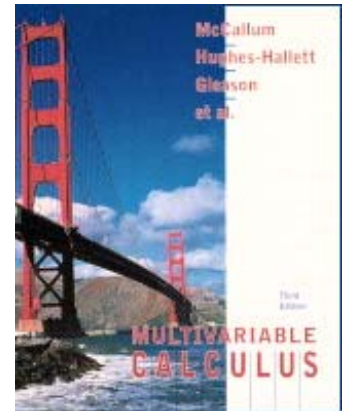
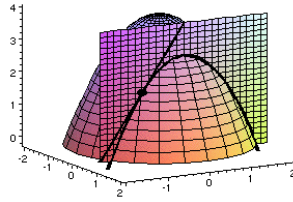


Mathematics 220, Spring 2009

Multivariable Calculus

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Required Text

Multivariable Calculus, by McCallum, Hughes-Hallett, Gleason, et al., 3rd Edition

Required Software

Maple

This is a powerful computer algebra system that is available over the network in all computer labs. A Student Edition of Maple is available for purchase from MapleSoft. See me for details. You should also have a USB flashdrive to save work when we work with Maple.

Network Resources

Blackboard	http://blackboard.agnesscott.edu
Egrade	http://aca-egrade.agnesscott.edu/classes/220AS09/
Maple worksheets	W:\StudentAccess\math\math220

Office Hours

I do not have regularly scheduled office hours. Rather, you are encouraged to stop by my office at any time when you have questions or problems and if I am not too busy I will be happy to work with you. You may also stop by to make an appointment for a time that is mutually convenient. Another good way to contact me is through email, particularly during the evenings or weekends. I promise to respond to your email as quickly as I can.

Goals

- Learn the tools and techniques of multivariable calculus, and their application in both mathematical and scientific contexts
- Understand the development of differentiation and integration of functions of several variables
- Develop an intuition for the geometry and properties of curves and surfaces
- Enhance your analytic (problem solving) skills, your ability to think abstractly and to analyze critically, and your computational (algebraic) skills
- Be able to use computer software as a computational tool for understanding and solving problems in multivariable calculus and its applications
- Learn to communicate mathematics effectively, both verbally and in writing.

Topics

- Functions of Several Variables (ch.12, sections 1–6)
- A Fundamental Tool: Vectors (ch.13, sections 1–4)
- Differentiating Functions of Many Variables (ch.14, sections 1–7)
- Optimization: Local and Global Extrema (ch.15, sections 1–3)
- Parameterized Curves (ch.17, sections 1-2)
- Integrating Functions of Many Variables (ch.16, sections 1–5, 7)

Computing Resources

We will make frequent and important use of computer technology to help us learn about multivariable calculus. The use of the computer can reinforce concepts from class, contribute to the discovery of new concepts and make feasible the solution of realistic applied problems. The philosophy we will take can be summarized by the following quote adapted from *Elementary Differential Equations, 5th Edition*, by William Boyce and Richard DiPrima:

“For you, the student, these various computing resources have an effect on how you should study mathematics. It is still essential to understand how the various solution methods work, and this understanding is achieved, in part, by working out a sufficient number of examples in detail. However, eventually you should plan to delegate as many as possible of the routine (often repetitive) details to a computer while you focus more attention on the proper formulation of the numeric, graphic, and analytic methods so as to attain maximum understanding of the behavior of the mathematics and of the underlying process that the mathematics models. Our viewpoint is that you should always try to use the best tools available for each task. Sometimes this is a pencil and paper; sometimes, a computer or calculator. Often a judicious combination is best.”

We will be using the computer algebra system Maple. This is available over the network from any computer lab. If you have not used Maple before, you should start playing with it as soon as possible. A Maple tutorial called intro.mws can be found in the folder W:\Students\MapleEssentials. Either double click on the file from Windows Explorer or open it from within Maple. A Student Edition of Maple is available for purchase from MapleSoft. See me for details.

Assessment

The first and most important assignment is to **regularly read the text** and to work through and understand the examples in each section. You paid too much money to ignore it! You should try to spend time, no matter how short, on this every day. Do not just accept mathematical statements or examples discussed in the text, but try to verify these statements and examples yourself. Working with paper and pencil or with Maple while you read the text is a good way to do this. If you have questions, ask in class or stop by my office. Since the reading is so important, some hints on how to do it might be helpful. You may find that slight variations on the following scheme will work for you.

- a. Plan on doing the reading more than once, and do not make it an essential goal to understand everything in the reading the first time through it. The first reading should be devoted only to getting a general overview of the material of the section.
- b. After the first reading, stop for a few minutes and attempt to summarize to yourself, in your own words, what the section is all about. Then immediately reread the section.
- c. During the second reading, make a serious effort to understand *all* of the material in the section. This does *not* mean to memorize it, but rather to understand all of the points before going on.
- d. If you do not understand something during the second reading, put the book aside awhile and return to it later when your mind is fresher. If you still do not understand it after returning to it, ask me or some other members of the class about it. Do make sure you eventually understand all of the material. You will probably get tripped up in later reading, in doing the homework, or on tests if you treat material you don't quite understand as “probably not all that important.”

- e. Do not get discouraged if some points require some time to understand. It is not uncommon to have to think about a point in a math text for a day or even several days before it becomes clear what is really going on.

You will be given homework practice problems to do from each section we cover. You will need to take the responsibility to keep up with these problems and work on the appropriate problems as we cover those sections in class. You are encouraged to work with others on these problems and check each other's work. You may ask questions about them in class or come talk to me about the problems. You are expected to check your answers to the odd-numbered problems in the back of the book. Answers to selected even-numbered problems will be checked using the Egrade web site. You may rework any of the Egrade problems until you correctly solve them. The purpose of the homework is to help you learn the concepts and techniques for working with multivariable calculus and to prepare for the exam problem sets. Therefore you should complete the homework before the exams are given.

In addition you will be given some problem sets that I will ask you to submit for me to grade. You are encouraged to work together on all these problems, but each student is always expected to write up (and understand) her own solutions.

The homework assignments and problem sets can be found at the course site on Blackboard. Maple worksheets used in the course will be kept in the math220 folder on the student network drive.

Information about homework, problem sets and other assignments will be posted as announcements on Blackboard so I expect you to check Blackboard on a regular basis.

While we will often use Maple to help solve multivariable calculus problems, it is still important that you be able to do some of the easier techniques by hand and understand the concepts used in those techniques. To give you an opportunity to demonstrate your mastery of these techniques, you will need to pass two Proficiency tests on Egrade, one on partial differentiation and the other on multiple integration. Each will consist of a small number of problems, and you must get all of them correct. You may retake each Proficiency test (with different problems) as many times as necessary until the deadline.

You will have two take-home problem sets and a final problem set that will count as exams. The first exam will be due at the end of February or early March, shortly before Spring Break, and will cover through section 14.5. The second exam will be due near the middle of April and will cover the rest of chapter 14 and chapters 15 and 17. The last problem set will be in lieu of a final exam, thus taken during the exam period, and will cover chapter 16.

Honor Code and Plagiarism

You are encouraged to work together on the homework for this course, but each student is always expected to write up (and understand) her own solutions. Working with someone else to understand an idea or a concept or even the requirements of an assignment is group learning and is encouraged. But once you understand what you were struggling with, you should complete the assignment individually, giving the work your own identity. Accessing or copying work of another student from a previous semester is a violation of the Honor Code.

Attendance

Class involvement is important. This includes your attendance and punctuality, your attitude, your willingness to contribute ideas and questions, to listen to your peers, and to be a contributing partner in collaborative efforts. Regular attendance for this class will be very important since much of our class time will be spent on discussing mathematical concepts, working on problems or working on computing experiments. It is therefore expected that you will attend and be prepared for every class, but it is also recognized that circumstances may occasionally necessitate missing a class. You are responsible for all material discussed in class whether you are there or not, and for submitting all work before the due date. Approval for extensions **must** be obtained in advance. Excessive number of unexcused absences will result in a reduction of your course grade.

Disabilities

If you have a disability that may have some impact on your work in this class and for which you may require accommodations, please see Machamma Quinichett in the Office of Academic Advising to register for services. Students that receive accommodation checklists, please meet with me to discuss the provisions of those accommodations as soon as possible.

Course Evaluation

The completion of course evaluations is an expectation of students in this class. Your feedback on the course is extremely valuable to me. In particular, I take your comments very seriously and use them to improve the course the next time I teach it. You are responsible for completing an on-line evaluation of the course at the end of the semester. You will receive more details later via email.

Grading (I reserve the right to make adjustments if necessary).

Three Problem Set Exams	300 points
Egrade homework and problem sets	100 points
Proficiency tests (10 points each)	20 points
Total	420 points