Syllabus - Math 345: Abstract Algebra I

Department of Mathematics
Millersville University

Description

Math 345 is an introduction to the elementary theory of groups and rings.

This course may be taken for general education credit (G2).

Prerequisites

A C- or better in both Math 310 and Math 322.

Objectives

The student will:

Demonstrate an understanding of the basic structures of abstract algebra: Groups, subgroups, abelian groups, finitely generated abelian groups, permutation groups, normal subgroups, quotient groups, group homomorphisms and isomorphisms, rings, integral domain, fields, polynomial rings.

Write proofs in the context of abstract algebra.

Demonstrate an appreciation for the axiomatic development of modern mathematics, as exemplified by algebraic structures.

Assessment

Students will demonstrate their understanding through work in class, homework, and examinations.

Course Outline

Groups

Subgroups

Homomorphisms

Divisibility

Greatest common divisors

The Euclidean algorithm

Prime numbers and congruences

Modular arithmetic

Cyclic groups

The unit group of the integers mod n

Permutation groups

Direct products

Finitely generated abelian groups

Cosets

Normal subgroups

Quotient groups

The First Isomorphism Theorem for groups

Rings

Integral domains and fields

Ring maps and ideals

Polynomial rings

Quotient fields

Quotient rings

The First Isomorphism Theorem for rings

Recent Texts

Judson, Thomas, *Abstract Algebra* (2015 edition). Self published - freely available online.

Gallian, Joseph, *Contemporary Abstract Algebra* (8th edition). Brooks and Cole, 2012.

Revised: January 28, 2016