AMS 351 / MAT 312: APPLIED ALGEBRA
FALL 2020
LECTURE AT TU TH 11:30-12:50

Topics.
This course covers the fundamentals of abstract algebra: groups, informal set theory, relations, polynomials, together with some applications: error correcting codes, Burnside's theorem, computational complexity, Chinese remainder theorem. This course is offered as both AMS 351 and MAT 312.

Learning objectives.
A successful student will understand

- elementary number theory, including modular arithmetic in integers and in polynomial rings,
- classification of finite groups of small order,
- properties of several different algebraic structures,
- Fermat's and Euler's theorem, Chinese remainder theorem,
- RSA cryptosystem and group codes as their applications

Text.
Numbers, Groups and Codes, (2nd Edition), by Humphreys and Prest.

Instructor and Teaching Assistants.
Instructor: Dr. Eun Hye Lee. `https://www.math.stonybrook.edu/cards/leeeun-hye.html`
Teaching Assistant (R01, R02): Mohamed El Alami. `https://www.math.stonybrook.edu/cards/el-alamimohamed.html`
Teaching Assistant (R03): Yoon-Joo Kim `https://www.math.stonybrook.edu/cards/kimyoon-joo.html`
Office hours may change during the semester without any prior notice: refer to Department webpage for the most updated information.

Modality of lectures.
Lectures are delivered online by Zoom. You can access the meeting through Blackboard. Direct link will be provided in case the Blackboard is not properly working. The recorded lectures will be available to you for one week from the original lecture. You are supposed to take your own notes: lecture note will not be provided.
You are encouraged to turn your webcam on during the lecture. You will be muted during the lecture, but you can unmute yourself for any questions that arise during the lecture.
You can also reach your instructor in office hours via Zoom as well: Link for office hours will be provided. If you cannot make it to preset office hours, you can request to make an appointment via email. Details will be discussed in lecture.
Note that recitations are delivered in person.

Technical and software requirements.
Since lectures are delivered online, you will need some technical equipments. The requirements include but are not limited to:

- computer with webcam and microphone capability and PDF viewer

- device with scanning capability
- strong internet connection (final exam will be online, so disconnect during exam may have negative impact)
- Zoom.us client
- PDF merging software

In addition, please check course Blackboard webpage and your SBU email frequently. Any announcements posted to the Blackboard will be assumed that everyone is aware of it within 24 hours.

Assignments.

An assignment will be given each week and a single .pdf file should be submitted through blackboard the following Thursday 11:30 AM unless otherwise stated in the assignment. You will be able to find the assignments on the course Blackboard website under "Assignments" tab. The first assignment will be posted on August 28, 2020 and is due on September 3, 2020. There will be no due date extension for the assignments under any circumstances. Since wrong formatted submission makes grading extremely difficult, it will not be graded, so please make sure that you gather all your answers together, merge into single file, and submit it through blackboard. Also, please make sure that your submission was successful once you submit it, since sometimes, technical errors do occur.

You are more than welcome to work with other people, but you are required to hand in your own solutions in your own words. Copying someone else's work will be considered as academic dishonesty.

Quizzes.

A short quiz will be given each week at the end of each recitation starting Week 2. No quiz on Week 7 due to the midterm exam. 12 quizzes will be given in total throughout the semester. Each quiz consists of simple 2-3 problems, and the format may vary (multiple choice, true or false, short answer, etc).

Exams. There will be one midterm exam and one final exam.

Midterm exam. Seventh week, during the recitations, in-person.

Final exam. Wednesday, December 16, 2020, 11:15 AM - 1:45 PM.

Important note. Missing the midterm with documented excuse will result in replacing the miterm grade with the grade on the final and missing the final with a documented excuse will result in a grade of I, with a make-up fianl to be given at a date to be determined.

For each exam, you will be given a letter grade along with numeric grade, and your final course letter grade will be at most one letter grade higher than your final exam letter grade.

Recitations

Recitations will be held in-person, as scheduled. Participation matters, and it will be counted towards the final course letter grade. Note that weekly quizzes and the midterm exam will be given during the recitations, so the attendance is mandatory.

Grading Policy.

Generally, the grades will be determined by the following factors:

Assignment: 25%, Quizzes: 25%, Recitation: 5%, Exam 1: 20%, Final exam: 25%

Note that your final course letter grade will be at most one letter grade higher than your final exam letter grade. (For example, if you get D+ for final exam, then the highest letter grade you can get is C+.)

Course schedule

This is tentative and can be adjusted as the semester progresses.

Week	Dates	Sections covered
1	August 25, 27	1.1 The division algorithm and greatest common divisors
2	September 1, 3	1.3 Primes and the unique factorization theorem 6.1 Introduction
3	September 8, 10	6.2 The division algorithm for polynomials 6.3 Factorization
4	September 15, 17	1.4 Congruence classes 1.5 Solving linear congruences
5	September 22, 24	1.6 Euler's theorem and public key codes
6	September 29, October 1	6.4 polynomial congruence classes REVIEW for MIDTERM
7	October 6, 8	MIDTERM EXAM
8	October 13, 15	4.1 Permutations 4.2 The order and sign of a permutation
9	October 20, 22	4.3 Definition and examples of groups
10	October 27, 29	5.1 Preliminaries 5.2 Cosets and Lagrange's theorem
11	November 3, 5	5.3 Groups of small order
12	November 10, 12	5.4 Error-detecting and error-correcting codes 6.5 Cyclic codes
13	November 17, 19	4.4 Algebraic structures
14	November 24, 26	THANKSGIVING–No classes
15	December 1, 3	REVIEW for FINAL

Syllabus revision

Over the course of the semester, events may occur that require changes to the policies stated in this document, and especially the weekly plan of lectures. Such changes will be announced in class and on blackboard, and a revision to this syllabus will be posted.

Student Accessibility Support Center Statement.

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following website: `http://www.stonybrook.edu/ehs/fire/disabilities`.

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 is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at `http://www.stonybrook.edu/commcms/academic_integrity/index.html`.

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 University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.