

MAT 443 NUMBER THEORY

(11:00 - 11:50 MONDAY/WEDNESDAY/FRIDAY)

Ewing 219

FALL 2015

Course Designation MAT 443. NUMBER THEORY. Divisibility, congruence, linear diophantine equations, prime and composite numbers, and continued fractions. Prerequisite: MAT 251. (3 hours credit.)

Text Kenneth H. Rosen. Elementary Number Theory and Its Applications. Fifth Edition. 2005. Addison-Wesley Publishing Company. ISBN: 0-321-23707-2

General Course Objectives

Upon completion of the course, the student will be able to:

1. Recognize and demonstrate his understanding of the basic properties of the set of integers.
2. Communicate and demonstrate his understanding of the divisibility of integers.
3. Communicate and demonstrate his understanding of the greatest common divisor of a set of integers.
4. Demonstrate his understanding of the Euclidean algorithm by applying it to find the greatest common divisor of a pair of integers.
5. Demonstrate and communicate his understanding of the concept of prime numbers.
6. State the Fundamental Theorem of Arithmetic.
7. Construct proofs of number theoretic results to include but not limited to divisibility, greatest common divisors, congruence modulo m , and continued fractions.
8. Communicate and demonstrate his understanding of linear diophantine equations by solving linear diophantine equations in applied problems.
9. Communicate and demonstrate his understanding of linear congruences by solving linear congruences in applied settings.
10. Demonstrate his understanding of the Chinese Remainder Theorem by applying it in appropriate applied problems.
11. Prove tests for divisibility and apply the tests in appropriate settings.
12. Define perfect numbers and Mersenne primes.
13. Define and demonstrate his understanding of the Euler phi function.
14. Define continued fraction.
15. Demonstrate his understanding of continued fractions by converting a finite continued fraction to a rational number and vice versa.
16. Demonstrate his understanding of a continued fraction by converting a periodic continued fraction to a quadratic irrational number.
17. Demonstrate his understanding of number theoretic concepts in solving non-routine problems.

Subject Matter or Content to be Studied

1. Divisibility
2. Prime Numbers
3. Numerical Functions
4. Congruence
5. Diophantine Equations

Activities and Requirements

1. Class attendance, as determined by the regulations of the university and the department.
2. Assignments to be completed by the student and graded at the discretion of the instructor.
3. Participation in class discussion.
4. Scheduled tests will be given periodically throughout the semester. Students will be given adequate notice.
5. A comprehensive final exam will be given as scheduled at the end of the semester.
6. Regular and punctual attendance is necessary for successful completion of this course.

Evaluation and Grading

3 or 4 Tests	Three or four 100-point tests
Daily grade	Quizzes will be given during the semester. Also, homework will be taken at the discretion of the instructor. The combined grade of quizzes and homework will be computed for the daily grade which will count as a major test.
Final exam grade	A 100-point final examination, counting approximately 25% of the final grade for the course

Exam Date: Wednesday, December 9, 3:00 p.m.

Grading Scale

Grades will be assigned according to the following scale:

A (90% - 100%) B (80% - 89%) C (70% - 79%) D(60% - 69%) F (below 60%)

Cheating and plagiarism are not tolerated. If it is established that a violation has occurred, the instructor may determine the penalty, or he may report the offense to the department chair and dean of the school. The usual penalty involves a grade of zero on the test, examination, or paper in question.

Make-up Tests, Class Attendance, and Tardiness

A student absent from class and missing a scheduled test is entitled to a make-up test if evidence is presented to the instructor that the absence was due to personal illness or death in the immediate family. Absences authorized by the Vice-President of Academic Affairs for official purposes (athletics, performing groups, student government, etc.) also entitle a student to make-up test privileges. Any absence from scheduled work must be covered by an excuse from the Vice-President for Academic Affairs, the Student Health Service, or a doctor before the student is allowed to make up that work. Any exception to this rule must be arranged before the missed work! Each student is directly responsible to the individual faculty member for making up work missed due to excused absences. ALL make-up work must be completed within one week after returning to class. In order to receive credit in this course, a student must attend a minimum of 75% of the class meetings. Students in this class will be allowed no more than 11 absences, excused and unexcused. If a student exceeds the allowable number of absences, a grade of "F" will be assigned in the course. In order to be counted present, a student must arrive on time for the class and remain in class the entire time. When a student is tardy for a class, it is the student's responsibility to talk to the faculty member about changing the recorded absence to a tardy. This must be done on the day that the tardy occurred. Failure to do so will result in a recorded absence. Tardies in excess of three during the semester count as unexcused absences.

Classroom Policies

1. **Turn off cell phones and pagers upon entering the classroom. Do not check messages or send text messages during class. If you are seen using a cell phone during a test, I will assume that you are using it to cheat. No cell phone calculators may be used during a test.**
2. Come to class on time.

3. Be prepared to start class at the scheduled time. Have all necessary items ready.
4. Do not ask to leave class early. Schedule any appointments at times that do not conflict with classroom time.
5. Calculator use is permitted and encouraged on all homework assignments and tests.
6. Be sure to show all work on homework assignments and tests. No partial credit can be given if no work is shown.
7. Homework must be turned in when it is due. No late homework will be accepted.
8. Cheating and plagiarism are not tolerated. If it is established that a violation has occurred, the penalty will be a zero on the test, examination, or paper in question.
9. It is the responsibility of the individual student to inform the faculty member of any clinically diagnosed learning disability or other limiting disability that might in some way hinder the student's progress in this class. Reasonable accommodations are available upon request.
12. Pop quizzes can only be made up if the absence is excused.

Important Dates

Students who remain in the course more than one week after the first test and who then elect to drop the course will receive a grade of **W** if passing or a grade of **F** if failing the course at the time of the drop. A drop is not effective and complete until the drop slip has been signed by all parties designated and turned in to the Registrar's office. No course may be dropped after **December 4**. If you plan to audit this class, you must notify the instructor by **August 28**. You will not be allowed to change your status from credit to audit after this date. The final examination for this course is scheduled for **Wednesday, December 9, at 3:00 p.m.** That is when it must be taken.

If a student has a disability that qualifies under the American with Disabilities Act and requires accommodation, he should contact the Counseling Center (Student Health Center; phone 846-4690) for information on appropriate policies and procedures.

Instructor: Dr. Lee Virden

Instructor's Office: Broom 255

Office Phone: 846-4511

E-mail: lvirden@deltastate.edu

Instructor's Office Hours:

Monday	Tuesday	Wednesday	Thursday	Friday
1:30 – 4:00	1:30 – 4:00	2:00 – 5:00 Nursing 140	1:30 – 4:00	

Admission Policy for Programs Offered Through The Mathematics Department

Provisional Admission

Students entering Delta State University who declare a major offered through the Department of Mathematics are initially admitted with *provisional status*. Students who demonstrate satisfactory performance in a core of introductory mathematics courses (as defined below) are granted *full admission* to the program. The intent of this policy is to insure that all students gain basic knowledge and skills in introductory core courses that are required for the level of scholarship expected from them in their advanced studies and in their future professions.

Full Admission

Full admission is granted upon satisfactory completion of the following introductory mathematics core:

MAT 104/105 or 106	College Algebra and Trigonometry or Precalculus
MAT 251	Unified Calculus and Analytics

Satisfactory completion is defined as having completed a course with a grade of C or better. **Any grade below C must be removed by repeating the course and earning a grade of C or better.** Students should be aware that repeating courses may increase the time required for graduation.

When a student fulfills the core requirements, he or she is considered to be adequately prepared to continue with advanced mathematics courses and is granted *full admission* to the program. **A student who has not been granted full admission will not be permitted to register for any upper division mathematics course.** Upper division courses are those MAT courses numbered above 251.

At the close of each semester, each student's record will be reviewed by his or her advisor and the Chair of the Curriculum Committee. The Curriculum Committee will notify each student by letter when he or she achieves full admission status. Students may check their status at any time by contacting their advisors.

Requirements for full admission also apply to students who transfer credit from other institutions. Courses equivalent to the core courses listed above must have been completed with grades of C or better to be accepted for transfer credit. Verification of transcripts should be completed prior to the start of the first semester of enrollment. Upon enrolling for the first semester, a transfer student whose transcript has not been verified will be given provisional status. When it has been verified that the student has fulfilled the requirements, he or she will be granted full admission status. Enrollment in upper division courses will not be permitted until full admission status has been granted.

Requirements for Graduation

In addition to the graduation requirements stated in the University Bulletin, the Department requires satisfactory academic performance in major courses. Specifically, this means **the GPA in upper-level courses within the major must be at least 2.5 overall and at least 2.5 on upper-level major courses completed at DSU. No grade below C in a required major course may be applied toward graduation. Any grade below C must be removed by repeating the course and earning a C or better grade. In addition the students will take the Praxis subject area test in mathematics and pass at a published level (see the Department for the most current information). Also, students in the BSE program must have at least a 3.0 grade point average on the completed 44 hours of General Education coursework and at least a 3.0 overall grade point average.**

Failure to maintain satisfactory academic standing

A student with full admission status who fails to maintain good academic standing will be placed on departmental academic probation. When a student whose GPA in upper level mathematics courses has fallen below 2.0, he or she will be warned that he or she is in danger of being placed on probation, and that the problem course or courses should be retaken. A student who fails to improve the GPA in upper level mathematics to 2.0 or above within two semesters of being warned will be placed on *probationary status*. A student on probation will not be permitted to advance in mathematics course work until such time that the probationary problems have been corrected. Students should be aware that being on probation may increase the time required for graduation.

