MATH 4400-1 NUMBER THEORY, SPRING 2021  
TH 9:10-10:30 AM, IVC CLASS VIA ZOOM

Instructor: Gordan Savin

- Email: savin@math.utah.edu
- Zoom ID: 926 705 9662
- Office: LCB 205
- Phone: 801 809 4817
- Accessibility and Support: Office hours: MWF 11-12 by zoom. You can also contact me by phone or email, and we can arrange a zoom meeting at other time.

Course Description: 3 Credit Hours. Prerequisites: "C" or better in MATH 2270 OR MATH 2250.

Course details: An overview of algebraic number theory, covering factorization and primes, modular arithmetic, quadratic residues, continued fractions, quadratic forms, and diophantine equations. We shall follow my notes available on the class Canvas page (see under files). We expect to cover Chapters 1 - 6, 8 and 9. We will emphasize the role and importance of groups in the subject. To give you a taste of the course, here are some problems that will be studied and nicely answered.

- Show that the sequences 1, 4, 7, 10, 13... and 2, 5, 8, 11, 14, 17... contain infinitely many primes. (The problem of primes in a progression.)
- Develop a fast test to decide if $2^p - 1$, a Mersenne number, is a prime number or not.
- Find all integral solutions of the Pell equation $x^2 - 2y^2 = 1$. (This in turn can be used to find all square-triangular numbers.)

It is interesting to mention that the first of these problems is solved using calculus. The second makes use of a group of order $2^p$, while the third is solved by combining a geometric argument with an observation that all solutions of the Pell equation form a group!

Important dates: No instruction on Monday, 02/15, Friday 03/05 and Monday 04/05. (Whatever. Note that time for this class is a week and a half longer than for a comparable MWF class.) The last day of classes is 04/27.

Communication:

- All course materials, such as lecture slides, assignments, solutions, grades, etc. will be posted on the Course Canvas site. Class announcements will be done via email through the Canvas server. You will be responsible for any information contained in them as well as the information announced in class.
• It is your responsibility to also regularly check your Umail (make sure you set up forwarding if you do not check it regularly), your Umail is the only way for me to communicate privately with you, there will be occasions during the semester that we may need to reach out to you individually (e.g. regarding a grade or assignment) and it is in your best interest to respond promptly.

• Feel free to contact me by email for questions at savin@math.utah.edu, I will do my best to answer emails promptly. I would like to encourage you to email me only if it is something personal that requires individual attention, if instead you have questions about logistics of the class, course material and assignments, and anything else your classmates may wonder as well, please post a question on the Discussions Board instead. This way the information is shared quickly to the entire class, and each of you can benefit from seeing other classmates questions.

• I will always do my best to ensure the communication relevant to the course is clear and transparent, it is your responsibility as well to keep yourself updated by regularly checking: the announcements on Canvas, your Umail, the posts on the Discussions Board, and pay attention to the announcements given in class and Discussion Section.

• Course Canvas Page: Students are expected to log in and check canvas everyday for posted announcements and assignments. Students are also strongly advised to set up notifications for canvas so they do not miss any important notifications.

Homework and Grading: Grade will be based on five 40 minutes short exams/quizes, given every 3rd Tuesday, starting 02/02. There is no comprehensive final exam. HW is (essentially) all exercises in the notes at the end of each section. HW problems in the notes are repetitive, so you do not need to do all of them to grasp the material. I will not collect HW, however, each quiz will be a selection of HW problems. The grade will be based on five quizzes, about 20% each.

Approximate grade scale: 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), E (0-59).

Tutoring: There is free tutoring in the T. Benny Rushing Mathematics Student Center (room 155, the lower level between JWB and LCB), as well as a computer lab. For more information see www.math.utah.edu/undergraduate/mathcenter.php

Accommodation: 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 Services (CDS), 162 Olpin Union Building, 581- 5020 (V/TDD). CDS will work with you and me to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to CDS.

Student Code: Students are encouraged to review the Student Code for the University of Utah: https://regulations.utah.edu/academics/ 6-400.php. In order 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 academic 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.

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 and Access, 162 Olpin Union Building, 801-581-5020. 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 and 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; Director, Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or to the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to police, contact the Department of Public Safety, 801-585-2677(COPS).

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-COPS (801-585-2677). 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 safeu.utah.edu