MA 0200: Intermediate Calculus (Physics/Engineering)
Course Syllabus

Instructor:	Samuel Walsh (Email: `Samuel_Walsh@Brown.edu`)
TA:	Dylan Cashman (Email: `Dylan_Cashman@Brown.edu`)
Textbook:	Edwards and Penney, *Multivariable Calculus* (6th Edition)
Lectures:	12:00–12:50, MWF in BH163
Office hours:	M: 11:00–11:50, W: 4:30–5:30 in Room 020, 182 George St.
Website:	`http://www.math.brown.edu/~braval/0200.html`

Overview. Multivariable calculus is one of the central tools of the physical sciences. For example, the motion of an incompressible (Newtonian) fluid is governed by the Navier-Stokes equation,

$$\frac{\partial \mathbf{u}}{\partial t} + (\mathbf{u} \cdot \nabla)\,\mathbf{u} = \nu \Delta \mathbf{u} - \nabla P, \qquad \nabla \cdot \mathbf{u} = 0,$$

and the fundamental laws of electromagnetism are described by Maxwell's equations,

$$\frac{\partial \mathbf{E}}{\partial t} = \nabla \times \mathbf{B}, \qquad \frac{\partial \mathbf{B}}{\partial t} = -\nabla \times \mathbf{E}, \qquad \nabla \cdot \mathbf{E} = \nabla \cdot \mathbf{B} = 0.$$

The goal of this course is fairly simple: by the end of the semester, you should be able to understand equations like those above. More than that, though, you should be comfortable enough with calculus in several variables to manipulate the quantities involved.

The course will cover Chapters 12 through 15 of Edwards and Penney. The following is a rough list of topics.

- **Vectors, curves, surfaces.** 2-d and 3-d vectors, dot product, cross product, lines and planes in space, curves. (§12.1–§12.8)
- **Differential calculus in higher dimensions.** Continuity, limits, partial differentiation, optimization, chain rule, gradients. (§13.1–§13.9)
- **Multiple integrals.** Double integrals, area, volume, triple integrals, integration in other coordinate systems, change of variables. (§14.1–§14.9)
- **Vector calculus.** Vector fields, line integrals, Green's theorem, surface integrals, divergence theorem, Stokes' theorem. (§15.1–§15.7)

Recitations. Beginning next week, there will be a recitation session held every Thursday from 12:00–12:50 in BH 163. Recitations are meant primarily to reinforce the material presented in the lecture, as well as giving you the opportunity to discuss the homework assignments. You should view these sessions as part of the course proper, i.e., *you need to go to them*.

Office hours. Office hours are held every week on Mondays from 11:00–11:50 and Wednesdays from 4:30–5:30 in Room 020, 182 George St. (the Applied Math building, adjacent Barus and Holley.) You can also email me to set up an appointment if that time is inconvenient. The TA will also hold office hours on Wednesdays from 2:00–4:00 on the Mezzanine level of the Science Library.

Homework. The majority of your learning for the course will come through completing the homework assignments. These will be posted weekly on the course website. *Homework is to be turned in Thursdays during the recitation session.* You are encouraged to work together, but each student must write his or her own; *do not simply copy one another*. Also, please remember that the grader has to be able to follow your thought process in order to award credit. It is incumbent on you to ensure that your assignments are readable, both in terms of legibility and comprehensibility. Given the size of the course, and the speed at which we're going to be moving, *late homework will not be accepted*.

Exams. There will be two midterm exams as well as a cumulative final:

Midterm I:	7:00 PM, October 7th
Midterm II:	7:00 PM, November 11th
Final:	2:00 PM, December 15th.

Room information will be given closer to the date; see the course website for details. The exams are common among all sections of the course.

Grading. Your final grade will be determined according to the following formula:

Homework:	20%
Midterm I&II:	30% (15% each)
Final:	50%.