Introduction to Advanced Mathematics MATH 3100

Instructor: Dr. Michel Smith
Office: Temporarily Unavailable
Office hours: MWF 2:30 via zoom and by appointment.
Class Web Site: http://www.auburn.edu/~smith01/math3100Su21/

Students will be expected to discuss their proofs to theorems and homework exercises via zoom. 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 problem solving techniques that can be applied to a broad range of problems. The techniques of mathematics are retained much more firmly if students can discover their own solutions to problems. Students who are prepared to discuss their work will be asked to submit their homework to me via email by midnight of the night before the class meeting when they are to do their presentation. (Students are requested to submit their work as a pdf document - scanned or photographed homework papers - with their last name as the first part of the file name [e.g. SmithMHomeworkJune6.pdf].) Then during the class I will ask the student to present their work verbally while I write down their work, that would ordinarily appear on the blackboard, on my clipboard made visible by document camera.

MATH 3100 has the "Writing in the Discipline" curriculum component for the mathematics majors. An optimal way to write mathematics is by using the type setting language LaTex which we will learn in preparation for the writing assignments. The "Oral Communication" component for mathematics majors is also in this course. Students will be expected to be prepared to give oral presentations of their proofs to theorems stated in the notes or their solutions to exercises via the presentation process described above. Students will be expected to critique student presentations for understanding and correctness. This process both enhances the presenter's grade (by correcting errors) and the critic's grade (by adding to their participation grade.)

Grade Calculation

Item		
Participation grade (includes: attention to zoom presentation, attendance)	05%	T
Oral Presentation and Homework	10%	U
Writing Assignments	10%	V
Projects	5 pts each	W
Quizzes	10 pts each	X
Tests	20 pts each	Y
Final Exam	40 pts	Z

The standard 10 percentage point scale will be used: 90 to 100 =A; 80 to <90 = B; 70 to < 80 =C; 60 to <70 = D; <60=F.
Calculation of the final grade:

$$G = (T+U+V)\ 25\% + (W+X+Y+Z) * 75\% \div (\text{Total Points possible})$$

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: If you have accommodations, please request them online so that I can access them before we meet in my office. If you are seeking accommodations you should make an appointment with a member of the professional staff in the Office of Accessibility office, 1244 Haley Center (844-2096).

Oral presentations grade: Student will be expected to clearly present their proofs of theorems and exercises via zoom. Grades will be based on the clarity of the presentation and the correctness of the logic used. (For mathematics majors this is the required "oral communication component" of your program.) See the *Oral Presentation Grade* file online.

Writing assignments grade: You will need to learn to use LaTex. It's an easy "publishing" software to use and it's free! It's the way mathematicians write to each other, and as part of the writing component in this class, it is appropriate for you to be expected to learn some familiarity with it. Students will be expected to submit write-ups of theorems or exercises that they have presented or worked out as part of their homework. LaTex converts the code that you type up into readable pdf files; that's the form in which the write-ups are to be sent to me. Grades will be based on readability, clarity of presentation, correctness of logic and completeness of the argument. (For mathematics majors this is the required "writing across the discipline" component of your program.) See the *Writing Assignment Grade* file online

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 very 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 is

stated or considered. A medium theorem may take two to three class meetings before a proof is produced. A medium hard theorem may take one to two weeks; a hard theorem a month and a very hard theorem months. There will be a range of difficulty among the theorems stated in class. For some of the harder theorems I may state some hints. So do not be surprised if you do not figure out the proof of a theorem immediately. I will have more easy theorems and exercises than hard ones.

The proofs of the theorems stated in class (and in the notes) have been around for decades, centuries and even millennia (some were known by Archimedes, Aristotle and Euclid.) 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. Please read my short essay *MyModifiedSocraticMethod* online about my teaching pedagogy where I discuss this in more detail.

I think of theorems as interesting puzzles and 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 yourself. 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 (at least a number of hours and in some cases days) before you ask someone in your study group what they figured out about it. If you don't figure it out for yourselves, this preparatory work will make it easier for you to understand the proofs once they are presented in class – because you will already have found out some of the "clues."