**Instructor:** Sam Payne, DL 414, sam.payne@yale.edu

**Office Hours:** Tuesday 2–4 PM, Wednesday 10:15–11 AM, and by appointment.

**Textbook:** Vector Calculus, Linear Algebra, and Differential Forms, by Hubbard and Hubbard.

**Prerequisites:** Multivariable calculus (Math 120) and linear algebra (Math 225), or equivalent.

**Course Overview:** This course will cover the calculus of functions in several variables using methods from linear algebra. It will include a conceptual treatment of the derivative as a linear transformation, proofs of the Inverse Function Theorem and Implicit Function Theorem, and a development of the theory of differential forms, exterior derivatives, and Stokes's Theorem in arbitrary dimension. It will be more proof-based than Math 120 or Math 225, but less so than Math 230–231. It will not include an intensive treatment of foundational issues, as covered in analysis courses such as Math 300, Math 301, and Math 305. It is suitable for engineers, physicists, and economists, and fulfills the vector calculus requirement for the math major.

The textbook for the course is Vector Calculus, Linear Algebra, and Differential Forms, by Hubbard and Hubbard (4th edition). We will cover the contents of Chapters 1, 2, 4, and 6.

**Homework**: Homework sets will be distributed each Friday and collected the following Wednesday. Please work together, use the library, wikipedia, and any other resources that you find useful or necessary to figure out and understand solutions to the problems. When you have arrived at a satisfactory understanding, please close all books and browsers, say goodbye to your friends, and write down your own solution without further assistance.

Homework sets will include proofs. Proofs should be written carefully and beautifully, in complete sentences, including a statement of the problem, explanation of overall plan of the argument, and justification for all significant steps.

**Quizzes**: There will be in-class quizzes, with or without prior announcement, at random intervals throughout the course, to monitor basic understanding of the material presented in class and in the readings. There will be one mid-term exam and one final exam, which will cover the core material of the course in more depth and detail.

**Grading**: Grades for the course will be based on the final exam: 40%, midterm exam: 30% homework: 20%, and quizzes: 10%.