COURSE INFORMATION: MATH 2233 – Group Theory (Winter 2008)

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

Time	MWF 9:30-10:30
Place	Ryan Building 1045
Instructor	Adam Van Tuyl
	Office: RB 2015
	Office Hours: M 2:30-3:30 and W 3:30-4:30
Text	*Abstract Algebra: An Introduction* by T. Hungerford (2nd Edition)
Email	`avantuyl@sleet.lakeheadu.ca`
Web Page	`http://flash.lakeheadu.ca/~avantuyl/courses/2008_math2233.html`

Contact Information. The best way to get a hold of me is via email. Because the class is small, I will usually contact class members via email if there is news or changes.

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

Chapter 7	Groups
Chapter 8	Topics in Group Theory

We will cover every section of Chapters 7-8. I expect you to read over each section before you attend class.

The evaluation is composed of three components.

1. Homework (35%) A homework assignment will be given out every week on Friday. It will be due the following Friday at the beginning of class. 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 to the solution has been made, but there is a major flow 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 an remarked 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. Exams (Midterm 20%, Final Exam 35%) There will be one test and a final exam. I will give more details about the tests nearer to the test dates.

3. Presentations 10% For more details on this, see next sheet.

Class Policies. Though attendance is not mandatory, I would appreciate the fact that you show up on time if you do decide to come to class. I highly recommend that you do come to class. Some of the topics can be quite complicated.

Exams and tests must be taken on the date assigned.

Important Dates.

Jan. 7, 2008 – Classes begin

Feb. 18-22, 2008 – Reading Break (no classes)

Feb. 27, 2008 – Midterm (subject to change)

March 21-24, 2008– Easter Break (no classes)

March 30-April 4, 2008 – Presentations

April 8, 2008– Second semester classes end

April 11-24, 2008 – Final Exams

As part of your mark, you will be asked to give a presentation (plus write up) on a topic in group theory not covered in class. This presentation will be worth 10% of your final mark. The following sheet will guide you through this project.

TOPIC: You must pick a topic in group theory not covered in class. You can decide to either discuss a special theorem (e.g., the Butterfly theorem), a special class of groups (e.g., monster groups), or a result that uses group theory to solve a problem. A good place to get your feet wet is the wiki page:

`http://en.wikipedia.org/wiki/List_of_group_theory_topics`

Or you could try in the library. Check out journals like the American Mathematical Monthly, or the Mathematics Magazine, or the College Math Journal. In fact, the last two can be searched at:

`http://www.math.hmc.edu/journals/journalsearch2/`

Find something that interests you. Please note that all topics need to be cleared with me first. When you come to clear the topic with me, you must show me what resources (journals, textbooks, web pages, etc.) that you plan to use.

PRESENTATION: You are required to give a 10-15 minute presentation on your topic. Please keep this mind when picking your topic. Your goal is to explain to the other students in the class the main points of your topic. Note that you are not limited to using the chalkboard. If you feel a Power-point presentation (or interpretative dance!) would be better, please do so. However, I will need to know about any A/V needs in advance. Presentations will be graded upon your knowledge of the material, your delivery, and your ability to handle questions.

WRITE UP: You will also be required to write up a summary of your main topic. This summary should be two-three pages (about 500-750 words) and it is required to be typed. The write up will be due about a week and a half before your presentation. Copies will be distributed to members of the class. Written work will be graded upon the the mathematical content, as well as the clarity of exposition.

As part of your write up, you will need to include correct mathematical references. Here are some samples. The first is for a journal, the second is for a book:

1. A. Van Tuyl, The defining ideal of a set of points in multi-projective space. J. London Math. Soc. (2) **72** (2005), 73–90.
2. R. H. Villarreal, *Monomial algebras.* Marcel Dekker, Inc., New York, 2001.

Web pages are a little bit more complicated. For a complete list of possibilities, see:
`http://www.virtualsalt.com/mla.htm`

TIME-LINE: The following schedule will be used:

Feb 29, 2008 – Topic picked, with evidence of references, cleared by me.

March 19, 2008 – Write up on topic is due.

March 30-April 4, 2008 – Presentations (3-4 per class).

GRADING: You will be graded on this presentation as follows:

10% Topic picked on time, with references.

45% Write up.

45% In-class presentation.

You will lose 10% per day for every day you miss a deadline.