Math 122　　　Calculus II　　　Colby College

Section B:	**MTWF**	**11 − 11:50**	**Keyes 102**
Section C:	**MTWF**	**12 − 12:50**	**Keyes 102**

Professor:	Scott Taylor
Office Hours:	MTWF 10 − 11 AM, 2 − 3 PM
	And by appointment!
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Prerequisites:	Mathematics placement questionnaire.

Text:	Chp 9 & 10 <u>Calculus: Single Variable</u> 5/e
	<u>Calculus: Multivariable</u> 5/e by Hughes-Hallet et al.

Major Course Objectives:

- Define and use Taylor polynomials to approximate common functions

- Understand what it means for a sequence to converge and be able to calculate limits of common sequences

- Understand what it means for a series to converge and be able to determine whether or not certain series converge using well-known convergence tests

- Be able to calculate the limit of certain convergent series

- Be able to write down Taylor series for common functions and determine their intervals of convergence

- Understand when it is appropriate to apply the basic operations of Calculus to Taylor series and be able to do so correctly

- Draw and interpret graphs and contour diagrams of functions from $\mathbf{R}^2 \rightarrow \mathbf{R}$

- Understand and define what it means for a function of several variables to be continuous and differentiable

- Understand and calculate partial derivatives, gradients, and directional derivatives of multivariable functions

- Understand and perform basic operations on vectors in $\mathbf{R}^n$. This includes being able to calculate the cross product of two vectors in $\mathbf{R}^3$

- Understand and be able to calculate double and triple integrals.

- Learn how to use Mathematica to perform the basic operations of Calculus and use it to gain a greater understanding of the concepts involved

- Introduce the notion of mathematical proof and understand its relevance for sequences, series, and multivariable functions

Attendance: I value your involvement in the class, therefore class attendance is mandatory. Absence for official Colby activities requires prior approval. Absence for religious reasons will be considered "excused" if the policy in the college catalogue is followed. I reserve the right to take attendance. More than 3 recorded unexcused absences will result in the reduction by 1/3 of the final course grade. Excessive tardiness or early departure may also result in such a reduction.

Computing Resources: You are encouraged to bring a calculator to class. You may use such a calculator on homework (but you must still show all the important steps). On quizzes and exams you may use a graphing calculator. The point of an exam is to test for understanding – such understanding must come through clearly in your answers.

You will be required to use the software Mathematica to complete projects throughout the semester. Mathematica is available on many computers at Colby, including the computers in Mudd 415 and Olin 323. From Colby's fileserver you may also download and install Mathematica on your personal computer for use while on campus. See the instructions on the first Mathematica project.

Upon occasion you may also wish to make use of two other free pieces of software to check your computations.
*   Wolfram|Alpha (wolframalpha.com) is a web-based "computational knowledge engine". It can compute most of the integrals and evaluate most of the limits which we will encounter in the course. It can be a bit tricky to use, so you will need think about whatever response it gives you.
*   Grapher is software which comes bundled with every modern Macintosh. (It can be found under "Utilities"). It is very easy to use and can draw almost every imaginable type of 2 and 3 dimensional graph. (Including solutions to differential equations and vector fields.)

Calculus-After-Hours: Each Sunday – Thursday evening from 7 – 9 PM you may drop by Mudd 405 for help with Calculus. I will be there on Tuesday evenings from approx. 8 – 9 PM.

Evaluation: The numerical course grade will be a weighted average of the cumulative grades with weightings as follows:

20% Weekly Homework	5% Mathematical Engagement
10% Mathematica Projects	15% Exam 1
10% Quizzes	15% Exam 2
5% Reading Assignments	20% Final Exam

However, *earning fewer than 50% of the total number of possible points on the exams will result in a grade of "F" for the course.*

Course letter grades will be assigned (subject to above caveat) according to the following scale. Any curve will be determined at the end of the course, according to the discretion

of the instructor.

93 - 100 % A	90 - 93 % A-	87 - 90 % B+	83 - 87 % B
80 - 83 % B-	77 - 80 % C+	73 - 77 % C	70 - 73 % C-
67 - 70 % D+	63 - 67 % D	60 - 63 % D-	below 60 % F

An A+ may be awarded to students who show exceptional engagement with and mastery of course material. Such a student will have earned, for example, close to 100% of the possible points in the course.

Homework: Homework is probably the most important part of this course – it's when you get to put into practice the concepts you've played with during class. Some of the homework questions may require you to explore some topic which we didn't discuss in class. The purpose of such questions is to help you develop the ability to read and learn mathematics on your own. If you go into a mathematical or scientific career, there will undoubtedly be times when you need to teach yourself some mathematics. If, *however*, all the homework problems fall into this category, you should check to make sure that you are working on the correct assignment.

Weekly homework will generally be due on Wednesdays and will always be posted on the course webpage. You are responsible for checking the webpage. If no homework assignment is posted, you should refresh the webpage on your browser and, if that doesn't work, email me to let me know. In the special circumstance that there is no new homework, the webpage will make note of that. If you will not be in class on the day that homework is due you should arrange to turn it in at my office or to have a friend bring it to class. Late homework may be penalized.

You should start the homework early, some problems will require multiple attempts and careful thought. If you are having substantial difficulty with a particular problem or the entire homework set you should email me or come to office hours. I am eager to help you!

You are encouraged to work with a partner on the homework, but **all work should be your own**. In other words, you may discuss particular problems but you may not copy someone else's solution. Doing so violates academic honesty. As the course progresses, the question of how much work to show will arise. I encourage you to use common sense. If the problem is testing your ability to evaluate whether or not a series converges, you need to give a detailed explanation. If your answer requires an easy derivative or integral, you do not necessarily need to show the steps. In general, **your work is your answer**. Ie. It is possible for someone to obtain a correct answer but to not receive full credit because their work is incorrect. Conversely, (almost entirely) correct work with an incorrect answer may receive full credit.

Homework must be very neat. This means: no messy scratchwork, no cramped writing, no huge eraser marks. Multiple pages should be stapled and the problems should be in order with section and problem number clearly indicated. If these guidelines are not followed you may be penalized. If you are incapable of writing neatly, you should type your solutions.

Reading Assignments: You will frequently have a reading assignment due each class period. These assignments will require that you do a certain amount of reading and answer 1 or 2 fairly easy questions. Usually the reading will cover material we have not yet or will not discuss in class. I will always assume that you have done the reading by the time that it is due and will not regurgitate in class material you have read on your own.

Quizzes: A quiz will be given periodically. In case of absence from class on the day of a quiz, the quiz may be made up within a week of when it was given. You are responsible for requesting a make-up quiz. The lowest quiz score will be dropped from the computation of the course grade.

Mathematica Projects: Usually once per week or per two weeks you will be asked to complete an assignment using Mathematica. As with any complex piece of software, Mathematica requires some initial investment of energy to simply learn how it should be used. I am happy to answer questions, but you should start these projects early to be sure that you allow time for things to go wrong. The ability to learn how to use a piece of software is, itself, a necessary life skill.

Mathematical Engagement: Half of your "Mathematical Engagement" grade will be based on your class participation. I expect that you will volunteer answers to questions posed to the class as a whole and that you will be prepared to make a contribution to the discussion if specifically called upon. In the event, that I call on you specifically you do not necessarily need to be able to answer the question I ask, but you should be prepared to give a partial answer, an intelligent guess, or to ask a relevant question.

The other half of your "Mathematical Engagement" grade will be based on **two** activities designed to have you encounter mathematics outside the classroom. You can complete an activity in one of two ways:
1. Attend a Mathematics/Statistics Colloquium or the IBM Public Lecture and write a page summarizing and reacting to the lecture.
2. Read an article on reserve in the Library and write a page summarizing and reacting to the article.

Exams: In addition to the quizzes, there will be two in-class exams and a final exam. Each exam is cumulative, although the final exam is "more cumulative". Exams will be designed to test your understanding of the course material, not just your computational abilities. You must understand, and communicate, the material. Computers, textbooks, notes, and other people may not be used on the exam. The in-class exams will be on **October 2** and **November 13**.

The final exam is during exam period 17 on **Monday, December 21** at **12:30 PM**. It may not be rescheduled for personal convenience (including airline reservations).