Salisbury University Department of Mathematical Sciences

MATH 441/561 : Abstract Algebra I
Syllabus (Tentative)

Description: Introduction to the theory of groups, rings, integral domains and fields, including basic properties of polynomials. 4 Hours Credit: Meets four hours per week. Meets General Education IVB or IVC.

Prerequisites: C or better in MATH 210 or MATH 306 (both recommended).

Intended Audience: All majors in the mathematical sciences and any students who wish to pursue graduate study in mathematics or its applications, physics or computer science.

Objective: To develop the foundations for modern algebra. The primary focus will be on constructing proofs and writing in mathematics. The standard theory of a first semester algebra course will be presented.

Textbooks: *Abstract Algebra: An Introduction*, 3rd Edition by Thomas W. Hungerford

Topic	Weeks
Basic Notions	1
Sets, functions; binary operations; modular arithmetic.	
Rings	3
Mathematical theory of a rings, subrings, integral domains, fields, and division ring; interconnections between these algebraic structures; commutative and noncommutative rings; zero divisors; characteristic and other fundamental ring theoretic topics.	
Polynomials	2.5
Polynomials; the division algorithm; factorization; units; associates; unique factorization domains.	
Ideals and Quotient Rings	3
Ring homomorphisms; ideals; quotient rings; homomorphism theorem for rings; quotients of polynomial rings.	
Groups	3.5
Definition; elementary properties including cancellation laws, uniqueness of the identity and inverses; unique solvability of linear equations; subgroups and subgroup tests; orders of elements; cyclic groups; modular systems; abelian groups; permutation groups, including the alternating and symmetric groups, cycle notation, and transpositions; dihedral groups and applications to symmetry.	
Tests	1
Total	**14**

Evaluation

Tests	30 – 40%
Homework	30 – 40%
Final exam	20 – 30%

- Graduate students will be assigned special homework/test problems or projects.
- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.
- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help

you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**

- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.