

# MATH 465 - MODERN ALGEBRA I

Nicholls State University, Spring 2009

**Instructor:** Dr. Brian Heck  
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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.

**Prerequisites:** Math 358 and 360.

**Text:** There is no required text for this course. If you would like a reference text, anything with the title like "Modern Algebra" or "Abstract Algebra" would be sufficient.

**Course Description (catalog):** Introductory concepts, axiomatic approach to the number system, general algebraic systems, groups.

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

- demonstrate a thorough understanding of the fundamental concepts of sets, mappings, relations, and groups
- determine properties of binary operations
- determine whether subsets of groups are subgroups
- find generators of cyclic groups
- prove propositions about a variety of groups (finite, infinite, cyclic, permutation, dihedral, and more) and isomorphisms
- perform operations in the permutations groups

**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 Fundamentals**

Section 1: Relations and Functions

Section 2: Permutations

Section 3: Integers

Section 4: Modular Arithmetic

## **II Introductions to Groups**

Section 1: Basics

Section 2: Subgroups

Section 3: Permutations Groups

Section 4: Cyclic Groups

Section 5: Dihedral Groups

\*\*\*Mid-Term Exam – Wednesday, March 11, 2009\*\*\*

## **III More on Groups**

Section 1: Homomorphisms

Section 2: Cosets

Section 3: Normal Subgroups

Section 4: Quotient Groups

Section 5: The Fundamental Theorem of Finite Abelian Groups

## **IV Rings and Fields**

Section 1: Rings

Section 2: Ring Homomorphisms

Section 3: Ideals  
Section 4: Integral Domains  
Section 5: Fields

**Important Dates:** Mid-Term Exam – Wednesday, March 11, 2009  
'W' Day – Friday, April 3, 2009  
Final Exam Due– Wednesday, May 13, 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](http://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).