Introduction to Number Theory
MAS 4203
Summer B 2023

Instructor:	Dr. John Streese
Office:	LIT 324
E-mail:	jstreese@ufl.edu
Office Hours:	TBD ?? pm - ?? pm or by appointment
Lecture:	MTWRF, 2:00pm - 3:15pm
Classroom:	LIT 223

Prerequisites MAC 2312, MAC 2512 or MAC 3473 with a minimum grade of C; MAS 3300 or MHF 3202 recommended. It is highly recommended you have had a course that requires proof-writing.

Course Description This course is designed as an introduction to elementary number theory as well as some of the various applications. The basic topics include the greatest common divisor, the fundamental theorem of arithmetic, arithmetic functions, multiplicative functions, congruences, the Chinese remainder theorem, quadratic residues, quadratic reciprocity and primitive roots. During the last week, I would like to cover some fun topics like cryptography and integer partitions.

Course Goals At the end of this course you should be able to:

1. Effectively communicate mathematical ideas.
2. Write a mathematical proof.
3. kKow and understand basic ideas and applications of number theory.

Required Materials There are no required textbooks for this course. However, my lecture notes will be based off of the text *Elementary Number Theory* by Strayer ISBN 1-57766-224-5. I will also be using Ivan Niven's *An Introduction to Number Theory* Fifth Edition ISBN 978-0-471-62546-9. Prioritize Strayer over Niven if you'd like to just use a single text.

E-Learning Canvas: I will put homework assignments, lecture notes, announcements and grades on Canvas. Please check Canvas regularly.

You are responsible for verifying that your grades are accurate. **You have one week after a score has been posted to contact me if you believe there has been a recording error. There is no grade dispute at the end of the semester.**

Tests There will be two midterm exams throughout the course. The first midterm exam will be on July 21st during class. The second midterm exam will be on August 10th during class. The second exam is not cumulative. Periods are 75 minutes in length, and therefore that will be the standard time allotted on an exam. I will go into even more detail on what to expect for exams when the dates draw nearer.

Homework

There will be 6 homework asssignments. Homework will generally be assigned on Mondays and due by 11:59pm the following Sunday. You are allowed and encouraged to discuss the assignments your classmates on the assignments. However, you are expected to actually write up your solutions on your own. Plagiarized solutions will result in a 0 on that assignment. I will discuss more in class how to avoid plagariasm in a proof-based mathematics course. Because of how condensed the summer B schedule is, the final homework assignment will be shorter and also be due sooner than the usual Sunday 11:59pm.

Late Homework Policy

Homeworks are due 11:59pm Sunday evenings (with the exception of homework 6). For each day that a homework assignment is late, the assignment will accrue a 10 percent penalty. This penalty with accumulate up to one week. Here are soem concrete examples: If you assignment is submitted 5 hours late, a 10 percent penalty is applied. If your assignment is 37 hours late, you will receive a 20 percent penalty. If an assignment is over one week (168 hours) late, it will no longer be accepted.

Class Attendance

There will be very simple class exercises, especially in the beginning of the course, that will be utilized so student's can earn attendance credit. Further, this will help me learn your names. See below for the breakdown of category weights for your grade.

Grading

Attendance: 10%

Homework: 40%

Exam 1: 25%

Exam 2: 25%

Grading Scale

90-100 A	87-90 A-	84-87 B+	80-84 B
77-80 B-	74-77 C+	67-74 C	64-67 C-*
60-64 D+	57-60 D	54-57 D-	0-54 E

NOTE: I will not review disputed points at the end of the semester. All grade concerns must be settled within one week of the return of the paper.

Calculators

One of the goals of the class is to learn how to use number theoretic tools to simplify or speed up calculations and algorithms that would otherwise be unwieldly to use. Since these applications involve the use of numbers larger than would be comfortable to work with in an exam setting, you will be allowed to use a non-programmable calculator on exams.

Course Evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Students with Learning Disabilities

Students requesting class and exam accommodations must first register with the Dean of Students Office Disability Resource Center (DRC), www.dso.ufl.edu/drc/. That office will provide a documentation letter via email to your instructor. This must be done as early as possible in the semester, **at least one week before the first exam**, so there is adequate time to make proper accommodations. I am fairly familiar with the DRC accomodation process, so please reach out to me if you had any specific questions about this.

Academic Honesty Guidelines

All students are required to abide by the Academic Honesty Guidelines which have been accepted by the University. The academic community of students and faculty at the University of Florida strives to develop, sustain and protect an environment of honesty, trust, and respect. Students are expected to pursue knowledge with integrity. Exhibiting honesty in academic pursuits and reporting violations of the Academic Honesty Guidelines will encourage others to act with integrity. Violations of the Academic Honesty Guidelines shall result in judicial action and a student being subject to the sanctions in paragraph XIV of the Student Code of Conduct. The conduct set forth hereinafter constitutes a violation of the Academic Honesty Guidelines (University of Florida Rule 6C1-4.017).

The Mathematics Department expects you to follow the Student Honor Code. We are bound by university policy to report any instance of suspected cheating to the proper authorities. You may find the Student Honor Code and read more about student rights and responsibilities concerning academic honesty at the link www.dso.ufl.edu/sccr/.

In addition, we remind you that lectures given in this class are the property of the University/faculty member and may not be taped without prior permission from the instructor and may not be used for any commercial purpose. Students found to be in violation may be subject to discipline under the Student Conduct Code.

Note: Information in this syllabus is subject to change. Any changes will be clearly announced in class or through e-mail.

Please see the last page for the tentative schedule for the course.

Tentative Schedule

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	July 3 Intro and Divisibility	July 4 Holiday - No Class	July 5 The Division Algorithm and GCD	July 6 GCD continued	July 7 Primes and Unique Factorization
2	July 10 Congruences	July 11 Linear Congruences in one variable	July 12 The Chinese Remainder Theorem	July 13 Wilson's Theorem	July 14 Fermat's Little Theorem and Euler's Theorem
3	July 17 Arithmetic Functions and Multiplicativity	July 18 $\phi(n)$	July 19 $\nu(n)$ and $\sigma(n)$	July 20 Review Day	July 21 Midterm 1
4	July 24 Mobius Inversion Formula	July 25 Quadratic Residues	July 26 The Legendre Symbol	July 27 Law of Quadratic Reciprocity	July 28 Linear Diophantine Equations
5	July 31 Simultaneous Linear Equations	August 1 Pythagorean Triples	August 2 The Order of an Integer; Primitive Roots	August 3 Primitive Roots for Prime Numbers	August 4 The Primitive Root Theorem
6	August 7 Partitions and Ferrers Graph	August 8 Cryptography; The RSA Encryption System	August 9 Review Day 2	August 10 Midterm 2	August 11 No class