Syllabus

MATH 110 (Introduction to Number Theory) • Summer 2021 • MWF: 2:00 – 4:30 PM

Instructor: Deewang Bhamidipati
(Please address me by my first name, which is pronounced *thee-waang*. Pronouns: he/him/his.)

Lectures: The lectures will be **synchronous** and will take place on Zoom (so will Office Hours). Lectures **will be recorded** and will be available for asynchronous viewing on Yuja via Canvas. You're highly encouraged to attend the lectures synchronously, or office hours if you can't attend lectures synchronously.

Office Hourse: Mondays and Wednesdays 4:30 – 6:00 PM, or by appointment
(This is when you come and talk to me if you have any questions, or otherwise. Do not hesitate to make appointments with me if regular office hours don't work for you!)

Teaching Assistant: Xu Gao **TA's Office Hours**: Tuesdays 2:00 – 3:30 PM

Canvas: I will be using Canvas primarily as a course repository. It will also be a place where you will receive course announcements, access the course schedule etc.
(Log in at `https://canvas.ucsc.edu` using your CruzID and Gold password.)

Zoom: I will be using Zoom to teach; links and more details will be available on Canvas.

Campuswire: We will be using Campuswire as a discussion forum for anything and everything course related. It will be checked frequently and unresolved questions will be answered. You're highly encouraged to collaborate with each other and answer each other's questions; engaging in such discussions amongst yourselves is an incredibly invaluable part of succeeding in this course. Links and more details will be available on Canvas.

Gradescope: Any assessment (see below) that needs to be turned in will have to be uploaded to Gradescope; links and more details will be available on Canvas.

Learning Outcomes:
- You will be able to write clearly, concisely, and precisely; this is a writing-intensive course.
- You will develop your problem-solving skills.
- You will understand the structure and importance of theorems, proofs and counterexamples.
- You will be able to understand the logic and methods behind major proofs in Number Theory.

References: We will largely follow the excellent *An Illustrated Theory of Numbers* by Martin H. Weissman (main reference), which can be bought here (currently on sale!).

Here are some other books that would be worthy additions to your library:

- ▷ *The Higher Arithmetic* by H. Davenport (available digitally HERE for free!)
- ▷ *Elementary Number Theory* by Gareth A. Jones, J. Mary Jones (available digitally HERE for free!)
- ▷ *Elementary Number Theory* by Underwood Dudley (buy HERE)
- ▷ *A Classical Introduction to Modern Number Theory* by Kenneth Ireland, Michael Rosen (available digitally HERE for free!)

Aim: We will try and cover chapters 1 – 8 from the main reference, except chapter 4 which will be covered if time permits. One major goal of the class is to present and understand the statement and proof of *Quadratic Reciprocity*.

Assessment & Weighing: For the assessments listed below, we will be implementing **contract weighing**, essentially you will decide what weight works best for you for each assessment.

- In Week 1, you will be asked to fill a Canvas form (this is our contract) where you will indicate what weight you would like to give to each assessment.
- The weights you give need to add up to a 100%. Indicated below are the minimum weights you should give to each assessment.
- Provided below are also the default weights AKA the default contract.
- In Week 3, you will be given an option to renegotiate your contract i.e. revisit the weights you originally assigned and possibly change it.

This may be a new system for all of us, it is for me, so please reach out to me if you have any queries.

PROBLEM SETS (50%) [MIN: 20%]	You will be asked to attempt two problems after almost every class, 9 in total. The answers will be due by end of next class. The specific days will be announced on Canvas.
GLOSSARY (10%) [MIN: 5%]	Throughout the course you will maintain a glossary of terms and results that you have had trouble digesting or would like to remember. Add how you think about them and whenever possible, also include examples. You will share them with me twice, end of Weeks 2 and 4.
PAPER (20%) [MIN: 10%]	You will submit an expository article, at least five pages long, on a topic of your choosing. Further instructions and details will be available on Canvas, so will a non-exhaustive list of topics. Due end of Week 5.
UNIT TEST A (10%) [MIN: 5%]	This short, four questions long, three-hour test will have problems from the content covered in the first half of the course. Dates will be available on Canvas.
UNIT TEST B (10%) [MIN: 5%]	This short, four questions long, three-hour test will have problems from the content covered in the latter half of the course. Dates will be announced on Canvas.

Grading Scale: Passing grade is **C** or above.

A+	$\geqslant 95\%$	**B+**	80 – 84%	**C+**	65 – 69%	**D**	40 – 54%
A	85 – 94%	**B**	70 – 79%	**C**	55 – 64%	**F**	$< 40\%$

Extra Credit: You can earn upto 10% of extra credit by completing surveys on Canvas, extra credit problems, and participation on Campuswire.

LaTeX: LaTeX (LAH-tekh or LAY-tekh) is the preferred choice among mathematicians for creating mathematical documents. You will need to learn basic LaTeX for and during this course. This will likely be done by looking at the `.tex` (tekh, the LaTeX file extension) files that I provide you, mimicking the LaTeX in them, and heading to **TeX Stack Exchange** for anything that is not included in them. Most of you will be able to pick up the basics very easily. You can start this journey by using **Papeeria** or **Overleaf**, both online LaTeX editors. **Please contact me if this is not a viable option for you for any reason**, and, of course, if you need help getting started.

Course Schedule: Will be available and updated on Canvas throughout our time together.

Guidelines:

- Problem Sets
  - ▷ Please turn in the problem set on the due date.
  - ▷ Discuss the problem set with your peers on Campuswire. (I insist on this.)
  - ▷ Pay close attention to the presentation and clarity of your reasoning in your answers.
  - ▷ Cite resources you have used while solving the problem set.
  - ▷ Name your peers with whom you have discussed the problem set.
- Communication
  - ▷ Please contact me primarily via Canvas, especially if the topic is of a sensitive or personal nature. If your question is math-related, then please contact me on Campuswire
  - ▷ Please make sure you give me as much information as you possibly can about the subject you intend to discuss when you contact me.
  - ▷ You are more than welcome to contact me at any time, you will get a response from me promptly between 8 AM - 7 PM, Monday to Saturday.
  - ▷ You can send me an email (at bdeewang@ucsc.edu) if, and only if, your attempts at contacting me on Canvas have yielded no response from me.
  - ▷ **Never hesitate to reach out, I always want to hear from you.**

practice, discuss, ask

practice problems

discuss problems with your peers

ask me questions; more importantly: ask ***follow-up*** questions

Subsequent addendums, if any, to above will be made via Canvas.

I reserve the right to change any particular of the syllabus above.

(any changes will be to your advantage, and you will be informed of them promptly via Canvas.)

Summer Deadlines:

- (Session 1) Drop: **Monday, June 28**; Request for "W": **Friday, July 9**;
- (Session 2) Drop: **Monday, August 2**; Request for "W": **Friday, August 13**;
- (8-Week & 10-Week) Drop: **Monday, July 5**; Request for "W": **Friday, July 23**.

You will not be dropped for non-attendance or non-payment, you must drop yourself. Dropping before the deadline results in a full-tuition reversal/refund. Withdraw posts a W for the grade and full tuition is charged (no refund).

For all dates and deadlines, including 'change of grade option' (P/NP) and grades due, here is the summer academic calendar: https://summer.ucsc.edu/studentlife. For questions about dropping, requesting a W grade for a course, or withdrawing from the summer quarter, email summer@ucsc.edu.

DRC Remote Accommodations: The Disability Resources Center (DRC) reduces barriers to inclusion and full participation for students with disabilities by providing support to individually determine reasonable academic accommodations. Operations continue via remote appointments. If you have questions or concerns about exam accommodations or any other disability-related matter, email the DRC Schedulers at drc@ucsc.edu for an appointment; you can also visit their website at http://drc.ucsc.edu.

CAPS (Counseling and Psychological Services): This is a stressful time, so if you are in distress, managing heightened stress and anxiety, or want to get more support and a counselor's perspective on something you're going through, CAPS provides a variety of services for your needs, please visit their website for more information https://caps.ucsc.edu.

Title IX: The university cherishes the free and open exchange of ideas and enlargement of knowledge. To maintain this freedom and openness requires objectivity, mutual trust, and confidence; it requires the absence of coercion, intimidation, or exploitation. The principal responsibility for maintaining these conditions must rest upon those members of the university community who exercise most authority and leadership: faculty, managers, and supervisors.

The university has therefore instituted a number of measures designed to protect its community from sex discrimination, sexual harassment, sexual violence, and other related prohibited conduct. Information about the Title IX Office, the online reporting link, applicable campus resources, reporting responsibilities, the UC Policy on Sexual Violence and Sexual Harassment, and the UC Santa Cruz Procedures for Reporting and Responding to Reports of Sexual Violence and Sexual Harassment can be found at titleix.ucsc.edu.

The Title IX Office is actively responding to reports and requests for consultation. If you are not currently working with someone in the office and want to make a report/request a consult, you can expect the fastest response by using our online reporting link.

For more information please visit the Title IX Operations under Covid-19 page.

Report an Incident of Hate or Bias: UC Santa Cruz is committed to maintaining an objective, civil, diverse and supportive community, free of coercion, bias, hate, intimidation, dehumanization or exploitation. The Hate/Bias Response Team is a group of administrators who support and guide students seeking assistance in determining how to handle a bias incident involving another student, a staff member, or a faculty member. To report an incident of hate or bias, please use the Hate/Bias Reporting Form.

Religious Accommodations: UC Santa Cruz welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request the reasonable accommodation for religious practices. The instructor will review the situation in an effort to provide a reasonable accommodation without penalty. You should first discuss the conflict and your requested accommodation with your instructor early in the term. You or your instructor may also seek assistance from the Dean of Students office.

Small Group Tutoring: Small Group Tutoring (SGT) supports students academically to advance educational equity by designing inclusive learning environments outside of the classroom. In SGT, you can expect the Tutor to facilitate cooperative group activities designed to have students work together on the course content and develop study skills for the course, please visit their website for more information https://lss.ucsc.edu.

Academic Integrity: Academic integrity is the cornerstone of a university education. Academic dishonesty diminishesvthe university as an institution and all members of the university community. It tarnishes the value of a UCSC degree. All members of the UCSC community have an explicit responsibility to foster an environment of trust, honesty, fairness, respect, and responsibility. All members of the university community are expected to present as their original work only that which is truly their own. All members of the community are expected to report observed instances of cheating, plagiarism, and other forms of academic dishonesty in order to ensure that the integrity of scholarship is valued and preserved at UCSC. For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the Academic Integrity page at the Division of Undergraduate Education.