Syllabus

Instructor: Yury Ustinovskiy, yu3@nyu.edu

Lectures: WWH 317, Monday, Wednesday 12:30-1:45PM

Recitations: WWH 517, Fridays 12:30-1:45PM

Office hours: WWH 827, Monday, Wednesday 11:30-12:30PM (or by appointment)

Course description

This is a course in Abstract Algebra. It will be centered on the notion of group, with examples coming from number theory, linear algebra, geometry and combinatorics. After a quick recap of the set theory, we will start with a chapter on arithmetics and congruences in order to introduce a very important example of group, $\mathbb{Z}/n\mathbb{Z}$. We will proceed with the definition of a group and derive some of its main properties. Then we will give a whole other new set of examples, called permutation groups. After that, we will introduce more advanced topics, among which cosets, normal subgroups, quotient groups.

Textbooks

Textbook is not required for this course, but Judson's *Abstract Algebra: Theory and Applications* is a good reference, and is available online at http://abstract.ups.edu

Homeworks

There are weekly written homework assignments posted on NYU classes **every Monday** due the next Monday at the beginning of the class. **No late assignments allowed**, except with a valid excuse which the instructor should be notified about in advance. One lowest score will be dropped.

Quizzes & Exams

There will be three quizzes during the recitation classes (**February 14**, **April 10** and **May 1**). There will be in-class written Midterm (**Wednesday, March 11**) and Final (**date TBA**) exams.

Grades

Grades for homeworks and quizzes will be posted on NYU Classes as soon as they become available. It is the students' responsibility to check that they correspond to the grades on the papers which are handed back to them. No homework or quiz grade change requests will be accepted three weeks after posting or after the final exam. The final grade will be computed with the following weights:

Homework 20%	Quizzes 20%	Midterm 30%	Final Exam 30%

Policy on out-of-sequence exams and missed quizzes

An excused absence for a quiz or exam requires notification to the instructor before the exam starts (unless your absence is due to an emergency situation, in which case you still need to let the instructor know about it as quickly as possible), followed by valid documentation. Otherwise, you will receive a "0" for any missed exam. We are only able to accommodate a limited number of out-of-sequence exams due to limited availability of rooms and proctors. For this reason, we may approve out-of-sequence exams 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 have your coach, conductor, or other faculty advisor contact your instructor.

- A religious holiday.

- Extreme hardship such as a family emergency.

In any case, make-up exams must occur within one week of the scheduled exam.

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

Academic Honesty

Guidelines regarding cheating and plagiarism are laid out in the Graduate School of Arts and Sciences guidelines and will be adhered to strictly. Collaboration is permitted, in fact encouraged, for home assignments; however, all submitted assignments must be written up independently and represent the student's own work and understanding. Furthermore, collaborations must be acknowledged at the top of the assignment, by naming the participants in it.

How to do well in class?

- Review the material from the previous lecture before coming to class: it is hard to follow if you don't remember what has been said last time.

- Ask questions and try to propose answers to questions asked by the instructor even if you're not sure: making mistakes is part of the normal process of learning. One remembers something very well if one got it wrong the first time.

- Please raise your hand if you think you have the answer to a question asked in class, and only answer the question if you've been prompted to do so, so as to let the others think. Not everyone has the same speed.

- Come to office hours, even if you don't think you have that many questions. You can come by anytime during the specified time range.

- This is a proof-based course. Make sure to go over each proof actively, asking yourself: what would I do if I wanted to prove this? How many steps are there, what is the structure of this proof? Why do we need to do this? Why are we done at the end? Knowing the proof of a theorem helps you get a deep understanding of the theorem itself, I therefore strongly recommend that you learn the proofs at the same time as you learn the theorems.

- Work in groups! It's much more fun doing maths with other people than on one's own.

Tentative weekly breakdown of topics

Week starting	Topics%
27/1	Introduction, reminders on set theory
3/2	Arithmetics
10/2	Group $\mathbb{Z}/n\mathbb{Z}$ and its properties
17/2*	Laws of composition, groups, subgroups
24/2	Cyclic groups, products of groups, homomorphisms
2/3	Classification of groups of small order
9/3	Review & **Midterm**
23/3	Permutation groups
30/3	Cosets, Lagrange's theorem
6/4	Subgroups of $\mathbb{Z}/n\mathbb{Z}$, Euler's theorem
13/4	Normal subgroups
20/4	Quotient groups
27/4	Symmetries of Platonic solids*
4/5	Classification of finitely generated abelian groups
11/5	Review
TBA	**Final**