Mathemtics GU4041
INTRO TO MODERN ALGEBRA I
Spring 2021
Columbia University

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Office: 624 Mathematics.
Office hours: (tentative) Mo., We. 11:30am-12:30pm, online on Zoom. The Zoom link for office hours will be posted on Courseworks. Please send me an email in advance or just before connecting to Zoom to make sure I see you.

Classroom: online on Zoom.
Lectures: Mo., We. 10:10am-11:25am.

Required text: There is no required text. I will mainly follow the book Abstract Algebra, by Herstein. Other good books are: Algebra by Artin, Abstract Algebra by Dummit and Foote, A First Course in Abstract Algebra by Fraleigh, Undergraduate Algebra by Lang.

Prerequisite: The four Calculus courses, and Linear Algebra. You should also be familiar with complex numbers, mathematical induction and other methods of proof, and in general have a certain confidence in your abilities to handle abstract mathematical reasoning. A prior course which involves writing proofs such as Honors Math A/B or Introduction to Higher Mathematics is strongly recommended.

Course outline: Groups, homomorphisms, normal subgroups, the isomorphism theorems, symmetric groups, group actions, the Sylow theorems, finitely generated abelian groups.

Homework: Homework exercises will be published online every Wednesday night, and the solutions are due 6 days later, on Tuesday night. More precisely, the deadline will be on Wednesday early morning, at 5am. The solutions must be handed in electronically, via Courseworks. We encourage collaboration between small groups of students on the homework, but all solutions must be written up by you alone in your own words.

Extensions: Understandably, there will be bad weeks, where a student is overwhelmed and doesn't manage to submit the homework on time. To cover for these cases, the following two policies will be implemented:

1. Late submission. We *will* accept late submissions, but we will deduct 10% of the points for every day of lateness. Use this option only if you are just a few days late. After 9 days of lateness, submitting is not worth any more.
2. At the end of the semester, when computing the average of the grades obtained at the homework, we will discard the two lowest grades. In this way, students who once or twice don't manage to submit the homework will not be penalized.

Midterm exams: There will be midterm exams on Monday February 15 and on Monday April 5 during the usual class time.

Final exam: Projected schedule for the final exam: Wednesday April 21, 9am-Noon. The date will be confirmed by the University.

Exam details: The exams will be online. You *must* plan to take the midterm and final exams at the scheduled time, so please make your travel plans accordingly. Besides students with disabilities having prior arrangements with ODS, the only exceptions will be for those with an incapacitating illness, a serious family emergency, or situations of comparable gravity. In the first case you will need a note from a doctor; in the other cases you will need a note from your advising dean. Incompletes can be granted only by your advising dean and only in the circumstances mentioned above. Anyone guilty of academic dishonesty, such as cheating on an exam or helping someone else to cheat, will fail the course and faces further academic discipline.

Grading: I will first compute a numerical final score for every student. This will depend on the homework, the two midterms and the final exam. Every week the homework will be graded from 0 to 60 points. Every midterm and the final exam is graded from 0 to 60 points. The numerical final score is computed in the following way:

Let A be the average of the homework grades (where the two lowest grades are discarded). Let M_1, M_2 be the grades of the two midterms. Let F be the grade of the final exam. The numerical final score S, also from 0 to 60 points, is given by

$$S = \frac{10A + 25M_1 + 25M_2 + 40F}{100} .$$

In other words, the formula is: Homework 10%, midterms 25%, final 40%.

After computing the numerical final score for every student, I will translate them into letter grades (A,B,C,D,F) using a curve. I will choose the curve after the final exam.