



FLORIDA ATLANTIC UNIVERSITY

MAS 3203-001 11366

Introductory Number Theory

Date: Wednesday, Friday 12:30 PM - 1:50 PM

Building: Sanson Life Sciences Bldg Boca **Room:** 179

3 Credit(s)

Spring 2025 - 1 Full Term

Instructor Information

Zvi Rosen

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Office: SE 224

Office Hours: Thursday 12 PM - 2 PM, (in person), or by appointment over Zoom via rosenz.youcanbook.me.

Course Description

Introductory Number Theory

The basic theory of divisibility and congruences. The theorems of Fermat, Euler and Wilson. Quadratic residues.

Honors Introductory Number Theory (Honors College [HC] version)

Prerequisite: MAC 2312 or MAC 2254

The basic theory of divisibility and congruences. The theorems of Fermat, Euler and Wilson. Quadratic residues.

Number theory studies the beautiful properties of the integers following the ingenuity of incredible mathematicians throughout the ages including Euclid, Fermat, Euler and Lagrange. In this course, we will explore some of the incredible basic results in number theory guided by the textbook *Elementary Number Theory* by David M. Burton. From the elegance of prime numbers and modular arithmetic to the intriguing questions around perfect numbers and Diophantine equations, we will sample a diverse

array of number theory results. By studying these concepts, we will develop a deeper appreciation for mathematical reasoning and practice our logical and scientific rigor.

Instructional Method

In-Person

Traditional concept of in person. Mandatory attendance is at the discretion of the instructor.

Required Texts/Materials

Elementary Number Theory

ISBN: 9781260625530

Publisher: McGraw-Hill

Edition: 7th

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Course Objectives/Student Learning Outcomes

By the end of the course, you will be able to:

1. Define divisibility, prime numbers, and greatest common divisors, and apply the Euclidean algorithm.
2. Perform calculations with modular arithmetic and solve linear congruences using the Chinese Remainder Theorem.
3. Compute and interpret number-theoretic functions such as Euler's phi function and the sum of divisors function.
4. Determine primitive roots, solve problems involving indices, and apply the Law of Quadratic Reciprocity.
5. Solve linear Diophantine equations, and find Pythagorean triples.

6. Identify properties of important sequences like Mersenne primes, perfect numbers, and Fermat primes.

Faculty Rights and Responsibilities

Florida Atlantic University respects the rights of instructors to teach and students to learn. Maintenance of these rights requires classroom conditions that do not impede their exercise. To ensure these rights, faculty members have the prerogative to:

- Establish and implement academic standards.
- Establish and enforce reasonable behavior standards in each class.
- Recommend disciplinary action for students whose behavior may be judged as disruptive under the Student Code of Conduct [University Regulation 4.007](#).

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Course Evaluation Method

Each in-class lesson consists of approximately 40 minutes of lecture followed by approximately 40 minutes of group work. Students will be given worksheets with applications and practical exercises related to the new material and will work through these exercises in small groups. Worksheets **MUST** be turned in at the end of each class. Students are expected to be present for the entire class to receive credit for the worksheet/homework (lecture and small group) and to engage with each other when working in small groups. Missing class or leaving early will result in a 0 for that worksheet.

Worksheet Assignments (total 25%):

During each lecture, students will receive a worksheet during the group work portion of class. Students will work together in groups of 3-4 to complete the worksheets. Worksheets are turned in at the end of each class, and will be graded for completion with effort. Missing class or leaving early will result in a 0 for that worksheet.

Reading Quizzes (total 10%):

Students will be assigned reading from our course textbook *Elementary Number Theory* by David M. Burton before each class. After completing the reading, you will take a multiple choice quiz on the Canvas site to confirm you have done so.

Research Presentation (total 15%):

At the end of the semester, two classes will be devoted to student presentations. The presentations will include 1-2 students, will last 15 minutes and will introduce some number theory topic not covered in the course. The first part of this assignment is a half-page writeup due February 28, describing the topic and the sources you will use to research it. The second part due March 28 is a full writeup of notes of what you would like to present. The final part is the actual delivery of the presentation which will be assigned semi-randomly on April 11 and April 18.

Mastery Exams (total 50%):

There will be six mastery exams over the course of the semester, plus one mastery exam during the final exam schedule. Each question will be aimed at demonstrating mastery of a skill on the list of "Mastery Question Types." For each question, you will receive a grade of M, mastered, P, progressing, or X, not assessable. These results will be recorded as 5, 1, or 0 respectively in your Canvas Gradebook. No books, notes, or calculators are allowed during the exams.

More details about the grading system will be given in a separate document. Your mastery exam grade will be the percentage of Mastery Topics that you have mastered by the end of the semester.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see [University Regulation 4.001](#).

Attendance Policy Statement

Students are expected to attend all their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal

obligations, or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances, and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Religious Accommodation Policy Statement

In accordance with the rules of the Florida Board of Education and Florida law, students have the right to reasonable accommodations from the University in order to observe religious practices and beliefs regarding admissions, registration, class attendance, and the scheduling of examinations and work assignments. University Regulation 2.007, Religious Observances, sets forth this policy for FAU and may be accessed on the FAU website at www.fau.edu/regulations.

Any student who feels aggrieved regarding religious accommodations may present a grievance to the executive director of The Office of Civil Rights and Title IX. Any such grievances will follow Florida Atlantic University's established grievance procedure regarding alleged discrimination.

Time Commitment Per Credit Hour

For traditionally delivered courses, not less than one (1) hour of classroom or direct faculty instruction each week for fifteen (15) weeks per Fall or Spring semester, and a minimum of two (2) hours of out-of-class student work for each credit hour. Equivalent time and effort are required for Summer Semesters, which usually have a shortened timeframe. Fully Online courses, hybrid, shortened, intensive format courses, and other non-traditional modes of delivery will demonstrate equivalent time and effort.

Course Grading Scale

Letter Grade	Percentage
A	100 - 94%
A-	< 94 - 90%
B+	< 90 - 87%
B	< 87 - 83%
B-	< 83 - 80%
C+	< 80 - 77%
C	< 77 - 73%
C-	< 73 - 70%

Letter Grade	Percentage
D+	< 70 - 67%
D	< 67 - 63%
D-	< 63 - 60%
F	< 60 - 0%

Tentative mastery exam (ME) dates

ME # 1 1/29/25

ME # 2 2/12/25

ME # 3 2/26/25

ME # 4 3/19/25

ME # 5 4/02/25

ME # 6 4/16/25

Final Exam 4/25/25, 10:30 AM - 1 PM

If the exam dates need to be moved, new dates will be announced during class and via Canvas Announcement.

Grade Distribution

In Class Worksheets	25%
Reading Quizzes	10%
Research Presentation	15%
Mastery Topics	50%

Grade Appeal Process

You may request a review of the final course grade when you believe that one of the following conditions apply:

- There was a computational or recording error in the grading.
- The grading process used non-academic criteria.
- There was a gross violation of the instructor's own grading system.

[University Regulation 4.002](#) of the University Regulations contains information on the grade appeals process

Policy on Make-up Tests, Late work, and Incompletes

Late Assignments Policy

Students are responsible for arranging to make up work missed due to a legitimate excuse, such as family funerals, military obligations, court-imposed legal obligations, religious observation, or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily within 48 hours. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence. Any excusable absence must be documented by a verifiable source, and the instructor must be notified AT LEAST ONE WEEK prior to the test date.

Exam Make-up Policy

If a student misses a test due to an emergency, the instructor must be notified WITHIN 24 HOURS after the test, and written verifiable documentation is required. Students will not be penalized for absences due to participation in University-approved activities provided they notify their instructor and make appropriate arrangements well in advance of any test. Similarly, reasonable accommodations will be made for students participating in a religious observance. Travel plans are NOT emergencies. Exams missed without approved documentation will receive a grade of 0 (zero).

Incomplete Grade Policy

The University policy states that a student who is passing a course but has not completed all work due to exceptional circumstances, may, with consent of the instructor, temporarily receive a grade of incomplete (I). The assignment of the I grade is at the discretion of the instructor but is allowed only if the student is passing the course.

Policy on the Recording of Lectures

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not

be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Artificial Intelligence Preamble

FAU recognizes the value of generative AI in facilitating learning. However, output generated by artificial intelligence (AI), such as written words, computations, code, artwork, images, music, etc., for example, is drawn from previously published materials and is not your own original work.

FAU students are not permitted to use AI for any course work unless explicitly allowed to do so by the instructor of the class for a specific assignment. [\[Policy 12.16 Artificial Intelligence\]](#)

Class policies related to AI use are decided by the individual faculty. Some faculty may permit the use of AI in some assignments but not others, and some faculty may prohibit the use of AI in their course entirely. In the case that an instructor permits the use of AI for some assignments, the assignment instructions will indicate when and how the use of AI is permitted in that specific assignment. It is the student's responsibility to comply with the instructor's expectations for each assignment in each course. When AI is authorized, the student is also responsible and accountable for the content of the work. AI may generate inaccurate, false, or exaggerated information. Users should approach any generated content with skepticism and review any information generated by AI before using generated content as-is.

If you are unclear about whether or not the use of AI is permitted, ask your instructor before starting the assignment.

Failure to comply with the requirements related to the use of AI may constitute a violation of the [Florida Atlantic Code of Academic Integrity, Regulation 4.001.](#)

Proper Citation: If the use of AI is permitted for a specific assignment, then use of the AI tool must be properly documented and cited. For more information on how to properly cite the use of AI tools, visit <https://fau.edu/ai/citation>

AI Language Specific To This Course

AI Prohibited: The use of AI to assist in any work assigned in this specific course is prohibited.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students

a range of services – individual therapy, group therapy, and crisis services, to name a few - offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>

Student Support Services and Online Resources

- [Center for Learning and Student Success \(CLASS\)](#)
- [Counseling and Psychological Services \(CAPS\)](#)
- [FAU Libraries](#)
- [Math Learning Center](#)
- [Office of Information Technology Helpdesk](#)
- [Center for Global Engagement](#)
- [Office of Undergraduate Research and Inquiry \(OURI\)](#)
- [Science Learning Center](#)
- [Speaking Center](#)
- [Student Accessibility Services](#)
- [Student Athlete Success Center \(SASC\)](#)
- [Testing and Certification](#)
- [Test Preparation](#)
- [University Academic Advising Services](#)
- [University Center for Excellence in Writing \(UCEW\)](#)
- [Writing Across the Curriculum \(WAC\)](#)

Course Topical Outline

Dates	Material Covered - Wednesday	Material Covered - Friday
Week 1: 1/6 – 1/10	1.1 - 1.3	2.1 - 2.2
Week 2: 1/13 – 1/17	2.3 - 2.4	3.1 - 3.3
Week 3: 1/20 – 1/24	4.1 - 4.2	4.3 - 4.4
Week 4: 1/27 – 1/31	ME #1	5.1 - 5.2
Week 5: 2/3 - 2/7	5.3 - 5.4	6.1
Week 6: 2/10 - 2/14	ME #2	6.2 - 6.4
Week 7: 2/17 - 2/21	7.1 - 7.2	7.3 - 7.4
Week 8: 2/24 - 2/28	ME #3	8.1 - 8.2
Week 9: 3/3 - 3/7	SPRING BREAK	

Week 10: 3/10 - 3/14	8.3 - 8.4	9.1 - 9.2
Week 11: 3/17 - 3/21	ME #4	9.3
Week 12: 3/24 - 3/28	9.4	11.1 - 11.2
Week 13: 3/31 - 4/4	ME #5	11.3 - 11.4
Week 14: 4/7 - 4/11	13.1 - 13.3	Research Presentations
Week 15: 4/14 - 4/18	ME #6	Research Presentations
Week 16: 4/21 - 4/25	Reading Day - no class	Final (ME #7)

Title IX Statement

In any case involving allegations of sexual misconduct, you are encouraged to report the matter to the University Title IX Coordinator in the Office of Civil Rights and Title IX (OCR9). If University faculty become aware of an allegation of sexual misconduct, they are expected to report it to OCR9. If a report is made, someone from OCR9 and/or Campus Victim Services will contact you to make you aware of available resources including support services, supportive measures, and the University's grievance procedures. More information, including contact information for OCR9, is available at <https://www.fau.edu/ocr9/title-ix/>. You may also contact Victim Services at victimservices@fau.edu or 561-297-0500 (ask to speak to an Advocate) or schedule an appointment with a counselor at Counseling and Psychological Services (CAPS) by calling 561-297-CAPS.