Math 314: Calculus of Several Variables

Winter 2022 – Section 4 & 9

Instructor: Tuan Pham
Email: tuan.pham@mathematics.byu.edu
Office: TMCB 316, **phone:** 801-422-7873
Office Hours:

- M: 2 - 3 PM; W,F: 1 - 2 PM at TMCB 316 (in person)
- T: noon - 1 PM; Th: 11 - noon on Zoom. Link: https://byu.zoom.us/j/4429506864

Course Credits: 3
Time and location:

- Section 4: 12:00 - 12:50 PM at TMCB 112.
- Section 9: 11:00 - 11:50 AM at TMCB 121.

Class meeting may be livestreamed/recorded upon request. Those who are unable to attend the class in person can join online at

https://byu.zoom.us/j/94889780558?pwd=UmZaMUpPblFZY3pHM2VxRWFNcVNhdz09

Couse website:
http://math.byu.edu/~tpham/Courses/W22-Math-314/W22-Math-314.html

Learning Suite:
https://learningsuite.byu.edu/.fQLt/cid-anxJ3-hilAfZ/home

Textbook: "*Multivariable Calculus*", 9th Edition by Stewart, Clegg, and Watson.
DO NOT BUY THE TEXTBOOK. Our department has negotiated access to the textbook online as well as the online assignments for a basic tuition fee. This is done through the program Webassign. Your BYU student financial account will be directly charged $25 later in the semester, which covers full access to all of the required materials. This is very cheap compared to the $125 students used to pay for the book and online homework. Your account will not be charged if you drop the course before the add/drop deadline. You need to get registered into Webassign by go to webassign.net, then click on 'Enter class key', then enter the following code:

byu 6348 8422

Other Learning Resources:

1. The last chapter of the ebook version in WebAssign has detailed solutions to all the odd problems. You can read them if you get stuck.

2. From time to time, we will use a mathematical software called Mathematica to visualization purposes. You can also use it to double check your answers in homework problems. Learning Mathematica is encouraged in this course, although not mandatory. You can earn extra points in homework sets by doing the "M" problems using Mathematica. The instruction to install Mathematica will be given on Page 4 of this syllabus.

3. Math Lab is open for online and in-person service. That is a great place for you to ask questions besides office hours. Please check out this website to know how: https://math.byu.edu/?page_id=193.

Course Description: This course is analogous to Math 112 except that you will learn about functions of more than one variable. Thus comes the name of the course. You will learn how to do calculations on functions of several variables, for example: take derivatives, integral, and find local minimum, maximum, and so on. You will learn very interesting applications in real life, for example: computing the length, area, volume of a general object, or finding the total flux of water coming out of a surface. This course is highly suitable for all who are interested in (but not limited to) science and engineering. The prerequisite is Math 113.

Learning Outcomes: Upon completion, a successful student will be able to:

1. Understand conceptually the limit, partial derivatives, double integral, triple integral of a multivariable function.

2. Know the basic techniques to compute partial derivatives, especially the Chain Rule.

3. Know the basic techniques to compute double/triple integrals: change of variables, Jacobian matrix, Riemann sum, etc.

4. Know how to apply to certain real-life problems: expressing the length of a curve, area of a surface, volume of a shape as an integral, or finding local extrema of a function using Lagrange multiplier method.

Grading:
Written homework: 25% (plus 2% bonus if you do the "M" problems using Mathematica)
Online homework (optional): 4%
Midterm 1: 25%
Midterm 2: 25%
Final Exam: 25%

Written homework: submitted on Learning Suite. A schedule of written homework assignments was posted on the course website and Learning Suite.
Policy: you work on your own paper, then take a picture (please make sure that it is clear enough to read) and upload it on Learning Suite. Typing would be great, but not required. You are encouraged to work together. However, homework must be written individually in your own words and reflect your own understanding. Each homework set is worth 20 points. The lowest 3 homework scores will be dropped. Only a few selected problems will be graded in detail. The rest will be given credit based on completion. Some homework sets have "M" problems. You can earn up to 2 bonus points in those homework sets if you include commands and graphs from Mathematica in the "M" problems. Make sure that graphs are accompanied by commands (codes) as an evidence that you did use Mathematica. You can simply take a screenshot of your computer screen. See an example on Page 5 of the syllabus. If you don't use Mathematica, you can still earn full credit of the homework set, but not the bonus points.

Online homework: this is for extra credit. A schedule of online assignments can be found on both Learning Suite and WebAssign. You will need to enroll yourself to WebAssign to be able to see those assignments. See the instruction above to know how to enroll yourself.

Policy: These assignments are strictly multiple choice or fill-in-the-blank. For each assignment, you can submit up to 50 times. There are 3 'batches' of online assignments. The first batch is due on the last day of the first midterm. The second batch is due on the last day of the second midterm. The third batch is due on the last day of the instruction week. *Doing those online assignments will not only prepare you for the exam but also help you earn extra credits.* You don't need to do all the online assignments to receive extra credits. The more assignments you do, the more extra credits you get (up to 4%).

Midterm Exam: there will be two midterm exams, 2 hours long each, taken at BYU's Testing Center.

- Midterm 1: Feb 2 – 4
- Midterm 2: Mar 9 – 11

Policy: No note cards or calculators are allowed. The first midterm covers Chapter 12 and 13. The second midterm covers Sections 14.1-15.6.

Final exam:

- Section 4: 2:30 PM - 4:30 PM on Tuesday 4/19/2022 at TMCB 112.
- Section 9: 11 AM - 1 PM on Saturday 4/16/2022 at TMCB 121.

Policy: No note cards or calculators are allowed. The Final exam covers Sections 15.7-16.8.

Make-up work: If you experience extended illness, injury, hospitalization, or other major disruption during the semester and cannot complete your work, please speak to your instructor. Special accommodations may be able to be arranged on a case by case basis.

COVID-19 policy: The university has asked all students and teachers to wear a mask in classroom when 6-feet distance from others cannot be maintained. If you are in quarantine, please inform the instructor, who will then give you a code to control the classroom camera remotely, so that you can attend the class virtually through Zoom. Lecture proceedings will not be recorded unless there is a request from one of the students. If you choose not to attend classes in person only because you prefer not to wear a mask, it is the university's policy that the instructor needs not provide accommodations.

Grade lines: the course grade lines will not be harder than the standard grade lines: A 100-93%, A- 92.99-90%, B+ 89.99-87%, B 86.99-83%, B- 82.99-80%, C+ 79.99 - 77%, C 76.99-73%, C- 72.99-70%, D+ 69.99-67%, D 66.99-63%, D- 62.99 - 60% and E < 60%.

Preventing Sexual Harassment: Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education and pertains to admissions, academic and athletic programs, and university-sponsored activities. Title IX also prohibits sexual harassment of students by university employees, other students, and visitors to campus. If you encounter sexual harassment or gender-based discrimination, please talk to your

professor; contact the Equal Employment Office at 801-422-5895 or 1-888-238-1062 (24-hours), or http://www.ethicspoint.com; or contact the Honor Code office at 801-422-2847.

Students with Disabilities: BYU is committed to providing reasonable accommodation to qualified persons with disabilities. If you have any disability that may adversely affect your success in this course, please contact the University Accessibility Center at 422-2767. Services deemed appropriate will be coordinated with the student and instructor by that office.

Get access to Mathematica

There are two methods to get access to Mathematica.

Method 1: (cloud based, no installation required)

- Go to https://byuapps.cloud.com/

- Sign in with your Net ID. Make sure to include '@byu.edu' at the end.

- On the left panel, click on Apps, then All Apps. Scroll down to locate Wolfram Mathematica.

Method 2: (installation on your own computer)

- Go to https://software.byu.edu/mathematica

- Click on platform (Window or Mac) that is compatible with your computer. The download will start.

- Meanwhile, click on the link 'Product Key'. It will takes you to the Sign-in/ Sign-up page. Create a Wolfram Alpha account if you haven't had one. Make sure to use your NetId@byu.edu email to sign up.

- Check your BYU email. You should receive an activation code from Wolfram Customer Support.

Example of an "M" problem

Sketch the curve with the given vector equation. Indicate with an arrow the direction in which t increases.

7. $\mathbf{r}(t) = \langle -\cos t, t \rangle$

Solution: We use the command ParametricPlot to sketch the curve.

In[2]:= `ParametricPlot[{-Cos[t], t}, {t, 0, 10}]`

Out[2]=