

SYLLABUS:
MATH 4573, ELEMENTARY NUMBER THEORY
(SPRING 2026)

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1. INSTRUCTOR DETAILS

1. **Instructor:** Tyler Genao
2. **Class section:** 25428
3. **Classroom and times:**
 - Baker Systems 394
 - Monday, Wednesday and Friday, 11:30 AM - 12:25 PM
4. **Email:** genao.5@osu.edu
5. **Office:** MW 746 (Mathematics Tower)
6. **Office hours:** times to be listed on Carmen.

2. COURSE DESCRIPTION

Number theory is often referred to as the “Queen of Mathematics,” since it champions connections to many other areas of mathematics. It has a worldly history spanning several thousand years. In this class, we will learn the foundations of number theory, called **elementary number theory**. We will learn about integer divisibility, modular arithmetic, basic abstract algebra, quadratic reciprocity and Diophantine equations. This will end with us spending a few weeks on *elliptic curves*, which have a rich historical context in studying Diophantine equations, as well as applications in modern cryptography. We will also learn how to perform calculations in elementary number theory with *computer algebra systems*.

2.1. Textbook. There will be no required textbook for this class. Instead, I will post my own notes to Carmen. These notes will closely follow *An Introduction to the Theory of Numbers, 5th edition*, by Niven, Zuckerman and Montgomery. Feel free to print these notes and take them to class to annotate. My hope is that this will make it easier for you to keep up with the lectures, and help you participate in working through examples in class with me.

2.2. Computations. One goal of this class is to learn how to perform calculations pertinent to elementary number theory, using a *computer algebra system*, or *CAS* for short. Such CAS have widespread use in mathematical research, particularly in experimentation and pattern spotting towards conjectures; they can also be used to verify the (non)existence of certain numbers/points/algebraic objects. Using a CAS gives easy access to a large library of useful mathematical functions.

To uniformize this course, we will stick to using the CAS called **SageMath**, also just called **Sage**. This is a free, open source CAS with a syntax similar to Python's. A browser version is available [here](#), with instructions to install a version on your computer [here](#). A tutorial on basic arithmetic with **SageMath** can be found [here](#).

2.3. Prerequisite. A grade of C- or above in 3345 or 4181H, or credit for 264H or 345. Not open to students with credit for 5576H or 573.

3. CLASS CALENDAR

The following is a calendar for the semester, with later topics being tentative. The section numbering follows our notes, which mostly follows Niven, Zuckerman and Montgomery. Any section italicized is either not in the textbook, or differs significantly from the corresponding textbook section.

Week	Sections	Major Assignments/Deadlines
January 12 – 16	Introduction, 1.1, 1.2, 1.3	Initial Survey, Syllabus Quiz (Fri)
January 21 – 23	1.3, 1.4, <i>1.5</i> (SageMath demo)	HW 1
January 26 – 28	2.1, 2.2, 2.3	HW 2 (Prerecorded lecture for Friday)
February 2 – 6	2.3, 2.6	HW 3
February 9 – 13	2.7, 2.10, 2.11	HW 4
February 16 – 20	2.11, 2.8	HW 5
February 23 – 27	Midterm review, 3.1	Midterm (Wed)
March 2 – 6	3.1, 3.2, 3.3, <i>5.0</i> , 5.1	HW 6
March 9	5.1, 5.3	HW 7 (Prerecorded lecture for Wed.)
March 16 – 20	No class (Spring break)	
March 23 – 27	5.6	HW 8
March 30 – April 3	5.6, <i>5.7</i>	
April 6 – 10	<i>5.7</i> , <i>5.8</i>	HW 9
April 13 – 17	<i>5.8</i>	HW 10
April 20 – 24		Class presentations (Mon - Fri)
April 27	Final exam review	
May 1		Final exam

4. ASSESSMENTS

The following table is a breakdown of the grading categories for this class.

Assessment	Percentage
Homework	40%
Midterm Exam	20%
Final Exam	20%
Class Presentation	15%
Class Participation	5%

We will follow the standard university grading scheme:

$\geq 93-100$	$\geq 90-93$	$\geq 87-90$	$\geq 83-87$	$\geq 80-83$	$\geq 77-80$	$\geq 73-77$	$\geq 70-73$	$\geq 67-70$	$\geq 60-67$	< 60
A	A-	B+	B	B-	C+	C	C-	D+	D	E

Once a homework or exam grade is posted on both Gradescope and Carmen, **you have exactly 1 week from the posting date** to contact me about possible errors in grading, so please make sure to review your graded work as soon as you get it back.

4.1. Homework. There will be 10 homework assignments in this class, due on select Fridays. Your average HW score is worth 40% of your final grade. **Late assignments**

will not be accepted. However, I will drop your lowest HW grade from your HW average automatically, to allow for exceptional circumstances.

Here are some things you should know about the homework assignments:

1. Homework must be submitted through Gradescope. Each assignment submission must follow Gradescope formatting guidelines. If your HW isn't submitted properly, parts of it might not be graded. There will be an optional assignment on Gradescope in the first week of classes, where you can test out the uploading process.
2. You will have at least one week to work on each homework. When a HW is assigned, there will be a Carmen post about it, so please turn on Carmen notifications for this class, or just keep a close eye on Carmen around each Friday afternoon.
3. Homework submissions must be done individually. You are encouraged to talk to me or other students about the HW, but your final write-up must be your own.
4. Each homework will have a 'consulted with' section, worth a point. If you consulted with me, your classmates or other sources besides class notes while doing your HW, you are required to write it down.
5. Mathematics is not just about getting the correct answers, but also about convincing others that your answer is correct. Writing good proofs is necessary in this class to succeed. In particular, **insufficiently supported answers or proofs may receive little to no credit on homework and exams.**
6. The use of AI tools is not allowed for this class. More details on this later in the syllabus.

The goal of each homework assignment is to help you understand and explore the class material. Thus, it is imperative that you start working on the HW as soon as you can. You should take some time to work through problems yourself before seeking help from other sources, even if you're stuck – this is a **crucial** part to retaining mathematics that you have practiced! It is not enough to just listen to someone tell you about math.

4.1.1. *LaTeX*. LaTeX is a high-quality typesetting system used by mathematicians and scientists to write papers. It is available free to download [here](#), or can also be used online for free through [Overleaf](#). It is **strongly recommended** that you typeset your homework on LaTeX; you can earn +3 extra credit points on each submitted HW for which you do this. I will also allow you to earn extra credit if you instead submit a PDF made with Microsoft Word, for example.

If you are trying to write your HW in LaTeX but do not know the command for a particular math symbol, the [Detexify](#) website can help you find it.

4.2. **Exams.** There will be one midterm and one final exam. Each exam is worth 20% of your final grade.

The midterm exam will be 50 minutes long, closed book, closed notes and proctored in class. It will be on **Wednesday, February 25**.

The final exam will be 60 minutes long, closed book, closed notes and proctored in the same room as lecture. It will be on **Friday, May 1** (we have the usual classroom from 12 - 1:45 PM on that day).

4.3. Class Presentation. Separate from the midterm and final exam, we will have class presentations near the end of the semester. These will be 20–25 minutes in length, discussing a topic that is related to our class but has not been covered by lecture. We will have three or four class sessions dedicated to presentations. Closer to Spring break, I will release a list of topics you can choose from for your presentation. You will have approximately three weeks to work on it, and can present in pairs for your presentation (I recommend this!).

4.4. Class Participation. Your class participation grade breaks down as follows.

Part	Percentage
Online Syllabus Quiz	1%
Initial Survey	1%
General class engagement	3%

4.4.1. Syllabus Quiz. This is a quiz available on Carmen which is due by **11:59 PM on Friday, January 16**. This quiz asks you general questions about our syllabus, to make sure you are acquainted with class policies. You can refer to the syllabus while taking it.

4.4.2. Initial Survey. This is an assignment available on Carmen which is also due by **11:59 PM on Friday, January 16**. The goal of this survey is for me to get to know you better; it is graded on completion.

4.4.3. General Class Engagement. In this class, you are expected to show up to and participate in lecture. This class will be a lot more interesting and enjoyable if you do this, and you will better retain the course content.

4.5. Discord. In the first week, I will set up a Discord channel for this course. In it, you can ask questions about course content and related topics. I will respond to questions in a timely manner, but other students *can* and *should* respond to student questions, too! Students can also ask for small hints to HW problems, but if you already know the answer to a problem, please try not to spoil too much. It is my hope that we can use this channel productively to encourage learning.

4.6. Make-Up Policy. Makeup exams will be available for students with a proper excuse, such as a hospitalization. In this case, it is necessary to contact me as soon as possible to obtain permission to receive a make-up exam, ideally before the exam. Documentation will also be necessary.

Late homework will not be accepted; instead, **your lowest HW grade will be dropped** to help with emergency situations.

5. EXPECTATIONS

5.1. Academic Expectations. According to the university, each credit hour for a class equates to 3 hours of your time each week (including class hours). As such, you are expected to spend at least 6 hours outside of lecture each week working on assignments and reviewing class material. While attending office hours are not mandatory, I strongly encourage it.

5.2. Academic Honesty. Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research and other educational and scholarly activities. Thus, the Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute Academic Misconduct.

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: Any activity that tends to compromise the academic integrity of the University or subvert the educational process. Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an excuse for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, by my job I am **required** by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me. For more information, see the Code of Student Contact: <https://studentconduct.osu.edu/>.

5.3. AI Policy. All students have important obligations under the Code of Student Conduct to complete all academic and scholarly activities with fairness and honesty. Our professional students also have the responsibility to uphold the professional and ethical standards found in their respective academic honor codes. Specifically, students are not to use "unauthorized assistance in the laboratory, on field work, in scholarship or on a course assignment" unless such assistance has been authorized specifically by the course instructor. In addition, students are not to submit their work without acknowledging any word-for-word use and/or paraphrasing of writing, ideas or other work that is not their own. These requirements apply to all students – undergraduate, graduate and professional.

To maintain a culture of integrity and respect, these generative AI tools should not be used in the completion of assignments for this course.

6. ADDITIONAL STATEMENTS AND RESOURCES

6.1. Disability Statement. The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If students anticipate or experience academic barriers based on a disability (including mental health and medical conditions, whether chronic or temporary), they should let their instructor know immediately so that they can privately discuss options. Students do not need to disclose specific information about a disability to faculty. To establish reasonable accommodations, students may be asked to register with Student Life Disability Services. After registration, students should make arrangements with their instructors as soon as possible to discuss their accommodations so that accommodations may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu.

6.2. Religious Accommodations. Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Civil Rights Compliance Office.

6.3. Creating an Environment Free from Harassment, Discrimination and Sexual Misconduct. The Ohio State University is committed to building and maintaining a welcoming community. All Buckeyes have the right to be free from harassment, discrimination and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy or recovery therefrom), race, religion, sex, sexual orientation or protected veteran status, or any other bases under the law, in its activities, academic programs, admission and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking and sexual exploitation.

To report harassment, discrimination, sexual misconduct or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Civil Rights Compliance Office (CRCO), via: online reporting form: <http://civilrights.osu.edu/>; phone number 614-247-5838 or TTY 614-688-8605; or email civilrights@osu.edu.

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment and remedying its discriminatory effects. All university employees have reporting responsibilities to the Civil Rights Compliance Office to ensure the university can take appropriate action.

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. any human resource professional (HRP); 2. anyone who supervises faculty, staff, students or volunteers; 3. chair/director; and 4. faculty member.

6.4. Mental Health. As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th floor of the Younkin Success Center and 10th floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.