

BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

SYLLABUS: MATH 46 - Abstract Algebra (4 credits, 4 hrs. per week)

Prerequisite: MTH 42 or equivalent; and CUNY English Proficiency, or ENG 100 or 110, if required

TEXT: *Abstract Algebra: theory and applications*, by Thomas W Judson. Judson

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OFFICE: *CP 311*

Lect	Topic	Day	Judson	Description
1	Set Theory	W: 1/25	1	Algebra of sets, maps, partitions.
2		M: 1/30	1	Algebra of sets, maps, partitions.
3	Integers	W: 2/1	2	Integer division, modular arithmetic and residues.
4	Groups	M: 2/6	3.1,3.2	Definition, properties and examples.
4.5	Groups and examples	W: 2/8	3.3	Examples of subgroups.
5	Subgroups	M: 2/13	4.1,4.2	Properties of groups. Powers of elements, cyclic groups.
6	Properties of subgroups	W: 2/15	3.3	Examples of subgroups.
7	Cyclic groups	Tue: 2/20	5.1	Subgroups of cyclic groups.
8	Cosets	W: 2/21	6.1,6.2,6.3	Left and right cosets. Lagrange's theorem.
9	Review. Symmetric groups	M: 2/27	5.1	Permutations, cycles and cycle notation. Transpositions, odd and even permutations, alternating group.
9.1	Symmetric groups	W: 3/1	6.2, 9.2	Conjugacy classes. Conjugacy classes in the Symmetric group.
9.2	Symmetric groups	M: 3/6	6.2, 9.2	Conjugacy classes. Conjugacy classes in the Symmetric group.
	Test 1	W: 3/8		
10	Dihedral group	M: 3/13	5.2	Representations of dihedral groups.
11	Homomorphisms	W: 3/15	10.1, 11.1	Normal subgroups and group homomorphisms.
12	Isom. Theo.I	M: 3/20	5.2	Isomorphism theorems.
13	Isom. Theo. II	W: 3/22	5.2	Isomorphism theorems.
14	Characters I	M: 3/27		Characters of finite abelian groups.
15	Characters II	W: 3/29		Characters of finite abelian groups.
16	Abelian groups	M: 4/3	13.1	Classification of finite abelian groups.
	Spring Break	M: 4/5		
	Spring Break	W: 4/10		
	Spring Break	M: 4/12		
17	Rings	M: 4/17	16.1	Introduction to rings.
18	Integral Domains and Fields	W: 4/19	16.2	Rings and the cancelation property.
19	Ring homomorphisms and ideals	M: 4/24	16.3	Homeomorphisms and kernels.

Lect	Topic	Day	Judson	Description
20	Maximal and prime ideals	W: 4/26	16.4	Factor rings.
21	Rings of Polynomials	M: 5/01		Polynomials.
22	Integral domains and field of fractions	W: 5/3	18.1	Embedding integral domains into fields.
23	Factoring Polynomials over Fields	M: 5/8		Polynomials

In abstract algebra we study sets of objects which behave more or less like numbers do. That is, they combine under operations similar to addition and multiplication, and obey certain familiar rules such as associative and distributive laws. A *field*, for example, is a set of objects that behave like the rational numbers; a *ring* behaves like the subset of integers. These objects are abstractions in the sense that operations denoted $+$ and \cdot may have nothing to do with ordinary addition and multiplication. Rings and fields are built out of simpler objects called *groups*. About $2/3$ of this course is devoted to the study of groups (Lectures 0-16).

Grading There will be two midterms counting for 35% of the grade, five homework counting for 30% of the grade and a final exam with value equivalent to 35% of the grade.

Academic Integrity

Academic dishonesty (such as plagiarism and cheating) is prohibited at Bronx Community College and is punishable by penalties, including failing grades, dismissal and expulsion. For additional information and the full policy on Academic Integrity, please consult the BCC College Catalog.

Accommodations/Disabilities

Bronx Community College respects and welcomes students of all backgrounds and abilities. In the event you encounter any barrier(s) to full participation in this course due to the impact of a disability, please contact the disAbility Services Office as soon as possible this semester. The disAbility Services specialists will meet with you to discuss the barriers you are experiencing and explain the eligibility process for establishing academic accommodations for this course. You can reach the disAbility Services Office at: disability.services@bcc.cuny.edu, Loew Hall, Room 211, (718) 289-5874.

If you test positive for COVID while taking this in-person/hybrid course:

Using your BCC email account, please email all your in-person and/or hybrid professors of your status.

- Please include your emplid # and current phone number in your email.
- Please also email us at healthservices@bcc.cuny.edu.
- Your professor will work with you to complete class work while you are in quarantine.

You will be called by a Health Services staffer. It is critical that you connect in a timely matter with this staff member for contact tracing information. You will need to submit a negative COVID test to Health Services (healthservices@bcc.cuny.edu) before you are allowed access to the campus. Your negative test result must come from your doctor or a medical provider (e.g. CityMD, Urgent Care, etc.). We will not accept a negative home test result.