MATH 3500(H): Multivariable Mathematics (part I)
Fall 2020 Syllabus

Instructor: Professor Michael Usher (usher@uga.edu)

Required textbook: *Multivariable Mathematics: Linear Algebra, Multivariable Calculus, and Manifolds*, by Shifrin. John Wiley & Sons, 2005, ISBN 047152638. (Up-to-date list of typos at http://math.uga.edu/~shifrin/Multivariable_Errors.pdf.)

Recommended book for students seeking help with proofs: *How to Think Like a Mathematician: A Companion To Undergraduate Mathematics*, by Houston. Cambridge Univ. Press, 2009, ISBN 052171978.

Supplemental videos: The youtube channel https://www.youtube.com/channel/UCp9W-et2Zbx7u5_VMiXGtPQ consists of videos from the last year that Ted Shifrin taught this course. (You are not expected to watch these, but may find some of them useful.)

Course format:

- Lecture material will be delivered through asynchronous videos posted to ELC. There will be associated short (and hopefully easy) quiz questions to make sure that you are following along.
- Students will have (if they desire it) one in-person meeting per week, in Boyd 302. Because the social distancing capacity of this room is only 12, this will occur at different times for different students. The **Tuesday** class session will be divided into two 35-minute periods separated by a five-minute break (11:10-11:45 and 11:50-12:25) for which students will sign up by an online form so as to ensure that we do not exceed capacity. If this is not sufficient to meet demand for in-person meetings in a given week then we will hold an additional such meeting, usually on Wednesday.
- On Mondays, Wednesdays (except as indicated above), and Fridays we will hold class meetings by Zoom, at the scheduled time of 11:30-12:20. Since lectures are delivered asynchronously these (as well as the in-person meetings) will focus on answering questions about the lecture material or about the upcoming homeworks, reviewing challenging problems from previous homeworks, and/or working practice problems related to the current material.

Discussion board: We will be using Piazza for class discussion; our board is at https://piazza.com/uga/fall2020/math3500/home. The system is highly catered to getting you help fast and efficiently from me and from your classmates. Rather than emailing questions to me, I encourage you to post your questions on the board.

Subject matter: This is the first semester of a one-year course that gives an integrated treatment of multivariable calculus and linear algebra (corresponding to MATH 2270 and MATH 3000, respectively). This semester, we will cover Chapters 1-5 of Shifrin's text, which deal with:

- vectors and matrices (about 4 weeks);
- limits and continuity for multivariable functions (about 2 weeks);
- derivatives of multivariable functions (about 3 weeks);
- solving systems of linear equations (about 3 weeks);
- multivariable maximum/minimum problems (about 3 weeks).

In addition to covering the above material, another goal of the course is to develop students' abilities with abstract mathematical reasoning and proofs.

Prerequisites: MATH 2260 (second-semester calculus) or equivalent, and a high level of motivation. Students coming from AP Calculus require a 5 on the BC exam.

Homework (30% of your grade): The weekly homeworks are the central part of the course. There will be an assignment due Thursday at noon (on ELC) every week that there is not an exam. These assignments are intended to be challenging and to require a significant amount of time to complete to an acceptable standard. I expect that most or all of our Tuesday and Wednesday meetings will be devoted to answering questions about the homework; if you have not done enough work to at least have well-thought-out questions by Tuesday then you have started the homework too late. You are encouraged to cooperate on the homework assignments, but the solutions that you hand in must be written up independently and represent your own understanding of how to solve the problems.

A new feature of the course this year is that it is part of UGA's Writing Intensive Program; this reflects that an important part of your task in doing your homework is to present your arguments in a clear and logically well-structured way. The grader will pay close attention to this, and will also identify one problem each week which you will be allowed to re-submit for additional credit.

In addition to the weekly homeworks, this grading category also includes quizzes on the videos, which will be approximately 5% of the overall grade.

Midterms (2*20%=40% of your grade): There will be two midterms. **Tentative** dates are September 29 and November 10. These will be conducted remotely, using Zoom or Respondus (details TBA). This would require you to take the exam with your webcam on and the entirety of your workspace clearly visible.

Final (30% of your grade): The final will be comprehensive and is scheduled for Monday, December 14, at 12pm. If you do better on the final than on one or both midterms, then I will replace your lowest midterm grade by the final grade (so that midterm will be dropped and the final will count 50% instead).

Assignment of letter grades: The conversion between point totals on exams and letter grades will be announced when the exams are returned, and will depend on how difficult the exams turn out to be.

Make-ups: A medical excuse (confirmed by a medical professional) will be required for you to make up any exams that you miss without giving me advance warning. If your schedule requires you to miss an exam and you tell me about this in advance, then, at my discretion, we might find an alternative time for you to take it.

Mathematics Department Mask policy: Students are expected to follow UGA guidelines and wear masks in classrooms (except for students with an ADA exception from wearing a mask). A student not wearing a mask will be asked by the instructor to put on a mask. If the student does not comply, then the instructor will ask the student to leave the classroom. If the student refuses to put on a mask or leave, the instructor will dismiss the class and report the student to the Office of Student Conduct.

UGA Student Honor Code: "I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others." A Culture of Honesty, the University's policy and procedures for handling cases of suspected dishonesty, can be found at http://www.uga.edu/ovpi.

Mental Health and Wellness Resources: If you or someone you know needs assistance, you are encouraged to contact Student Care and Outreach in the Division of Student Affairs at 706-542-7774 or visit https://sco.uga.edu. They will help you navigate any difficult circumstances you may be

facing by connecting you with the appropriate resources or services. UGA has several resources for a student seeking mental health services (https://www.uhs.uga.edu/bewelluga/bewelluga) or crisis support (https://www.uhs.uga.edu/info/emergencies). If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA (https://www.uhs.uga.edu/bewelluga/bewelluga) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center. Additional resources can be accessed through the UGA App.

Obligatory disclaimer: The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.