COURSE INFORMATION
MATH 2231 – Ring Theory
Fall 2009

The goal of this course is to introduce *rings*, an abstract algebraic structure. We will learn the basic language of rings, as well as some of the fundamental theorems that describe the structure of rings. The other aim of this course is to teach students how to write mathematical proofs.

Time	MWF 10:30 - 11:30
Place	Ryan Building 1044
Instructor	Adam Van Tuyl
	Office: RB 2015
	Office Hours: TBA
Text	*Abstract Algebra: An Introduction (2nd Edition)* by T. Hungerford
Email	avantuyl@lakeheadu.ca
Web Page	http://flash.lakeheadu.ca/∼avantuyl/courses/2009_math2231.html

Contact Information. The best way to get a hold of me is via email. Because the class is small, instead of posting news to the web page, I will contact the class via email. Homework assignments, however, will be posted to the web.

Outline. We will cover the following sections of Hungerford's book:

Chapter 1 - Arithmetic in $\mathbb{Z}$
Chapter 2 - Congruence and Modular Arithmetic
Chapter 3 - Rings
Chapter 4 - Arithmetic in $F[X]$
Chapter 5 - Congruence in $F[X]$
Chapter 6 - Ideals and Quotient Rings
Chapter 12 - Public-Key Cryptography

The evaluation is composed of three components.

1. Homework (40%) There will be a homework assignment given out about every week and a half. The due date of the assignment will be given when the assignment is handed out. This information will also be available on the web. All of the homework questions (with some possible exceptions) will be taken from the text book. The text book divides questions into two types of problems:

Type A These exercises review the concepts and definitions introduced in the section. Type A exercises will be marked out of 2 points as follows:
   2 pts Near perfect or perfect solution. A near perfect solution is a solution that is correct up to the final stage with possible mistake or sign error at the last step.
   1 pt The solution shows some of the needed ideas, but fails to have the final solution.
   0 pts Little or no progress is made toward the solution.

Type B These exercise usually involve proving statements using the results and concepts of the corresponding section. The majority of problems assigned will be Type B exercises. These exercises will also be graded on how the proof has been written. These problems will be graded out of 5 points as follows:
   5 pts A correct solution and a well written proof.
   4 pts Most of the required ingredients are present, but there are a few technical problems with the solution.

3 pts Some of the needed ideas are present. However, the solution either lacks the final conclusion or has some problems in the exposition.

2 pts The proof has at most one or two of the needed ideas and/or the proof is poorly written.

1 pt An attempt at the solution has been made, but there is a major flaw in the logic of the proof, or the proof is not well written.

0 pts Little or no progress is made toward the solution.

An exercise that receives a mark of 3 or less can be rewritten and submitted for a new grade. A remarked exercise will receive a maximum of 4 points. For example, if on your first submission of an exercise you receive 2 points out of 5, you can rewrite the exercise (using the suggestions I gave you) to attain a higher mark. However, the maximum you can now receive on this exercise is 4 out of 5. A rewrite can be done at anytime (until the last day of class) and at most one time for any specific problem. When handing in a re-write assignment, you must include the original assignment so I can compare the two, and more importantly, up-date your mark!

Homework Presentation: Since an important part of this course is learning how to write proofs, I am going to be very picky about your write up. In particular, you must use the following guidelines when writing your solutions:

- Always write out the question before giving the proof or answer.
- Use only **one** side of the paper, and write on every other line. This will give me plenty of room to write comments.
- Homework **must always be stapled** together, and must include your name and homework assignment number.

Homework will have 10 points deducted for every day (weekday) that it is late, and if any of the above style guidelines are not meet.

2. Readings (5%) An important mathematical skill is to be able to read mathematics independently. To encourage this skill, before each class you will be required to read the material we will discuss in class. At least twenty-four hours before each class, you must send me a question you had about the reading (e.g., what you didn't understand). I will then post one or two questions on the class webpage (without your name), or take up common questions in class. Your mark is based upon participation – if you remember to send me a question before every class, you will receive full marks.

3. Exams (Midterm 20%, Final Exam 35%) There will be one test and a final exam. A detailed handout describing the test (resp. exam) will be given near the test (resp. exam) date.

4. Bonus (up to 5%) Throughout the semester, the department holds talks from visitors. Recieve an extra percent (up to 5%) for every talk you attend.

Class Policies Although attendance is not mandatory, I would appreciate the fact that you show up on time if you do decide to come to class. It is your responsibility to make up missing material. Also, please turn off your phone while in class.

Exams and tests must be taken on the date assigned.

Important Dates

Sept. 10, 2009 – Classes Begin
Oct. 12, 2009 - Thanksgiving (no classes)
Oct. 30, 2009 - MIDTERM
Nov. 6, 2009 - Last day to withdraw without penalty
Dec. 3, 2009 - First semester classes end
Dec. 7-19, 2009 - Final Exams