Math 510: Vector Calculus

MWF 9:30-10:20

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General Information

Calculus or vector Calculus was invented by Issac Newton (1642-1726) and Gottfried Leibniz (1646-1716) to handle the problems of *classical mechanics*. The ideas of flat space and steady flowing time become two center catgories of the great Philosopher Kant's twelve categories. Later on Calculus fits well Maxwell's *theory of Electro-magnetism*. Calculus becomes a must-part of education.

We must be humble and remember that natural sciense, like *relativity* which was a force to promote non-Euclidean Geometry and *quantum mechnics* which promote probability, goes beyond Calculus. For all the short-coming of Calculus, it is still the solid foundation for modern mathematics. The topic of Calculus has been studied for the last three hundred years. Its contents had been largely standardized.

In this course we will go through the book Vector Calculus by J. Marsden and A Tromba. We start with The geometry of Euclidean Space, Differentiation, Higher Order Derivative, Vector Valued Functions, Double and Triple Integrations, The Change of Variables Formular, Integrals Over Paths and Surfaces, and The Integral Theorems of Vector Analysis. Clearly some knoweldge of classical physics, gravitational laws and Maxwell's electro-maagnetism will help the readers.

Throughout, sometimes we shall be conscious of the reliance on computers for real world computation. the students are encouraged to use computer to solve problems. The Mathematics Department makes MATLAB, an industry standard program, for numerical analysis, Assistance is available for students S–Th, 7:00pm-10:00pm, at the Macintosh Lab in LAEB B275. The Student Version of MATLAB is recommended; student versions for Macintosh and Windows are available at the bookstore. In addition, many of you have calculators that do calculus calculations.

The stated prerequisite, Math 261, is accurate in spirit in that students who know absolutely nothing about vector calculus are likely to have a hard time, but is not literally accurate because most students did not do their undergraduate work at Purdue and much of calculus learning that I expect you to know will have come informally from a variety of engineering sources. The course will be complete, but basic material on computational topics will be covered quickly.

References

TEXT: Vector Calculusi by J. Marsden and A Tromba. is a good reference and is in the library.

Grading Policies

There will be two one-hour tests, each counting 20% of your grade, and 30% of your grade will come from the two-hour final exam given during the 16^{th} week. The the one-hour tests will be an in-class test about the seventh week and the thirteenth week of the semester.

Weekly homework (collected Friday, except the first Friday) will make up 20% of your grade. You should show your all your work on homework and tests. Results of machine computations will be acceptable in **all** homework problems in place of hand computation;

There will be a weekly Quiz on every Friday (except the first Friday) which will make 10% of your grade.

Academic Adjustments

Students who have been certified by the Office of the Dean of Students – Adaptive Programs as eligible for *academic adjustments* should go to MATH 242 and request the information sheet for *this* semester that explains how to proceed this semester to get these adjustments made in Mathematics courses. (It is not the same as last semester.) *This should be done during the first week of classes.* Only students who have been certified by the ODOS – Adaptive Programs and who have requested ODOS to send their certification letter to their instructor are eligible for academic adjustments. Students who are currently undergoing an evaluation process to determine whether they are eligible for academic adjustments are encouraged to find out *now* what procedures they will have to follow when they are certified by requesting the above mentioned Information Sheet from MATH 242. Large print copies of the Information Sheet are available from MATH 242 upon request.