MATH 331, Fall 2021

MENU: Abstract Algebra

Instructor: Paul Goerss
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Teaching Assistant to be announced

Course Time: MWF 10AM.

Office hours: TBA, but will include Th 10AM.

Overview: This is the first quarter of a year long sequence in abstract algebra; in the Fall the topic emphasis will be on group theory, including the structure of finite groups and the basics of matrix groups.


This is an industry standard abstract algebra text for advanced undergraduates and beginning graduate students. We will cover most of Part I: Group Theory.

Read this: As of August 16, this class is scheduled to be taught in-class and in-person. Learning and teaching are highly interactive and the best learning experience is possible only if we can meet together. However, it is ultimately up to the local health authorities and the University to set guidelines for when and how classes can be held, and students should be alert to and aware of any changes.

What this course is: Math 331 is a junior/senior level mathematics course for students interested in the basic and important ideas of modern mathematics. Because it is a MENU course, material will be covered in-depth and with a high level of rigor; put another way, we will come to terms with the way modern mathematicians think, work, and write. With Math 321 MENU: Real Analysis, this class is ideal and essential preparation for anyone interested in further work in mathematics and related fields, such as statistics, operations research, data analysis, or the more mathematical aspects of finance.

Topics will include:

1. Definition and basic examples of groups
2. Special types of groups: finite, abelian, algebraic, etc.
3. Subgroups, normal subgroups, quotient groups
4. Basic isomorphism theorems
5. Group actions
6. Groups as symmetries: Cayley’s Theorem
7. Structure theorems for finite groups: Lagrange and Sylow
8. Simple groups, composition series, Jordan-Hölder Theorem
9. New groups from old: semi-direct products

**Learning objectives:** Basic familiarity with key ideas in and the culture of modern mathematics. This includes, but is not limited to:

1. Mastery of the basic ideas and results of group theory.
2. Fluency in the basic prose forms of the field: definitions, examples, statements of results, and proofs.
3. Practice at collaboration. Mathematics is a highly collaborative subject.

**The Evaluation Component – Grades:** There will be one traditional timed exam, to be held in the fifth week of class. All other student work will consist of regular smaller homeworks and larger projects, spaced evenly through the quarter with the last due at the end of the exam period. **Collaboration is encouraged and desirable. In order to facilitate this students will be assigned to teams; teams will rotate, with changes occurring after the projects.** Teams may be be asked to give short presentations during the quarter.

Policies and procedures for completing projects will be available on Canvas.

**Canvas:** All class materials, including the syllabus, more detailed descriptions of class topics, all assignments including homework and the projects, further policies and procedures, and all grades will all be available through Canvas.

**Should I take this class or Math 330?** Good question. Math 330 covers some, but not all, of the same material. As a general rule, Math 331 is intended for students who want a fuller story or who have a mathematical field as a career goal. It is more challenging, but for the right student it can be very rewarding. Did you get a good grade in Math 300 and did you like linear algebra? Then try Math 331. Still not sure? E-mail the instructor, or talk to Professor Cañez, Director of Undergraduate Studies in the Mathematics Department.

**University Statements and Policies**

**Accessibility**

Any student requesting accommodations related to a disability or other condition must register with [AccessibleNU](https://www.example.com) and provide the instructor with an accommodation notification from [AccessibleNU](https://www.example.com) preferably within the first two weeks of class. All information will remain confidential. For more information, visit [AccessibleNU](https://www.example.com) or call (847) 467-5530.
Discrimination and Sexual Harassment

Northwestern University’s Policies on Discrimination, Harassment, and Sexual Harassment apply to all members of the University community, including students, staff, and faculty. Any student, staff, or faculty member who believes that he or she has been discriminated against or harassed on the basis of his or her race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, parental status, marital status, age, disability, citizenship, veteran status, genetic information or any other classification protected by law, should contact the Office of Equal Opportunity and Access at (847) 491-7458 or the Sexual Harassment Prevention Office at (847) 467-6571. Additional information about the University’s discrimination and harassment policies, including the campus resources available to assist individuals with discrimination or harassment concerns, is available online on the Human Resources Equal Opportunity and Access website.

Sexual Misconduct and Reporting

Northwestern University is committed to fostering an environment where students are safe and free from sexual misconduct. Confidential resources are available to those who have experienced sexual misconduct. Faculty and instructors are not confidential resources and are required to report incidents of sexual misconduct, whether discussed in your assignments or in person, to the Title IX Coordinator, who can provide information about resources and options. Students who have experienced sexual misconduct are strongly encouraged to talk with someone to get support. For more information, including how to request interim protective measures and academic accommodations or file a complaint, see the Get Help page.

Academic Integrity

Academic integrity is taken very seriously at Northwestern. Students are responsible for reading and understanding Northwestern’s academic integrity policies. All suspected violations of academic integrity will be reported. These include: cheating, plagiarism, fabrication, unfair advantage, unauthorized collaboration, and aiding and abetting of academic dishonesty. Students found in violation of academic integrity may receive a zero on the assignment or a failing grade for the course, and may be suspended or permanently expelled from the University. See the WCAS website on academic integrity and Academic Integrity: A Basic Guide for more information.

Resources

Students can find useful resources for safety and security, academic support, and mental and physical health and well-being at the NUhelp website and app.