Math 417
Spring 2010
Course Information Sheet

Course Description: The basic idea of Abstract Algebra is to study a set endowed with an *algebraic structure*, i.e., a method for combining elements. In Math 310, you studied rings. In this course, we will concentrate on groups. There are fewer axioms for groups than there are for rings (and only one operation instead of two), so on the surface, it may seem like groups would be easier to understand. However, fewer rules allow for a greater diversity of behavior, and the absence of a second operation (with the accompanying distributive law) seems to make things less intuitive for beginning students.

Why study abstract algebra? One of the great advantages of studying mathematics is that it helps one develop the ability to handle abstract ideas, and no subject is better suited to cultivate this ability than algebra. Further, there are many applications of abstract algebra. For example, you may have seen the applications of rings and fields to cryptography and coding theory already. Groups allow us to formalize the symmetries of an object, and applications of this idea range from the physics of boiling water in a microwave oven to the insolvability of a general polynomial of degree 5 or greater.

Instructor: Prof. Tom Marley

Office: Avery 305. Office hours will be 2:30-3:30 on Mondays and 9:30 -11:00 on Thursdays.

Email: `tmarley@math.unl.edu` This is the most reliable way to reach me, and is, in particular, much better than phone messages.

Text: *Contemporary Abstract Algebra* by Joseph A. Gallian (Sixth or Seventh Edition)

Syllabus: As mentioned above, the course will concentrate on group theory. I expect we'll cover most of Chapters 1–11 and selected topics from Chapters 24–30.

Homework: There will be two kinds of homework: daily exercises and weekly (or sometimes biweekly) problem sets. The exercises will not be collected or graded, but your are expected to do them and be prepared to discuss them the following class period. The weekly problem sets will be collected and graded.

Many of the problem sets will include problems that require the use of GAP, a computer system designed for computational group theory. You can use GAP in the math department's computer lab using your university computer account, or you can download it for free from

`http://www.gap-system.org`

Many of the problems will be taken from the lab manual "Abstract Algebra with GAP" by J. Rainbolt and J. Gallian. It's available online for free at

`http://euler.slu.edu/Dept/Faculty/rainbolt/manual.html`

Exams: There will be three exams — two midterms and a final. The two midterms will be a two-hour evening exams (this will also make-up for the first week of classes). The date and time for the midterms will be set at least two weeks prior to the exams. The final will be during our assigned Final Exam Period: 10:00–12:00 noon on Friday, May 7. (Note that we have the option of moving this to another time during finals week if we can find one that is "mutually agreeable to all concerned". We will discuss this option in early February.)

Rules and Expectations: Here are some of the expectations I have for your problem sets.

- Although you are encouraged to work together on the homework and problem sets, you should not turn in anything you do not understand.
- Give justification (in complete sentences!) for your answers.

- Take pride in your work. This means, for example, that you should write legibly on full sheets of paper with no fringe. Typed solutions are also, of course, acceptable. If you choose to type, I strongly recommend using (La)TeX, especially if you are thinking about going to graduate school.
- Turn in the problems in order, with the problems clearly labeled.
- Only use one side of each sheet of paper, especially if you write in ink.
- If you turn in more than one sheet of paper, staple your assignment together.
- Put your name (first and last, written legibly) in the top right-hand corner of every page you turn in.
- Be academically honest. This means, for example, providing a list of the people (if any) with whom you worked on the assignment; providing a list of sources other than the textbook (if any) that you used to do the assignment; stating clearly that you're copying or mimicking a proof from the book in order to do the assignment (if appropriate).
- All assignments are due at the beginning of class. Problem sets may be accepted late under certain circumstances, but late problem sets will be penalized.

Grades: Grades for the course will be computed as follows:

Problem Sets	35%
Midterms	40%
Final	25%
Total	100%

Obligatory ACE Syllabus Statement: This course satisfies ACE Outcome 10. The collective body of your problem sets will be a scholarly product that requires broad knowledge, appropriate technical proficiency, information collection, synthesis, interpretation, presentation, and reflection.