MTH 301 - Fall 2020
Introduction to Number Theory
Course Syllabus

Course information

Room: https://csuohio.zoom.us/j/98640524392?pwd=dVljTXV2QjRPU0tjTWJUcVpiOENZZz09

Time: MWF 9:10 - 10:00 am

Credits: 3.0

Prerequisites: A grade of C or better in MTH 220, or permission of the instructor.

Description: This course is an introduction to elementary number theory. One of the main driving questions for this course is: how can we find integer solutions of an algebraic equation with integer coefficients? This will motivate the study of several topics including: properties of integers (e.g. divisibility, greatest common divisors, primes, factorizations), modular arithmetic (e.g. linear congruences, Chinese remainder theorem), and quadratic equations (e.g. Legendre symbols, quadratic reciprocity).

Learning outcomes: Successful MTH 301 students will be able to:

- define and recognize properties of integers and modular integers, and correctly compute with those number systems;
- solve linear Diophantine equations, and linear and quadratic congruences;
- state and prove foundational results of elementary number theory.

Online resources: Visit Blackboard for up-to-date information about this course.

Instructor

Name: Federico Galetto (he/him/his; I/me/the instructor, in this document)

E-mail: f.galetto@csuohio.edu

Office hours: Schedule an appointment at https://math.galetto.org/appt

Materials

Notes and other materials will be distributed online. All course materials are copyrighted and cannot be distributed without the permission of the authors.
The following textbooks will be used, the first one is required.

Required textbook:
- Martin H. Weissman, *An Illustrated Theory of Numbers*, AMS, 978-1-4704-3493-9

Secondary textbook:
- Karl-Dieter Crisman, *Number Theory: In Context and Interactive*, Available at http://math.gordon.edu/ntic.

In addition, as this course is delivered remotely, the following equipment is required:
- a computer (Windows or Mac);
- a webcam;
- and a microphone.

Cleveland State University might be able to provide access to some of this equipment. For availability, contact Campus411 All-in-1 or Information Services and Technology. You may also contact your academic advisor for assistance.

Grading

Standards based grading: In order to succeed in this course, you will need to demonstrate competency in several standards. You will be provided with a separate document containing a list of standards and a detailed rubric. Each attempt at showing competency in a certain standard will receive one of the following evaluations: Exceeds expectations (E), Meets expectations (M), Some progress (S), or Little progress (L).

Your letter grade will be assigned as follows.

- If you exceed expectations on at least 90% of the standards and meet expectations on the rest, then you are in the A range.
- If you meet expectations on at least 80% of the standards and show some progress on the rest, then you are in the B range.
- If you show some progress on at least 70% of the standards but show little progress on the rest, then you are in the C range.
- If you show some progress on at least 60% of the standards but show little progress on the rest, then you are in the D range.
- If you show some progress on less than 60% of the standards, then your grade will be F.

Plus and minus grades will be computed proportionally according to the following scheme.

A	93%-100%	B	83%-86%	C	70%-75%
A-	90%-92%	B-	80%-82%	D	60%-69%
B+	87%-89%	C+	76%-79%	F	0%-59%

For example, suppose there is a total of 50 standards. If you meet (or exceed) expectations on 40 of them and show progress on the remaining 10, then your grade will be B-. If you meet (or exceed) expectations on 43 of them and show progress on the remaining 7, then your grade will be B. If you meet (or exceed) expectations on 47 of them and show progress on the remaining 3, then your grade will be B+.

Exams: There are no formal tests or exams in this course. The time designated by the registrar's office for the final exam:

- Friday, December 11, 2020, 8:00 - 10:00 am,

will be used for further standards testing.

Participation: Active participation is encouraged and can contribute positively to your grade. Such participation includes asking good questions during class, answering questions in class, contributing to class discussions and activities, etc.

Feedback: Feedback on your work will be provided using the comments and feedback tools on Blackboard. Turnaround time for grading will be communicated in class.

Grade appeal: You are responsible for checking feedback on your work, and for ensuring evaluations are reported correctly on Blackboard. Any appeal request must be submitted within one week after a score is posted.

Policies

Online conduct: The following is expected during all our Zoom meetings.

- All class meetings on Zoom are recorded by the faculty host. Recordings will be made available to students enrolled in the class for later viewing.

- You need to log into Zoom with your CSU account. You may sign into your account at https://csuohio.zoom.us/.
- Your Zoom profile needs to include your preferred first name and your last name. You should also upload a picture of yourself to your profile. You can enter this information on the profile page of your account, after signing in.
- Your audio should be muted at all times to avoid ambient noise and feedback from your speakers. You may unmute yourself if you have a question.
- You may also ask questions using the Zoom chat function. All chats will be saved (including private chats).
- Class attendance may be taken via built-in Zoom features (such as attendance tracking, polls, etc.).
- Students are not permitted to record or share the contents of the Zoom meetings. Any attempt to do so will be considered a violation of the Student Code of Conduct.
- Please do not share the information on how to access this class with any unauthorized persons. An unauthorized person includes anyone not registered for the class. CSU staff providing academic or technical support, or those providing an approved accommodation to the student are considered authorized persons.

Communication: All communication, outside of class meetings, will be conducted via email. You can reach me at f.galetto@csuohio.edu. I strongly recommend using your CSU email account, as email from other accounts is often marked as spam. You can usually expect to receive an answer from me within 24 hours Monday through Friday, or within 48 hours during the weekends.

Attendance: You are expected to attend all classes. If you are unable to attend a class, it is your responsibility to notify your instructor in advance and to inquire about any topics covered and announcements made during that class.

Electronic devices: The use of electronic devices such as (but not limited to) phones, smartwatches, computers, tablets, and headphones is prohibited during class, unless otherwise required (e.g. to connect to a Zoom meeting) or indicated by the instructor.

Excused absences: You may only be excused from class and class related activities in case of university sanctioned activities (such as conferences, competitions, etc.) or in case of medical conditions. With the exception of unforeseen medical emergencies, you must notify your instructor of your absence and present sufficient documentation in advance. Sufficient documentation includes an invitation to attend an event or a doctor's note indicating you cannot attend on the scheduled date.

Extra credit and makeups: There is no extra credit in this class. There are no makeups in this class other than for excused absences. Insofar as circumstances allow, all makeups have to be arranged in advance.

Academic integrity: Cheating and/or plagiarism will not be tolerated. Cheating includes copying or receiving help from another student on quizzes, tests or exams, as well as allowing another student to copy from your work. Receiving help from someone else by using an electronic device such as a mobile phone or a smartwatch constitutes cheating. Copying another student's homework, or allowing someone else to do your homework for you, is also considered cheating. If cheating occurs in a quiz or test, the student will receive a grade of 0 for that component of the course. If a student cheats a second time during the course, the student will receive an F for the course. If cheating occurs on the final exam, the student will receive a grade of F in the course. Any cheating activity may be reported for further action. Information regarding the official CSU Policy on Academic Misconduct can be found at https://www.csuohio.edu/sites/default/files/3344-21-02_0.pdf.

Safe space: I am committed to making our encounters (in class, during office hours, in person, and online) feel safe for everyone involved. All participants are expected to conduct themselves in a respectful manner towards other participants and their ideas. Behaviors that are disrespectful or discriminatory towards other individuals or groups of individuals will not be tolerated.

Accommodations: Educational access is the provision of classroom accommodations, auxiliary aids and services to ensure equal educational opportunities for all students regardless of their disability. Students who feel they may need an accommodation based on the impact of a disability should contact the Office of Disability Services at 216-687-2015. The Office is located in BH 147. Accommodations need to be requested in advance and will not be granted retroactively.

Withdrawals: The last day to withdraw is Friday, October 30, 2020. Withdrawing from the course may put a student in violation of the federally mandated standards for academic progress (SAP) that a student must maintain to be eligible for financial aid. Please visit https://www.csuohio.edu/financial-aid/standards-academic-progress-sap for more information.

Course modifications: The instructor retains the right to modify the contents of the course, including grading criteria and course policies. Reasonable notice will be given for all time sensitive matters. Course changes will be communicated in class and on Blackboard.

Calendar

Here is a rough calendar for the course. Please note this is tentative and subject to change. References are from Martin H. Weissman, *An Illustrated Theory of Numbers*, AMS, 978-1-4704-3493-9.

Weeks	Topics	Reference
1	Division with remainder, divisibility	Chapter 0, pages 12-17
2-3	GCD, Euclidean Algorithm, LCM, linear Diophantine equations	Chapter 1
4-5	Prime numbers and factorizations	Chapter 2, pages 47-50, 56-59, 61
6-7	Modular arithmetic and congruences	Chapter 5, 127-139
8-9	Totient, Euler's Theorem and Fermat's Little Theorem, modular dynamics	Chapter 6, pages 153-159, 161
10-11	Chinese Remainder Theorem, RSA cryptosystem	Chapter 7, pages 173-181, 186-187
12-14	Legendre symbol, Quadratic reciprocity	pages 194-199, 202-203
15	Catch-up and/or applications	