

Calculus III (Math 221, Section 2)

Syllabus and Study Guide

Spring 2011

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Class Times: Monday, Wednesday, Friday, 12-12:50pm; Thursday 12:15-1:30pm.

Class Location: Maybank Hall room 115.

Final Exam: Wednesday May 4, noon-3pm.

Office hours: Monday, Tuesday and Thursday 4-5pm, and Wednesday 2-3pm.
I am also available immediately after each class.

Text: *Calculus: Early Transcendentals* by James Stewart, 6th. edition.

There is a site for this course in the College's new Learning Management System OAKS at <https://lms.cofc.edu>
OAKS is also accessible through MyCharleston at <http://my.cofc.edu>
(Click on the acorn.)

Syllabus for Math 221, Spring 2011, Dr. LeMesurier

Objectives and expectations

The main objective of this course is to combine ideas of calculus and geometry to deal with functions whose values are a point in the plane or space (a vector), and functions whose arguments are several variables or a vector. These ideas are applied to study curves in space, motion, minimizing functions of several variables and functions defined on surfaces in space, and integral over solids and surfaces.

This material is covered in Chapters 12 to 16 of the text *Calculus: Early Transcendentals* (6th Ed.) by James Stewart, except omitting Section 15.5.

Students are expected to prepare for class by doing the reading assignments described below, and to practice what is learnt in class by doing all the recommended homework exercises, not just the ones to be handed in for grading.

Textbook *Calculus: Early Transcendentals* 6th ed. by James Stewart

The text is supported by the *Tools for Enriching Calculus* (TEC) website
<http://www.stewartcalculus.com/tec/>

To use TEC, select our text (the *early transcendentals* version) and then select the chapter needed in menu Browse Homework Hints. The TEC exercises are also marked with a red boxed number in the textbook.

Exercises, assessment, and grading

Exercises, for study and for grading These notes give a list of exercises for each section covered, to guide your study. A selection of these will be set for weekly graded homework, due in Friday classes. There will also be some graded in-class activities.

The lowest of these exercise grades will be dropped from the average.

Tests and exam There will be three tests, provisionally scheduled for the Thursday classes of **February 10, March 17, and April 14**.

These will be partially cumulative: each will focus on material covered since the previous test, but some questions will rely on ideas and methods learned earlier in the semester. Mathematics is like that!

There will also be a final exam, covering the whole syllabus, on **Wednesday May 4**.

If you miss a test, the score can be made up only for very convincing reasons, documented through The Office of the Associate Dean of Students: see

http://www.cofc.edu/studentaffairs/general_info/absence/

The grade will usually be made-up by using the grade on the corresponding part of the final exam.

Grading scheme The assignment and in-class work scores will be averaged to get an assignment-classwork average. This will count for 15% of the course total, each test will count for 20%, and the final exam score will normally carry a weight of 25% in the course total.

However, if the final exam score is better than the lowest test score or the assignment-classwork average, the exam score will carry an additional 10% and that low score will count for 10% less.

The aggregate score guarantees at least the following letter grades:

$$\geq 90\% : A \quad \geq 80\% : B \quad \geq 70\% : C \quad \geq 60\% : D.$$

Participation policy

I will not check attendance, but you are responsible for knowing what happens in each class including reading, study exercises and written assignments, information about test topics, and due dates. Thus when you miss a class, get the handouts and find out about any other announcements, either from a classmate or from me: checking the course web page should also help.

Missing a test or more than three homework assignments or class exercises without adequate explanation will lead to a W/A: withdrawal due to absence. So if you miss a test or other item of graded work, you should contact me and explain why.

Email

I encourage questions by email; you can often get a quick answer, maybe even over weekends. However, if you wish to contact me from an off-campus email address instead of a "cofc.edu" account, give that address to me in writing (or by email from a cofc.edu address) so I can add it to my address book: otherwise junk email filters might reject your messages.

Calculators

Calculators should not be needed in class or on tests: exact answers like " $\pi/6$ " need not be converted to decimal approximations, except to satisfy your curiosity.

Some important dates and times

Monday January 17	Martin Luther King Day: no classes
Tuesday January 18	Last day to add/drop courses (changed due to the storm day)
Thursday February 10	Proposed date for Test 1
Wednesday February 22	Last day to withdraw with a grade of "W"
March 7–13	Spring Break — no classes
Thursday March 17	Proposed date for Test 2
Thursday April 14	Proposed date for Test 3
Monday April 25	Last day of classes
Wednesday May 4	Final Exam
Friday May 13	Grades available on MyCharleston.

Topics, sections and homework exercises

A star * indicates an exercise that I tentatively plan to include on graded homework.

The other exercises are for study, not grading, and hints and solutions for most of them are available at the *Tools for Enriching Calculus* website <http://www.stewartcalculus.com/tec/>

Questions are welcome in class on any exercise, for grading or otherwise.

Chapter 12 Vectors and the Geometry of Space

Section 1 Three-Dimensional Coordinate Systems

Homework Exercises 8*, 12*, 13, 21, 27, 31, 35, 39.

Section 2 Vectors

Homework Exercises 14*, 23, 24*, 25, 39, 41.

We omit the subsection APPLICATIONS, but read it if interested in physics or engineering.

Section 3 The Dot Product

Homework Exercises 2*, 11, 19, 26*, 27, 41, 43, 49, 51, 57.

We omit the subsection APPLICATIONS, but read it if interested in physics or engineering.

Section 4 The Cross Product

Homework Exercises 7, 8*, 13, 16, 19, 20*, 29, 31, 43, 45, 49.

We omit the subsection TORQUE, but read it if interested in physics or engineering.

Section 5 Equations of Lines and Planes

Homework Exercises 5, 8*, 9, 13, 19, 24*, 31, 49, 61, 73.

Section 6 Cylinders and Quadric Surfaces

Homework Exercises 8*, 9, 19, 20*. I also encourage you to do all the sketching for the examples in the text.

Chapter 13 Vector Functions

Section 1 Vector Functions

Homework Exercises 12*, 13, 19, 21, 24*, 25, 26*, 37.

We omit the final topic, USING COMPUTERS TO DRAW SPACE CURVES.

Section 2 Derivatives and Integrals of Vector Functions

Homework Exercises 1, 3, 6*, 15, 19, 22*, 25, 26*, 49.

Section 3 Arc Length and Curvature

Homework Exercises 3, 5, 6*, 17, 18*, 31, 33, 37, 43, 44*, 49, 51.

Section 4 Motion in Space: Velocity and Acceleration

Homework Exercises 11, 12*, 19, 22, 25, 34*, 35.

We omit the final topic KEPLER'S LAWS OF PLANETARY MOTION.

Chapter 14 Partial Derivatives

Section 1 Functions of Several Variables

Homework Exercises 5, 13, 17, 23, 30*, 33, 43, 48*, 55, 61, 65.

Section 2 Limits and Continuity

Homework Exercises 9, 12*, 13, 14*, 21, 25, 28, 37, 39.

Section 3 Partial Derivatives

Homework Exercises 1, 5, 6*, 9, 18*, 21, 31, 50, 54*, 60*, 81, 87.

Section 4 Tangent Planes and Linear Approximations

Homework Exercises 4*, 11, 20* [graph optional], 21, 31, 35, 37, 43.

Section 5 The Chain Rule**Homework** Exercises 5, 11, 14*, 17, 32, 34*, 35, 39, 45, 47.**Section 6** Directional Derivatives and the Gradient Vector**Homework** Exercises 1, 11, 12*, 19, 23, 24*, 27, 29, 33, 40*, 43.**Section 7** Maximum and Minimum Values**Homework** Exercises 1, 3, 12*, 13, 31, 32*, 41, 43.**Section 8** Lagrange Multipliers [Constrained Optimization]**Homework** Exercises 1, 3, 4*, 11, 18*, 19, 25, 35, 45.**Chapter 15** Multiple Integrals**Section 1** Double Integral over Rectangles**Homework** Exercises 7, 12*, 13.**Section 2** Iterated Integrals**Homework** Exercises 3, 9, 10*, 17, 19, 20*, 23, 26*, 27, 35.**Section 3** Double Integrals over General Regions**Homework** Exercises 5, 13, 14*, 17, 21, 22*, 43, 45, 51, 58.**Section 4** Double Integrals in Polar Coordinates**Homework** Exercises 11, 12*, 13, 15, 25, 35.

It might help to review polar coordinates in Section 10.4.

Section 6 Triple Integrals**Homework** Exercises 11, 12*, 19, 23, 27, 34*, 35.**Section 7** Triple Integrals in Cylindrical Coordinates**Homework** Exercises 3, 9, 10(a)*, 17, 18*, 21.**Section 8** Triple Integrals in Spherical Coordinates**Homework** Exercises 1, 5, 10(a)*, 17, 21, 22*, 30.**Section 9** Change of Variables in Multiple Integrals**Homework** Exercises 7, 8*, 12, 13*, 21.**Chapter 16** Vector Calculus**Section 1** Vector Fields**Homework** Exercises 5, 6*, 11, 12*, 23, 24*, 29.**Section 2** Line Integrals [a.k.a. Path Integrals]**Homework** Exercises 3, 7, 8*, 11, 17, 21, 33, 39, 40*.**Section 3** The Fundamental Theorem for Line Integrals**Homework** Exercises 4*, 5*, 7, 11, 12*, 15, 20*, 23, 27, 29, 33.**Section 4** Green's Theorem**Homework** Exercises 3, 4*, 7, 8*, 8, 17, 27.**Section 5** Curl and Divergence**Homework** Exercises 1, 8*, 11, 12*, 15, 16*, 19, 21, 31.**Section 6** Parametric Surfaces and Their Areas**Homework** Exercises 3, 13, 14*, 19, 23, 26, 33, 34*, 37, 41, 42, 47, 55, 57.**Section 7** Surface Integrals**Homework** Exercises 4, 5, 6*, 10, 15, 19, 20*, 25.**Section 8** Stoke's Theorem**Homework** Exercises 1, 4*, 5, 7, 8*, 15, 19.**Section 9** The Divergence Theorem**Homework** Exercises 1, 2*, 7, 8*, 9, 19, 20*, 25.