

LIBERTY UNIVERSITY
Math 231–001 Calculus and Analytic Geometry III (4 Credit Hours)
Fall 2011

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AS 105

Office Hours:
MWF 2:45 - 3:35
TR 12:15 - 1:00
and by appointment

*Thus shall you say to them: "The gods who did not make the heavens and the earth shall perish from the earth and from under the heavens" It is he who made the earth by his power, who established the world by his wisdom, and by his understanding stretched out the heavens. **Jeremiah 10:11-12 (E.S.V.)***

I. Course Description

A continuation of Math 132. Infinite series, power series, geometry of the plane and space, vectors, functions of several variables, multiple integrals, and an introduction to differential equations. 4 hours credit.

II. Rationale

Vector calculus is an essential tool for the analysis of physical phenomena that depend on more than a single variable, such as the observation of the trajectory of a projectile. Vector calculus also provides a right setting for the interrelation between geometry, matrix algebra and physics. This course is aimed at mainstream calculus students and strives for an optimal balance of intuition and rigor. Various applications will be considered in order to service even students outside the field of mathematics, physics, and engineering.

III. Prerequisite statement

To enroll in this course you must have successfully completed Math 131 and Math 132, or equivalent. *It is the student's responsibility to make up any prerequisite deficiencies, as stated in the Liberty University Catalog, which would prevent the successful completion of this course.*

IV. Materials List

Required:

- Textbook – Calculus, Sixth Edition, By James Stewart, Brooks/Cole Publishing Co. 2008.
- No graphing calculator is required. But a scientific calculator will be very helpful. Mathematica can do much more than even the best calculator. Use of calculators on cell phones, PDA's, etc. is not permitted.
- Maple is also recommended as a help for visualization and computation. Ask me for further details if you want to purchase a student version.

V. A. Course Learning Outcomes

The student should be able to:

1. Use vector algebra, parametric spaces and level-sets to model curves and surfaces.
2. Use non-Cartesian coordinates to simplify problems with manifest symmetry.
3. Take partial derivatives of functions of several variables.
4. Calculate multiple integrals.
5. Calculate line or surface integrals of vector fields.
6. Apply Greene's, Stokes and the Divergence Theorem to solve appropriate physical or mathematical problems.

VI. Assignments/Requirements

1. Cognitive Growth
 - a. Demonstrate proficiency in the ability to take the knowledge acquired and apply it to problem-solving situations.
 - b. Appreciate mathematics as a powerful tool in their discipline.
2. Product:
 - a. For each hour in class each student needs to spend at least two hours of study time.
 - b. Each student from memory will write four one-hour examinations over related material covered in class. There will be a final comprehensive examination at the designated time.
 - c. There will be homework assignments over material covered. These will be graded and returned.
 - d. Announced and unannounced classroom quizzes may occur in this class. These will be graded and returned.
3. Process:
 - a. The method of instruction will consist of lecture and interaction with the students.
 - b. Student–Instructor conference will be used where appropriate. Study groups are encouraged.

Assignments:

Resources related to the course, including study outlines and assignments, will be posted as needed on the Course Content area of Blackboard.

VII. Grading Policies

1. **No late assignments are accepted.**
2. Quizzes may or may not be announced in advance.
3. **Tests and quizzes must be taken as scheduled.** No make-up tests/quizzes will be given after the scheduled time, except in the case of emergency. If a test/quiz is missed due to an official university sponsored event, arrangements must be made **in advance** with the instructor to take the test/quiz at an alternate time. For other excused absences, the student must contact the instructor by email and make arrangements to take the test/quiz before the absence. Please plan accordingly. Solutions are posted soon after most tests so no make-ups are given (except of course in the case of an unplanned emergency)
4. **Missed Tests:** if a test is missed with good reason and you explain the reason within a week of the missed test then the final exam may replace the grade. In particular the problems on the final exam which are primarily from the missed test will be used to replace the grade. Please make a short note on the final exam to remind me to replace your grade in the event you need to exercise this option.

Course Grade

Average of Assignments	200 points
Quizzes & Mathematica	50 points
Test 1	125 points
Test 2	125 points
Test 3	125 points
Test 4	125 points
Final	250 points

GRADES ARE BASED ON ACADEMIC PERFORMANCE.

Letter grades will be assigned as follows:

A: 900-1000 points, B: 800-899 points, C: 700-799 points, D: 600-699 points, F: below 600

VIII. Attendance Policies

For the good of the Liberty University student body, a consistent attendance policy is needed so that all students in all majors will understand the expectations of faculty in all their courses. **In general, regular and punctual attendance in all classes is expected of all students.** At times, students will miss classes. These absences will be identified as either excused or unexcused and will be handled per the policy below.

Excused Absences

- Excused absences include all Liberty University sponsored events, to include athletic competition or other provost-approved event.
- Absences due to medical illness that are accompanied by a doctor's note will be excused.
- Absences due to family situations such as a death in the family or a severe medical condition will be excused
- Students will **not** be penalized for excused absences and will be permitted to make arrangements to complete missed work.

Unexcused Absences

- Classes that meet:
 - Three times per week will permit three unexcused absences per semester.
 - Twice per week will permit two unexcused absences per semester.
 - Once per week will permit one unexcused absence per semester.
- Questions regarding unexcused absences must be resolved by the student with the faculty member within one week of the absence. Students may appeal decisions to the dean.
- Extraordinary circumstances regarding excessive absences will be addressed by the student with the faculty member, department chair, and dean as required.
- Penalties for each unexcused absence over the permitted number per semester will be as follows:
 - 50 points for classes that meet 3 times per week
 - 75 points for classes that meet 2 times per week
 - 150 points for classes that meet once per week
- Students who are late for class 10 minutes or less are considered tardy but present for the class. If a student misses in-class work due to tardiness, the faculty member may choose not to allow the student to make up this work. Three class tardies will be counted as one unexcused absence.
- Students who are more than 10 minutes late for class are considered absent

Note: As stated in Section VII, arrangements for make-up tests/quizzes must be made with the instructor in advance when possible and at the earliest possible opportunity in the case of emergencies.

IX. Other Policies

Dress Code

Students are expected to come to class dressed in a manner consistent with *The Liberty Way*.

Honor Code

We, the students, faculty, and staff of Liberty University, have a responsibility to uphold the moral and ethical standards of this institution and personally confront those who do not.

Academic Misconduct

Academic misconduct includes: academic dishonesty, plagiarism, and falsification. See *The Liberty Way* for specific definitions, penalties, and processes for reporting.

Disability Statement

Students with a documented disability may contact the Office of Disability Academic Support (ODAS) in DH 2016 to make arrangements for academic accommodations. For all disability testing accommodation requests (i.e., quieter environment, extended time, oral testing, etc.), the Tutoring/Testing Center is the officially designated place for all tests administered outside of the regular classroom.

Drop/Add Policy

A Fall/Spring course may be dropped without a grade, tuition, and fee charges within the first five days of the semester. From the sixth day until the last day of class, a Fall/Spring course may be withdrawn with a grade of W.

Classroom Policies

The inappropriate use of technology, such as cell phones, iPods, laptops, calculators, etc. in the classroom is not tolerated. Other disruptive behavior in the classroom is not tolerated. Students who engage in such misconduct will be subject to the penalties and processes as written in *The Liberty Way*.

Beneficial dictator policy:

I reserve the right to modify all aspect of this syllabus if the policies are seen (by me) to be needlessly hurtful to the students. This may result in the addition or subtraction of assignments and/or the shifting of due dates. All such changes are communicated via email and lecture meeting. Obviously, this policy does not apply to university-wide policies such as attendance or point scale since I have no authority to modify said policies. However, such policies as I initially set I reserve the right to modify said policies when it is beneficial for the student.

OTHER EXPECTATIONS:

- Arrive on time and stay for the entire class.
- Bring lecture notes, notes, paper, pencil, calculator, and homework.
- No food or drink is allowed in the classroom.
- Phones, beepers, iPods, computers, etc. should be turned off while in the classroom and they should be placed in your bag.
- Any behavior that disrupts the class or interferes with learning is unacceptable.

X. Calendar for the semester/term

Homework is expected to be completed promptly after the material is presented in class.

Date	Topic	my notes	Stewart
M/8-22	Vectors, points, components	9 - 18	13.1, 13.2
T	Dot products, angles	18 - 28	13.3
W	cross product	29 - 40	13.4
TH	Lines and planes	41 - 53	13.5
F	Curves	54 - 68	14.1
M/8-29	Surfaces	69 - 81	13.6
T	Curvilinear coordinates	82 - 90	
W	Curvilinear coordinates	82 - 90	
TH	Calculus of curves	91 - 102	14.2
F	Arclength	103 - 107	14.3
M/9-5	Geometry of curves	107 - 121	14.3
T	Geometry of curves	107 - 121	14.3
W	3D motion	122 - 131	14.4
TH	3D motion, open sets & multivariate limits	122 - 148	14.4, 15.1, 15.2
F	Multivariate limit examples	133 - 148	15.2
M/9-12	Multivariate limits	133 - 148	15.2
T	Multivariate limits	133 - 148	15.2
W	Review day	9 - 148	
TH	TEST I	Chapters 1,2 & 3	13.1 - 15.2
F	Directional derivatives & partial differentiation	149 - 152	15.6*
M/9-19	Partial differentiation with two-variables	153 - 166	15.3*, 15.6*
T	gradient vector field, level curves, contour plots	167 - 174	15.3*, 15.6*
W	Partial diff. with three-variables & applications	175 - 187	15.3*, 15.6*
TH	General concept of differentiation	188 - 202	15.4*
F	Chain rules	203 - 217	15.5*
M/9-26	Tangent spaces of graphs, parametrized surfaces & level surfaces.	218 - 225	15.4*
T	Total differentials and applications thereof	226 - 237	15.4*
W	Partial differentiation with constraints	226 - 237	Page 945*
TH	Gradients in curvilinear coordinates	238 - 241	
F	Lagrange multipliers	243 - 257	15.8
M/10-3	Lagrange multipliers, the quadratic form example	258 - 262	15.8
T	Multivariate Taylor	263 - 269	Page 969*
W	Second derivative test	270 - 278	15.7
TH	FALL BREAK		
F	FALL BREAK		

Date	Topic	my notes	Stewart
M/10-10	Closed set test	279 – 284	15.7
T	Closed set test	279 – 284	15.7
W	Review day		
TH	TEST 2		15.3 - 15.8
F	Simple multivariate integrals	To be prepared	16.1, 16.2
M/10-17	Nontrivial double integrals	To be prepared	16.3, 16.5
T	Nontrivial triple integrals	To be prepared	16.5, 16.6
W	Jacobians and change variables theorem	To be prepared	16.9
TH	Integrals in polars, cylindrical and sphericals	To be prepared	16.4, 16.7, 16.8
F	Integrals in polars, cylindrical and spherical	To be prepared	16.4, 16.7, 16.8
M/10-24	Vector fields and the gradient operator	To be prepared	17.1
T	Geometry of vector fields, curl and div	To be prepared	17.5
W	Line integrals	To be prepared	17.2, 17.3
TH	Line integrals	To be prepared	17.2, 17.3
F	Line integrals	To be prepared	17.2, 17.3
M/10-31	Line integrals	To be prepared	17.2, 17.3
T	Greene's Theorem	To be prepared	17.4
W	Greene's Theorem	To be prepared	17.4
TH	Greene's Theorem	To be prepared	17.4
F	Greene's Theorem	To be prepared	17.4
M/11-7	Review day		
T	TEST 3		16.1 – 17.5
W	Surface integration	To be prepared	17.6
TH	Surface integration	To be prepared	17.6
F	Surface integration	To be prepared	17.6
M/11-14	Stoke's Theorem	To be prepared	17.8
T	Stoke's Theorem	To be prepared	17.8
W	Stoke's Theorem	To be prepared	17.8
TH	Gauss' Theorem	To be prepared	17.9
F	Gauss' Theorem	To be prepared	17.9
M/11-21	THANKSGIVING		
T	THANKSGIVING		
W	THANKSGIVING		
TH	THANKSGIVING		
F	THANKSGIVING		

Date	Topic	my notes	Stewart
M/11-28	Gauss' Theorem	To be prepared	17.9
T	Gauss' Theorem	To be prepared	17.9
W	Gauss' Theorem	To be prepared	17.9
TH	Gauss' Theorem	To be prepared	17.9
F	TBA	To be prepared	
M/12-5	Review day		
T	TEST 4		17.6 – 17.9
W	TBA	To be prepared	
TH	READING DAY !!!		
F			
M/12-12			
T			
W			
TH			
F			

(Time for the final exam is not known to me at this time.)