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: Math 42 or permission of the instructor

TEXT: *A First Course in Abstract Algebra*, John B. Fraleigh, Addison-Wesley, 7th ed.

Section Number and Topic	**Page**	**Exercises***
0. Sets and Relations	8	13, 16, 17, 29, 32, 36 / 19#
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2. Binary Operations	25	2, 4, 5, 7-11/ 17, 19, 22, 34
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23. Factoring Polynomials over Fields	218	1-5, 9, 10, 12, 14, 16, 18, 21/ 26-28, 34

* Exercises listed before the slash (/) are required; others are recommended. # denotes a challenge.

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 (sections 0-15). Once fields and rings are defined (sections 18-19), their abstract properties can be used to prove subtle results about ordinary numbers, such as Fermat's and Euler's theorems (sections 20-21). The study of polynomial rings (sections 22-23) is the beginning of a very deep theory about the solvability of algebraic equations, called Galois theory. At the end of this course, you will have most of the tools necessary to understand this theory.

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