Professor: David McClendon (2046 ASC, phone x2574 (231-591-2574 off campus), hours 1-2 MW, 12-1 TR or by appointment, email: mcclend2@ferris.edu)

Lectures: TR 9:30-10:45 in Starr 134.

Web: I maintain a personal web page at http://mcclendonmath.com/420.html; there's not much here yet because I've never taught this course.

Required Materials:
1. My lecture notes, which will be distributed in class (bring them every day).
2. The textbook *Elements of Algebra* by J. Stillwell, ISBN 978-0387942902 (you do not need to bring this to class)

Recommended Materials:
1. Colored pens or pencils (for better note-taking).
2. A three-ring binder for the lecture notes and other handouts.

Prerequisite: C- or better in Math 324 (you need this primarily for exposure to mathematical language and proof techniques; if you had 324 from me, we'll repeat some of the content early in the semester).

Course material: Abstract algebra (groups, rings, fields, and some basic number theory).

Learning outcomes: After completing Math 420, it is my hope and expectation that students will be able to solve problems and write proofs involving these topics:

1. binary algebraic structures, groups and subgroups;
2. cyclic groups, generating sets and permutation groups;
3. cosets, direct products and homomorphisms;
4. rings, integral domains and fields.

Grading policy: Homework: 30%. Participation/attendance: 8%. Chapter quizzes: 7%. Midterm exams (three of them): 15% each. Final exam: 10%. Grades will be curved at the end of the semester, but an average of 90% guarantees you at least an A-, an average of 80% guarantees you at least a B-, etc.

Attendance policy: I have no formal attendance policy. That said, **nothing** is more correlated with strong performance in my classes than attendance in lectures.

Homework: There will be regular homework assignments distributed in class, usually due on Tuesdays. You can turn in homework in class or by putting it in the slot next to my office door marked "Math 420". I will grade homework problems both for correctness and "aesthetics" (i.e. neatness, grammar, correct use of notation, etc.), but you get only one overall grade on each homework problem.

Many of the homework questions are meant to be challenging! In advanced math classes, you learn not only from lectures but by thinking about difficult homework problems. If you get stuck, come to office hours and ask questions, or ask a classmate.

Redoing homework: Throughout this course, I want you to become better at writing mathematical arguments and improve your understanding of course material. Toward this end, I want you to recognize what you do wrong, and fix your errors. Toward

this end, I will allow you to resubmit homework and earn back the points on each problem that you lost, subject to the following rules:

- The problem(s) redone must be **proofs** (i.e. the wording of the problem must be "Prove" or "Show that" or something equivalent).
- The problems in the original assignment must have been turned in on time, and some effort must have been made on any problems you are resubmitting.
- The redone problems must be turned in within a week of when the graded assignment is returned.
- You must resubmit your original assignment together with the redone problems.
- You can only resubmit each assignment once.
- A redone problem can earn at most 80% of the points possible. For example, if a problem is graded out of 15 points, a problem done perfectly the second time around would score 12/15.

Chapter quizzes: After we complete each chapter, you will get an in-class quiz (for example, if we finish Chapter 2 on a Thursday, the quiz will come at the beginning of class the following Tuesday). The quizzes focus on the terminology and results from the preceding chapter (definitions of terms, statements of theorems, and short questions emphasizing the main ideas). There are no proofs or substantial computations on the quizzes.

Midterms: There are three midterms, all of which are to be done at home and returned in class. You may use your notes, the Stillwell textbook and graded homeworks, and you can ask me for assistance (how much help I am willing to give you depends on the particular problem). On the other hand, you may not use calculators or *Mathematica* (except to check your work), or get help from other books, the internet, or other sources, and you must work by yourself on the exams. Late exams will be severely penalized.

While none of the midterms are directly cumulative, mathematics is by its nature cumulative.

Final exam: The exact format of the final exam is TBA.

Getting help: The best place to receive help is my office. In class, I will not have time to take many homework questions, and I will not be able to present all perspectives on a topic. In office hours, I am able to discuss the material at a much more friendly pace and offer some alternate viewpoints that may help you understand the material better.

If you cannot make my scheduled office hours, you can come talk to me anytime my office door is open. Also, I am more than happy to make an appointment to discuss the material with you. Send me an email.

Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements should register with the Educational Counseling and Disability Services office (x3057, `ecds@ferris.edu`). While ECDS

will send me a letter outlining the accommodations to make for you, I would appreciate it if you could contact me immediately for assistance with any necessary classroom accomodations.

Academic dishonesty: Papers will be monitored for "magic answers". Issues with academic dishonesty are taken very seriously, will almost always result in an F for the class, and will be referred to the Office of Student Conduct.

How to succeed in this class: Start by mastering vocabulary. Abstract algebra is filled with new words, new symbols and new concepts you've never seen before: for every new word or phrase you learn, you should

1. know the precise mathematical definition of the word/phrase
2. have a heuristic understanding of what the phrase means beyond its rigorous definition;
3. have a working list of examples and nonexamples which illustrate the phrase; and
4. think about how the concept relates to other ideas from the course.

Start by learning the item's part of speech... if it is a verb, what do you do the verb to? If it is an adjective, what kinds of nouns does it describe? If it is a noun, is it a specific type of some other noun (like a set or a number or a function)? A more general type of some other noun? Etc.

If at any point there is terminology you don't think you understand, come to office hours.