Math 253X UX1 - Calculus III

Spring 2021

Course Description

An introduction to multivariable calculus, including vectors and vector-valued functions, partial derivatives and applications of partial derivatives (such as tangent planes and Lagrange multipliers), multiple integrals, volume, surface area, and the classical theorems of Green, Stokes and Gauss.

Course Information

Credits	4.0 credits
Prerequisites	The prerequisite for MATH 253X is MATH 252X with a grade of C or better. Students not meeting this prerequisite are not eligible to take this course and will be dropped.

Instructor Information

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Teaching Assistant Information

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Course Reading Materials

- **Textbook:** Calculus (standard or 'early transcendentals') *or* Multivariable Calculus, 8th ed., by J. Stewart, Chapters 12-16 only
- *WebAssign Access Code.* You will be doing a significant portion of your homework online. To do this you must have a WebAssign access code. If you purchase your textbook from the UAF bookstore this code will come packaged with your text. If not, you can purchase one on www.webassign.net. If you have not yet purchased a code, don't fret! WebAssign grants you a two-week "trial" period where you can use the service without paying. You also have access to an eBook on WebAssign.

Course overview and learning outcomes

Multivariable calculus is concerned with functions of many variables. Whereas in MATH 251 and MATH 252 you study functions of a single variable (height as a function of age $h(a)$, $f(x)$), in multivariable calculus functions will have more input variables (temperature of a particle in 3-space) or be vector-valued functions (position in 3-space $(x(t), y(t), z(t))$.

Our goal this semester is to extend your knowledge of calculus into the 2-, 3-, and $n-$dimensional realms. All of the techniques you learned from single variable calculus come into play here. Indeed, taking derivatives and computing integrals in the multivariate setting depends intimately on the ability to apply skills from univariate calculus.

Other interesting topics like vector fields and alternative coordinate systems appear. Multivariate calculus is essential for further study in physics, chemistry, engineering, economics, statistics and many other fields, as well as in mathematics. Though visualization in three dimensions can be hard at first, the benefit is well worth the effort.

Students will become competent in multivariable calculus, and gain some experience of its applications to other fields. Students will be able to visualize surfaces in three dimensions, and compute double and triple integrals, and multivariate derivatives.

Instructional Methods

This course is designed for online instruction primarily through UAF Blackboard, but active participation from the students is expected. This is not an independent study course. Regularly scheduled assignments and assessments with firm due dates will pace the course. All exams (COVID-permitting) will be proctored, closed book, closed notes and no calculators.
If you would prefer a course with live lectures, or not comfortable taking online classes, you should instead enroll in the synchronous delivery section FX1.

Homework

Basic Assignments are done through the on-line WebAssign system, and can be expected to take about 1 hour per lecture. This is the primary way you practice the material to learn it. Problems are multiple choice or fill-in-the-blank, and are computer graded. Online homework is due before 9 pm. You will be allowed five attempts on each question. You will be able to make at most 5 attempts on each problem. After the due date/time you may request an automatic 2-calendar-day extension for any assignment with a 25% penalty on your score. We are going to access WebAssign directly from Blackboard. To do so your browser must be configured to accept third-party cookies. If you are having technical troubles contact OIT (`https://www.alaska.edu/oit/`) or WebAssign directly (`https://webassign.com/support/student-support/`).

Here are the steps to access WebAssign from Blackboard.

- Log in to Blackboard.
- Click on the **Courses** tab.
- Click on our course, Math 253X.
- In the course menu, click Tools.
- Click Access WebAssign.

The first time you access WebAssign from Blackboard, a new linked WebAssign account is automatically created for you. If you already have an account you may have to contact WebAssign's student tech support to link your accounts. If you are having trouble with WebAssign, please let your instructor know **and** contact WebAssign's student tech support. (`https://webassign.com/support/student-support/`)

Written problems: In addition, I will assign a set of problems to be done by hand. You need to show all work leading to the solution. Written homework is due on the same day as the online one before midnight. You will submit the written homework as a single PDF file on **Gradescope**. You may not collaborate or use any form of online help (solution manuals, question/answer boards, etc.). But you are encouraged to ask me questions about assignments (during office hours, or by email) or use the services of the UAF MathLab (online tutors are available). Late written homework is accepted but at a potential penalty. The grade for a late written homework will be the minimum between the grade your work would have earned if turned in on time and the total possible number of points minus two points per day late (including weekends).

Unproctored 45 minutes Quiz will be given biweekly on Friday (see schedule). No form of collaboration or help is allowed on quizzes. In particular, quizzes are closed book, closed notes, and calculator-free. Material from quizzes will be similar to those in lecture notes and homework assignments. On the designated day of the quiz,

you will log in to **Gradescope** past 5 pm to take the quiz, and you will have 45 minutes total to work out the problems and enter your PDF file with the solutions. The deadline to complete the quiz (not start it) is midnight. No make-up for quizzes is allowed. Please honestly follow the rules on these, as cheating will not increase your grade substantially. You are encouraged to work with others on the written homework, but you must write up solutions independently. You will learn nothing from simply copying someone's solution. The best approach is 1) make a first attempt at all problems alone, 2) work with a classmate on any difficulties, 3) write up complete solutions alone.

Examinations

Midterm: There will be two two-hour midterm exams (exact dates (COVID-permitting) are Wednesday, February 10 and Wednesday, March 26.
Final: There will be a cumulative two-hour final exam on Thursday, April 30. No form of collaboration or help is allowed on the exams. The exams should be proctored on the indicated days either at the eCampus center (COVID-permitting) or via video conferencing.
Missed examinations or assignments that are not approved in advance will result in a zero grade on that exam or assignment. No make-ups will be allowed except in unforeseeable circumstances (e.g., documented illness, quarantine, family emergencies, etc.). Notifying me by email or a note that you will miss an exam or due date is not sufficient for advance approval; you must speak with me via Zoom if you believe you have a valid excuse.
Calculators or similarly capabilities on smart phones or computers may be used on any homework, but not on quizzes or exams.
Auditing of this course will only be allowed for those who agree to participate fully, as evidenced by completion of homework, midterm exam, and class participation.

Evaluation

In this course you will be evaluated based on your performance in WebAssign, Written Homework, Unproctored Quizzes, three midterm exams and the final exam. These components will be weighted as follows:

WebAssign Homework		10%
Written Homework		10%
Unproctored Quizzes		10%
Midterms	(20% each)	40%
Final Exam		30%

Grading

The grading scale used will be the plus/minus letter grades (97-100%=**A+**, 93-96%=**A**, 90-92%= **A-**, 87-89%=**B+**, 83-86%= **B**, 80-82%= **B-**, 77-79%=**C+**, 70-76%=**C**, 67-69%=**D+**, 63-66%= **D**, 60-62%= **D-**, and below 60%=**F**). The instructor reserves the right to make the brackets of this scale wider. An incomplete will be given due to extreme circumstances beyond your control (you will need to provide verifiable proof). After the drop date, students who do not wish to continue with the course will be responsible for withdrawing themselves. If a student chooses to stop participating in the course after the withdrawal deadline, this will result in a grade of **F**.

Communication

Blackboard will be used extensively in this class to communicate with students. All announcements, handouts, solutions, and grades will be posted in Blackboard. It is the responsibility of the student to check Blackboard regularly and report any issues to their instructor. Additionally, the student must check their `@alaska.edu` e-mail daily. If you prefer to use another e-mail it is best to set up your `@alaska.edu` account to forward to your preferred account.

Some Important Information

University and Department Policies: Your work in this course is governed by the UAF Honor Code. The Department of Mathematics and Statistics has specific policies on incompletes, late withdrawals, and early final exams: http://www.dms.uaf.edu/dms/Policies.html.

Student disabilities statement: Your instructor will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

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/.

COVID-19 statement: Students should keep up-to-date on the universitys policies, practices, and mandates related to COVID-19 by regularly checking this website: https://sites.google.com/alaska.edu/coronavirus/uaf/uaf-students?authuser=0 Further, students are expected to adhere to the universitys policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

UAF Math & Statistics Lab: Free tutoring or occassional help. See https://www.uaf.edu/dms/mathlab/math-and-stat-lab/

Important Dates to Remember

See `http://https://catalog.uaf.edu/calendar/` for a more detailed description of these dates.

First Day of Instruction and late registration begins	Monday, January 11
Alaska Civil Rights Day (no classes, most offices closed)	Monday, January 18
Last day for student- and faculty-initiated drops with refund	Friday, January 22
Deadline for tuition and fee payment; 5 p.m. in person, midnight at UAOnline	Friday, January 22
Midterm 1	Wednesday, February 10
Midterm 2	Wednesday, March 26
Deadline for student and faculty-initiated withdrawals	Friday, March 26
Spring break (no classes, most offices closed)	Monday-Friday, March 8-12
Last day of instruction	Monday, April 26
Final Exam	Thursday, April 30
Deadline for faculty to post grades, noon	Wednesday, May 5

Course Schedule

Here is a tentative schedule of the topics we will cover during the semester. If necessary, changes to this schedule will be announced via Blackboard.

	Dates	Content	Comments
Week 1	Jan 11, 12, 13, 15	12.1, 12.2, 12.3, 12.4	
Week 2	Jan 19, 20, 21	12.5, 12.5, 12.6	M holiday
Week 3	Jan 25, 26, 27, 29	13.1, 13.2, 13.3	
Week 4	Feb 1, 2, 3, 5	13.3, 13.4 14.1	
Week 5	Feb 8, 9, 10, 12	14.2, 14.3	**Exam 1** Wednesday, Feb 10
Week 6	Feb 15, 16, 17, 19	14.4, 14.4, 14.5, 14.5	
Week 7	Feb 22, 23, 24, 26	14.6, 14.6, 14.7, 14.8	
Week 8	Mar 1, 2, 3, 5	15.1, 15.2, 15.2, 15.3	
	Mar 8 - 12		Spring break
Week 9	Mar 15, 16, 17, 19	15.4, 15.4, 15.5	
Week 10	Mar 23, 25, 26, 27	15.6, 15.7, 15.8	**Exam 2** Wednesday, Mar 26
Week 11	Mar 29, 30, 31, Apr 2	15.9, 16.1, 16.2, 16.2	
Week 12	Apr 5, 6, 7, 9	16.3, 16.3, 16.4, 16.5	
Week 13	Apr 12, 13, 14, 16	16.6, 16.6, 16.7, 16.7	
Week 14	Apr 19, 20, 21, 23	16.8, 16.9	
	Apr 26		
		Final exam **Th Apr 30 5PM-7PM**	Happy Summer!

WebAssign Schedule

Here is a tentative schedule of WebAssign. All the WebAssign will be available at 09 AM and will due at 09:00 PM. If necessary, changes to this schedule will be announced via Blackboard.

Section	Visible Date (Time: 09 AM)	Due Date (Time: 09 PM)
12.1	01/11	01/13
12.2	01/13	01/15
12.3	01/16	01/18
12.4	01/18	01/20
12.5	01/20	01/22
12.6	01/23	01/25
13.1	01/25	01/27
13.2	01/30	02/01
13.3	02/01	02/03
13.4	02/03	02/05
14.1	02/06	02/08
14.2	02/10	02/12
14.3	02/13	02/15
14.4	02/17	02/19
14.5	02/20	02/22
14.6	02/22	02/24
14.7	02/24	02/26
14.8	02/28	03/01
15.1	03/01	03/03
15.2	03/03	03/05
15.3	03/13	03/15
15.4	03/17	03/19
15.5	03/20	03/22
15.6	03/22	03/24
15.7	03/24	03/26
15.8	03/27	03/29
15.9	03/29	03/31
16.1	03/31	04/02
16.2	04/03	04/05
16.3	04/05	04/07
16.4	04/07	04/09
16.5	04/10	04/12
16.6	04/14	04/16
16.7	04/19	04/21
16.8	04/21	04/23
16.9	04/24	04/26

- You will be able to make at most 5 attempts on each problem.
- After the due date/time you may request an automatic 2-calendar-day extension for any assignment with a 25% penalty on your score.