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COURSE INFORMATION  
MATH 4301 – Honours Seminar on Galois Theory  
Winter 2005

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The topic of this semester's Honours Seminar is Galois Theory. Galois Theory is a beautiful topic in mathematics that connects the study of groups with solutions to polynomial equations. In fact, one of the main applications of Galois Theory is to prove that an arbitrary quintic polynomial (a polynomial of degree 5) can not be solved using radicals. As well, Galois Theory was used to finally show the impossibility of various questions put forward by the Greeks, e.g., squaring the circle. The goal of this course is to introduce the basics of Galois Theory and to work our way through these wonderful results.

Since this is an Honours Seminar, I will be encouraging you to learn the material in an independent manner. As a result, some of your mark will be based on in class presentations.

I. Class Information.

Time            TTh 10:00-11:30  
Place            Ryan Building 2042  
Instructor      Adam Van Tuyl  
                    Office: RB 2015  
                    Office Hours: TBD  
Text             *Galois Theory (Third Edition)* by Ian Stewart  
                    As another source of information, you can use  
                    *Abstract Algebra (2nd Edition)* by T. Hungerford. The relevant chapters are  
                    Chapters 10, 11, and 15.  
Email            avantuyl@sleet.lakeheadu.ca  
Web Page        [http://flash.lakeheadu.ca/~avantuyl/courses/2005\\_winter\\_math4301.html](http://flash.lakeheadu.ca/~avantuyl/courses/2005_winter_math4301.html)

II. 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.

III. Outline. Our goal is to cover the first 15 chapters of Stewart's book. If time, we will also look at Chapter 24.

IV. Evaluation. The evaluation is composed of the following components.

1. **Tests (50%)** There will be two tests, each worth 25%. There will be no final exam. The second test will not be cumulative. I will give you the exact dates of the tests later.

2. **Homework (30%)** The best way to learn mathematics is by doing mathematics. I will assign questions from each chapter of the text book. For this class, instead of individual assignments, I will expect you to work together as a group to produce one solution set to the problems. It will be up to you to divide the work among yourselves and to make sure you understand all the material. I may ask you to present your solution, so be prepared.

Depending upon the difficulty level, a question will be graded out of 2 or 5 points. The points will be awarded as follows:

An exercise out of 2 points will be graded 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.

Exercises worth 5 points 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.

Here is my rewrite policy:

- 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. A rewrite can be done at anytime (until the last day of class) and at most one time for any specific problem.
- No late assignments will be accepted.

All homework should conform to the following style:

- 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.

3. Class Lectures (15%) Another excellent way to learn mathematics is to teach it. You will therefore be required to give lectures on some material on the text. I will tell you at least a week in advance what you will be responsible for. As well, I hope to have some days where we have problem days; I will ask you to present one or two solutions from the homework assignment.

4. Colloquiums (5%) Since you are in the Honours program, I expect you to attend all the colloquiums and talks given within the department. You will loose 1% for every talk you miss without a resonsible excuse.

## V. Important Dates

Jan. 4, 2005 – Classes Begin

Feb. 8, 2005 – Final date for course withdrawal with academic penalty.

Feb. 14-18, 2005 – Reading Week (No class)

April 4, 2005 – Classes End