Math 213: Multivariable Calculus
George Mason University, Fall 2020
Prof. Anton Lukyanenko, Section DL1

Contact information and office hours (free tutoring!)

Professor:		
Anton Lukyanenko	alukyane@gmu.edu	MW 2:45-3:15, or by appointment
Graduate Teaching Assistant:		
Duy Nguyen	dnguyet@gmu.edu	T 2-4pm
Undergraduate Learning Assistants:		
Anu Gupta	agupta29@gmu.edu	M 6-7pm, F 10-11pm
Harrison Klein	hklein2@gmu.edu	W 6-8pm ~~Tu 11am-noon, W 6-7pm~~
Meghana Puduru	mpuduru@gmu.edu	F 2-4pm

Course Resources

You will access everything through Blackboard: `https://mymasonportal.gmu.edu`:

- Live lectures (MW 1:30-2:45), discussions (Th mornings), office hours, and assessment (via Zoom).
- Recorded lectures and idea question lists.
- Weekly homework, and quizzes (via Pearson MyMathLab).
- Textbook (*Calculus: Early Transcendentals*, Thomas, 14th ed.; via MML).
- Message board (via Piazza).
- Grades (ignore the total points column, we'll be using completion grading)

Online Learning Plan

The class is in a synchronous online format. You are expected to attend the lectures and discussions at the scheduled times via Zoom, and to regularly meet with the professor for brief one-on-one assessments.

There is a lot of flexibility: all lectures are recorded, all assignments are self-paced, and can be repeated to improve your score. You are encouraged to ask questions about earlier parts of the course as needed.

If something unexpected happens during the semester, details on this syllabus may need to be adjusted. In particular, the backup instructor for this course is Professor Rebecca Goldin.

Workload

This is a hard class. You will spend 8-10 hours per week on the coursework, possibly more depending on how well-prepared you are. Your work will consist of:

(1) **Lectures:** Standard lectures, with a chance to ask questions. Recorded and posted on Piazza.
(2) **Discussions:** Solve problems, practice idea questions, ask questions. Group-based. Not recorded.
(3) **Office Hours:** Ask us anything (within reason), and get personalized help. **This is free tutoring.**
(4) **Homework:** a weekly list of problems on MML. These are not graded, but are a good way to practice. A new homework set will appear every Monday morning.
(5) **Quizzes:** a weekly 1-hour quiz on MML. Questions will be selected automatically from the list of homework problems. A new quiz will appear every Monday morning. Quizzes must be completed in order. For example, to unlock Quiz 3 you first have to get a 70% on Quiz 2.
(6) **Idea questions:** At the beginning of each of the five units, I will post a list of conceptual questions that I expect you to master. You should be able to explain these quickly and clearly.
(7) **Idea question assessments:** These are 1-on-1 chances to show that you have mastered each unit, by answering 3 of the idea questions. Two correct answers count as passing. See below for details.
(8) No exams.

Accommodations

If you require accommodations, approved by Disability Services, please let Dr. Lukyanenko know as soon as possible. If you think you may need accommodations, see the University Resources section below.

Grades

Your letter grade will depend on how well you do on MyMathLab quizes **and** idea question assessments. Here's what you need to do to earn each grade:

(1) To get a C in the course: pass 3 idea question assessments **and** get a 70% or better on 12 quizzes.
(2) To get a B in the course: pass 4 idea question assessments **and** get an 80% or better on 13 quizzes.
(3) To get an A in the course: pass 5 idea question assessments **and** get a 90% or better on 14 quizzes.
(4) To get an A+ in the course: pass all 5 idea question assessments on the first try **and** get a 95% or better on all 15 quizzes.

You will have 8 opportunities to pass the idea question assessments (see the calendar below), and can try each MyMathLab quizzes up to 10 times (only the best grade is kept). **Don't fall behind!**

Idea Questions and Assessments

The idea questions (unlike MML homework and quizzes) focus on teaching you to think. The list of idea questions for each unit will be posted at the beginning of the unit.

You should read through the list when the questions are posted, write down the answers as they come up in lecture, and make sure that you can explain your answer to your classmates (you will have opportunities to practice this in your discussion section). Don't focus too much on the exact wording for the solutions, and in particular don't just memorize the responses.

You will have the chance to demonstrate your understanding of each unit during 5-minute 1-on-1 appointments, which will be scheduled on alternating Thursdays and during the scheduled day of the final (8 tries total). During the 5 minutes, you will answer 3 randomly-chosen idea questions. You will be able to skip one question if you don't know it, but will need to correctly answer the other two to pass the assessment. **I will be making sure that you both know the answer and can explain it clearly.** In particular you will not pass if you use notes, receive outside help, or sound like you are reciting a memorized text.

If you do not pass an assessment, you can try again at the next opportunity (alternating Thursdays and the day of the final). There will be 8 chances to pass the 5 assessments. Meeting with up to 90 students in one day will be difficult, so I will not be able to accommodate late arrivals or technical problems for any reason.

Good Participation

Please help make this class good for everyone's learning (including your own!) and generally pleasant.

- Math is hard, and consistent work is more impressive than coming into the class well-prepared.
- It's helpful (and more fun) to work together with others on the homework and idea questions.
- If you're feeling behind, make sure to speak up in class, find study groups, and come to office hours.
- If you're feeling confident, do help others learn, but make sure you're listening more than talking.

If any disruptive behavior does occur, please notify the professor (or a GTA/LA) as soon as possible.

On both the quizzes and idea question assessments, the use of notes or other resources is not allowed. Please respect the hard work of your classmates (and avoid unnecessary paperwork) by staying honest.

University Resources

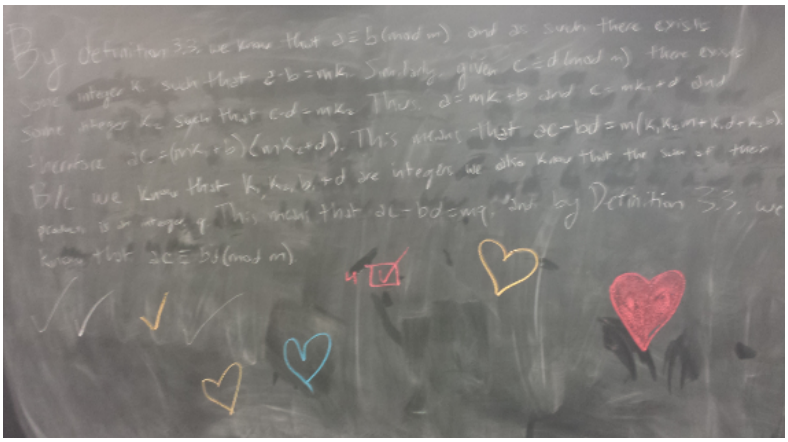
The following groups exist to support student learning, with both academic and non-academic issues, so don't hesitate to contact them:

- Mathematics Tutoring Center: `http://math.gmu.edu/tutor-center.php/`
- General Advising: `http://advising.gmu.edu/`
- Student Support and Advocacy Center: `https://ssac.gmu.edu/`
- Disability Services: `http://ds.gmu.edu/`
- Counseling and Psychological Services: `https://caps.gmu.edu/`
- Compliance Diversity and Ethics Office: `https://diversity.gmu.edu/`

Issues affecting learning may also be discussed with the professor. In certain cases, the professor is required to report such issues to appropriate university units.

Course Schedule

Week	Dates	Topic	Notes
Unit 1			
1	Aug. 24-28	Review of Calculus I	
Unit 2			
2	Aug. 31-Sept. 4	12.1-12.4: Vectors in 2D and 3D, operations (dot product, cross product, etc)	
3	Sept. 7-11	12.5-12.6: Shapes in 3D	No Monday Lecture (Labor Day), Thursday idea assessment
4	Sept. 14-18	15.4, 15.7, 13.1: Coordinate systems, curves	
5	Sept. 21-25	13.2-13.3: integrals, arc length, parametrization of shapes in 2D and 3D	Thursday idea assessment
Unit 3			
6	Sept. 28-Oct. 2	14.1-14.2: derivatives, level surfaces, limits, and continuity	
7	Oct. 5-Oct. 9	14.3-14.4: partial derivatives, chain rule, gradient	Thursday idea assessment
8	Oct. 12-Oct. 116	14.6-14.8: tangent planes, linear approximation, optimization	
Unit 4			
9	Oct. 19-23	15.1-15.4: integrals, area, averages, polar coordinates	Thursday idea assessment
10	Oct. 26-30	15.5-15.7: 3D integrals, center of mass, review of polar/spherical/cylindrical coordinates	
11	Nov. 2-6	15.7-15.8: derivatives and integrals using polar/spherical/cylindrical coordinates, Jacobian derivative, 2D u-substitutions	Vote, Thursday idea assessment
Unit 5			
12	Nov. 9-13	16.2: vector fields, work, flow, flux, curl, div	
13	Nov. 16-20	16.3-16.4: conservative vector fields, Fundamental Theorem of Line Integrals, Green's Thm	Thursday idea assessment
14	Nov. 23-27	16.5: parametrizing surfaces, computing their area, center of mass, etc.	Thanksgiving break Nov. 25-27
15	Nov. 30-Dec. 4	16.6-16.8: surface integrals, Stokes and Divergence Theorems	Thursday idea assessment
	Dec. 9	Final Exam Day: all quizzes due by midnight	Last idea assessment (Wednesday!)



Want More Math?

- Talk to the professor, GTA, and LAs during office hours.
- Take Math125H: Mathematics of Cryptography in the spring, and discover math ideas with friends.
- Sign up to be a Learning Assistant or Tutoring Center Assistant.
- Do research with the Mason Experimental Geometry Lab (MEGL).
- Take Advanced Calculus, where we focus on why calculus works.
- Become a math major or minor!