

**MATH 510**  
**NUMBER-THEORETIC AND DISCRETE STRUCTURES**  
Section WWP, Nicholls State University, Spring 2016

**Instructor:** Dr. Brian Heck  
**Office:** 106-E Peltier  
**Phone:** 448-4383  
**Email:** [brian.heck@nicholls.edu](mailto:brian.heck@nicholls.edu)  
**Webpages:** <http://math.nicholls.edu/heck>  
<http://www.facebook.com/bheck2009>

My office hours are:

Mon 10:30 am – 12:00 pm  
Tue 9:00 am – 11:30 am  
Wed 10:30 am – 12:00 pm, 2:00 pm – 4:00 pm  
Thu 9:00 am – 11:30 am

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 Moodle routinely throughout the semester (<http://moodle2.nicholls.edu/moodle>).

***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, 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 Moodle. All students enrolled in an Internet course should have basic computer skills (such as word processing, e-mail, navigating the Internet, etc.). I invite you to visit the distance education webpage (<http://www.nicholls.edu/distance>) for more information and guidance. As an online student, you will be somewhat 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. Since email will be our primary means of communication, you will need to check your Nicholls email account regularly (*at least* once a day) for possible news and/or announcements. Additionally, please feel free to email me as often as is necessary if you have questions about the material. Finally, just like a typical class, instances of academic dishonesty such as plagiarism will not be tolerated. Sanctions for such behavior are outlined in the *Code of Student Conduct* (Section 1.9).

*Special Note: Section Five of the Code of Student Conduct, 'Academic Dishonesty and Disruptive Behavior,' includes a requirement that faculty file a charge complaint statement with their respective dean whenever a student is confronted or disciplined for cheating. The Office of Academic Affairs will maintain these records, and any student confronted and/or disciplined for multiple offenses of academic dishonesty will be brought before the Academic Affairs Integrity Committee for further review and potential sanctions. Please read the Code of Student Conduct for further details regarding this policy."*

**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.** We will have two exams and many problem sets.

**Exams:** We will have an "in-class" midterm exam and a "take-home" final. The "in-class" midterm exam will obviously not actually be in-class, since we do not have class. 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). Once the day of the midterm exam gets closer, I will schedule a time for the local students to take their exam with me. *\*\*Distance education students need to choose an approved testing center in their local area and complete a Proctor Approval Form to taking the exam. Once the form has been uploaded to Moodle, 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.\*\** ***Each exam will count for 25% of your semester grade.***

**Problem Sets:** You will have regular problem sets assigned approximately once a week. Problem sets will consist of typical mathematics exercises, discussion boards to participate in, and/or independent research, etc. ***This portion will account for 50% of your semester grade.***

At the conclusion of the semester, letter grades will be assigned based on the usual 10% grading scale (A: 90-100%, B: 80-89%, C: 70-79%, etc). Late assignments will not be accepted unless there are VERY unusual circumstances, and make-up exams will only be administered if the student provides a valid excuse. The instructor decides which excuses are valid and which circumstances are unusual. As I said above, academic dishonesty (i.e. cheating, plagiarism, etc.) will not be tolerated.

***Important Date:***      **W** Day – Wednesday, April 6, 2016

***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 Moodle (or university designated electronic delivery system);
- being familiar with emergency guidelines;
- evacuating textbooks and other course materials;
- knowing their Moodle (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 Moodle (or designated) software;
- having a plan for continuing their courses using only Moodle 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.

**Assistance with Studying and Assignments:**

- The Tutoring Center at 143 Peltier Hall. Call 985-448-4100, email [tutoring@nicholls.edu](mailto:tutoring@nicholls.edu), or visit <http://www.nicholls.edu/academic-enhancement>.
- The Writing Center at 144 Peltier Hall. Call 985-448-4100, email [tutoring@nicholls.edu](mailto:tutoring@nicholls.edu), or visit <http://www.nicholls.edu/academic-enhancement>.
- Online Tutoring through Moodle. Look for the Brainfuse log-in link on the home page, <http://moodle2.nicholls.edu/moodle>

**ADA Compliance:** 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 158A Shaver Gym. The phone number is (985) 448-4430 (TDD 449-7002).