

Class meetings: Monday, Wednesday, and Friday, 2:35 p.m. – 3:45 p.m., PPHAC 235

Instructor: Alicia Sevilla

Office: PPHAC 217

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Office hours: Monday, Wednesday, and Friday, 11:30 a.m.- 12:50 p.m. and by appointment.

Course Prerequisites: This course has for prerequisite Math 216 and assumes familiarity with basic methods of mathematical proof.

Textbook : *Abstract Algebra: A First Undergraduate Course*, fifth edition, by Abraham Hillman and Gerald Alexanderson, Waveland Press, Inc., 1994

Course Goals: After successful completion of this course, you are expected to:

- understand and be able to work with the basic concepts and definitions in group and ring theory
- have improved your skills at writing and reading mathematical proofs
- be prepared for future study in the area of abstract algebra, or other higher level mathematics
- have some knowledge about applications of abstract algebra

Course Content: This course is an introduction to the modern, abstract approach to the problems of algebra. We will cover most of chapter 1 of the textbook as a review; then we will cover most of chapter 2, and selected sections of chapters 3, 4, 5 and 8.

Topics to be covered include:

Review of basic properties of the integers: mathematical induction, multiples and divisors, primes, the division algorithm, common divisors, Euclid's algorithm, common multiples.

Groups: permutations, abstract groups, subgroups, cyclic groups, groups of permutations, groups of symmetries, alternating groups, cosets of a subgroup, quotient groups.

Sets and Mappings: mappings, group isomorphisms, group homomorphisms, Cayley's theorem.

Rings and Fields: rings, ring homomorphisms and ideals, congruence in the set of integers, the Euler and Fermat theorems, integral domains, fields, matrices and quaternions.

Polynomials: polynomial extensions of rings, polynomials over a commutative ring, divisibility in commutative rings, polynomial functions.

Some applications to coding: binary codes, matrix codes, a hamming code, modular codes, trapdoor functions (as time permits.)

Attendance: Class attendance is required. Students are responsible for all work covered in class and all assignments, even if absent from class. If a student must miss more than one class due to illness or

emergency, the instructor should be notified. In-class exams must be taken at the announced time; make-up exams will be given only in case of extreme emergency or serious illness.

Homework Assignments: Daily reading and writing assignments will be given. You are expected to complete all assignments when due and to come to class prepared to answer and ask questions. Some assignments (you will know in advance which ones) will be collected and graded. For ungraded written homework assignments, you are encouraged to work with other students, but all work to be handed in for grading must be done individually. The Academic Honesty Policy guidelines for Mathematics courses, which are copied at the end of this document, are to be followed.

Graded assignments **must be turned in by 4 p.m. on the date due to be graded without penalty**. No assignment will be accepted after graded papers have been returned to the students.

Projects: Each student will write a paper and make a 10-minute class presentation on a modern algebra topic chosen by the student and approved by the instructor. You must notify Dr. Sevilla of the choice of topic by **November 12**. The paper is due **November 30**. In class presentations will take place during the last week of classes.

Examinations: There will be three in class exams and one cumulative final examination. The days of the in-class exams are as follows.

Monday, September 24 Wednesday, October 24 Monday, November 19

The final exam for this class is scheduled for **Wednesday, December 12 at 8:30 a.m.**

Grading:

Graded homework	20%
Class participation (including showing solutions to daily homework assignments)	10%
In-class exams	40 %
Project (paper and presentation)	10%
Final exam	20%

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Help: You are encouraged to see Dr. Sevilla during office hours or to arrange an appointment for extra help when needed.

Accommodations: Students who wish to request accommodations in this class for a disability should contact Elaine Mara, assistant director of learning services for academic and disability support, at 1307 Main Street, or by calling 610-861-1510. Accommodations cannot be provided until authorization is received from the Academic Support Center.

Note: *This syllabus is a guideline for the course. It may be necessary to make changes during the semester. I will announce any changes in class.*

ACADEMIC HONESTY POLICY GUIDELINES

MATHEMATICS COURSES

The Mathematics and Computer Science Department supports and is governed by the *Academic Honesty Policy of Moravian College* as stated in the Moravian College Student Handbook. The following statements will help clarify the policies of members of the Mathematics faculty.

In all homework assignments that are to be graded, you may use your class notes and any books or library sources. When you use the ideas or thoughts of others, however, you must acknowledge the source. For graded homework assignments, you may not use a solution manual or the help, orally or in written form, of an individual other than your instructor. If you receive help from anyone other than your instructor or if you fail to reference your sources you will be violating the *Academic Honesty Policy of Moravian College*. For homework that is not to be graded, if you choose, you may work with your fellow students. You are responsible for understanding and being able to explain the solutions of all assigned problems, both graded and ungraded.

All in-class or take-home tests and quizzes are to be completed by you alone without the aid of books, study sheets, or formula sheets unless specifically allowed by you instructor for a particular test.