
MAS 4214: Elementary Number Theory

3 Credit Hours, Spring 2026

COURSE SYLLABUS

Instructor: Dr. Marie Meyer

Class Meetings: **Wednesdays** 5:00-7:45pm (CMC 109)

Office Hours: Tuesdays 1:30-2:30pm (CMC 110) & Wednesdays 2:30-4:30pm (in-person/online)

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I. Welcome to Elementary Number Theory

Number theory is one of the oldest branches of mathematics and is often called the “queen of mathematics” due to its elegance and depth. While number theory is rooted in pure mathematics, its applications are everywhere, from secure communication systems to error-correcting codes. In this course, we will develop a deep understanding of integers and their structure, learn to prove results rigorously, and appreciate the beauty and logic behind mathematical reasoning. By the end, you will not only master fundamental techniques but also see how number theory connects to real-world problems and advanced areas of mathematics.

II. University Course Description

Divisibility, prime numbers, Fundamental Theorem of Arithmetic, Diophantine equations, the algebra of congruencies, number functions and other selected topics.

III. Course Attributes

6AM - State Computation Requirement, 6AMT - Gordon Computation Requirement, 6AMT - State Computation Requirement.

IV. Course Prerequisites

MAC 2312 or MAC 2282 (minimum grade of C)

V. Course Format

This course meets Wednesday evenings from 5:00-7:45pm in a hybrid format, which means classes alternate between the modalities of in-person (MC 110) and online (Microsoft Teams) meetings. We will have a 10-minute break (roughly 6:20-6:30pm) each week. During every class I expect you to participate by being present, active note taking, collaborating on activities, working through exercises, as well as asking and answering questions. All exams and presentations will be conducted during our in-person class meetings.

VI. Course Objective

The primary goal of the course is to provide students in mathematical education with some elementary background in number theory. These notions strengthen the mathematical knowledge of future mathematics teachers in an important long-standing branch of mathematics.

VII. Student Learning Outcomes

By the end of this course, students will be able to:

- State and prove elementary properties on divisibility.
- Compute the GCD of two integers.
- Prove the uniqueness of the prime factorization of numbers.
- Decide if two numbers are congruent modulo m .
- Perform arithmetic operations (addition, multiplication, exponentiation) modulo m .
- Compute units modulo m .

VIII. Required Texts and/or Readings and Course Materials

We will use the open textbook *Elementary Number Theory* by Barrus and Clark. This is a FREE textbook found here: [Elementary Number Theory \(Barrus and Clark\) - Mathematics LibreTexts](#). Additional material is available on Canvas for you to use as reference or further exploration.

IX. How to Succeed in this Course

1. Show up to all class periods. Make this a habit.
2. Your job as a student of mathematics is to ask questions. This can be difficult, but it is an important skill that will serve you well. Use this class as a safe place to practice. Any question you ask will only ever improve my opinion of you.
3. Think critically! Don't believe something just because I tell you it's true. Always ask yourself if you have good reason to believe it.
4. Do not be discouraged if you don't get something the first, second, or even third time. Most of us didn't either. Mathematics is a habit of thought, and it takes time to develop this habit. Focus on understanding and appreciating the material, and everything else will fall into place.
5. Do all the homework as soon as possible and keep up with the course content.
6. Form a study group. We will do some group work in class. There is no reason you can't continue to work together outside of the classroom.
7. Make a reasonable study plan based on your schedule and stick to it.
8. Come to my office hours. Ask me for help. I want you to succeed!

X. Academic Continuity

During any semester, there is a possibility this course may be disrupted. In the case that USF transitions to remote instruction, I will send an announcement on Canvas with instructions.

XI. Email Communication

The best way to reach me outside of class (besides attending office hours) is through email. I generally check emails during business hours and will try to respond to your message within 48 business hours.

A	93 – 100%	A-	90 – 92%
B+	87 – 89%	B	83 – 86%
B-	80 – 82%	C+	77 – 79%
C	73 – 76%	C-	70 – 72%
D+	67 – 69%	D	63 – 66%
D-	60 – 62%	F	0 – 59%

Grading Scale

XII. Grade Categories and Weights

Below is the breakdown of your course grade. Note this as well as any other part of the syllabus is subject to change and in that case you will be notified both in class and on Canvas.

Graded Items	Percent of Final Grade
Homework	25%
Class Presentations	5%
Attendance & Participation	10%
Final Group Presentation	20%
Exams	40%

Homework

Learning mathematics requires regular practice. By the end of each class day, I will post homework that will consist of reading, exercises from the textbook, and additional problems to be completed outside of class. Some problems will be eligible for *Class Presentations*. Homework will be graded for both completion and accuracy with solutions posted on Canvas after presentations.

Class Presentations

In the beginning of in-person class time, students will be presenting designated homework exercises. Though the atmosphere in this class should be informal and friendly, the presentations made by students are to be taken seriously since they are meant to facilitate learning. Here are some of my expectations:

- The purpose of a class presentation is to make the solution clear to the other students. It is not to prove the presenter has solved the problem.
- Presenters should explain their reasoning as they go along, not simply write everything down and then turn to explain.
- Fellow students are allowed to ask questions at any point, and it is the responsibility of the person presenting to answer those questions to the best of his or her ability.
- Since the presentation is directed at the students, the presenter should frequently make eye-contact with the students to address questions when they arise and be able to see how well the other students are following the presentation.

Class presentations will be graded using the following rubric.

Grade	Criteria
4	Completely correct and clear solution/explanation.
3	Solution/proof has minor technical flaws, some unclear language, or lacking some details. Essentially correct.
2	A partial explanation or solution is provided but a significant gap still exists.
1	Minimal progress has been made that includes relevant information and could lead to a solution/proof.
0	You were completely unprepared.

However, you should not let the rubric deter you from presenting if you have an idea about a solution/proof that you'd like to present, but you are worried that your solution/proof is incomplete or incorrect. You will be rewarded for being courageous and sharing your creative ideas! Yet, you should not come to the board to present unless you have spent time thinking about the problem and have something meaningful to contribute.

Each student must present two times during the semester. I will post an ongoing sign-up sheet on Canvas for student presenters. If there are no volunteers, I will assign student presentations. If more than one student volunteers, the student with the fewest number of presentations has priority. Each student in the audience is expected to be engaged and respectful during another student's presentation.

Attendance & Participation

Class attendance is considered mandatory and contributes 5% of the overall course grade. Attendance is tracked through Canvas's grading system, and students must be present the entire class period to receive credit. A student's first absence will not incur a point deduction. Beyond that, please contact me if you have any circumstances that prevent you from attending class. Since this course only meets once per week, missing more than a couple of classes will have a negative impact on your grade. The other 5% from this category will come from the work you complete during class. Often there will be class time designated for an activity or worksheet to be completed in groups, and I will collect your work on Canvas (or check it in-person) for a grade.

Final Group Presentation

Towards the end of the course, you will select a topic that relates to the content of this course. You will work with a group of 3-4 classmates to prepare a 25 minute presentation to be given during our final exam timeslot. You may use the whiteboard, slides, or any other medium you desire, as long as you can effectively use it to communicate your topic. I will provide presentation prompts, but you are welcome to come up with your own topic with permission.

Exams

There will be 3 exams throughout the semester. All exams will be completed in-person during class time during the first hour of class. There will be no make-up exams administered unless proper documentation is provided for an excused absence. The tentative dates for exams are found on the Course Schedule. If these dates change, you will be notified both in class and on Canvas at least one week in advance.

XIV. USF Core Syllabus Policies

USF has a set of central policies related to student recording class sessions, academic integrity and grievances, student accessibility services, academic disruption, religious observances, academic continuity, food insecurity, pregnancy and related conditions, and sexual harassment that **apply to all courses at USF**. Be sure to review these online: usf.edu/provost/faculty-success/resources-policies-forms/core-syllabus-policy-statements.aspx

XV. Course Schedule.

A tentative class schedule is included on the next page. Please consult Canvas for an up-to-date version.

Tentative Course Schedule (subject to change)

Week	Date	Topics
1	Jan 14	1. What is Number Theory 2. Basic Axioms of Integers
2	Jan 21 online	3. Proof by Induction 4. Elementary Divisibility Properties 5. The Division Algorithm
3	Jan 28	6. The Base b Representation of n 7. Greatest Common Divisor and Least Common Multiple 8. The Euclidean Algorithm
4	Feb 4 online	9. Exam 1 Review 10. Bezout's Lemma Computing Coefficients for Bezout's Lemma
5	Feb 11	11. Exam 1 Prime Numbers 1.12 Unique Factorization
6	Feb 18 online	13. The Gaussian Integers 1.14 Fermat Primes and Mersenne Primes 1.15 Number Theoretic Functions
7	Feb 25	1.16 Perfect Numbers and Mersenne Primes 1.17 Congruences
8	Mar 4 online	Exam 2 Review 1.18 Divisibility Tests for 2, 3, 5, 9, 11 1.19 Divisibility Tests for 7 and 13
9	Mar 11	Exam 2 1.20 More Properties of Congruences
Break	Mar 18	Spring Break – No Class
10	Mar 25	1.21: Residue Classes and the Integers Modulo m 1.22: The Groups U_m
11	Apr 1 online	1.23: Chinese Remainder Theorem 1.24: Theorems of Wilson, Euler, and Fermat
12	Apr 8	1.25: Primality Tests 1.26: Computation of $a^n \bmod m$
13	Apr 15 online	Exam 3 Review 1.27: The RSA Scheme

14	Apr 22	Exam 3 Work on Presentations
15	Apr 29 online	1.28: Sum of Squares or Other Bonus Topics Work on Presentations
16	May 6 5:30-7:30pm	Final Group Presentations

*** Note: The Schedule is subject to revision. See Canvas for the updated version.**

XVI. Course Policies: Grades

Late Work Policy: There are no exam make-ups unless proper documentation is provided to demonstrate an excused absence.

Medical Excuses: Students should not attend class if they are ill, particularly if they have fever and/or gastrointestinal symptoms and/or respiratory symptoms such as a sneezing, runny nose, sore throat or coughing. Students experiencing any of these symptoms should contact immediately the Student Health Services (813-974-2331) on the Sarasota-Mantatee and Tampa campus or the Wellness Center (727-873-4422) on the St. Petersburg campus for appropriate medical guidance and to obtain a verification of care letter. Students may turn to other health providers as well. **To be approved for missed classes, late assignments or missed examinations a verification of care letter must be presented by the student to the faculty member upon return to class.**

Grades of "Incomplete": The current university policy concerning incomplete grades will be followed in this course.

For undergraduate courses: An "I" grade may be awarded to a student only when a small portion of the student's work is incomplete and only when the student is otherwise earning a passing grade. The time limit for removing the "I" is to be set by the instructor of the course. For undergraduate students, this time limit may not exceed two academic semesters, whether or not the student is in residence, and/or graduation, whichever comes first. For graduate students, this time limit may not exceed one academic semester. "I" grades not removed by the end of the time limit will be changed to "IF" or "IU," whichever is appropriate.

Attendance Policy: Students are expected to attend classes. Faculty must inform students of attendance requirements on syllabi. Instructors should accommodate excused absences by making arrangements with students ahead of time (when possible) or by providing a reasonable amount of time to make up missed work.

Make-up Exams Policy: If a student cannot be present for an examination for a valid reason (validity to be determined by the instructor), a make-up exam will be given only if the student has notified the instructor in advance that they cannot be present for the exam.

Artificial Intelligence Policy: The use of Artificial Intelligence (AI) tools like ChatGPT is strictly prohibited for completing your graded assignments, quizzes, and exams in this course. Any attempt to use AI to generate solutions without proper attribution or understanding of the underlying mathematical concepts will be considered a violation of academic integrity and will result in a 0 for the assignment as well as further disciplinary action.

XVII. Course Policies: Technology and Media

Canvas: This course will be offered via USF's learning management system (LMS), Canvas. If you need help learning how to perform various tasks related to this course or other courses being offered in Canvas, please view the following videos or consult the Canvas help guides. You may also contact USF's IT department at (813) 974-1222 or help@usf.edu.

Recordings: In the case of unexpected university closure, there may be an online class session that will be recorded using Microsoft Teams. As a student in this class, your participation in live class discussions will be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Please discuss this option with your instructor.

WhatsApp, GroupMe, and Student-to-Student Communication:

While students may use digital communication tools (WhatsApp, GroupMe, etc.) to communicate with fellow students, it is important to remember that academic integrity policies still apply in these environments. Informing others about the contents of tests is prohibited by [the official regulation](#), as is receiving unauthorized information about an examination. Students are expected and required to immediately report instances of such violations to the instructor.

Phone Usage: As a sign of respect to the instructor and your fellow peers, cell phones and other electronic devices should be set to silent and should not disrupt class in any fashion. If you have a special circumstance, please let me know and an exception can be made.

Classroom Response Clickers: There may be clicker questions that require response via phone.

XVIII. Course Policies: Student Expectations

Health and Wellness: Your health is a priority at the University of South Florida. We encourage members of our community to look out for each other and to reach out for help if someone is in need. If you or someone you know is in distress, please make a referral at www.usf.edu/sos so that the Student Outreach & Support can contact and provide helpful resources to the student in distress. A 24-hour licensed mental healthcare professional, offered through the counseling center, is available by phone at 813-974-2831, option 3. Please remember that asking for help is a sign of strength. In case of emergency, please dial 9-1-1.

Title IX Policy: USF is committed to fostering a safe and respectful learning environment, free from sex discrimination and sexual harassment, in accordance with Title IX and [USF Policy 0-004](#). If a student shares an experience of sexual harassment, sexual assault, stalking, or relationship violence with a USF employee (including faculty), that employee will notify the Title IX Office. This allows the Title IX Office to send the student an email with information about support resources and options—if it is safe to do so. Students are not required to respond to this email. The Title IX Office is a private resource. Information is shared only on a need-to-know basis to provide students with support measures. To speak to a confidential resource, students may contact [USF Center for Victim Advocacy](#) at 813-974-5757. Confidential resources do not notify the Title IX Office unless the student requests it. For more information about Title IX, available resources, or to make a report, please visit www.usf.edu/title-ix.

Generative AI: The framework below acknowledges the growing presence of AI in education but reflects a course policy that does not permit the use of generative AI tools.

1. **Definition of Generative AI Tools:** Generative AI tools refer to software or applications powered by artificial intelligence that produce original content, including but not limited to text, images, music, data analysis, and code. Examples include ChatGPT, Claude, Gemini, DALL-E, GitHub Copilot, and AI-based summarizers or paraphraser.
2. **Prohibited Use:** Use of generative AI tools is not permitted for any coursework in this class. This includes all assignments, exams, or any other graded component. Students are expected to complete all work independently, without the aid of AI-generated content.
3. **Student Responsibility:** Students are responsible for submitting work that reflects their own original effort. Use of AI-generated content, even in part, is considered a violation of this policy unless explicitly authorized. Students must not use AI tools to generate, rewrite, translate, summarize, or enhance their assignments.
4. **Violation Consequences:** Use of AI tools in violation of this policy will be treated as a breach of academic integrity under USF Regulation 3.027. Consequences may include assignment failure, course grade penalties, or further disciplinary action depending on the severity of the offense.
5. **Exceptions:** If any future assignments allow limited or guided AI use, explicit permission will be provided in the assignment instructions. In the absence of such permission, students should assume that AI use is not allowed.
6. **Questions and Clarifications:** Students who are unsure whether a tool or method violates this policy should consult the instructor before using it. Uncertainty is not an excuse for academic misconduct.

Course Hero / Chegg Policy: The [USF Policy on Academic Integrity](#) specifies that students may not use websites that enable cheating, such as by uploading or downloading material for this purpose. This does apply specifically to Chegg.com and CourseHero.com – almost any use of these websites (including uploading proprietary materials) constitutes a violation of the academic integrity policy.

Professionalism Policy: Per university policy and classroom etiquette; mobile phones, iPods, etc. **must be silenced** during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, etc., and have been warned may suffer a reduction in their final class grade.

Netiquette Guidelines

1. Act professionally in the way you communicate. Treat your instructors and peers with respect, the same way you would do in a face-to-face environment. Respect other people's ideas and be constructive when explaining your views about points you may not agree with.
2. Be sensitive. Be respectful and sensitive when sharing your ideas and opinions. There will be people in your class with different linguistic backgrounds, political and religious beliefs or other general differences.
3. Proofread and check spelling. Doing this before sending an email or posting a thread on a discussion board will allow you to make sure your message is clear and thoughtful. Avoid the use of all capital letters, it can be perceived as if you are shouting, and it is more difficult to read.
4. Keep your communications focused and stay on topic. Complete your ideas before changing the subject. By keeping the message on focus you allow the readers to easily get your idea or answers they are looking for.
5. Be clear with your message. Avoid using humor or sarcasm. Since people can't see your expressions or hear your tone of voice, meaning can be misinterpreted.

End of Semester Student Evaluations: All classes at USF make use of an online system for students to provide feedback to the University regarding the course. These surveys will be made available at the end of the semester, and the University will notify you by email when the response window opens. Your participation is highly encouraged and valued.

Food and Drink Policy: Please adhere to the firm policy of no beverages (other than bottled/capped water), food, tobacco products, or like items in the classroom. Your understanding of the necessity for this policy and cooperation will be greatly appreciated. This policy will be strictly enforced.

XIX. Learning Support and Campus Offices

Academic Accommodations

Students with disabilities are responsible for registering with Student Accessibility Services (SAS) in order to receive academic accommodations. For additional information about academic accommodations and resources, you can visit the SAS website.

[SAS website for the Tampa and Sarasota-Manatee campuses.](#)

[SAS website for the St. Pete campus.](#)

Academic Support Services

The USF Office of Student Success coordinates and promotes university-wide efforts to enhance undergraduate and graduate student success. For a comprehensive list of academic support services available to all USF students, please visit the [Office of Student Success website.](#)

Canvas Technical Support

If you have technical difficulties in Canvas, you can find access to the Canvas guides and video resources in the “Canvas Help” page on the homepage of your Canvas course. You can also contact the help desk by calling 813-974-1222 in Tampa or emailing help@usf.edu.

[IT website for the Tampa campus.](#)

[IT website for the St. Pete campus.](#)

[IT website for the Sarasota-Manatee campus.](#)

Center for Victim Advocacy

The [Center for Victim Advocacy](#) empowers survivors of crime, violence, or abuse by promoting the restoration of decision making, by advocating for their rights, and by offering support and resources. Contact information is available online.

Counseling Center

The Counseling Center promotes the wellbeing of the campus community by providing culturally sensitive counseling, consultation, prevention, and training that enhances student academic and personal success. Contact information is available online.

[Counseling Center website for the Tampa campus.](#)

[Counseling Center website for the St. Pete campus.](#)

[Counseling Center website for the Sarasota-Manatee campus.](#)

Tutoring

The Tutoring Hub offers free tutoring in several subjects to USF undergraduates. Appointments are recommended, but not required. For more information, email

asctampa@usf.edu.

[Tutoring website for the Tampa campus.](#)

XX. Important Dates to Remember

All the dates and assignments are tentative and can be changed at the discretion of the professor.
For important USF dates, see the [Academic Calendar](http://www.usf.edu/registrar/calendars/) at <http://www.usf.edu/registrar/calendars/>