

MATH 471 - ELEMENTARY TOPOLOGY

Nicholls State University, Spring 2009

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My office hours are 4:00-5:00 MW and 8:00-12:00 TTH. Please contact me (phone, email, or in person) during these times if you have any questions. If you need assistance at a different time, let me know and we'll work something out.

Prerequisite: Math 360.

Text: There is no required text for this course. If you would like a reference text, anything with the title like "Topology" or "Point-Set Topology" would be sufficient.

Course Description (catalog): An informational and introductory study of topological spaces.

Course Description (instructor): Our goal is the study of topological spaces. These are very common in mathematics, and in fact you have dealt with them your whole career, even if you did not know it. To do this, though, we will need to study a variety of preliminary topics first such as set theory, relations and functions, countable (and uncountable) sets, and the axiom of choice. With these basics in hand, we will tackle confidently topological spaces. We will learn many examples, and certain types of topological spaces such as metric spaces, product spaces, and quotient spaces. Then we will move on to limit points, homeomorphisms, connectedness, and compactness. Then, as time allows, we will hit the Countability Axioms and the Separation Axioms.

Course Objectives: At the completion of this course, a student will be able to:

- describe open sets in a variety of topological spaces
- determine whether a collection of sets is a topology
- demonstrate an understanding of limit points and neighborhoods
- analyze topological spaces and subspaces for connectedness and compactness

Grading Policy: There will be four equally weighted components to your course grade: board work, problem sets, midterm exam, and final exam.

Board Work: Mathematics can be a very interactive activity. In fact, I think one of the best ways to learn mathematics is to talk about it with others. To that end, every night a portion of class time will be set aside for student presentations and discussion. Students will receive participation points (for lack of a better term) in a variety of ways; for example posing good questions, answering posed questions, and presenting solutions at the board. A student presenting at the board will

receive points for *attempting* a solution and also for *successfully* presenting a solution.

Problem Sets: Several times throughout the semester (maybe 4-7 times) I will assign additional problems that will be turned in the next week. These will often be just like the other homework problems, but will usually include one or two “outside-the-box” problems.

Exams: We will have an in-class midterm exam and a take-home final. Both exams will be quasi-comprehensive (they will each be comprehensive on their half of the semester) and neither is optional.

Make-Up Policy: If a student knows in advance of a scheduled test that will be missed due to a school-sponsored function, or a scheduled appointment, then they may take a make-up test provided arrangements are made sufficiently in advance with the instructor and documentation of the absence is produced. In order to be eligible to take a make-up for other reasons, such as medical emergencies and illnesses, the student must supply for verification purposes *appropriate documentation and relevant phone numbers* upon the first day returning to class. The instructor will judge what is or is not appropriate.

Course Outline: Below is a list of the sections we will cover this semester. If time allows, more sections may be added. If time does not allow, some sections may be skipped. The tentative date of our mid-term exam is included. I do not expect the date to change, but if it does, you will be notified in class.

I Topological Spaces
Section 1: Euclidean Space
Section 2: Topologies
Section 3: Closed Sets
Section 4: Continuous Functions

II Metric Spaces
Section 1: Introduction
Section 2: The Order Topology
Section 3: The Product Topology

*****Mid-Term Exam – Monday, March 16, 2009*****

Section 4: Sequences

III Topological Properties
Section 1: Connectedness
Section 2: Compactness
Section 3: Countable Spaces
Section 4: When is a compact space not compact?

IV Advanced Topics

Section 1: Complete Metric Spaces

Section 2: The Baire Category Theorem

Section 3: The Separation Axioms

Important Dates: Mid-Term Exam – Monday, March 16, 2009
'W' Day – Friday, April 3, 2009
Final Exam Due– Monday, May 11, 2009

Attendance/Expectations: I will not include attendance as part of your course grade. I do, however, expect you to attend class everyday. You are responsible for all material covered in class. It is assumed that you are attending this university because you have a desire for higher learning. It is therefore expected that you will pay attention, be respectful of your instructor and fellow students, and follow the Code of Student Conduct. Instances of academic dishonesty will be dealt with severely. If you are caught cheating, you will fail this course. Similarly, if you are a disruptive presence in the classroom, you will be dropped from the class.

Academic Grievances: The proper procedure for filing grade appeals or grievances related to academic matters is listed in Section 5 of the *Code of Student Conduct* and at the following link: www.nicholls.edu/documents/student_life/code_of_conduct.pdf.

Continued Learning following an Extreme Emergency: In order to make continued learning possible following an extreme emergency

students are responsible for:

- reading regular emergency notifications on the NSU website;
- knowing how to use and access Blackboard (or university designated electronic delivery system);
- being familiar with emergency guidelines;
- evacuating textbooks and other course materials;
- knowing their Blackboard (or designated system) student login and password;
- contacting faculty regarding their intentions for completing the course.

faculty are responsible for:

- their development in the use of the Blackboard (or designated) software;
- having a plan for continuing their courses using only Blackboard and email;
- continuing their course in whatever way suits the completion of the course best, and being creative in the continuation of these courses;
- making adjustments or compensations to a student's progress in special programs with labs, clinical sequences or the like only in the immediate semester following the emergency.

Disability: If you have a documented disability that requires assistance, you will need to register with the Office of Disability Services for coordination of your academic accommodations. The Office of Disability Services is located in Peltier Hall, Room 100-A. The phone number is (985) 448-4430 (TDD 449-7002).