

MATH-UA.0343-005 Algebra, Fall 2019

Instructor Fengbo Hang, WWH 630, 212-998-3221, email: fengbo@cims.nyu.edu.

Time and location 12:30-1:45PM, Tuesdays and Thursdays, WWH 317

Office hours 9:30am-11:30am, Tuesdays

Recitation section TBA

Textbook Topics in algebra (2nd edition) by I. N. Herstein. ISBN-13: 978-0471010906

Other references

- Abstract Algebra: Theory and Applications by Judson. Available at <http://abstract.ups.edu/>
- Abstract Algebra by Dummit and Foote. ISBN-13: 978-0471433347
- Algebra by Hungerford. ISBN-13: 978-0387905181
- <http://aimath.org/textbooks/approved-textbooks/>

Course description Basic theory of groups and rings.

Course requirements The course meets for lecture twice a week for 75 minutes each class period and you have one recitation of 75 minutes a week. You are also expected to study outside of class, up to four hours for each hour of class. Studying can be reading the book, reviewing notes, practicing problems, or doing homework.

Calculator policy At NYU, undergraduate mathematics is largely conceptual rather than computational. Calculators may be used on homework but do not suffice on problems for which explanation is required. Calculators may not be used on quizzes or exams.

Course prerequisites A grade of C or better in Math-UA 121, 122 Calculus I, II and Math-UA 140 Linear Algebra. Algebra I is a conceptually challenging course. Students are assumed to be able to write up a good proof.

Evaluation plan Homeworks will be assigned on every Tuesday and due the next Tuesday at the beginning of the class. Only hard copies of solutions are accepted (no electronic submission please, you may ask your friend to hand in your paper if you can not come to class). There will also be two quizzes, a midterm exam and a final exam. These elements will be combined into a course average using the following weights:

| | |
|----------|------|
| Homework | 25% |
| Quiz | 10% |
| Midterm | 30% |
| Final | 35% |
| Total | 100% |

Policy on missed and out-of-sequence assessments

In general, out of fairness to the rest of the students in the class, late homework assignments and makeup quizzes or exams are not possible. We will drop the lowest homework to give you a "free pass" for any reason.

We may approve a rescheduled or makeup exam or quiz in the following cases:

- A documented medical excuse.
- A University-sponsored event such as an athletic tournament, a play, or a musical performance. Athletic practices and rehearsals do not fall into this category. Please present documentation from your coach, conductor, or other faculty advisor describing your absence.
- A religious holiday.
- Extreme hardship such as a family emergency, again with documentation.

Weddings and other special family events do not qualify as any of the above; the free pass is appropriate here. Nor can we reschedule for purposes of more convenient travel, *even if tickets have already been purchased*.

Rescheduled exams and quizzes (those not arising from emergencies) must be taken prior to your absence. Otherwise, please contact us before you return to class.

If you require additional accommodations as determined by the Moses Center for Student Disabilities, please let us know as soon as possible.

Grading The weighted average above will be converted to a letter grade beginning with the following scale:

| Cutoff | Grade |
|--------|-------|
| 93% | A |
| 90 | A- |
| 87 | B+ |
| 83 | B |
| 80 | B- |
| 75 | C+ |
| 65 | C |
| 50 | D |

As for a "curve", we may lower these cutoffs to create higher letter grades.

Policy on academic integrity New York University takes plagiarism and cheating very seriously and regards them as a form of fraud. Students are expected to conduct themselves according to the highest ethical standards. These offenses are all considered violations of academic integrity:

- Use of unauthorized resources for completion of assignments (e.g., a solution manual illegally purchased or downloaded or an internet community that provides answers);
- Nondisclosure of collaboration on homework or copying another student's written solution;
- Discussion of a quiz or exam between someone who has taken it and someone who has not;
- Copying another student's quiz or exam;
- Forging documentation to justify a makeup quiz or exam or late assignment.

There are of course other possibilities. We expect you to be familiar with your school's student handbook and its statement of academic integrity. Penalties range from a score of zero on a problem, assignment, quiz, or exam, to a failing grade in the course and notification of the student's Dean. Multiple violations can result in dismissal from the University.

Rough schedule of classes Below is only a rough schedule. Actual pace and contents may be different.

1. 09/03, 09/05: Sec 1.1-1.3, equivalence relation, greatest common divisor, prime numbers, unique factorization theorem, congruence modulo a given number.
2. 09/10, 09/12: 2.1-2.3, definition of groups and some examples, basics of groups.

3. 09/17, 09/19: 2.4-2.5 subgroups, cosets, a counting principle.
4. 09/24, 09/26: 2.6-2.7 normal and quotient subgroup, homomorphism, **quiz 1 on 09/26.**
5. 10/01, 10/03: 2.7-2.8 homomorphism, automorphism, group action on sets
6. 10/08, 10/10: 2.9-2.10 Cayley's theorem, permutation groups
7. 10/17: 2.11 another counting principle
8. 10/22, 10/24: **Midterm exam on 10/22,** 2.12 Sylow's theorem
9. 10/29, 10/31: More Sylow's theorem, 2.13-2.14 direct product and structure of finite abelian groups
10. 11/05, 11/07: 2.14-3.1 finite abelian group and the notion of rings
11. 11/12, 11/14: 3.2-3.3 examples of rings, homomorphisms **quiz 2 on 11/14.**
12. 11/19, 11/21: 3.4-3.5 ideals and quotient rings.
13. 11/26, 12/03, 12/05: 3.6-3.7 integral domain and field, Euclidean rings
14. 12/10, 12/12: 3.8-3.10 Euclidean rings and polynomial rings
15. Final exam: TBA