General Topology **Fall 2021**

Instructor

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Textbooks and References

The first book is the course textbook, and the second one is a reference.

- **Introduction to topology**
  - by T.W. Gamelin and R.E. Greene
- **Topology: a first course**
  - by J.R. Munkres

Grading

Your final grade will consist of the following:

- **Attendance** **10%**,
  - No penalties for missing up to 3 classes. After that, your being further absent will deteriorate your final grade. NO EXCEPTIONS. Use those 3 days wisely.
  - If you miss more than 3 classes, then you will lose half the credit.
  - If you miss more than 6 classes, then you will receive no credit for attendance.
- **Homework** **30%**,
- **The Midterm Exam** **30%**,
- **The Final Exam** **30%**.

The final grade will be given based on the following absolute scale.

- (A+, A, A− ≥ 75)
- (B+, B, B− ≥ 50)
- (C+, C, C− ≥ 35)
- (D+, D, D− ≥ 20)
- (F < 20)

Academic Integrity

As future leaders of our society, UNIST students will be held to the highest ethical standards. Academic dishonesty includes cheating, plagiarizing and inappropriate collaboration. It will result in a zero grade on that particular work, and it may lead to further actions by the University such as suspension.

Topics

The first part of the course will cover essential topics in general topology, after which students should be able to understand and answer the following questions.

- **Topological Spaces**
  - What is a topological space?
  - What does a topology have to do with continuity and connectivity?
  - Bases for a topology - how to generate a topology.
  - Separation Axioms - how to tell if two sets are separated.
  - Compactness and Local Compactness - what is compact?
  - Connectedness and Path Connectedness
  - Finite and Infinite Product Spaces
  - Quotient Spaces
    - e.g., Möbius strip, Klein bottle, Sphere, Torus, $\mathbb{R}\mathrm{P}^n, \mathbb{C}\mathrm{P}^n$, etc.

In the second part, we will see how topology is related to other research fields. We may have only a fraction of time left to discuss few of the following topics.

- **Applications**
  - Homotopy
  - Convexity and Topology : weak topology, weak-$*$ topology
  - Manifolds
  - Triangulation
    - Simplicial Complexes
    - Delaunay triangulation
  - Computational Topology
  - The Euler characteristic
  - Some entertaining articles
    - An article on 'not all manifolds can be triangulated.'
    - Triangulations of manifolds
    - Delaunay triangulation
    - Properties of the Delaunay triangulation
    - Voronoi diagrams and Delaunay triangulations: ubiquitous siamese twins
    - The Euler characteristic for data analysis

Notes

Please be advised that

• *Homework assignments* are very important not only for understanding the course material, but also for preparing for the exams.

• It is also important to attend classes. :)

• **Mathematical Analysis I** is a prerequisite course, which means that presumably, you have taken the course. I will assume that you are familiar with properties of metric spaces and concepts of continuity, connectivity, compactness in metric spaces.