MATH 241: Vector Calculus

Instructor: Jeremiah Southwick
CRN: 49157
Section: 007
Room & Time: LC 112, MWF 9:40am-10:30am

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Office Hours: MWF 10:30-11:00
MW 2:40-3:40 **T** 9:30-10:30
R 12:30-1:30 **F** 8:30-9:30
ELSE by appointment

COURSE DESCRIPTION AND OBJECTIVES

Prerequisites: A grade of C or better in MATH 142 or consent of the Undergraduate Director.

Learning Outcomes: Upon successful completion of the course, students:

- will understand the meaning, use, representations, and generalizations of multivariable functions, including the generalization of fundamental calculus concepts (such as limits, continuity, derivatives, and integration).
- will master concepts and be able to solve problems associated with vectors, lines, planes, curves, surfaces, coordinate systems involving differentiation, max-min theory, and multiple integration techniques via physical applications of the tools of multivariable calculus.
- will be able to explain how some of the major integration theorems of vector calculus are generalizations of the fundamental theorem of calculus to higher dimensions, and apply them to physical problems.

MATERIALS

- **Textbook: Thomas' Calculus, Early Transcendentals**, 13th Edition or Custom Edition for USC, by G.B.Thomas.
- **Online Materials:** The syllabus and other material can be found on Blackboard (blackboard.sc.edu) or my website (http://people.math.sc.edu/southwij/Teaching.html).
- **Calculator:** This class will not use calculators. On problems requiring computations, the numbers will be chosen so that the problems can be worked by hand.
- **Colored Pens/Pencils**: These can be useful when sketching things in 3 dimensions.

COURSE POLICIES AND EXPECTATIONS

Purpose: This syllabus is the framework that lays the foundation for a successful course. It is ultimately a contract between the instructor and the student outlining the expectations and goals of the course. As such, the syllabus has the final say on all matters, including attendance policies, classroom management, grading policies, and assessment structure. However, if issues arise throughout the summer session that require changes to existing policies or the addition of new policies, the instructor reserves the right to modify the syllabus so as to keep the course on a solid academic footing. If such modifications are made, the instructor will notify the students of the changes, and the updated syllabus will be posted on Blackboard for easy reference.

Attendance: Attendance will be taken for each class period. Absences will be excused only if they are documented and fall under the following categories: USC events, military events, illness, family illness or death, legal proceedings, professional obligations, or religious observances. Any absence without documentation will not be excused. To document an absence, the student must notify the instructor of their absence and have a parent/guardian/supervisor email the instructor within a week of the absence to verify the nature of the absence. In the case of illness, the student can provide a doctor's note. In this course, excused absences will count as half-absences. As per USC policy (bulletin.sc.edu), "*[a]bsence from more than 10 percent of the scheduled class sessions, whether* **excused or unexcused***, is excessive and the instructor may choose to exact a grade penalty for such absences*". We will meet roughly 42 times this semester, so a grade penalty can be enforced if a student misses more than 4 class periods. For such students, the grade penalty in this course will be assessed as a 2.5% penalty on their course grade for each 5 classes missed.

Participation: Attendance is only useful to students if they are attentive during the class. Thus all students are expected to participate in class and may be called upon to respond to classroom discussions or present work at the board. During lecture, this means that students should be actively following the instructor and should ask questions when the lecture is unclear. During group work, this means students should be engaged in the work and should be contributing ideas to the task the group is working on. During school closures, this means monitoring email to be aware of assignments from the instructor.

Cell Phones: Cell phones must be turned off and put away during class. If you expect to receive a call during a class period, tell

the instructor beforehand and quietly leave the room when the call comes. If the instructor sees a student using their cell phone during class, a warning will be given. If the student uses their phone a second time during that class period, the instructor will request it be turned off and will take it away to be returned once the class period ends.

Laptops/Other Technology: If a student wishes to use a laptop, tablet, or other technology to take notes during class, they may do so with the proviso that they must have the device opened to the note taking app/program for the duration of the class period. Smart watches can be worn during lecture periods but must be taken off and put away during exams since their PDF capabilities represent a cheating risk. Any other use of technology during class must be cleared with the instructor prior to its use.

Academic Integrity: Each student must familiarize themselves with the Honor Code found in the current student handbook. As per USC policy, "Any student who violates this Honor Code or who knowingly assists another to violate this Honor Code shall be subject to discipline." If the instructor finds that any student has violated the Honor Code on any matter pertaining to the course (exams, homework, etc.), the instructor will submit the incident to the Office of Academic Integrity. The Honor Code can be found at http://www.housing.sc.edu/academicintegrity/honorcode.html.

Students with Disabilities: If any student requires special accommodations during lectures or exams, they must register with the Student Disability Resource Center (LC 112A). They must also talk with the instructor as soon as possible (after class or during office hours). This will allow the instructor to know how best to serve each student.

Studying: This course meets three times a week for 50 minute lectures. The pace will necessarily be rapid. It is **very** important that you study 2-3 hours out of class for every hour within class. Studying can involve working on homework, reviewing lecture notes, reading proofs of theorems in the textbook to understand them better, or attending office hours.

Late Policy: Assignments will be accepted up to a week late, for a 50% penalty. No late assignments will be accepted after the last class period on Monday, April 29.

Make-Up Policy: Quizzes cannot be made up. Exams can be made up **ONLY** in the case of an emergency, and **ONLY** if the student requests a make-up exam before the scheduled time. It is the responsibility of the student to contact the instructor within a reasonable time to request a make-up exam.

ASSESSMENT STRUCTURE

Homework: Homework assignments will be posted on Blackboard and will (tentatively) be collected each Monday. These assignments are critical to understanding the material and thus completing them will provide feedback both to the student and to the instructor on where the student stands in the course. Homework can be discussed with other students but each student must complete their own write-up.

Quizzes: There will be quizzes (tentatively) on Fridays over the material covered in previous lectures. These serve as an additional benchmark to students to test their knowledge of the course material before coming to exams. Keeping with USC's attendance policy, the lowest (at least) 10% of your quiz scores will be dropped.

Exams: There will be three 50 minute exams given throughout the semester. The dates for each are at the end of the syllabus.

Final Exam: The final exam is on Monday, May 6 at 9:00am. It will be a cumulative 3 hour exam. Students must make sure they are free on this date to take the final, since it cannot be offered at any other time.

Evaluation: Each student's course grade will be calculated with whichever of the following schemes results in the higher score:

SCHEME 1		SCHEME 2	
Homework	10%	Homework	10%
Quizzes	15%	Quizzes	15%
Exam 1	18%	Exam 1	15%
Exam 2	18%	Exam 2	15%
Exam 3	18%	Exam 3	15%
Final Exam	21%	Final Exam	30%

Final grades will use the following scale:

A	B+	B	C+	C	D+	D	F
100-90%	89-86%	85-80%	79-76%	75-70%	69-66%	65-60%	59% and below

USEFUL WEBSITES:

- Blackboard Website: https://blackboard.sc.edu
- My website: http://people.math.sc.edu/southwij/Teaching.html
- Software Support for Calculations: http://www.wolframalpha.com/
- Good app to use for notes and handouts, "Notability" (gingerlabs.com)
- Desmos 2D graphing website: https://www.desmos.com
- Robert Vandermolen's MATH 241 (Summer 2017) slides: http://people.math.sc.edu/robertv/teaching.html
- Graphing in 3D: https://www.geogebra.org/3d?lang=eng

SUPPORT:

- My Office Hours
- FREE TUTORING in LC 105 **MTWR** 10:00-4:00.
- Student Success Center – Offers FREE tutoring and FREE 1 on 1 ONLINE tutoring. (http://www.sa.sc.edu/ssc/)

IMPORTANT DATES:

- January 22, 2019: Last day for students to DROP without a grade of "W".
- March 4, 2019: Last day for students to DROP or withdraw without a grade of "WF".
- ***Note that the schedule below is tentative and subject to change.***

Date	Section	Title
Monday, January 14, 2019	12.1/12.2	Coordinates in 3-space, distance, vectors, spheres
Wednesday, January 16, 2019	12.2/12.3	Vector algebra, dot product
Friday, January 18, 2019	12.3/12.4	Projections, cross product
Monday, January 21, 2019	**NO CLASS**	Dr. Martin Luther King Jr. Service Day (**NO CLASS)**
Wednesday, January 23, 2019	12.4	Cross product, equations of lines
Friday, January 25, 2019	12.5	Equations of lines and planes
Monday, January 28, 2019	12.5	Distance between points, lines, and planes

Wednesday, January 30, 2019	12.5	Distance between points, lines, and planes
Friday, February 1, 2019	13.1/13.2	Vector functions, derivatives and integrals
Monday, February 4, 2019	13.3	Arc length
Wednesday, February 6, 2019	13.4	Motion, velocity, acceleration
Friday, February 8, 2019	**Review**	**Review**
Monday, February 11, 2019	**Exam 1**	**Exam 1 (Chapters 12 and 13)**
Wednesday, February 13, 2019	14.1/14.2	Functions of several variables, limits
Friday, February 15, 2019	14.2	Limits
Monday, February 18, 2019	14.3	Continuity, partial derivatives
Wednesday, February 20, 2019	14.4	The chain rule
Friday, February 22, 2019	14.5	Directional derivatives, gradients
Monday, February 25, 2019	14.5/14.6	Geometric properties of the gradient/Tangent planes
Wednesday, February 27, 2019	14.6	Tangent planes
Friday, March 1, 2019	14.7	Critical points, first derivative test
Monday, March 4, 2019	14.7	Absolute maximum and minimum values **(WF DROP DATE)**
Wednesday, March 6, 2019	**Review**	**Review**
Friday, March 8, 2019	**Exam 2**	**Exam 2 (Chapter 14)**
March 10-17	**NO CLASS**	Spring Break (**NO CLASSES**)
Monday, March 18, 2019	12.6	Cylinders and quadric surfaces
Wednesday, March 20, 2019	15.1	Integrals over rectangular regions
Friday, March 22, 2019	15.2/15.3	Integrals over general regions, area
Monday, March 25, 2019	15.2/15.3	Integrals over general regions, area
Wednesday, March 27, 2019	15.4	Double integrals in polar coordinates
Friday, March 29, 2019	15.5	Triple integrals in rectangular coordinates
Monday, April 1, 2019	15.5	Triple integrals in rectangular coordinates
Wednesday, April 3, 2019	15.5	Triple integrals in rectangular coordinates
Friday, April 5, 2019	15.7	Triple integrals in cylindrical coordinates
Monday, April 8, 2019	15.7	Triple integrals in cylindrical coordinates
Wednesday, April 10, 2019	**Review**	**Review**
Friday, April 12, 2019	**Exam 3**	**Exam 3 (12.6, 15.1-15.5,15.7)**
Monday, April 15, 2019	15.7	Triple integrals in spherical coordinates
Wednesday, April 17, 2019	15.7	Triple integrals in spherical coordinates

Friday, April 19, 2019	16.1/16.2	Line integrals, vector fields
Monday, April 22, 2019	16.3	The fundamental theorem for line integrals
Wednesday, April 24, 2019	16.4	Green's theorem
Friday, April 26, 2019	**Review**	**Review**
Monday, April 29, 2019	**Review**	**Review**
Monday, May 6, 2019	**FINAL**	**FINAL EXAM (COMPREHENSIVE): 9:00am**