Abstract Algebra I MATH 5310/6310

Instructor: Dr. Michel Smith
Office: Extension Hall 201
Email: smith01@auburn.edu
Office hours: MWF 11:00 – 12:00 and by appointment.
Class Web Site: http://www.auburn.edu/~smith01/math5310/

Students will be expected to present proofs to theorems and homework exercises on the blackboard. An integral part of the learning process for mathematics is solving mathematics problems. You will be challenged to solve problems and prove theorems that you have not seen; the purpose of this course is to develop analytical techniques to be able to prove theorems and solve problems about abstract algebraic systems. The techniques of mathematics are retained much more firmly if students can discover their own solutions to problems. Students will be expected to critique student presentations for understanding and correctness.

Grade Calculation

The standard 10 point scale will be used:

90 to 100 =A; 80 to <90 = B; 70 to < 80 =C; 60 to <70 = D; <60=F.

Participation grade (blackboard presentation, attendance, homework, quizzes)	20%
Tests (Tentative dates: Sept. 27, Nov. 1):	40%
Final Exam (As scheduled by the University):	40%

Attendance Requirement.

Attendance and class participation are a critical part of this course. Students are permitted one unexcused absence. More than one unexcused absence (an excused absence is any University excused absence) will result in percentage points taken off the final grade as follows:

1 missed class results in a total of zero points subtracted,
2 missed classes results in a total of 2 point subtracted,
3 missed classes results in a total of 5 points subtracted,
4 missed classes results in a total of 10 points subtracted,
More than 4 missed classes will result in a grade of "F" assigned for the class.

Accommodations for Disabilities: Students who require such considerations should make an appointment with me before the end of the second week of classes. Please bring your memo from the Program for Students with Disabilities (PSD). If you do not have a memo, it is recommended that you make an appointment with a member of the professional staff in the PSD office, 1244 Haley Center (844-2096).

Participation Grade Calculations.

The Process. In my presentation grade sheets, I use check plus √+ for excellent, check √ for medium/good, check minus √ - for poor but with some indication that the student understood some of the mathematics, check double minus √-- when there is no indication that the student has made any progress on the exercise/theorem. If a student makes a major mathematical mistake, the student will generally be given the opportunity to correct their work for the next class for full credit. So a student who makes a major mathematical mistake can correct it and still receive an A presentation grade. Also, In addition there will be opportunities to get extra presentation points by volunteering to present an extra theorem or exercise. I use a (pseudo) random number generator to select the order in which the students are called to present. Absent students receive 0 for their participation grade.

Grading: The following grades are detailed below √, √+, √+ +, √-, √-- in my presentation grade sheets.

I. √+, √+ +: An excellent presentation (converted to 95 – 110 % for the purposes of grades) is one where: The mathematics is correct baring some minor errors (and these errors are corrected at the board after questions from me or the class); the presentation is understood by the class – the proof is well defended, questions are adequately addressed; the student can answer my questions.

II. √ (85%, 90% for harder problems): The mathematics is for the most part correct but the student makes some errors; the underlying idea is okay and they are able to present that idea; the class has many questions of understanding, and the student needs a little help to explain the proof or solution; the student answers most of my questions (and help from the class is allowed).

III. √- (70 %): The student uses the correct techniques, but does not have a correct explanation of the steps needed toward the solution; he/she may have the "answer" but the explanation is weak; the student cannot answer all questions asked well.

IV. √-- (0 - 65%): the student does not have the mathematics correct and does not indicate any understanding of the problem or is not prepared to present at all.

Some comments about working on theorems for this course.

The level of difficulty of the proofs of the theorems stated in the class notes and in class range from easy to hard. By ``easy'' I mean a theorem that I would expect the majority of the class to be able to prove in a day or two; that is, by the next class after it was stated or considered. A medium theorem may take two to three class meetings before a proof is produced. A hard theorem may take one to two weeks. There will be a range of difficulty among the theorems stated in class. In Algebra there are many theorems where it's not obvious how to begin trying to figure out proofs. For some of these I may state some hints. So do not be surprised if you do not figure out the proof of a theorem immediately. I will also deliberately state things that are not true. (I'm sure I will do some accidentally as well.) As mathematicians you will need to be aware that some reasonable sounding statements are not true – in these cases you will be expected to provide a counter example.

The proofs of the theorems stated in class (and in the notes) have been around for decades, since the late 18th century. So it's not too hard to find the proofs in various places on the internet and in books (not to mention in the notes (or minds) of more advanced students.) I expect students, on their honor, not to present or submit work that is not entirely their own work. Please read my short essay MyModifiedSocraticMethod online (http://www.auburn.edu/~smith01/math5500/MyModifiedSocraticMethod.pdf) about my teaching pedagogy where I discuss this in more detail. I understand that many of you work in groups and, in some cases, I would encourage it (especially in preparing for tests.) So sometimes you may get a hint on the proof of a theorem from someone else – or, in fact, you may co-discover a proof with someone else in class. Similarly, many of you have looked at mathematics on the web and some will have seen the proofs of some of our theorems on the web or in other classes. In either of these cases, as do professional mathematicians, you must credit whatever contribution was made to your proof or solutions from your colleagues or outside resources. Priority of presentation will be given to students who have not already seen the proofs or solutions. Furthermore, in order to receive full oral presentation credit, students must be prepared to defend and argue the correctness of their work.

I think of theorems as interesting puzzles; I find an incredible joy in figuring out why they are true. So, much like reading a murder mystery, it's not as much fun hearing someone exclaim, "The butler did it!" than it is to figure out who-dun-it for ourselves. Also, once you've figured out why a theorem is true, I guarantee that you will not forget it! So I strongly urge each one of you to work on each theorem for some time (a couple of days for the medium hard ones) before you ask someone in your study group what they figured out about it. This preparatory work will also make it easier for you to understand the proofs once they are presented in class – because then you will already have found out some of the "clues." I hope, and it is my goal, that you have "eureka" moments during our course where a proof to a theorem or a solution to an exercise will occur to you by waking up in the middle of the night with the solution in your head, or while taking a shower (or bath as in Archimedes' case) or just while on a walk.