math 228

Instructor: **I. E. Leonard**
Office: CAB 679
Telephone 492-2388
Office hours: MTWR 11:00-11:30
Email: isaac@math.ualberta.ca
Web: http://www.math.ualberta.ca/~isaac

Text: *Abstract Algebra, An Introduction*, 2nd Edition
by Thomas W. Hungerford.

Schedule:

Event	Date
First class	Monday, May 7
Victoria Day	Monday, May 21 (no classes)
Midterm Test	Friday, May 25
Last class	Wednesday, June 13
Final Exam	**Thursday**, June 14, 11:30–13:30
Deferred Final Exam	Date and location to be announced

Note: Lectures are in CEB 326 from 09:00 until 10:10.
The deferred final exam is not an option, but is intended to accommodate those who have a legitimate reason for missing the final exam, for example, due to illness.

Assignments: There will be four assignments to be handed in. Most assignments will have from 8 to 12 questions, and all questions will be worth 10 points. Questions that are not submitted will be given a grade of 0. You will have about 5 to 6 days to complete each assignment. Completed assignments should be deposited into the appropriate assignment box on the 3rd floor of CAB **before 4:00 pm** on the due date.

You are encouraged to discuss your assignments and homework with other students. Do not plagiarize another student's assignments (the penalty is severe).

As well as assignments to be handed in, there will be work (e.g. reading) that you will be expected to do in order to be prepared for the lectures.

Solutions to all assignments will be posted on my web page (*not* WebCT), and you may need Adobe Reader to view and print them. If you have difficulty accessing the web page, please let me know.

Course summary: The course covers Chapters one through six, and Chapter nine in the text as well as the material in the Appendices.

Chapter 1 demonstrates the spirit and background of the course. It is an introduction to the basic properties of the integers.

Chapter 2 is about modular arithmetic in the integers and provides a introduction to the abstract notions needed in the next chapter.

Chapter 3 is about rings which are mathematical structures modeled on the properties of the integers. Here we discuss arithmetic and algebra in rings and give numerous, and familiar, examples of mathematical structures that are rings.

Chapter 4 introduces the familiar notion of a polynomial with coefficients in a ring or a field and studies the arithmetic and algebraic properties of rings of polynomials. Again, numerous, and familiar, examples are given.

Chapter 5 continues the analogy between the ring of integers and the ring of polynomials with coefficients in a field. The concepts of congruence and congruence class arithmetic are almost identical.

Chapter 6 extends the concept of congruence to arbitrary rings and introduces the concepts of ideals and quotient rings.

Chapter 9 covers arithmetic in integral domains similar to the arithmetic we studied in the ring of integers and the ring of polynomials with coefficients in a field.

Marking Breakdown:

Homework:	15%
Midterm test:	35%
Final exam:	50%

Grading:

Grade	Percent	Grade	Percent
A+	95 – 100	C+	65 – 69
A	90 – 94	C	60 – 64
A−	85 – 89	C−	55 – 59
B+	80 – 84	D+	50 – 54
B	75 – 79	D	45 – 49
B−	70 – 74	F	0 – 44

Calendar Description:

Math 228 Algebra: Introduction to Ring Theory

Integers. Mathematical induction. Equivalence relations. Commutative rings, including the integers mod n, complex numbers and polynomials. The Chinese remainder theorem. Fields and integral domains. Euclidean domains, principal ideal domains and unique factorization. Quotient rings and homomorphisms. Construction of finite fields. Applications such as public domain encryption, Latin squares and designs, polynomial error detecting codes, and/or addition and multiplication of large integers. Prerequisite: MATH 120 or 125 or any linear algebra course. Note: This course cannot be taken for credit if credit has already been obtained in MATH 128 or 223.

Code of Student Behavior: The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behavior and avoid any behavior which could potentially result in suspicion of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Policy about course outlines can be found in Section 23.4(2) of the University Calendar.
Students who require accommodations in this course due to a disability affecting mobility, vision, hearing, learning, or mental or physical health are advised to discuss their needs with Specialized Support and Disability Services, 2-800 Students' Union Building, 492-3381 (phone) or 492-7269 (TTY).