

MATH 441/841 - General Topology

Fall 2021

General information

Instructor: Martin Frankland

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Office: CW 307.17

Office hours: Tuesday 6-7 PM, Wednesday 5-6 PM, Thursday 5-6 PM. The Zoom link is posted on UR Courses.

In person meeting by appointment.

Lectures: TR 11:30 AM - 12:45 PM on Zoom. The link is posted on UR Courses.

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

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, countability axioms, connectedness, compactness, Tychonoff’s theorem, Urysohn’s lemma, and the Tietze extension 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.

Grading scheme

- Homework: 40%
- Midterm: 15%
- Final Exam: 15%
- Project: 30%

Course delivery and computer requirements

The course is taught **remotely**. At no point are you required to be physically in Regina. Here are the technology requirements.

- A computer, laptop, or similar device, with a reliable internet connection.
- A way of submitting work online, e.g., a smartphone camera or a scanner. Typing up your homework is another option.
- A video camera and microphone for the oral presentation. The rest of the semester, a camera and microphone are strongly recommended, in order to facilitate participation. Note: Most laptops have a built-in camera and microphone, which work fine for our purposes.

The course has both synchronous and asynchronous components.

- **Synchronous:** Lectures during the designated schedule.
- **Asynchronous:** Selected sections from the textbook, notes posted after each live session, additional notes and worked examples.

Exams

- Midterm: **Thursday October 14**, take-home exam.
- Final Exam: **Tuesday December 21**, take-home exam.

Details for both exams will be confirmed.

The final exam covers the entire semester, with heavy emphasis on material after the midterm.

All exams will be **open book**: the textbook, notes, and class material are allowed. More details will be provided as to which resources are allowed and which are not.

Homework

Homework will be assigned more or less weekly and submitted on UR Courses. Selected problems from each assignment will be graded.

Late homework will not be accepted.

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

For students registered in MATH 841: Each homework assignment will contain one designated graduate problem, which is part of the assignment for MATH 841 but not for MATH 441.

Project

You will work on a project on a topic of your choice related to the course. The project consists of two components:

- An expository written report, worth 20%.
- An oral presentation, worth 10%.

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.

Exams: In case of excused absence from an exam, the exam will be dropped, with the course grade computed out of the remaining 85 course points. There will be no make-up exam.

For administrative purposes, the Final Exam plays the role of a second midterm. In particular, the section “Deferral of Final Exam” in the *Academic Regulations* does not apply here.

Academic integrity

Working on homework with your peers is allowed. However, each student must write **their own** solutions. Handing in suspiciously similar solutions will be considered an instance of cheating.

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, 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

Any student with special needs who may need accommodation should contact the Centre for Student Accessibility at:

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

After I receive the letter from the Centre for Student Accessibility, please contact me to discuss the accommodation.