Topology MATH 5500/6500

Instructor: Dr. Michel Smith
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Office hours: Virtually via zoom MWF 8:00 and by appointment.
Class Web Site: http://www.auburn.edu/~smith01/math5500/

I begin by quoting from a message sent to the faculty from the Provost's Office:

> While 2020-2021 was undoubtedly a year like none other, we can all be proud of our institution's ability to successfully balance the needs of our faculty, staff, and students while remaining focused on our immediate priority – the safety and well-being of our campus.

The Provost's Office further tells us that, "Given the efficacy of vaccinations, we know they are the most important protection against COVID-19, and all members of our campus community are strongly encouraged to get vaccinated."

We will begin the semester by meeting via zoom. A zoom link will be available on the class canvas site. I have posted an addendum to my teaching method essay that includes a description of the how the scheduled remote class sessions will be run:

http://webhome.auburn.edu/~smith01/math1627/SocraticMethodDuringCoronavirus.pdf

Here are some links related to the zoom software in case you are not familiar with it.

http://wp.auburn.edu/biggio/zoom-participant/

http://wp.auburn.edu/biggio/zoom/

This fact makes the following requirement moot – but the requirement will be implemented at any time if and when the class meets face-to-face:
Based on the above guidelines, University policy and advise from the CDC, **ALL STUDENTS IN MATH 5500/6500 ARE REQUIRED TO WEAR PROTECTIVE MASKS WHEN ATTENDING THE CLASS AT THE SCHEDULED MEETING TIMES.** If at any time during one of the class meetings, you need to remove your mask - you must leave the classroom to do so. No penalty will be given to any student who needs to leave the classroom for this reason.

Students who are feverish or unwell should not attend class but should be tested and follow the advice of their physicians regarding interacting with others and returning to campus. If a student needs to quarantine, the student should contact me immediately, and we will discuss ways to make up classwork, provided the student is well enough to do so.

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.

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 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.

Consequently the *Participation* grade will count as 20% of your final grade: this includes attention to class presentations, my own and that of students, answering and asking questions during class discussions, blackboard presentations, homework, assigned presentations. See my information online regarding the participation process and the rubric I use for grade calculations.

http://webhome.auburn.edu/~smith01/math5000/Participation.pdf

The remaining 80% of the grade will be based on a point system with the points assigned as follows:

Grade Calculation

Item	
Projects (if any)	10 pts each
Quizzes (if any)	10 pts each
Tests (tentatively two planned during the semester)	20 pts each
Final Exam (at the time scheduled by the Provost's Office	60 pts

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 Office of Accessibility. If you do not have a memo, it is recommended that you make an appointment with a member of the professional staff in the Office of Accessibility, 1244 Haley Center (844-2096).

ACCADEMIC HONESTY: Plagiarism (work presented as your own that is not your own) and giving or receiving aid on exams in whatever form will result in action by the University Honesty Committee. Refer to the Tiger Cub for more specific details.

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 was 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. In topology there are many theorems in the medium to hard range. 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 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, centuries (some since the time of Newton and Leibniz.) 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://webhome.auburn.edu/~smith01/math5000/MyModifiedSocraticMethod.pdf

Where I discuss my teaching pedagogy 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! 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.

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.