score of zero

Exceptions are made with instructor approval and only under extraordinary circumstances, such as a severe illness, injury, or similar emergency. Documentation may be required. Students should contact the instructor as soon as possible regarding any missed or late work if they believe this policy applies.

#### 12. CLASSROOM BEHAVIOR

In order to provide a classroom environment most conducive to learning, and to minimize distractions, students are asked to follow these guidelines:

- Use of electronic devices during class should be limited to purposes directly related to the course, such as note-taking<sup>1</sup>.
- Electronic devices should be silenced during class.
- Making or receiving phone calls in the classroom is prohibited.

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<sup>1</sup>Taking notes by typing on a computer keyboard is *not* recommended, though it is permitted.

- Please do not to eat in class. (If this policy creates a hardship, please contact the instructor.)

### 13. UNIVERSITY POLICIES

UIC requires that every syllabus mention the following university policies.

13.1. **Academic deadlines.** The UIC academic calendar can be found at:

<http://catalog.uic.edu/ucat/academic-calendar/>

In particular this calendar includes the deadlines for adding and dropping courses.

13.2. **Academic honesty.** All UIC students are required to maintain the standards of academic integrity described in the *Guidelines Regarding Academic Integrity*:

<http://dos.uic.edu/docs/Guidelines%20for%20Academic%20Integrity.pdf>

In particular, this policy prohibits plagiarism. Any violation of these standards will be handled in accordance with the [Student Disciplinary Policy](#).

13.3. **Disability accommodation.** The University of Illinois at Chicago is committed to maintaining a barrier-free environment so that students with disabilities can fully access university programs, courses, services, and activities. Students with disabilities who require accommodations for access or participation in this course are welcome, but must be registered with the Disability Resource Center (DRC). Students may contact the DRC at 312-413-2183 (voice) or 312-413-0123 (TTY). Further information is available from the DRC web page (<http://drc.uic.edu/>).

13.4. **Religious holidays.** The UIC Senate Policy on religious holidays (approved May 25, 1988) is as follows:

“The faculty of the University of Illinois at Chicago shall make every effort to avoid scheduling examinations or requiring that student projects be turned in or completed on religious holidays. Students who wish to observe their religious holidays shall notify the faculty member by the tenth day of the semester of the date when they will be absent unless the religious holiday is observed on or before the tenth day of the semester. In such cases, the students shall notify the faculty member at least five days in advance of the date when he/she will be absent. The faculty member shall make every reasonable effort to honor the request, not penalize the student for missing the class, and if an examination or project is due during the absence, give the student an exam or assignment equivalent to the one completed by those students in attendance. If the student feels aggrieved, he/she may request remedy through the campus grievance procedure.”

The University Holidays and Religious Observances calendar can be found at:

<http://oae.uic.edu/religious-calendar/>

### 14. REVISION HISTORY OF THIS DOCUMENT

- 2018-01-08 Initial syllabus publication.