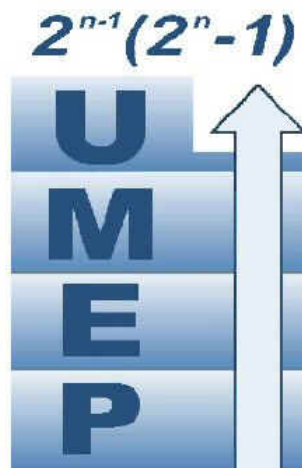


# Syllabus for MATH 4910-C: Conceptual Calculus 3

Summer 2009 First Block,  
Tuesday and Thursday, 4:15 – 7:15

✂Distance Delivery ✂

Instructor	Dr. David Brown
TAs	Cherie Bennett and Melissa Crook
Instructor email	david.e.brown@usu.edu
TAs' email	che.be@aggiemail.usu.edu, melissa.crook@aggiemail.usu.edu
Text	<i>Second Year Calculus: From Celestial Mechanics to Special Relativity</i> by David Bressoud, Fourth Corrected Printing.
Meeting site	Your distance-delivery location



## Course Content

The substance of this course is similar to a “standard” university-level third-semester calculus course. That is, topics include the calculus of multivariable functions (scalar fields – input is a vector, output is a number), and vector fields (input and output are vectors). This includes notions of differentiability, and its uses, and the uses of integration. A major distinction in this course, however, will be the use and terminology of differential forms, and the content will have the context of physics applications which will be developed into a proof that  $E = mc^2$  – a cornerstone of special relativity. To me, the course consists of 7 major units:

1. Differential Forms: what are they, and why should we use them? Chapter 4
2. Basic Integration in a multivariable setting. Chapter 5
3. Linear Transformations. Chapter 6.
4. Differentiability: the Derivative and what it means in dimensions higher than 2. Chapter 7
5. Not-so-basic Integration in a multivariable setting. Chapters 8 and 9
6. The Fundamental Theorem of Calculus: Revisited in all its Glory. Chapter 10
7. Maxwell’s Equations, Special Relativity, and  $E = mc^2$ , Oh My! Chapter 11.

Along the way the more minor, but still notable, topics of Lagrange multipliers, Taylor’s Theorem in several variables, line integrals, surface integrals, work, flux, and torque, will be dealt with.

A basic understanding of vectors will be assumed, but is available for review in the first 3 chapters of our text (which will not be part of class discussion).

A major component of the course, on which you will be assessed is technical writing. Communicating Mathematics in general, and proving theorems and solving problems more specifically entails implementing good technical writing and communication skills. The way you will develop these skills is by interweaving them into your currently well-established and well-practiced writing skills in order to earn full credit on homework problems. So, basically, you will develop these skills because you have to, because I will be assessing you on clarity of presentation for each homework assignment. Your verbal communication skills will be enhanced as you work with classmates outside of class, see the section **Course Structure Outside of Class** below.

As a very brief summary, my main goals, in their most unrefined sense, is that you improve your technical writing skills, develop more *mathematical maturity*, and become indoctrinated to some of the more useful aspects of calculus.

## Evaluation

You will have opportunities to determine your letter grade in this class via one medium: homework assignments, whose complexity and difficulty will change from week to week and may be book-based, or concocted by me. Your responses to the prompts of each homework assignment will be assessed for quality of writing, presentation, and for accuracy of calculations and facility with which terminology, notation and algorithmic skills are displayed.

### Homework policies

Homework will probably be assigned every class meeting and collected weekly.

**Policy:** No late homework will be accepted.

**Reason:** Timely and prompt completion of assignments is crucial for your continued understanding.

**Policy:** Assignments that are not well-written, not well-organized, or are not clear to a reader (like a classmate, or me) will not be graded.

**Reason:** Technical writing and the communication skills required to do that are among the skills I want you to develop in this class, and are perhaps the most important ones. Writing well is thinking well. Grading and marking assignments for errors is one method for assessing the extent to which you are assimilating and coping with material; it is impossible to determine whether a correct answer is accidental, versus intentional, if the written solution is vague.

**Recommendation:** Learn some sort of software for mathematical writing. I use L<sup>A</sup>T<sub>E</sub>X it is free and can be downloaded from <http://www.latex-project.org/ftp.html>.

**Reason:** It is easy to edit and wordsmith an electronic document. It is at best annoying to edit a document made with a pencil. To this end, if you do not acquire and use a mathematical typesetting software, then revise your homework assignments; do not turn in your first draft. To reiterate the policy directly above, I will not grade an assignment that appears to be a draft.

**Recommendation:** I encourage working together on assignments, and discourage plagiarizing another's work. There is a difference between collaboration and cheating and I want the former, not the latter, to happen here.

**Reason:** Collaboration entails using another type of communication skill, one that may not be reflected on a written assignment, but I am convinced that the ability to explain your solution to another will positively affect the quality of your written solution.

**Policy:** Evidence of cheating on an assignment will result in a zero for that assignment. Evidence of cheating on more than one assignment will result in failure of the course.

### Mid-Semester Self Evaluation

Assume that your final grade will be computed on a 10-point scale: if  $x$  is your percentage of points earned versus points possible, and  $x \in [90, \infty)$ , then your letter grade will be A; if  $x \in [80, 90)$ , then your letter grade will be B;  $x \in [70, 80) \Rightarrow C$ ,  $x \in [60, 70) \Rightarrow D$ . If  $x < 60$  or you cheat, your letter grade will be F. This scheme is your way for estimating your final grade at any mid-semester moment.

### Course Structure Outside of Class

As stated above, I encourage working together for a number of reasons, so I will assume that study groups and meeting places will be organized whenever and wherever possible. Much of the out of class communication and course management/administrative handling will be done on BlackBoard. If you are new to BlackBoard or have difficulties contact Melissa at [melissa.crook@aggiemail.usu.edu](mailto:melissa.crook@aggiemail.usu.edu) for help.  
Students with Disabilities

Students with physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations in accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, 797-2444 voice, 797-0740 TTY, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

If you need any accommodations because of special exceptionalities, contact Dave during the first week of this course.