MATH 281, MULTIVARIABLE CALCULUS 1, FALL 2020, PHILLIPS

1. Basic information

Course number: Math 281.
Course title: Several Variable Calculus I.
CRN: 14164.
Time and place: MTuWF 8:00–9:00 am Eugene time (slightly unusual time slot), remote via Zoom meeting ID 916 3410 5223. Password required; get it via email or use the link on Canvas, where the password is embedded in the link. More: see Section 3.

- If you are not in Eugene: Eugene time changes from Pacific Daylight Time to Pacific Standard Time during the quarter. Countries like Japan and China don't use daylight savings time at all, and countries in Europe (being mostly farther north) change time on a different date. Things are more complicated if you are in a part of the southern hemisphere which uses daylight savings time.

Instructor: N. Christopher Phillips.
Course home page: `https://pages.uoregon.edu/ncp/Courses/Math281_F20_Web/Math281_F20_Web.html`. (Depending on your pdf reader, this might be an active link.)
Email: See the course home page. It is not included here because spammer address harvesters read pdf files.

- Send plain text **only**; no html only messages. See the links on the course home page. (Both Canvas and WeBWorK generate email messages which contain plain text. The default settings on the UO Exchange system don't. See `https://pages.uoregon.edu/ncp/IT/UOExchange/PlainText.html` for what to do about this.)
- The subject line of your message should start with "M281", followed by your last name, then first initial.
- No Microsoft Word files.

Course description: Introduction to calculus of functions of several variables including partial differentiation; gradient, divergence, and curl; line and surface integrals; Green's and Stokes's theorems. Linear algebra introduced as needed. (This description is taken verbatim from the Catalog of Courses. It covers both Math 281 and Math 282.)
Textbook: James Stewart, Multivariable Calculus, 8th edition, Cengage Learning, 2015. We will cover Chapters 12–14.

- I will not assign homework problems by number from the book (although practice problems may be given this way). Therefore you might be able to use an older edition, or even a book by a different author covering the same material at the same level.

Office Hours: Tuesdays, Thursdays, Fridays 9:30–10:30 am, remotely, at Zoom meeting ID 929 6845 7904, or by appointment.

- Different Zoom setup: You will be in a waiting room on entry, but no password is needed.

2. Schedule

This is a *tentative* schedule.

Week 1: Sections 12.1–12.3 of the book.
Week 2: Sections 12.4–12.6 of the book.

Week 3: Sections 12.6–13.2 of the book.
Week 4: Sections 13.2–13.3 of the book; Midterm 1 (Friday 23 October 2020).
Week 5: Sections 13.3–14.1 of the book.
Week 6: Sections 14.1–14.3 of the book.
Week 7: Sections 14.4–14.6 of the book.
Week 8: Sections 14.6–14.7 of the book; Midterm 2 (Friday 20 November 2020).
Week 9: Sections 14.7–14.8 of the book.
Week 10: Section 14.8 of the book; review.
Finals week: Final exam, 10:15 am–12:15 pm Monday 7 December.

3. Technical information

Lectures are remote via Zoom meeting ID 916 3410 5223. Password required; get it via email or use the link on Canvas (`http://canvas.uoregon.edu`), where the password is embedded in the link. You will be muted on entry. If you want to ask a question, simply unmute yourself and speak up; otherwise, to keep down background noise, please keep yourself muted. Warning: I am unlikely to be able to follow the Zoom chat or my email in real time, and I am unlikely to see raised hands, since I can only see five of you (and I don't get to choose which five). Please just speak up. (This policy will be modified if it turns out to be unworkable, but previous experience suggests it should work fine.)

Recordings of video lectures will be posted on the University of Oregon Panopto site. Links will be emailed to the class as they become available. (No password is needed.) Since they are not password protected, the URLs are not on the course website.

Pdf files of the notes written during the lectures will be posted on the course website (`https://pages.uoregon.edu/ncp/Courses/Math281_F20_Web/Math281_F20_Web.html`).

WeBWorK homework is at `https://webwork.uoregon.edu/webwork2/Math281-14164/`. (Login required, with your Duck ID and password, and possibly two factor authentication.) It is done online.

Written homework is posted on the course website (`https://pages.uoregon.edu/ncp/Courses/Math281_F20_Web/Math281_F20_Web.html`) and on Canvas (`http://canvas.uoregon.edu`). It is submitted via Canvas, as a single file per assignment, presumably a scan of handwritten work. (See me if you are interested in typing it, which is possible using TeX.) Allowed formats include pdf, jpg, and several others, but not Microsoft Word. Apart from the extension (such as "`.pdf`"), your file name should contain only numbers, capital and lowercase letters, and underscores. In particular, **no** spaces or parentheses. (Other characters cause trouble with handling homework files.) You do not need to put any identifying information in the file name; something like "`HW6.pdf`" is quite sufficient. (The Canvas system adds enough identifying information.)

Exams will be gotten from Canvas (`http://canvas.uoregon.edu`). See separate instructions for exams.

4. Grading

Components of the course grade:

Homework: About 25%. There are two components: WeBWorK (about 15%) and written homework (about 10%). WeBWorK is due twice per week, usually Tuesdays and Fridays at 8:00 pm (earlier in the week in midterm weeks). Written homework is due once a week, Fridays at 10:00 pm in weeks with no exam. I will drop the lowest written homework score. I plan to drop the two WeBWorK scores with the lowest percentages, but this depends on what I am able to make the WeBWorK system do.

Two midterms: Fridays of Week 4 and Week 8. About 20% each. During regular class times. See separate instructions.

Final exam: About 35%. Conducted on Zoom via the regular class Zoom meeting, 10:15 am–12:15 pm Monday 7 December. See separate instructions. (They will be essentially the same as for the midterms.) The final exam is cumulative.

Exams are open book and open notes, calculators allowed, but computer algebra systems and interaction with other people or websites prohibited. More details are in the exam instructions.

Extra practice WeBWorK assignments are for help studying for exams, but don't count towards the final grade.

Course grades will be no lower than the standard absolute scale would require, and may be adjusted to be higher, except that the course grade will be no more than one letter grade higher than than the final exam grade. Extra credit (on exams and as otherwise advertised during the quarter) will be counted only if the course grade without it is at least B^-. (It is extra, and not a substitute for the regular course material. As an example, if you prove the Riemann Hypothesis but don't do any of the course work, you will get an immediate full professorship at MIT and a Fields Medal [the mathematician's Nobel Prize], but you will not pass the course.)

Written homework solutions must be carefully written in a legible manner, presenting your work in a clear, logical, and orderly way, and using correct notation. Having the correct final answer is not sufficient. I am more interested in assessing your ability to correctly write complete explanations of the solutions demonstrating your understanding of the material than whether you find the correct final answer to the problem. If you submit homework that is written hastily and lacking detail, you should expect to receive very little credit. Exams will require correct notation, as in written homework. Thus, written homework serves to catch notation errors before they cost you points on exams.

While doing WeBWorK assignments, it is important to write out all steps on a piece of paper. Even though the WeBWorK assignments are submitted online and the system only checks your final answer, it is crucial that you complete the assignment as if it were submitted for written homework, as described above. This is important for your own understanding of the material and as practice writing solutions for exams. These assignments should be used as a study aid, but can only be useful if you have a complete solution.

5. Learning environment and academic misconduct

Please let me know if the instruction or design of this course results in disability related barriers to your participation. More importantly, consult the Accessible Education Center, 541-346-1155, uoaec@uoregon.edu. I am not competent to determine appropriate accommodations, such as amounts of extra time on exams; only the Accessible Education Center can do that. Be sure to meet its deadlines; I can't help you if you miss them. (I have tried in the past, with no success.)

The code of student conduct and community standards is at `http://conduct.uoregon.edu`. While I encourage students to discuss the material together as much as possible, any submitted homework must be your own and reflect your own understanding. It is not appropriate to help each other on exams, to look at other students' exams, to have another student (or anybody else) help you with your exam, or to use unauthorized materials on exams. In the event of academic dishonesty, the offense will be reported to the Office of Student Conduct and Community Standards and the student will be sanctioned up to receiving a failing grade in the course.

6. Learning objectives

Students should be able to understand the geometry of space, vectors, and the differential calculus of vector valued functions and multivariable functions. This overall goal includes:

(1) The computation and understanding of the vector operations (including dot product and cross product) and their applications to equations of lines and planes in space, the projection of one vector onto another vector, and volume.

(2) Recognizing generalized cylinders and the basic quadratic surfaces: paraboloids, hyperboloids of one sheet, hyperboloids of two sheets, cones, and ellipsoids.
(3) The definition of a vector valued functions and the computation of derivatives and integrals of such functions.
(4) The computation and understanding of partial derivatives of multivariable functions. The use of partial derivatives to find the tangent plane to a surface and the best linear approximation of a function.
(5) The definition of the gradient vector and understanding of its geometry and applications.
(6) Use of the second derivative test to classify critical points as local minimums, local maximums, or saddle points. Finding global minimums and maximums.
(7) Use of Lagrange multipliers to find local minimums and local maximums of functions subject to constraints.