

Philadelphia University
Department of Basic Sciences and Mathematics

First Semester

Course Syllabus

2012/2013

Course Title Abstract Algebra (1)
Course Code 250342
Lecturer
Office Room
Office Hours
E-mail
Webpage

Course Description

This module is the first part of the Abstract Algebra two-semester series, covering standard topics in group theory: the modular integers, cyclic groups, normal subgroups, isomorphisms, permutation groups, finite abelian groups, and possibly some Sylow theorems.

Topics by the Week

Week	Topics
1	Preliminaries: Properties of Integers. Modular Arithmetic. Equivalence Relations.
2	Groups: Definition and Examples of Groups.
3	Elementary Properties of Groups. Finite Groups; Subgroups: Terminology and Notation.
4	Subgroup Tests. Examples of Subgroups.
5	Cyclic Groups: Properties of Cyclic Groups. Classification of Subgroups of Cyclic Groups.
6	Permutation Groups: Definition and Notation. Cycle Notation.
7	Properties of Permutations. Isomorphisms: Definition and Examples.
8	Cayleys Theorem. Properties of Isomorphisms.
9	Automorphisms. Cosets and Lagranges Theorem: Properties of Cosets.
10	Lagranges Theorem and Consequences. An Application of Cosets to Permutation Groups.
11	External Direct Products: Definition and Examples. Properties of External Direct Products.
12	The Group of Units Modulo n as an External Direct Product. Normal Subgroups and Factor Groups: Normal Subgroups.
13	Factor Groups. Applications of Factor Groups. Internal Direct Products.
14	Group Homomorphisms: Definition and Examples. Properties of Homomorphisms.
15	The First Isomorphism Theorem. Fundamental Theorem of Finite Abelian Groups: The Fundamental Theorem. The Isomorphism Classes of Abelian Groups.
16	Final Exams.

Course Objectives

- Students will understand the basic ideas and some applications of groups. They will be able to explain groups, factor groups as a formalization of properties of symmetry. Students will recognize mathematical objects that are groups, and be able to classify them as abelian, cyclic, direct products, etc. Students will understand homomorphism of and quotients of groups, and be able to determine when a group has a normal subgroup, or a quotient.
- Students will be able to reason mathematically, to write simple proofs, and are able to judge when an attempted proof in group theory is correct/complete or is not.
- Students will have a chance to reflect on doing mathematics, solving problems and our role and progress as mathematicians.

Assessment Distribution

Students will be assessed based on a 100 total marks, which are distributed as follows.

Exam Type	Expected Time	Points Allocated
First		20%
Second		20%
Quizzes		20%
Final		40%

Textbook and Supporting Materials

- Joseph A. Gallian, **Contemporary Abstract Algebra, 7th Edition**, Brooks/ Cole 2010. Call number in PU library: 512.02 GAL.
- John B. Fraleigh, **A First Course in Abstract Algebra, 7th Edition**, Pearson 2003. Call number in PU library: 512.02 FRA.
- Amin Witno, **Group Theory, Lecture Notes**, 2012. Required and available for free from Amin Witno Website. <http://www.philadelphia.edu.jo/math/witno/index.htm>

Class Attendance

Attendance is expected of every student. Being absent is not an excuse for not knowing about any important information that may have been given in class. Under the University's regulations, a student whose absence record exceeds 15% of total class hours will automatically fail the course. Students who in any way disrupt the class will be expelled from the classroom and will not be allowed to return until the problem has been resolved.

Late Exams

Late (make-up) exams will be given only to students who have a valid excuse and are able to provide a written document for its verification. The level of difficulty of a late exam is about 50% higher than that of the corresponding regular exam. All late exams will be

conducted during the last week of the semester. Each student is allowed only one make-up in a semester, either for the first exam or the second, but not both. There is no make-up for a late exam.

Dishonesty

Any form of dishonest conduct will be strictly punished. A student who is caught cheating, or attempting to do so in an exam will be given a zero for the exam and a report will be written to the Dean for further action. A student who helps another student or is seen communicating with another student in an exam will be given the same penalty stated in the previous point. Students with different exam forms are not exempt from the above rules. Repeat offenders will be expelled permanently and banned from future courses.