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Welcome and Course Information

Welcome to the course *Vector Calculus for Engineers!*

A course on vector calculus is typically taken by engineering students in their second year of study, after a full year of single variable calculus. This course is similar to a course on multivariable calculus, or what is sometimes called Calculus Three, but here we place more emphasis on vectors and vector fields.

To see if vector calculus interests you, watch the [Promotional Video](#). To get a brief overview of the course, watch the [Course Overview](#) video. If you are considering taking this course and want to assess your math skills, take the [Diagnostic Quiz](#). If you pass the quiz, then you should have no problem succeeding in the course. If you struggle with the quiz, then you may need to brush up on single variable calculus before enrolling.

Course Materials

This course is divided into five weeks, each week focusing on a different topic. The first week is about vectors, the second week is about differentiation, the third week is about multidimensional integration and curvilinear coordinate systems, the fourth week is about line and surface integrals, and the fifth week is about the fundamental theorems of vector calculus, including the divergence theorem and Stokes' theorem. After each video, I post some suggested math problems. Within each week, the videos and problems are divided into sections, and at the end of each section is an ungraded practice quiz. At the end of each week, there is a graded quiz.

Textbook

My lecture notes for this course can be downloaded in a pdf format at the link

<https://www.math.hkust.edu.hk/~machas/vector-calculus-for-engineers.pdf>

A paperback edition of my lecture notes may also be purchased from amazon.com at the link

<https://www.amazon.com/Vector-Calculus-Engineers-Mathematics/dp/B0BMJMRYBH/>

My lecture notes are divided into Lectures corresponding to the Coursera videos. At the end of each Lecture are a list of practice problems, and solutions to these problems can be found in the Appendix. I have also included in my lecture notes all of the practice quizzes and their solutions. The pdf file is clickable, and it is easy to jump between the problems and their solutions.

After watching a video, I recommend that you read the corresponding Lecture in my notes to further cement the material in your mind.

Problems

After each video, there are some problems for you to solve. I strongly recommend that you attempt to solve these problems and take the time to understand their solutions. Doing problems is essential for learning mathematics, and it is important to practice and apply the concepts you have learned. After you solve the Coursera problems, or are stuck, you can then read my suggested solutions in my lecture notes. It is also a good idea to write down the problems and your solutions in a notebook, so you can refer to them when taking the quizzes.

Quizzes and Grading

The ungraded practice quizzes at the end of each section will test your knowledge about the video lectures and the problems. After you attempt these quizzes, you can read my solutions in my lecture notes. These quizzes will help you prepare for the graded quiz at the end of each week. There are five graded quizzes in total and each quiz contains ten questions. You will need to get six or more questions correct on each graded quiz to pass this course and be eligible for a course certificate.

Discussion Forums

I review the Discussion Forums almost every day, so please do not hesitate to reach out to me if you have any questions or need any help. There is also a discussion forum [Get to Know Your Classmates](#), where you can introduce yourself to other students in the course.

I hope you will find this course instructive. Vector Calculus is a powerful tool that extends the one-dimensional world of single variable calculus to three dimensions, allowing engineers to model and analyze real-world physical systems like electromagnetism, fluid mechanics, and data analysis.

Jeff Chasnov

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