MATH 229: CALCULUS III
FALL 2022 SYLLABUS

Disclaimer: The present syllabus does not constitute a contract. The Instructor reserves the right to make changes at his discretion throughout the semester.

General information:

- **Instructor:** Dr. Guillaume Dreyer
  Office: KAP 258
  Email: `gdreyer@usc.edu`
  Lectures: MWF 9:00–9:50 am in KAP 146
  Office hours: MW 4:30–6:00 pm on Zoom: `https://usc.zoom.us/j/9137491472`

- **Teaching Assistant:** Chengwei Wei
  Email: `chengwei@usc.edu`
  Discussions: TTh 8:00–8:50 am and 9:00–9:50 am in GFS 108
  Office hours: TBA

- **Textbook:** James Stewart, *Essential Calculus, Second Edition*, ISBN: 9781133112297

- **Prerequisite:** MATH 126

Grading breakdown: Quiz 16%; 2 Midterms, 22% each; Final 40%.

Course content: analytic geometry in 3D, curve, arc length function coordinate, Frenet frame, curvature, function of several variables, partial derivatives, multiple integral, line integral, surface, surface integral, Stokes' Theorem and its applications.

Learning objectives: By the end of the semester, you will be familiar with the fundamentals of multivariable calculus: vector formalism, vector function, partial derivative, gradient vector of a function, geometry of curves and surfaces. You will be able to apply these skills to a variety of applications – electromagnetism, classical and fluid mechanics, thermodynamics –. In particular, you will learn how to apply Green's Theorem, Divergence Theorem and Stokes' Theorem. (These 3 theorems are actually the very same theorem stated in different contexts.) We will also explore some applications of vector and multivariable calculus to physics.

We will cover the material in Chapters 10–13 of Stewart. **Caution:** while we will cover the material treated in those chapters, we will not follow the textbook line-by-line. Certain topics will be treated differently; there will be also additional topics not covered in the textbook.

Homework: Weekly homework assignments will be posted on **Blackboard** `http://blackboard.usc.edu`. It is everyone's responsibility to visit the website on a regular basis.

Quizzes: There will be a weekly 20 min quiz during Tuesday's discussion <u>every week of the semester</u>, expect during midterm weeks. **No make-ups** under no circumstances. To account for unexpected illness, absences, etc, the two lowest quiz scores will be dropped.

Exams: There will be two midterms and a final.
- **Midterm 1:** Friday, September 30th, in class.
- **Midterm 2:** Friday, November 4th, in class.
- **Final:** Wednesday, December 7th, 2:00–4:00 pm. **You must take the final exam at the scheduled time.**

No cheat sheet, calculator, cell/smart phone, smart watch, or other electronic device will be allowed during an exam. If there is a scheduling conflict for an exam, **you must let ME know (NOT the TA) at least 2 weeks before the examination**. A scheduling conflict must involve an activity sponsored and approved by USC (marching band, athlete event, etc.). In particular, the university club or organization in question must send an official request, approved by Dean, to all faculty. Personal activities do not qualify.

I am your point of reference: Above all, what is covered during lectures – topics, examples/exercises and methods to solve them – are your points of reference.

Resources: The **Math Center** is located in KAP 263 and is open weekdays from 8 am to 7 pm (it closes earlier at 5 pm on Fridays). For up-to-date information on the consulting hours, visit the Math Center homepage `http://dornsife.usc.edu/mathcenter`. The purpose of the Math Center is to provide an environment where students can stop by to get help on their math classes. Math TAs at USC hold their office hours there. It is probably better to attend office hours of TAs who are teaching Math 126 this term. However, you are welcome to stop by the Math Center at any time and seek for help from any of the Instructors or TAs who are present at that time.

Students with disabilities: Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester and a letter of verification detailing approved accommodations must be delivered to your Instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30–5:00 pm, Monday through Friday. The phone number for the DSP office is (213) 740–0776.

Course standards and good practice:

Work habits:

- <u>Preparing for lectures:</u> I usually announce at the end of each lecture what will be covered next. Taking 10 min before lecture to skim and get familiar with the content of a section – topics, definitions, theorems – is highly benefitial.

- <u>Daily training:</u> You must work every day, ideally 60 min in average. Daily training is the only way to properly learn and memorize the material, develop your mathematical skills and style. Exams and quizzes are fast-paced and require adequate preparation. Train yourself to complete as much work as possible within a given time-frame. Also, bear in mind that college-level calculus courses are demanding and move on very quickly. It is easy to fall behind and surprisingly difficult to catch up. Only daily practice can prevent this.

- <u>Evaluation standards:</u> Exams, quizzes, and homework assignments are all partial credits. The quality of your answers is a main component of the evaluation process. Your answers must be neat, organized, unambiguous. You must show mastery of mathematical terminology and notations – e.g. equations neatly organized; knowing definitions, theorems and conditions under which results apply. Keep in mind that it is in no way the job of the person evaluating your work to guess and piece together chaotic or illegible arguments. Developing a top-notch "style" comes with (a lot of) practice. It is also by following such standards you'll achieve mastery of the material. Indeed, writing neat complete but concise solutions forces you to organize your thoughts and identify the key arguments that must be part of your solution. It is by pushing yourself to delivering a work of high quality that will make real progress, in mathematics as in other areas.

Course policies:

- <u>Course attendance:</u> I do not enforce attendance. However, based on past experiences, all students who decide not to attend lectures and discussions regularly end up performing extremely poorly, which typically results in either dropping the class, barely passing, very often failing the course. Be aware that key examples and methods are discussed during lectures, and some are not covered in the book. You may be asked to solve an exercise following a specific method discussed in class.

- <u>Accountability:</u> Rules are clearly stated in the syllabus and are strictly enforced. By enrolling in this course, you pledge to abide by them. You determine what the learning experience will be through the working and commitment standards you set for yourself. You take full ownership for the quality of the work you deliver.

It hurts but it's inspiring:

Being part of a highly selective institution such as USC, we assume knowledge of concepts and methods covered in course prerequisites. In theory, you all have the same mathematical background. Reality however shall prove otherwise. While the majority of you may have achieved high grades in the past, those grades do not necessarily reflect actual mastery. It will be quickly apparent that some of you have set higher standards in the way they've been learning mathematics (and other topics), training and timing themselves on a regular basis, dissecting arguments, pushing themselves to write clear and articulate solutions. Others may have not imposed such standards on themselves while still getting by (grade inflation in high-school can be very deceptive).

So here is likely the first major challenge you'll face in college. Within days, you'll come to the realization that you're surrounded by high-achieving fellows, among them some who are extremely competitive and capable.

- <u>First step</u> is to humbly acknowledge this reality.

- <u>Second step</u> is to acknowledge these high-achieving students' qualities. Such persons are very good for very good reasons: they constantly and for a long time have been holding themselves to high learning standards; they've worked harder; they're attentive, and attentive to details; better organized; articulate; they deliver work of high quality.

- <u>Third step</u> is your own introspection. While there are things we're good at, there are plenty of skills we overlook, often very conveniently, and thus fail to develop. It takes years to correct some of our bad work habits. What matters is not where you as an individual start, it is how dedicated you are at shaping your intelligence and skills, especially the ones you're not good at. Improvement comes with one and only thing: hard work and perseverance.

Something to cheer you up: we've all been there.