Philosophy Statement for Math 432: Introduction to Abstract Algebra (Formerly Math 333)

Catalog Description

The definitions and properties of groups, rings, and fields are studied. Properties of familiar number systems are exhibited as special cases of these more general and abstract systems.

Offered Fall 3 Semester Hours Prerequisite: Math 315

Purpose

The purpose of this course is to continue the study of algebraic systems begun with vector spaces in Math 315, but raising the level of abstraction and generalization. This course provides the students with substantial experience in abstract mathematical reasoning, and a better understanding of our familiar number systems and elementary algebra.

Major topics

Groups: Cyclic groups, abelian groups, subgroups, isomorphisms, integers modulo n, permutation groups.

Rings: Integral domains, fields.

Approach

For many students, this course is more abstract than any they have previously experienced. It is important that much class time be spent on discussing and clarifying important definitions, concepts, and theorems. The more examples, the better. Students should develop the skills of verifying properties and producing counterexamples. The analysis and construction of simple proofs is important, though not to be overdone. Emphasis should be placed on learning to think mathematically, seeing relationships and consequences, and communicating them clearly and conclusively.

Clientele

Mostly junior and senior mathematics majors, with a few graduate students. Note that students should have had Math 300 and be familiar with sets, relations, functions and methods of proofs, including mathematical induction. This course is required in both the Liberal Arts and teacher education programs; secondary education students in mathematics must complete this course, at the latest, concurrently with Practicum.

Fall 2008

Course outline for Math 432: Introduction to Abstract Algebra

Text: Thomas W. Hungerford. **Abstract Algebra: An Introduction**
Saunders College Publishing, Second Edition, 1997

	# of Weeks (Estimated)
Chapter I Arithmetic in Integers	**.5**
Quickly review principal results in:	
Sec 1.1 Division Algorithm	
Sec 1.2 Divisibility	
Sec 1.3 Primes & Unique Factorization	
Chapter II Congruence & Modular Arithmetic	**2.5**
Cover all sections:	
Sec 2.1 Congruence & Congruence Classes	
Sec 2.2 Modular Aritmetic	
Sec 2.3 Structure When Prime	
Chapter III Rings	**5**
Cover all sections:	
Sec 3.1 Definitions & Examples	
Sec 3.2 Basic Properties	
Sec 3.3 Isomorphism & Homomorphism	
Chapter IV Arithmetic in F[x]	**1**
Survey quickly the principal results in:	
Sec 4.1 Polynomial Arithmetic	
Sec 4.2 Divisibility in F[x]	
Sec 4.3 Irreducibles & Unique Factorization	
Sec 4.4 Polynomial Functions, Roots & Reducibility	
Sec 4.5 Irreducibility in Q[x]	
Sec 4.6 Irreducibility in R[x] & C[x]	
Chapter VII Groups	**4**
Cover Sec 7.1 Definitions & Examples:	
Sec 7.2 Basic Properties	
Sec 7.3 Subgroups	
Sec 7.4 Isomorphism & Homomorphism	
Sec 7.5 Congruence & Lagrange's Thm	
Sec 7.6 Normal Subgroups	
Sec 7.7 Quotient Groups	
	13 Lectures
	+ 1 Exam
	14