# Math 417: Introduction to Modern Algebra I
# Spring 2011
# 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.

**ACE:** 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.

**Instructor:** Dr. Susan Cooper

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> *Office Hours:* Tuesdays 10:00 a.m. – 11:00 a.m. & Wednesdays 1:30 p.m. – 3:00 p.m.,
> or by appointment
> *Correspondence:* The most reliable way to reach me is via email.

**Class Times and Location:** TR 12:30 p.m. – 1:45 p.m., Avery Hall – Room 112

**Text:** *Contemporary Abstract Algebra* by Joseph Gallian (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.

**Course Web Page:** `http://www.math.unl.edu/∼scooper4/math417.html`
We will also be using *Blackboard* which can be found at `http://my.unl.edu`.

**Homework:** The best way to learn mathematics is by doing mathematics. There will be two kinds of homework: Daily Exercises & Readings and weekly (or sometimes biweekly) Problem Sets. The Daily Exercises will not be collected or graded, but you are expected to complete them and be prepared to discuss them the following class period. The weekly Problem Sets will be collected (usually on Thursdays) and graded. Note that there will be a Problem Set due during dead week.

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 Mathematics 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 on-line for free at

> `http://math.slu.edu/∼rainbolt/manual2.html`

**Participation:** We all learn by doing. The beginning of most class periods will be spent going over homework, with students presenting their solutions at the board. You are expected to participate in this. *In order for this class to be successful, it is imperative that you commit to coming to class, that you commit to coming to class prepared, and that you commit to participating in class!*

**Classroom Atmosphere:** In doing mathematics, or almost anything worth doing, one is going to make many errors and false starts while becoming more proficient. Think, for example, of learning to play a musical instrument or learning an athletic skill. We want to establish a classroom atmosphere where the inevitable false starts and mistakes become an opportunity to learn and to get better – not an opportunity for embarrassment. Thus, please be constructive and polite in questioning your colleagues in class.

**Midterm Exams:** There will be two midterm exams. These tests will be two-hour evening exams (in exchange for two in-class meetings, dates to be announced). Details for the midterms will be set at least two weeks prior to the exams and will take place during the following weeks:

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| Exam 1 | Week of February 14 |
| Exam 2 | Week of April 4 |

**Final Exam:** The final exam will be during our assigned Final Exam Period: 10:00 a.m. – 12:00 noon on Friday, May 6. (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 Problem Sets, you should not submit anything that you do not understand. I will assume that you will adhere to the UNL Policy on Academic Honesty.
- Give justification (in complete sentences!) for your answers.
- The material you submit should be self-contained. In particular, you should be able to look at it again a month later and understand what is on the paper.
- 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 submit more than one sheet of paper, staple your assignment together.
- Put your name (first and last) in the top right-hand corner of every page you submit.
- 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 complete the assignment; stating clearly that you're copying or mimicking a proof from the book in order to complete 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.
- As part of the ACE program, you must keep all of your graded work in a portfolio so that selected samples of work can be shared with the Department Undergraduate Advisory Committee.

**Grading:** Final grades will be determined as follows:

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| Problem Sets | 35% |
| Midterms | 20% each |
| Final Exam | 25% |
| Total | 100 % |

**Mathematics Department Grading Policy:** Students who believe their academic evaluation has been prejudiced or capricious have recourse for appeals to (in order) the instructor, the department chair, the departmental appeals committee, and the college appeals committee.

**Students with Disabilities:** Students with disabilities are encouraged to contact me for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska–Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 402-472-3787 voice or TTY.