

Course: Math 241
Section: 201
CRN: 76975
Location: LeConte 310
Time: M,T,W,TR 12:00-1:25

Instructor: Robert Vandermolen
Office: LC 317N
Office Phone: 803-777-9709
E-mail: robertv@math.sc.edu
Office Hours: M,T,W,TR: 11:00-12:00
 or by appointment.

COURSE DESCRIPTION AND OBJECTIVES

Prerequisites: C or better in MATH 142

Many scenarios in science, engineering, and life depend upon multiple factors, variables, and parameters. These scenarios are modeled mathematically using functions of more than one variable (multivariable functions). In this class, we'll learn properties and operators of multivariable functions including, partial derivatives, multiple integrals, parametric curves, line integrals, vector-valued functions, vector fields, and Green's Theorem.

Learning Outcomes:

1. 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).
2. Students will master concepts and solve problems associated with vectors, lines, planes, curves, surface, coordinate systems involving differentiation, max-min theory, and multiple integration techniques via physical applications of the tools of multivariable calculus.
3. Students will be able to explain how some of the major integration theorems of the course are generalizations of the fundamental theorem of calculus to higher dimensions.

REQUIRED MATERIALS

- Textbook: Thomas, *Calculus, Early Transcendentals*, 13th edition, Pearson.
- Calculator: TI-82 through TI-86. TI-89 and other CAS calculators are not allowed. TI-Inspire is acceptable with the proper faceplate. The calculator won't be used much in this course, but you may use one if you wish unless otherwise stated.

COURSE POLICIES AND EXPECTATIONS

Design: It is **very** important that you study at least 2 hours out of class for every hour within class. I suggest studying *every weekday in the morning for an hour* (so that you may stop by office hours with questions in the afternoon) and one hour on the weekends.

Participation: Participants are expected to attend every class meeting and to get involved in the discussion. We will learn much more if we explore the mathematics together. All participants are expected to show respect to other students, the instructor, and any guests who may be visiting the class during the year (Golden Rule). Out-of-class participation is also expected, so read the text and other materials; get to know the other students in class; exchange phone numbers; work together on assignments; and give each other moral support.

Cell Phones: Make sure that your **cell phone is off and away** during our sessions.

Attendance: Attendance is taken daily; any more than three absences will be considered excessive. Your attendance will be considered in borderline cases.

Academic Integrity: I expect you to familiarize yourself with the Honor Code found in the current student handbook. Keep in mind that "Any student who violates this Honor Code or who knowingly assists another to violate this Honor Code shall be subject to discipline."

Students with Disabilities: Students who would like to request accommodations for disabilities must talk to me as soon as possible. Students must register with the Office of Student Disability Services before I can make any accommodations.

Make-Up Policy: Exams can be made up **ONLY** in the case of an emergency, and **ONLY** if you request a make-up exam before the scheduled time. It is your responsibility to contact me within a reasonable time to request a make-up exam.

ASSIGNMENTS

Homework (VITAL FOR THIS CLASS!!!!!!!!!!): As this is a summer course and it will be moving quickly I will not be able to grade and return the homework fast enough, so at the end of the syllabus there is a list of suggested Homework. So to give you a homework grade, every day I will expect each student to choose at least one problem from the relevant section that they found extra challenging, and write it down (the whole question and attempted work not jus the number), and I will walk around and record if they have done so.

Quizzes: Quizzes will frequently be on Thursdays and will cover the previous week’s material.

Exams: There will be three midterm exams, whose dates will be announce in class at least one week in advance.

Final Exam: The final exam is cumulative. **Final Exam Friday, August 11th, 12:30pm-2:30pm in LC 310.** Do not plan on leaving town before this day.

EVALUATION

Homework and Participation...	9%
Quizzes	9%
Exam 1.....	18%
Exam 2.....	18%
Exam 3.....	18%
Cumulative Final	28%

Final Grades will use the following scale

A	B+	B	C+	C	D+	D	F
100-90%	89-87%	86-80%	79-77%	76-70%	69-67%	66-60%	59% and below

No "I" (incompletes) are expected for this course.

USEFUL WEBSITES:

- Blackboard Website: <https://blackboard.sc.edu>
- 3D Website (requires JAVA): <http://web.monroecc.edu/manila/webfiles/calcNSF/JavaCode/CalcPlot3D.htm>.
- Cheaper book bundle: www.mypearsonstore.com, Code: Gamecock, Item: ValuePack of student textbook + MML code, ISBN: 1323157131, Discount: 25% (bringing list price of \$131.73 down to \$98.80)
- Student Resource Files by Textbook (including ppts): http://wps.aw.com/aw_thomas_calculus_series/
- Good Video Lectures for Calculus: <https://www.khanacademy.org/math/differential-calculus>
- Software Support for Calculations: <http://www.wolframalpha.com/>
- Online access to practice from book: www.mymathlab.com COURSE ID #: yee82243
- Good app to use for handouts, “Notability”
- LaTeX Online: <http://www.scribtex.com/> LaTeX Decoder: <http://detexify.kirelabs.org/classify.html>
- Mathtype Website: <http://www.dessci.com/en/products/mathtype/features.htm>

TUTORING:

LeConte 105, or contact the student success center (<http://www.sa.sc.edu/ssc/>)

*Everywon makes mistakes,
But not everyone learns from their mistakes.*

Important Dates:

- 6/28/2017 Last day for students to DROP without a grade of “W”.
- 7/19/2017 Last day for students to DROP or withdraw without a grade of “WF”.

Topics: *Subject to change* All of my lectures are made via google slides and the links are here:

Section	Topic	Link
12.1	Three Dimension Coordinates	Lecture 1
12.2-12.4	Vectors	Lecture 2
12.5	Lines and Planes in Space	Lecture 3
12.6	Cylinders and Quadratic Spaces	Lecture 4
13.1-13.2	Curves in Space and Their Tangents	Lecture 5
13.3-13.4	Arc Length/Curvature/Normal Vectors	Lecture 6
14.1-14.2	Functions of Several Variables/Limits/Continuity	Lecture 7
14.3	Partial Derivatives	Lecture 8
14.4	The Chain Rule	Lecture 9
14.5	Directional Derivatives and Gradient Vectors	Lecture 10
14.6	Tangent Planes and Differentials	Lecture 11
14.7	Extreme Values and Saddle Points	Lecture 12
14.8	Lagrange Multipliers	Lecture 13
15.1-15.3	Double and Iterated Integrals over Rectangles	Lecture 14
15.4	Double Integrals in Polar form	Lecture 15
15.5-15.6	Triple Integrals in Rectangular Coordinates	Lecture 16
15.7	Triple Integrals in Cylindrical and Spherical Coordinates	Lecture 17
15.8	Substitution in Multiple Integrals	Lecture 18
16.1-16.3	Line Integrals	Lecture 19
16.4	Green's Theorem in the Plane	Lecture 20

Suggested Homework:

Section	Topic	Suggestions
12.1	Three Dimension Coordinates	5, 9, 25, 47
12.2	Vectors	1, 3, 19, 23, 47
12.3	The Dot Product	1, 3, 5, 11, 24
12.4	The Cross Product	7, 11, 13, 15
12.5	Lines and Planes in Space	1, 3, 15, 17, 33, 39, 47
12.6	Cylinders and Quadratic Spaces	1 - 12
13.1	Curves in Space and Their Tangents	1, 3, 13, 19
13.2	Integrals and Vector Functions	1, 3, 7, 13
13.3	Arc Length in Space	1, 3, 5, 7
13.4	Curvature and Normal Vectors of a Curve	1, 3, 9, 11, 13, 15
14.1	Functions of Several Variables	1, 3, 31 - 36
14.2	Limits and Continuity in Higher Dimensions	1, 3, 5, 25, 27, 29
14.3	Partial Derivatives	5, 7, 23, 25, 27, 41, 43
14.4	The Chain Rule	1, 5, 7, 13, 33
14.5	Directional Derivatives and Gradient Vectors	7, 9, 11, 15, 17
14.6	Tangent Planes and Differentials	1, 3, 5, 7
14.7	Extreme Values and Saddle Points	1, 3, 5, 7, 9, 31
14.8	Lagrange Multipliers	1, 13, 17, 19
15.1	Double and Iterated Integrals over Rectangles	1, 3, 5, 7
15.2	Double Integrals over General Regions	1, 3, 19, 21, 33, 35, 57
15.3	Area by Double Integration	1, 3, 5, 13
15.4	Double Integrals in Polar form	1, 3, 5, 9, 13, 15
15.5	Triple Integrals in Rectangular Coordinates	7, 9, 13, 21, 27, 41
15.7	Triple Integrals in Cylindrical and Spherical Coordinates	1, 3, 7, 15, 21
15.8	Substitution in Multiple Integrals	1, 3, 21
16.1	Line Integrals	9, 11, 13, 15, 25, 27, 29
16.2	Vector Fields and Line Integrals	1, 3, 13, 15, 19, 21
16.3	Path Independence, Conservative Fields	1, 3, 5, 7, 9, 19, 21
16.4	Green's Theorem in the Plane	5, 7, 9, 11, 13