Course Overview

Calculus in the real world involves multiple variables. The insects in Calculus I walked back and forth on a line, but real bugs fly in three dimensions. In a Calculus I problem, you might consider temperature as a function of time. Now we'll cover temperature as a function of three dimensional space. Applying calculus in this setting requires extending operations you are already familiar with, and some brand new ones, too. What is a derivative when your function has more than one input? The course ends with a sequence of results (Green's Theorem, Stokes' Theorem, the Divergence Theorem) that are spectacular generalizations of the Fundamental Theorem of Calculus and are fundamental tools in applied settings such as electromagnetism and fluid mechanics.

Essential Information

Professor	David Maxwell
Office	Chapman 308C
Email	damaxwell@alaska.edu
Web	http://damaxwell.github.io
Text	APEX Calculus Volume 3
Teaching Assistant	trhooge@alaska.edu

Prerequisites

The course prerequisites are a grade of 'C' or better in MATH252 or a 4/5 on the Calculus BC AP test.

Class Time

There will be four one-hour lecture classes each week. Although I'll be doing a lot of the talking during lectures, you are strongly encouraged to stop me at any point to ask questions. I'll try to ask you questions along the way as well. Lectures are more interesting and relevant when you participate actively.

Lecture Times	
MWF	8:00–9:00 Gruening 208
R	8:00-9:00 Gruening 208

Student Learning Outcomes

Students will:

- Gain competency in the algebra and geometry of 3-dimensional space.

- Apply calculus operations to curves in 2- and 3-dimensional space.

- Become competent with partial differentiation and apply it in optimization problems.

- Compute integrals of functions of several variables.

- Gain exposure to Stokes' Theorem and its cousins (Green's Theorem, the Divergence Theorem).

- Apply multivariable calculus to other fields.

Office Hours

Both I and my TA will host office hours this semester. The times will be posted on the course web site.

You are very welcome to schedule an appointment outside of my regular office hours; please send me an email and we will arrange a time.

Discord

A Discord server has been set up for this class. We will use it as the primary means of group communication.

Communication in Discord will be on-topic, polite and collegial as is suitable for a workplace setting.

Math Lab

The department offers tutoring services through the Math Lab, located in the library building. Please see https://uaf.edu/dms/mathlab/ for more information.

Homework

The class will have weekly written homework, due Mondays. Each assignment will cover the problems assigned the previous week as listed on the course website. All problems for the week will appear by the Monday of the week the problems are assigned. You will submit problems via the Gradescope link in Canvas.

The homework is practice. To help you, we will provide full solutions in advance (yep!) in Canvas so that you can check your work. We will also provide a sheet of bare answers so that you can quickly verify your work without having to peek at the full solution. Use these resources carefully, and feel free to reach out to myself or our TA if you are stuck solving something.

Because we are providing answers in advance, homework will be graded on the basis of completion only. Nevertheless, you are responsible for presenting well-written solutions; see the website for guidelines. Poorly presented solutions will not receive credit.

Quizzes

There will be a 20 minute quiz on Wednesdays covering material from the homework handed in on Tuesdays. On weeks when there is a midterm, there will be no quiz.

Midterms

There will be two in-class midterm exams as listed in the tentative schedule. Each midterm will only cover material seen since the previous midterm (i.e. they will not be cumulative).

Final Exam

There will be a final exam held Monday, December 9, 8:00 - 10:00 a.m.. The final will be comprehensive with an emphasis on material learned after the last midterm.

Evaluation

Course grades will be determined as follows:

Written Homework	10%
Quizzes	20%
Midterm 1	20%
Midterm 2	20%
Final	30%

Letter grades will be assigned according to the following cutoff scores. This scale is a guarantee; I also reserve the right to lower the thresholds.

A+	97%	C+	77%	F	≤ 59
A	93%	C	73%		
A-	90%	C-	70%		
B+	87%	D+	67%		
B	83%	D	63%		
B-	80%	D-	60%		

Covid 19

The pandemic is largely behind us. In the event that circumstances change, official university information can be found at:

https://sites.google.com/alaska.edu/coronavirus/

Tentative Schedule

Week	Topics and Events
8/26 – 8/30	Sections 10.2–10.4
9/2 – 9/6	Sections 10.4–10.6 Monday: Labor Day
9/9 – 9/13	Sections 10.1, 11.1–11.2
9/16 – 9/20	Sections 11.3–12.1
9/23 – 9/27	Sections 12.2–12.3 First Midterm: Chapters 10–11
9/30 – 10/4	Sections 12.4–12.6
10/7 – 10/11	Sections 12.6–12.8
10/14 – 10/18	Sections 12.8–13.2
10/21 – 10/25	Sections 13.3–13.5
10/28 – 11/1	Sections 13.6–13.7 Second Midterm: Chapter 12, part of 13 Friday: Last day to withdraw with a 'W'
11/4 – 11/8	Sections 13.7–14.3
11/11 – 11/15	Sections 14.3–14.5
11/18 – 11/22	Sections 14.5–14.7
11/25 – 11/29	Section 14.7 Wed.-Fri.: Thanksgiving
12/2 – 12/6	Review, Maxwell's Equations Friday: Last day of class

Rules and Policies

Attendance

Attend every class. Although attendance is not directly part of your grade, it is very easy in a math class to fall behind after skipping even one class.

Collaboration

You are encouraged to work together in solving the written homework problems. But each student must write up his or her solutions independently. Cloning (copying another student's homework) is not permitted

and is a form of Academic Dishonesty (see below). If you receive significant help solving a problem, it is customary to make a note in your homework to give the person who helped you credit.

With respect to the online problems, you are also welcome to discuss these problems with your fellow students. But you should be aware that the online problems are randomized so that each student gets a slightly different problem. Hence your solutions will all be a little different.

Late Homework

Written homework cannot be handed in late without a significant extenuating circumstance. Your lowest written homework score will be dropped.

Exam Aids
No aids are allowed on quizzes. Exams will allow a one page sheet of notes. No books are allowed. A calculator policy will be announced prior to the exams.

Makeup Exams
Quizzes cannot be made up, but the lowest quiz score will be dropped.

You can make up an exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss an exam.

Cell Phones
Turn off your cell phone before you come to class.

Incomplete Grade
Incomplete (I) will only be given in Computer Science, Mathematics or Statistics courses in cases where the student has completed the majority (normally all but the last three weeks) of a course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade. (Note: this is essentially the old University policy.)

Late Withdrawals
A withdrawal after the university deadline from a Department of Mathematical Sciences course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

Academic Dishonesty
Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.

Artificial Intelligence (AI)
In this class, homework solutions are provided in advance, and all other forms of assessment are proctored in person. Hence there are no conflicts in using AI as a tool in your learning. Feel free to converse with ChatGPT or Claude (my favorite for the moment) about class topics. Be aware, though, that large language models are error prone when doing computation. And they tend to agree with you even when you are mistaken. Of course, AI use is not permitted for any proctored assessment.

Official UAF Syllabus Addendum

Student protections statement: UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/.

Disability services statement: I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

Student Academic Support:

- Speaking Center (907-474-5470, uaf-speakingcenter@alaska.edu, Gruening 507)
- Writing Center (907-474-5314, uaf-writing-center@alaska.edu, Gruening 8th floor)
- UAF Math Services, uaf-traccloud@alaska.edu, Chapman 305 (https://www.uaf.edu/dms/mathlab/, for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, https://www.ctc.uaf.edu/student-services/student-success-center/)
- For more information and resources, please see the Academic Advising Resource List (https://www.uaf.edu/advising/students/index.php)

Student Resources:

- Disability Services (907-474-5655, uaf-disability-services@alaska.edu, Whitaker 208)
- Student Health & Counseling [**6 free counseling sessions**] (907-474-7043, https://www.uaf.edu/chc/appointments.php, Gruening 215)
- Office of Rights, Compliance and Accountability (907-474-7300, uaf-orca@alaska.edu, 3rd Floor, Constitution Hall)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, asuaf.office@alaska.eduasuaf.office@alaska.edu, Wood Center 119)

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applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at www.alaska.edu/nondiscrimination. For more information, contact:

UAF Office of Rights, Compliance and Accountability
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