

# MATH 441/841 - General Topology

Fall 2019

## General information

**Instructor:** Martin Frankland

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**Office:** CW 307.17

**Office hours:** Tuesdays 4-5, Wednesdays 2-3, Thursdays 4-5, or by appointment.

**Lectures:** TR 2:30 - 3:45 PM in room Education Building 230. There are no tutorials.

**Textbook:** *Topology*, Second Edition, by James Munkres.

**Prerequisite:** MATH 305 with a minimum grade of 60%.

**UR Courses:** <https://urcourses.uregina.ca/>

This site will contain announcements, additional course material, and solutions to selected problems. The site is updated throughout the semester, so please check back regularly.

## Course outline

Topology is the study of spaces. Whereas geometry studies notions like lengths, angles, and size, topology only sees the shape of a space and its qualitative features. That is why topology is sometimes called “rubber-sheet geometry”.

The course is an introduction to point set topology. We will cover topics such as: metric spaces, topological spaces, continuous functions, separation axioms, Urysohn’s lemma, the Tietze extension theorem, countability axioms, compactness, and Tychonoff’s theorem.

Some of the more advanced topics we may cover include: metrization theorems, paracompactness, function spaces, nets and filters, and uniform spaces.

As the course progresses, we will try to highlight connections between point set topology and other branches of mathematics. For instance:

- The Baire category theorem has applications to functional analysis.
- Paracompactness and partitions of unity have applications to differential geometry.
- Compactly generated spaces have applications to algebraic topology.

## Learning outcomes

By the end of the course, students will be able to:

- Identify different properties of topological spaces, and tell whether a given space satisfies certain properties.
- Provide examples of spaces that satisfy certain properties.
- Recognize special properties of metric spaces and tell whether a topological space comes from a metric space.
- Work with topological spaces appearing in various branches of mathematics.
- Write clear, rigorous proofs of mathematical statements.
- Explain mathematical concepts to their peers.

## Grade determination

- Homework: 40%
- Oral presentation: 20%
- Final exam: 40%

## Exam

The final exam is on **Tuesday December 10**, 2:00 - 5:00 PM, room to be announced.

There is no midterm exam.

The final exam covers the entire semester and will be **open book**:

- **Allowed:** the textbook, your own notes, your own homework, and printouts of material from this course.
- **Not allowed:** Calculators, electronic devices (cell phones, iPads, etc.), photocopies, and printouts of material not from this course.

# Homework

Homework will be assigned more or less weekly and collected in class. Selected problems from each assignment will be graded.

**Late homework will not be accepted.**

The **lowest homework score** will be dropped.

If needed, homework can be submitted in advance: in lectures, office hours, or at the Math Office (CW 307.14).

**“Second chance” policy:** Homework solutions that are incorrect can be resubmitted for partial credit.

- The second attempt must be submitted within a week of receiving the graded homework.
- The corrected solution must *specifically* address what was wrong with the original solution.
- Credit for the corrected solution is capped at 80%.

**For students registered in MATH 841:** The homework component of 40% consists of two parts. The regular homework, the same as for MATH 441, accounts for 30 percentage points. Then there is additional homework with more advanced problems, accounting for 10 percentage points. It will be collected about once a month.

# Oral presentation

Each student will give an oral presentation towards the end of the semester. Evaluation will be based on the presentation itself as well as preparation work.

# Missed course work

Information about missed course work can be found in the *Academic Regulations*, section “Deferral of Final Exams or Course Work”, available at:

<https://www.uregina.ca/student/registrar/resources-for-students/academic-calendars-and-schedule/undergraduate-calendar/sections.html>

See in particular the sections “Grounds for Deferral” and “Supporting Documentation”.

**Schedule conflicts:** If you have a schedule conflict between an exam and another course or university sponsored activity (e.g. conference, sports tournament), please contact me in advance, **no later than a week before the exam** in question.

**Illness:** If you are unable to meet a course requirement due to illness or other serious circumstances, please contact me as soon as possible.

**Homework:** An excused missed assignment will be dropped. There will be no make-up homework.

**Final:** You will need to submit the form *Deferral of term work and/or final exam*, available at:

[https://www.uregina.ca/student/registrar/assets/docs/pdf/forms/deferral\\_form.pdf](https://www.uregina.ca/student/registrar/assets/docs/pdf/forms/deferral_form.pdf)

For more information, please consult the *Academic Regulations*, section “Deferral of Final Exam”, or contact Science Student Services, Lab Building 238.

## Academic integrity

Working on homework with your peers is allowed, in fact encouraged. However, each student must write **their own** solutions. Handing in suspiciously similar solutions will be considered an instance of cheating. Please indicate which other students you collaborated with.

Handing in any material copied from the internet or another source will likewise be considered cheating. **Cite sources** that you consult, for instance Wikipedia, Math Stack Exchange, MathOverflow, or online course notes.

Scholastic offences are taken seriously and will not be tolerated. For more information, please consult the *Student Code of Conduct and Right to Appeal*, section “Academic Misconduct”, available at:

<https://www.uregina.ca/student/registrar/resources-for-students/academic-calendars-and-schedule/undergraduate-calendar/sections.html>

as well as the *Faculty of Science Student Handbook*, section “Academic Integrity”, available at:

<https://www.uregina.ca/science/assets/docs/pdf/programpdf/new-student-manual.pdf>

## Accessibility

If you feel you may need academic accommodation due to a disability, injury, or illness, please contact the Centre for Student Accessibility. Their contact information is available at:

<https://www.uregina.ca/student/accessibility/>

After I receive the letter from the Centre for Student Accessibility, please schedule an appointment with me to discuss the accommodation.