



Math 508 - Topology Course Syllabus

Course description: Metric spaces, topological spaces and Cartesian product spaces are studied together with certain topological properties such as compactness, connectivity and separability.

Credit hours: 3

Course Prerequisites and Corequisites: MTH 439

Course outline:

	Approximate time spent
<ul style="list-style-type: none">• Topological Spaces<ul style="list-style-type: none">○ Definition of topology○ Closed set○ Base for a topological space○ Subbase for a topological space○ Relative topology and subspaces○ Limit point○ Convergence	20%
<ul style="list-style-type: none">• Metric Spaces<ul style="list-style-type: none">○ Definition of a metric space○ Open ball○ Interior point○ Open set	20%
<ul style="list-style-type: none">• Functions<ul style="list-style-type: none">○ Continuity○ Homeomorphism○ Topological property	20%
<ul style="list-style-type: none">• Axiom of Choice	5%
<ul style="list-style-type: none">• Product Spaces<ul style="list-style-type: none">○ Product topology○ The Tychonoff Theorem	20%
Selected topics as time permits	15%
<ul style="list-style-type: none">• Separation Axioms<ul style="list-style-type: none">○ T_0 space○ T_1 space○ T_2 space (Hausdorff space)○ Regular space○ T_3 space○ Normal<ul style="list-style-type: none">▪ Urysohn's Lemma▪ Tietze Extension Theorem○ T_4 space	

- **Special Topological Spaces**
 - Separable Space
 - First axiom of countability
 - Second axiom of countability
 - Lindelof space
 - Connected space
 - Compact space
 - Alexandroff's One Point Compactification
 - The Stone-Cech compactification
- **The principle of transfinite induction**
- **Continua**
 - Irreducible continuum
 - Limiting set

Student Learning Outcomes (SLO): At the end of MTH 508, a student who has studied and learned the material should be able to:

1. Fully discuss the basic notions covered in this topology course. [PLO: 3,5]
2. Read and interpret written mathematics.[PLO: 1,3,5]
3. Recognize those things that must be proven and how to best describe their thoughts that lead to an easily understandable proof of a basic theorem.[PLO: 1,3,5]
4. Use the language successfully, in oral and written form, while expressing their mathematical thoughts. [PLO: 5]
5. Present their proofs in class by relying on their material they generated prior to class. [PLO: 1,2,3,5]

Program Learning Outcomes (PLO):

Students graduating from SFASU with a M.S. degree and a major in mathematics will:

1. **[Critical Reasoning]** Independently apply the principles of logic in mathematics to develop and analyze conjectures and proofs. (understanding of abstract structures, development of definitions, development and proof of conjectures)
2. **[Skills]** Execute advanced mathematical procedures and build upon these standard procedures. (learning of new skills, applying or extending skills in new situations)
3. **[Concepts]** Demonstrate knowledge of core mathematical concepts. (definitions and theorems in analysis, definitions and theorems in linear or abstract algebra, definitions and theorems in theoretical statistics)
5. **[Communication]** Demonstrate proficiency in communicating mathematics in a format appropriate to expected audiences. (written, visual, oral)