Math 310 Intro to Modern Algebra — Spring 2021

Instructor: Dr. Xavier Pérez-Giménez

Office: 328 Avery Hall, office hours (via Zoom) TR 8:30 am – 9:30 am or by appointment.

Email: xperez@unl.edu

Class Times and Location: MWF 11:30 am – 12:20 pm, Military & Naval Science Building – Room B5.

Text book: *Abstract Algebra An Introduction, 3rd edition* by Thomas W. Hungerford.

Course Description: There are two primary goals we'll work to achieve in this course:

- understand properties of the integers and of polynomials from a conceptual standpoint
- learn to write clear, logical proofs & improve your ability to communicate mathematics rigorously.

Attendance and Engagement Expectations: This course will be primarily delivered in-person, and students are expected to attend to class and stay engaged with the course activities. However, in the face of a pandemic, it is crucial that individuals who are sick with Covid-19 (or test positive or have been in close contact with someone who tested positive) stay home. Reasonable accommodations will be provided to students who need to temporally self-quarantine. If a student has to miss one or more classes due to Covid or any other reasons, they should communicate it to the instructor as soon as possible, and make a plan to remain engaged with the course activities.

Additional Covid-19 Adjustments: Students in class are required to follow the face-covering and social-distancing policies mandated by UNL (see Face Coverings Syllabus Statement). The unpredictable evolution of the Covid-19 pandemic during the term may require further adjustments.

Grades: Grades for the course will be computed as follows:

Homework/Quizzes	30%	
Midterms	40%	(2×20%)
Final	30%	

Homework: There will be weekly homework assignments. The purpose of the homework is to practice writing proofs and receive constructive feedback. The homework will be graded for logic, ability to reason abstractly and the rigorous presentation of your arguments, but also for clarity and appropriate use of language, including full sentences. Collaboration on every homework is not only allowed, but encouraged, as the best way to come up with a solution and to understand it is to explain it to your peers and get their feedback. Some homework sets will be turned in solo – each student should write their own solutions and some will be "team homeworks" – you will be able to turn in collaborative solutions in a group of 2–3.

Quizzes/Worksheets/Participation: There will be occasional in-class quizzes (solo) or worksheets (collaboration allowed) that will be collected. They will give you targeted practice with the most important concepts studied.

Midterm Exams: There will be two midterm exams. Makeup midterms are only allowed for reasons limited to serious illness or travel to university approved events. Proof of these circumstances will be required. The *tentative* dates for the midterm exams are

Exam 1: week of March 8 and **Exam 2: week of April 19**.

Final Exam: The final exam is cumulative. Students are expected to arrange their personal and work schedules to allow them to take the final exam at the scheduled time. Our final exam is on

Wednesday, May 5, 10:00 am – 12:00 noon in class.

Department Grading Policy: Students who believe their academic evaluation has been prejudiced or capricious have recourse for appeals to (in order) the instructor, the department chair, the departmental appeals committee, and the college appeals committee.

Course Evaluation The Department of Mathematics course evaluation form will be available through Canvas during the last two weeks of class. Evaluations are anonymous and instructors do not see the responses until after final grades have been submitted. Evaluations are important – the department uses them to improve instruction. Please complete the evaluation and take the time to do so thoughtfully.

Students with Disabilities: Students with disabilities are encouraged to contact me for a confidential discussion of their individual needs for academic accommodation. It is the policy of UNL to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 117 Louise Pound Hall, 402-472-3787 voice or TTY.

Important dates The following table shows the material expected to be covered and the important academic schedule events. Note that what is shown here is *tentative*; please be alert for changes.

Date	**Sections covered**
Week of January 25	Appendix A (Logic and Proof), 1.1 The Division Algorithm
Week of February 1	1.2 Divisibility
Friday, February 5 is the last day to remove a course from a student's record.	
Week of February 8	1.3 Primes and unique factorization, 2.1 Congruence and Congruence Class
Week of February 15	2.2 Modular Arithmetic, 2.3 The structure of $\mathbb{Z}_p$ (p prime) and $\mathbb{Z}_n$
Week of February 22	Appendix C (Well Ordering and Induction)
Week of March 1	Catch-up/Review
Week of March 8	Appendix D (Equivalence relations), Catch-up/Review
	Exam 1
Week of March 15	Appendix B (Sets and Functions)
Week of March 22	3.1 Definition and Examples of Rings, 3.2 Basic Properties of Rings
Friday, March 26 is the last day to change the grading option to Pass/NoPass.	
Week of March 29	3.3 Isomorphisms and Homomorphisms,
	4.1 Polynomial arithmetic and the Division Algorithm
Week of April 5	4.2 Divisibility in $F[x]$, 4.3 Irreducibles and Unique Factorization
Week of April 12	4.4 Polynomial functions, Roots and Reducibility
	4.5+4.6 Irreducibility in $F[x]$, $F = \mathbb{Q}, \mathbb{R}, \mathbb{C}$
Friday, April 16 is the last day to withdraw from the course.	
Week of April 19	13. Public Key Criptography
	Exam 2
Week of April 26	14. The Chinese Remainder Theorem, Catch-up/Review
The Final Exam is 10:00 am – 12:00 noon on Wednesday, May 5.	