Introduction to Number Theory
MAS 4203
Summer B 2024

Instructor:	Dr. John Streese
Office:	LIT 324
E-mail:	jstreese@ufl.edu
Office Hours (Start June 30):	Mondays 12:30pm - 1:45 pm Thursdays 11:00am - 12:15pm or by appointment
Lecture:	MTWRF, 2:00pm - 3:15pm
Classroom:	LIT 205

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 pythagorean triples and integer partitions as well.

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

1. Effectively communicate mathematical ideas.
2. Write a mathematical proof.
3. Know 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 Monday, July 21 during class. The second midterm exam will be on Thursday, August 7 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. You may use a non-programming scientific calculator for both exams. 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 Friday. There are **two exceptions** to this: During Week 1, Friday falls on a holiday, so the Week 1 homework is not due until Saturday, June 5. During Week 6, Week 6 Homework is due Friday, August 8. You are allowed and encouraged to discuss the assignments your classmates on the assignments. However, you are expected to 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. Week 6 Homework will also have extra credit questions available on the applications we cover during the last week of the course. **There are no homework drops.**

Late Homework Policy

Homework assignments are due 11:59pm Friday evenings (with the exception of homework 1 and 6, see the above explanation). Use the canvas due dates to guide you. For each day that a homework assignment is late, the assignment will accrue a 20 percent penalty. This penalty with accumulate up to three days, after which it is no longer accepted. Here are some concrete examples: If you assignment is submitted 5 hours late, a 20 percent penalty is applied. If your assignment is 37 hours late, you will receive a 40 percent penalty. If an assignment is over 3 days (72 hours) late, it will no longer be accepted.

Class Attendance

Very strongly encouraged, but is not mandatory. If a student exhibits excessive absences, they will have great difficult keeping up with the material. Not only do we cover material very quickly in Summer B, but I will commonly work through exercises that will be very helpful for your homework assignments and exams, so it is to your benefit to be present.

Excused absences

You must submit documentation through the UF DSO in order to reschedule an exam. For a list of other excused absences, please refer to UF's policy on excused absences here: UF's Excused absence policy. Homework assignments are available a week in advance, so generally excused absences only apply to exam dates.

Grading

Homework: 50%

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	June 30 Intro and Divisibility	July 1 The Division Algorithm and GCD	July 2 Euclidean Algorithm and Primes	July 3 Primes and Unique Factorization	July 4 Holiday - No Class
2	July 7 Congruences	July 8 Linear Congruences in one variable	July 9 The Chinese Remainder Theorem	July 10 Wilson's Theorem	July 11 Fermat's Little Theorem and Euler's Theorem
3	July 14 Arithmetic Functions and Multiplicativity	July 15 $\phi(n)$	July 16 $\nu(n)$ and $\sigma(n)$	July 17 Mobius Inversion Formula	July 18 Review Day
4	July 21 Midterm 1	July 22 Quadratic Residues	July 23 The Legendre Symbol	July 24 Law of Quadratic Reciprocity	July 25 The Order of an Integer; Primitive Roots
5	July 28 Primitive Roots for Prime Numbers	July 29 The Primitive Root Theorem	July 30 Diophantine Equations	July 31 Simultaneous Linear Equations	August 1 Pythagorean Triples and Intro to Fermat's Last Theorem
6	August 4 Partitions and Ferrers Graph	August 5 Continued Fractions	August 6 Review Day 2	August 7 Midterm 2	August 8 No class. HW 6 DUE (no late work accepted.)

GRADES DUE: AUGUST 11th