Applied Calculus

Math 115–01 (crn: 12276)

Fall, 2011

MWF 1:00 pm to 1:50 pm

Barret Library 033

Instructor:	Dr Rachel M. Dunwell
Office:	319 Ohlendorf Hall
Office Hours:	MW at 3:00 pm to 5: 00 pm, F at 3:00 pm to 4:00 pm, TTh 11:00 am to 12:00 pm, or by appointment
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Course Description:

This is a one-semester introduction to differentiation and integration from the perspective of applied mathematics, as well as the many applications of these ideas in the physical, life, and social sciences. While most of this course is devoted to calculus of functions of a single independent variable, some attention is paid to functions of several variables. The goals of this class do include learning the mechanics and formalism of differential and integral calculus; however, our primary goal is that you to learn how to apply the mathematics of calculus to model physical phenomena and solve related problems.

The field of Applied Mathematics is very different than the mathematics you may have studied in other courses. Though there may be some overlap, **this course will have little in common with a high school calculus class**. By its very nature, Applied Mathematics cannot be learned by doing drill exercises from a textbook, or by using pencil and paper to solve problems; applied mathematicians are interested in being able to understand and perform direct computations that arise in applications, not canned problems used to illustrate ideas. For this reason, this course will involve using the software package Mathematica. **Learning to use such a software package is a major part of learning Applied Mathematics**. Mathematica is not to be considered a tool to learn the book material; rather, it is a way of doing mathematics. The **primary** objective of this course is that you learn this way of doing mathematics. For this reason, you are strongly encouraged to seriously approach learning Mathematica as a major goal for this course.

Content:

The content of this course will be divided among five modules. Three of these modules will introduce the material through a number of related applications and will emphasize using the **concepts** and **technology** to model data. The other two modules, the theory modules, are brief excursions designed to develop technical skills.

Course Prerequisites:

The prerequisite for this course is a solid background in high school algebra and geometry. It is designed for students encountering calculus for the first time. **If there is any chance that you may take calculus beyond the introductory level, then you should take Math 121 instead**; Math 115

is not designed to prepare you for later calculus courses. **You cannot earn credit for Math 115 after taking Math 121**.

Office Hours:

Students are **strongly** encouraged to take advantage of my office hours and make appointments at other times.

Moodle:

This syllabus, as well as our other course materials, is available on Moodle. You will be required to log into Moodle and use it extensively over the semester to view course materials and hand in assignments.

Attendance Policy:

You are required to attend **each class**, a **weekly tutorial**, and **one workshop**. Though this class meets officially three times a week, it is a 4-credit course, and your attendance in tutorial meetings and the workshop is mandatory. Your attendance record will be a component of your final grade (see below). Mathematica workshops will be held on Wednesday, 31 August and Thursday, 1 September from 6:00 pm to 8:00 pm in the Barrett computer labs. You are required to attend ONE of these workshops.

Grading:

Your letter grade for the course will be based on the following scale:

A	[93, 100]	B-	[80, 83)	D+	[67, 70)
A-	[90, 93)	C+	[77, 80)	D	[63, 67)
B+	[87, 90)	C	[73, 77)	D-	[60, 63)
B	[83, 87)	C-	[70, 73)	F	[0, 60)

The total percentage will be computed as follows:

Module 1	20%
Module 2	10%
Module 3	20%
Module 4	20%
Module 5	10%
Final Exam	20%

Each module will be assessed based on the following:

Attendance: 10%
Includes attendance in class, weekly tutorials, and a workshop on Mathematica.

Homework, Quizzes, Tasks: 50%
Includes assignments from the text, assignments given from the lecture, and in-class quizzes, as well as tasks; see notes on homework below.

Final Assessment for the Module: 40%
The final assessment will be different for each module. For modules 1, 3, and 4, it will be a group project such as a written project or presentation, and your grade will have both a group and individual component. For modules 2 and 5, it will be an individual test.

The final examination for the course will have two components:

Written: 40%

This will be a comprehensive, closed book examination taken on Monday, 12 December at 1:00pm.

Mathematica: 60%

This will be a comprehensive, open book examination taken at a time and place to be scheduled later in the course.

Homework:

Your homework assignments will include a number of traditional assignments from the text, as well as additional tasks you will be required to complete in order to learn Mathematica, organize with your tutorial groups, etc. Homework assignments will sometimes be graded by your professor; however, some assignments will be self-graded in class to give you an opportunity to review your work. For these assignments, you may be given an opportunity to correct your mistakes to receive additional credit. Many of the tasks you will be asked to complete will be graded credit or no credit and will be worth 10-50% of a standard homework assignment.

Late work will not be accepted.

Group Work:

This course has a large group work component. See the document Description of Tutorial Groups for more information on this component.

Exams:

The final assessment for Modules 2 and 5 will be in-class exams. They are tentatively scheduled for 7 October and 30 November. If you have to be to be absent for an exam, you must make arrangements with me as early as possible before the day of the exam, and you will be expected to document your absence. Otherwise, you will not be allowed to make up the test. In most circumstances, I will not make arrangements for you to make up an exam unless I have been notified one week before the day of the exam.

Final Exam:

The written component of the final examination is scheduled for Monday, 12 December at 1:00pm. It will be a closed-book, in-class, cumulative exam covering all textbook-based exercises. The Mathematica component of the final examination will be an open-book, take-home cumulatative exam covering all the work done using Mathematica. The exam must be taken in a three hour time block starting after Monday, 5 December at 6:00pm and finishing before Wednesday, 7 December at 5:00pm.

Calculators and Mathematica:

The use of calculators on homework and exams is allowed, but for arithmetic operations only. You may not use your calculator to store any formulas or notes, and you will be required to show your work on homework and exams for full credit. Many of your homework and group projects will require the use of the software package Mathematica. Several workshops on Mathematica will be held on the second week of classes; you will be required to attend one of these workshops.

Math Support Center:

The Math Support Center is a resource for students located on the third floor of Ohlendorf. Tutors at the support center will be available as a resource to you. Your group will be assigned to a specific tutor who will work closely with your group. These tutors will also help assess your group projects by commenting on the participation of each member of the group; note that they will not grade your work.

Honor Code:

All students are expected to conduct themselves within the guidelines of the College's Honor Code. Please ask me if you have any questions about what is allowed.

Students With Disabilities:

If you have or think you may have a documented disability, please contact me and the Office of Student Disability Services as early in the semester as possible.

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Description of Tutorial Groups
(Appendix to Syllabus)

What is a Tutorial Group?

A tutorial group will be a group of five students who work together as a study group, under the guidance of a tutor.

What work will I do with the Tutorial Group?

The most significant task that the group will do is prepare the final projects for Modules 1, 3 and 4. There will, however, be other group tasks to complete, these tasks will help you understand the contents of the lectures more thoroughly.

Do I have to attend Tutorials?

Yes, with the exception of those tutorial meetings listed as optional. There is an attendance grade for each Module and a tutorial counts the same as a lecture.

How long are Tutorials?

A tutorial should not last for longer than 50 minutes.

Tutorial Related Tasks

Module 1: Task 1

Log in to Moodle and visit this course before 5:00pm January 14^{th} .

Module 1: Task 2

Form a group of five people who have similar schedules. Each person from the group should enter the list of names of the five students in the group on Moodle under Task 2. This should be done before 5:00pm Jaunary 19^{th} .

Module 1: Task 3

After submitting the list of fellow group members, your professor will e-mail you with the name and contact details of the tutor for your group. The group should meet with their tutor, and arrange a time when you can all meet for weekly tutorials, before 5:00pm January 28^{th} . Enter the day an time of your regular tutorial meetings on Moodle under Task 3.

Note: Each Module has a homework grade, and your completion of each task will count as a portion of one homework assignment (a homework assignment is worth at least 10 points, and each task is worth between 1 and 5 points). Your task grades are credit/no-credit.