

Introduction To Number Theory, Math 4400
University of Utah, Fall 2023

Anurag K. Singh

Class Monday, Wednesday, and Friday, 10:45 – 11:35 am, LCB 225

Office hours LCB 124, Monday 2:00 – 3:00 pm, Wednesday 1:00 – 2:00 pm, and by appointment.

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Text *Numbers, Groups and Cryptography* by Gordan Savin, available from
<https://www.math.utah.edu/~savin/book15.pdf> We expect to cover Chapters 1–9.

Prerequisites “C” or better in Math 2250 or Math 2270 or Math 2271.

Goals An overview of algebraic number theory covering: factorization and primes, Euclid’s algorithm, Chinese remainder theorem, modular arithmetic, elementary group and ring theory, Zeta functions and Dirichlet series, Mersenne Primes, Fermat primes, roots of unity, cyclotomic polynomials, quadratic residues, quadratic reciprocity, sums of squares, Gaussian integers, Pell’s equation, and continued fractions.

Homework Homework will be assigned regularly on Canvas; this is not to be turned in, but you will be tested on this in the weekly quizzes.

Quizzes There will be weekly quizzes, typically on Wednesday. **There are no make up quizzes**, though the lowest three quiz scores will be dropped. If you are absent from class on a quiz day, you will miss that quiz; exception to this are documented medical emergencies or documented university excused absences.

Canvas Course material, homework, grades, etc. will be posted on the course Canvas website; please check this regularly. Graded quizzes/exams will be accessible via Canvas/Gradescope.

Grading In addition to quizzes, there will be a mid-term exam and a final exam. Notes/calculators are not allowed on quizzes or exams. There are no make-up exams, though the final exam score may replace one missed due to personal or family emergencies.

Weekly quizzes: 40%

Mid-term exam: 30% Wednesday, October 4

Final exam: 30% Friday, December 15, 10:30 am – 12:30 pm

Letter grades for the course will be assigned **roughly** as follows: A [93, 100], A– [90, 93),
B+ [87, 90), B [83, 87), B– [80, 83), C [70, 83), D [60, 70), E [0, 60).

Other dates Last day to add, drop (delete), elect CR/NC, or audit classes: Friday, September 1.
Last day to withdraw from classes: Friday, October 20.

Tutoring Available in the T. Benny Rushing Mathematics Student Center (the lower level between JWB and LCB):
<https://www.math.utah.edu/undergraduate/mathcenter.php>

Information, policies, and resources

The Americans with Disabilities Act: The University of Utah seeks to provide equal access to its programs, services, and activities, for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, (801) 581-5020, <https://disability.utah.edu>. CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status, or genetic information. If you or someone you know has been harassed or assaulted on the basis of your sex, including sexual orientation or gender identity/expression, you are encouraged to report it to the University's Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, (801) 581-8365, <https://oeo.utah.edu/contact-us/index.php>, or to the Office of the Dean of Students (below). For support and confidential consultation, contact the Center for Student Wellness, 426 Student Services Building, (801) 581-7776. To report to police, contact the Department of Public Safety, (801) 585-2677 (COPS), <https://police.utah.edu>.

Campus Safety: The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at (801) 585-2677 (COPS). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit <https://safeu.utah.edu>.

University Counseling Center: The UCC staff is committed to supporting the mental health needs of our campus community: (801) 581-6826. For after-hours emergencies, contact the 24/7 Crisis Line: (801) 587-3000. More information is at <https://counselingcenter.utah.edu>.

Office of the Dean of Students: The Office of the Dean of Students is dedicated to being a resource to students through support, advocacy, involvement, and accountability. It serves as a support for students facing challenges to their success as students, and assists with the interpretation of University policy and regulations. Contact: (801) 581-7066, deanofstudents@utah.edu, <https://deanofstudents.utah.edu>.

Academic Code of Conduct: Please review the Student Code: <https://regulations.utah.edu/academics/6-400.php>. To ensure that the highest standards of academic conduct are promoted and supported at the University, students must adhere to generally accepted standards of academic honesty, including but not limited to refraining from cheating, plagiarizing, research misconduct, misrepresenting one's work, and/or inappropriately collaborating. A student who engages in academic misconduct, as defined in Part I.B., may be subject to sanctions including but not limited to a grade reduction, failing grade, probation, suspension or dismissal from the program or the University, or revocation of the student's degree or certificate. Sanctions may also include community service, a written reprimand, and/or a written statement of misconduct that can be put into an appropriate record maintained for purposes of the profession or discipline for which the student is preparing.

Student Names and Personal Pronouns: Class rosters are provided to the instructor with the student's legal name as well as *preferred first name*, if previously entered by you in the Student Profile section of your CIS account; this can be managed online by you at any time. I will refer to you with the name and the pronoun that you prefer, in class or on assignments: please advise me of any changes or preferences. For assistance or support, please reach out to the LGBT Resource Center, <https://lgbt.utah.edu>.

Diversity and Inclusivity: It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for others. In addition, if any of our class meetings conflict with your religious events, please let me know so that I can make alternative arrangements for you.

Covid-19: For information and guidelines, visit <https://coronavirus.utah.edu>.