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 fucntion 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   Openstax Calculus Volume 3
Teaching Assistant   Stefano Fochesatto, gsfochesatto@alaska.edu@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

Covid 19

The pandemic is ongoing. With this in mind:

- We need to be especially kind and patient with one another.

- Unforseen circumstances are going to occur. I will try to ensure that the class is taught in a way so that if you must miss a class due to illness or other reasons, you will have tools to make up the missed class. Please see the section below on Zoom and recordings.

- If circumstances routinely impact your ability to participate in the course, please get in touch with me so we can determine a best plan of action.

- Course practices or this syllabus may need to be adjusted as the semester progresses. I will announce any changes as needed; syllabus updates will be posted on the web site.

- Official university information can be found at:
  https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0

Student Learning Outcomes
Students will:

- Gain compentency 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 and outside my office door.

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.

Math Lab
The department offers tutoring services through the Math Lab. Please see https://uaf.edu/dms/mathlab/ for more information; the operation of the Math Lab will likely be different from past years due to COVID19.

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 Mondays. On weeks when there is a midterm, there will be no quiz. Students enrolled in the online edition of the class will take the quiz at the same time and will be proctored over Zoom.

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 12, 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%		

Tentative Schedule

Week	Topics and Events
8/29 – 9/2	Sections 2.1, 2.2, 2.3, 2.4
9/5 – 9/9	Sections 2.4, 2.5 Monday: Labor Day
9/12 – 9/16	Sections 2.6 3.1, 3.2
9/19 – 9/23	Sections 3.3, 3.4
9/26 – 9/30	Sections 4.1, 4.2 First Midterm: Chapters 2–3
10/3 – 10/7	Sections 4.3 4.4, 4.5
10/10 – 10/14	Sections 4.5, 4.6, 4.7
10/17 – 10/21	Sections 4.7, 4.8, 2.7, 5.1
10/24 – 10/28	5.2, 5.3, 5.6
10/31 – 11/4	5.4, 5.5 Second Midterm: Chapter 4, part of 5 Friday: Last day to withdraw with a 'W'
11/7 – 11/11	5.5, 5.7, 6.1, 6.2
11/14 – 11/18	6.2, 6.3, 6.3, 6.4
11/21 – 11/25	6.5 Wed.-Fri.: Thanksgiving
11/28 – 12/2	6.5, 6.6, 6.7
12/5 – 12/9	6.7, 6.8, 6.9 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

WRITE ME

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.

Official UAF Syllabus Addendum

COVID-19 statement: Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website: https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0

Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

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, uafmathstatlab@gmail.com, Chapman Building (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/lr/SKM_364e19011717281.pdf)

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, Whitaker 203)

- Center for Student Rights and Responsibilities (907-474-7317, uaf-studentrights@alaska.edu, Eielson 110)

- 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)

Nondiscrimination statement: The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, 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 Department of Equity and Compliance
1760 Tanana Loop, 355 Duckering Building, Fairbanks, AK 99775
907-474-7300
uaf-deo@alaska.edu

General Education Requirement
This course is listed as a General Education Math Course. As such this course is expected to meet the 4 general learning outcomes.

- Build knowledge of human institutions, sociocultural processes, and the physical and natural works through the study of mathematics. Competence will be demonstrated for the foundational information in each subject area, its context and significance, and the methods used in advancing each.

- Develop intellectual and practical skills across the curriculum, including inquiry and analysis, critical and creative thinking, problem solving, written and oral communication, information literacy, technological competence, and collaborative learning. Proficiency will be demonstrated across the curriculum through critical analysis of proffered information, well-reasoned solutions to problems or inferences drawn from evidence, effective written and oral communication, and satisfactory outcomes of group projects.

- Acquire tools for effective civic engagement in local through global contexts, including ethical reasoning, intercultural competence, and knowledge of Alaska and Alaska issues. Facility will be demonstrated through analyses of issues including dimensions of ethics, human and cultural diversity, conflicts and interdependencies, globalization, and sustainability.

- Integrate and apply learning, including synthesis and advanced accomplishment across general and specialized studies, adapting them to new settings, questions and responsibilities, and forming a foundation for lifelong learning. Preparation will be demonstrated though production of a a creative or scholarly product that requires broad knowledge, appropriate technical proficiency, information collection, synthesis, interpretation, presentation and reflection.