

MAT 312/AMS 351, SPRING 2022

Topics and Text:

In this course we will cover some basic topics in number theory and group theory. Topics in number theory include: the division algorithm, unique factorization into primes, modular arithmetic of integers, Fermat's and Euler's theorems. Topics in group theory include: permutation groups, cosets, Lagrange's theorem, and classification of groups of small order. This course also covers some coding theory; topics will include public key codes and error correcting codes.

Our text for the course is *Numbers, Groups and Codes*, second edition, by J.F.Humphreys and M.Y.Prest.

Teachers For This Course:

Lowell Jones: the lecturer for this course; office hours (TBA) are online – for more details continue reading below; contact either by joining a zoom meeting for office hours, or email at lowell.jones@stonybrook.edu.

Qianyu Chen: the instructor for both of the recitation sections; office hours and recitation meetings will both be via Zoom – for more details go to the website for your mat 312 (ams 351) recitation; contact by either joining zoom office hours or by emailing at qianyu.chen@stonybrook.edu.

Timely Course Information: Please check for “Announcements” on the blackboard websites (for both your lecture and your recitation), and do this several times a week. From time to time there will be more up-to-date information announced there concerning exams, homework, and other course matters.

Homework

Homework will be assigned each week and will be due during the following week. Each homework assignment will be posted under “Assignments” on your recitation blackboard website, along with the due date and instructions for how to submit your solutions. (Just go to “Assignments”, find the desired hw assignment, download the pdf file containing the homework problems. After completing the problems just upload a pdf file containing your solutions onto your recitation blackboard website by the due date.)

Tests

All Tests given in this course will be online during our scheduled lecture time. There will be 4 of these online Tests, scheduled as follows: Test 1 is on Thursday 2/17 from 1:15pm to 2:10pm; Test 2 is on Thursday 3/10 from 1:15pm to 2:10pm; Test 3 is on Thursday 4/7 from 1:15pm to 2:10pm; Test 4 is on Thursday 5/5 from 1:15pm to 2:10pm. Your final course grade will be based on these 4 online Tests, and on your homework grades (for more grading details continue reading below).

A makeup Test may be given if a student misses a Test for reasons beyond control of the student (such as a health emergency, or car accident); a makeup will not be given for schedule conflicts with other classes, for travel plans, etc. **So if you decide to continue with this course make sure that the 4 Test times for this course do not conflict with any of your other course obligations or plans.**

Grading Policy

Homework = 20%,

Each Test = 20%,

Lectures: All lectures will be recorded on Zoom each week in advance of the actual lecture times. All these lectures will be posted on the blackboard lecture website for this course; to find these postings just go to “Zoom Meeting” on the blackboard lecture website and click on “Cloud Recordings”.

What Happens During the Scheduled Lecture Time? Lecture

Time Office Hours: As already mentioned, some of these scheduled lecture times will be taken up with Tests. During the other scheduled lecture times I will hold Zoom office hours just for the students in this course. To join the zoom meeting for these office hours just go to “Zoom Meeting” on our blackboard lecture website and join the only meeting in progress. You can join at anytime and leave these meetings at any time; and you can just listen or ask some of your own questions.

General Office Hours: In addition to the lecture time office hours just mentioned, I will hold 3 more Zoom office hours (open to all students) each week at 11:30am to 12:30pm on Tuesday, Wednesday, Thursday. To join these general office hours just go to math.stonybrook.edu, click on “Advising” followed by “Office Hours”, and then scroll down a bit to find my link. You can join these Zoom meetings at anytime and leave at any time.

Recitations: Recitations meet once a week and will be conducted in real time in a Zoom meeting. Information about how and when to join these zoom meetings will be posted on the blackboard website for your recitation .

Technical and software requirements: Since lectures, office hours, Tests and home work are all delivered online, you will need some technical equipment:

- computer with webcam and microphone capability and PDF viewer
- device with scanning capability
- strong internet connection
- Zoom.us client
- PDF merging software

Disability Support Services (DSS) Statement

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services at 631-632-6748 or at <http://studentaffairs.stonybrook.edu/dss/> . They will determine with you what accomadations are necessary and appropriate. All information and documentation is confidential.

Academic Integrity Statement

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instance of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>.

Critical Incident Management

Stony Brook University expects students to respect the ,rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the saftey of the learning environment, and/or inhibits students' ability to learn.

Approximate Course Schedule

week of 1/24-1/28: cover section 1.1, (division algorithm, greatest common denominator)

week of 1/31-2/4: cover sections 1.2-1.3, (proof by induction, primes and unique factorization theorem)

week of 2/7-2/11: cover sections 1.3-1.4, (congruence classes)

week of 2/14-2/18: **TEST 1 ON THURSDAY 2/17;** also cover section 1.5, (solving linear congruences)

week of 2/21-2/25: cover section 1.6, (Fermat's theorem, Euler's theorem and public key codes)

week of 2/28-3/4: cover sections 2.1-2.2, (set theory and functions)

week of 3/7-3/11: **TEST 2 ON THURSDAY 3/10;** also cover sections 2.3,4.1, (relations – such as an equivalence relation – and permutations)

week of 3/14-3/18: spring recess (no classes during this week))

week of 3/21-3/25 cover section 4.2, (cyclic decomposition of a permutations, order and sign of a permutation)

week of 3/28-4/1: cover section 4.3, (definition and examples of groups)

week of 4/4-4/8: **TEST 3 ON THURSDAY 4/7;** also cover section 5.1, (structure of groups)

week of 4/11-4/15: cover section 5.2, (cosets and Lagrange's theorem)

week of 4/18-4/22: cover section 5.3, (understanding groups of small order)

week of 4/25-4/29: cover section 5.4 (coding and groups)

week of 5/2-5/6: **TEST 4 ON Thursday 5/5;** also catchup time; 5/5 is our last class day