MATH 510
NUMBER-THEORTIC AND DISCRETE STRUCTURES

Nicholls State University, Fall 2009

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My office hours are 9:00-12:00 M-TH. 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: Completion of or enrollment in MATH 509.

Text: There is no required text. We will use notes posted to Blackboard (blackboard.nicholls.edu) routinely throughout the semester.

Course Description (catalog): Primes, congruences, algebraic number theory, diophantine equations, and theory of algebraic equations. Applications of the theory of number systems to problem solving. Representation of phenomena via finite graphs, recursive relations, and combinatorial structures.

Course Description (instructor): This is one of four required MATH courses in the MCCM program. This program is uniquely designed to prepare students to teach mathematics at the community college/technical college level. It is the only program of its kind in the state. However, it is also useful to secondary teachers (providing additional mathematics content-area knowledge) and to students intending further graduate work. It is a very flexible and content-rich program.

In this course, our primary aim will be number theory. We will begin studying numbers in general, and in particular prime numbers, and then progress to congruences and equations. Using these essential tools, we'll then cover algebraic number theory, which is a mathematical field that studies abstract number systems similar in structure to the rational numbers and the integers. We will study other discrete mathematical objects (such as graphs) as time allows.

A few words need to be said about the Internet aspect of this course. All assignments, notes, announcements, etc will be posted on Blackboard. All students enrolled in an Internet course should have basic computer skills (such word processing, e-mail, navigating the Internet, etc). As an online student, you will be self-paced. This therefore requires self-discipline and self-motivation. The problem sets need to be turned in on time. It is the responsibility of the student to notify the instructor of technical and/or personal problems that may interfere with online participation. All students must check their Nicholls email account regularly. E-mail will be our primary

means of communication. Just like a typical class, instances of academic dishonesty, such as plagiarism, will not be tolerated.

Course Outline
I Prime Numbers
II Congruences
III Algebraic Equations
IV Recursive Relations
V Graph Theory

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

- test integers for primality
- solve linear congruences
- solve algebraic equations, including diophantine equations
- classify numbers as prime, composite, algebraic, transcendental, arithmetic, perfect, etc…
- classify sets of numbers as a group, ring, or field
- find primitive roots, units, and quadratic residues
- prove theorems of number theory in a variety of methods, including mathematical induction
- evaluate and examine recursive functions
- analyze graphs

Grading Policy: Your course grade will be composed of a problem set grade (50%), an "in-class" midterm exam grade (25%), and a take-home final exam grade (25%). The midterm exam will obviously not actually be in-class, since we do not have class. What I mean is that it will be a typical timed exam that students will take at a specified time and place (as opposed to a take-home exam that you can complete when and where you want during the time you are working on it). ***Distance education students need to choose an approved testing center in their local area and complete a Distance Learning Test Administration Approval Form (soon to be located under "Course Documents") prior to taking the exam. Once the form has been uploaded, I will give you two weeks to inform me of your choice. That will allow me ample time to contact your designated proctor and approve (or not) the selection.***

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).