MATH 231-001 – Calculus and Analytic Geometry III Spring 2009, Liberty University, Lynchburg, VA	Class Meets in: DeMoss Learning Center 1074 Lecture Times: M-W-F 12:35pm - 1:25 pm
Even though I walk through the valley of the shadow of death, I will fear no evil, for you are with me; your rod and your staff, they comfort me. *Psalm 23:4 (E.S.V.)*	Instructor: Dr. James S. Cook Office: Applied Science 105 Office Hours: 11am-12pm weekdays. Email: jcook4@liberty.edu office phone: 434-582-2476

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. 3 hours credit

II. Rationale

Calculus can be exciting; this subject offers a student so much new scope and power. The student will learn how to set up and solve calculus problems. This course is aimed at mainstream calculus students and strives for an optimal balance of intuition and rigor. Many diverse applications will be considered in order to service the ever-expanding clientele, which includes many students outside the field of mathematics, physics, and engineering.

III. Prequisite Statement

To enroll in this course you must have successfully completed Math 131 and Math 132 with a grade of C or higher, 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

1. Required Notes: See my website for course notes. You need to have a copy of the notes with you in-class. I don't require you to carry the text to class but I would ask that you have the relevant sections of my notes printed before class. If your eyesight is good you can print them front and back two pages a side, it's not much to carry.

2.Required Text: Calculus, Sixth Edition, By James Stewart, Brooks/Cole Publishing Co. 2008.

3. No graphing calculator is required for this course. Mathematica can do much more than even the best graphing calculator. I will allow (basic) scientific calculators during tests, but no graphing calculators, laptops, PDAs, IPODS,cell phones, bluetooth-type devices, or any other electronic device capable of either data storage or communication. If in doubt ask.

V. Learning Outcomes

Upon completing Math 231 students should be able to:

1. use the concepts of continuity, differentiation, and integration of vector-valued functions to determine unit tangent and unit normal vectors in the process of modeling objects in three dimensions. Students will be able to parametrize piecewise-smooth curves using arc length. They will be able to compute the curvature of a space curve.

2. compute and sketch level curves and level surfaces for functions of several variables and sketch the graphs of functions of two variables. Analyzing limits, determining continuity, and computing partial derivatives of multivariate functions is also expected. Students will be able to use tangent planes, directional derivatives, gradients, the second partials test, and Lagrange multipliers to approximate and solve optimization problems

3. demonstrate techniques of multiple integration and compute iterated integrals over rectangular regions, non-rectangular regions, and in other coordinate systems. They will be able to apply multiple integrals in problem situations involving area, volume, surface area, center of mass, moments of inertia, etc.

4. compute line integrals and surface integrals by applying The Fundamental Theorem for line integrals, Green's theorem, Stoke's Theorem and the Divergence Theorem. Applying these integrals to solve applications such as mass and work problems is also expected.

VI. Assignments/Requirements

- Cognitive growth – Demonstrate mathematical proficiency by working exercises and solving problems related to the topics discussed. (See the course description and the outcomes listed in Section V above.)
- Product – Daily assignments and quizzes, three tests, and a comprehensive final exam
- Process – A students will demonstrate individual progress by solving problems in daily assignments, quizzes, and tests. (See the outcomes listed in Section V above.)

VII. Grading Policies

- Free tutoring might be available in the Testing/Tutoring Center (TE 128) and in the Math Help Center (SH 134).
- No late assignments are accepted.
- Quizzes may be announced or unannounced, take-home or in class, open or closed book, group or independent work.
- No make-up quizzes will be given.
- Homework assignments are generally collected weekly. There is a complete list of problems as well as due dates on the course website. It is in your best interest to work on the problems well before the due date. Proper time management will allow you to get more out of the homework and ultimately the course as a whole. I will answer reasonable questions about homework in lecture, but it's hard to ask a reasonable question unless you have already tried to work the problems.
- There are a number of bonus homework problems (marked with a * in the homework list) thus no homework grades are dropped. If you are worried about your homework grade you can do additional work to remedy the missed or unsuccessful problems.
- Tests must be taken as scheduled. No make-up tests will be given after the scheduled time. If a test is missed due to an excused absence, the final exam grade may be substituted.
- **GRADING SCALE**: A – 90 and above, B – 80-89, C – 70-79, D – 60-69, F – below 60

The score for the course is earned as follows:

- [30pts] Quizzes and Homework: The Homework will be collected weekly in general. A complete list of problems as well as due dates is given on the course website. Quizzes may be given at any time during the semester, usually I give a quiz to alert you to the fact the test is coming. All of these items will be assigned a certain number of points. The total grade will be calculated from the percentage of total points earned. Typically there are 5pts per moderate homework problem. There are certain harder homework problems which require more work and are worth more.
- [45pts] Tests: there will be three tests, each is worth 15pts of the final course grade.
- [25pts] Comprehensive final exam.
- Bonus points are weighted with test points.
- You can also earn at least a C if you make 85% or higher on the final examination. The final examination is both comprehensive and difficult. It is in your best interest to avoid this option.

Forming study groups is encouraged. However, it is important that you do not simply copy other student's homework. You may check answers, but you should not replicate steps. Exceptions to this rule should be clear; no group work on tests and no group work when I outlaw it. For example, I typically outlaw group work on an easy take-home test.

Missed Tests: If you have an emergency absence then the weight of the final will be increased. For example, if you had to help your mom during test time because of a dehabilitating rabid squirrel bite (I would need documentation and/or witnesses) then I would drop the missed test and the final examination would be worth 25+15=40pts. If your absence is known ahead of time then you need to notify me so we can make arrangements.

Grades are based on academic performance. I do not "give grades", rather you EARN your grade through your responsible and continual efforts to master the material. I want everyone to pass my course, but it is you who must do the work. I will do everything in my power to help you work effectively. The recipe for passing is quite simple: come to class, pay attention, do your homework. I rarely fail anyone who actually does these three simple things.

VIII. Attendance Policies

- Class attendance is essential and students are expected to be present each class. If an absence is unavoidable, then the student should notify the professor in writing or by email in advance. If advance notice is not possible, then an email should be sent promptly after the absence. STUDENTS ARE RESPONSIBLE FOR ALL MATERIAL COVERED AND ASSIGNMENTS MADE DURING AN ABSENCE.
- Phones, beepers, iPods, etc. should be turned off and put away during class.
- Students will arrive on time and stay for the entire class.
- Students will bring posted lecture notes, pen/pencil, paper, calculator, and completed homework to class. (text not expected)

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

Any student with a documented disability may contact the Office of Disability Academic Support (ODAS) in Teacher

Education Building-TE 127 in order to make arrangements for an academic accommodation.

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 end of the tenth week, a Fall/Spring course may be withdrawn with a grade of W or WF.

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 the penalties and processes as written in the Liberty Way**. Also, I may dedicate pop-quizzes to those caught texting in lecture.**

X. Calendar for the semester/term

Quizzes may be given during any lecture. A tentative list of homework is given on the course webpage. Additions or deletions of problems on the tentative list may occur mid-semester. However, such modifications will be emailed and/or announced in lecture. I do expect you check email on a daily basis. (I send hints sometimes, especially if someone asks me a good question that will help the whole class)

Assignment	**Due Date**
Test 1	February 13
Test 2	March 23
Test 3 (take-home)	April 29-th at end of class until April 30 at 5pm
Comprehensive Final Exam.	10:30-12:30, Monday, May 4, usual room.

XI. Homework Assignments and Course Calendar

See the course website http://www.supermath.info/math132s09.html for detailed instructions and due dates.

XII. Disclaimer:

While I have attempted to completely specify the content of this course, I reserve the right to change this syllabus if necessary. It is your responsibility to monitor your Liberty University email account for any changes in the syllabus. I will notify you via email and announce in class in the event something needs modification.

XIII. Motivational comment from your instructor:

This is the last of a 3-semester course on Calculus. The methods and concepts presented in this course are fundamental to most, if not all, technical disciplines. Three dimensional coordinate geometry and vector analysis are used throughout many disciplines to describe where things reside in a careful analytic manner. The calculus of parametrized curves in two or three dimenions describes the motion of physical bodies in the plane or space. Newton's Laws are stated in terms of this calculus and vector analysis. We can derive Kepler's Laws, Centripetal Forces, Coriolis Forces and much more under this framework. Integral and differential vector calculus provide the langauge needed to analyze the electric and magnetic fields of electromagnetism. Maxwell's equations are written in terms of the curl and divergence. Vector calculus also is essential to discussing fluid dynamics and much more. Therefore, calculus is used to phrase many of the laws of physics describe the natural world. This means that if we know calculus then we can better appreciate the general revelation of God.

It is important that you master the techniques of MATH 231. I look forward to helping you toward that goal, but ultimately you must think for yourself. The ability to think in math comes from practice (for most of us anyway) so make sure you set aside plenty of time thoughout the week to work out the subject for yourself.

It is possible that you may not use calculus in your daily life, but there is still something to be gained by its study. As Christians we are called to sharpen our minds towards the purpose of defending our faith and winning others to Christ. Mathematics demands that we think more precisely than in many other avenues of discussion. In short, I argue that mathematics can help you think better. Think of it as weight lifting for your brain. No pain, no gain.

Finally, there is beauty. Mathematics can be beautiful. We can thank our Creator for this beauty. Often this is sufficient reason for the pure mathematician. For example, in MATH 231 we will learn that there are several different coordinate systems that describe the same underlying geometry. I find this idea of intrinsic geometry to be beautiful. I hope some of you can also find beauty in the calculus.