Material: J. R. Munkres, Topology, second edition, plus Notes that I write and distribute. We will cover Chapters 2 and parts of chapter 3 of the textbook. This includes the following topics:

1. Basics:
   Topology: definition, basis, subbasis.
   Fundamental examples: order, $X \times Y$, subspace.
   Closure: closed sets, limit points, Hausdorff spaces.
   Continuity: equivalent definitions, constructing, homeomorphisms and embeddings.
   Product topology: basis and subbasis, box and product compared: $\mathbb{R}^n, \mathbb{R}^\omega$.
   Metric spaces: basics, comparison of metrics, uniform topology, sequence lemma, uniform limits.

2. Connectedness:
   Connected spaces and sets: definition, continuity.
   Products: finite, arbitrary, $\mathbb{R}^n, \mathbb{R}^\omega$.
   Ordered spaces: linear continua, real line, first uncountable ordinal.
   Components and path components: sin continuum. Local connectedness: sin($1/x$) continuum, $\mathbb{R}^n$.

3. Compactness:
   Compact spaces: definition, finite products, finite intersection condition.
   Ordered spaces: greatest lower bound and least upper bound, real line, first uncountable ordinal.
   Limit point and sequential compactness: equivalence in metric spaces.
   Local compactness: one point compactification; $[0, \infty]$ and $[-\infty, \infty]$.
   Complete metric spaces: relate to compactness; classical Ascoli theorem.
Some topics on connectedness and compactness may not be covered in the course if we do not have time.

**Organization**

We will reserve Fridays for presentations by students of home work problems. I will lecture some, but mostly students will do presentations starting in chapter 2; two students will cover about 2 sections at a time. They are expected to work together and be ready to present the material when needed. If you have questions and do not understand something, feel free to come to my office any time. I am in most days and you should have no problem finding me.

Mathematics is learned by actively doing it. Hence you should often ask questions during presentations. Also, if you are presenting, you should anticipate questions and prepare answers for them (if you initially don’t understand why a statement is true others will most likely have the same problem; hence supply more argument).

Similarly, working problems is crucial for testing and improving your understanding of the material. Topology is very abstract and you have to learn to accept that you are given a set of rules and you must work within them. Why these rules are this way may only be clear later.

Finally you must memorize basic definitions and facts; you cannot function without knowing what a topological space is, what it means for a set to be open, what it means to be the basis for a topology etc.

**Grading**

Working home work problems will count for 20%.
Presentations count for 20%
Midterm 20%
Final exam 40%