

MAT 365 - Vector Calculus

Syllabus

Dr. R.L. Herman

Fall 2018

Instructor: Dr. R. Herman
Office Hours: MWF 11-12, TR 9:30-11
Office: Osprey Hall 2007J
Phone: 962-3722 : Email: hermanr@uncw.edu
<http://people.uncw.edu/hermanr>

Course Content:

Required Text: *Second Year Calculus*, D.M. Bressoud, Springer-Verlag, 1991;

The objectives in Advanced Calculus are typically to add depth to your first exposure to calculus. We will cover topics ranging from vector analysis and the calculus of vector spaces through integration over vector spaces. We will begin with a review of basic multivariate calculus and expand on the theory and application of what you had already encountered in elementary calculus. As described in the catalog, this will be "a thorough study of differential and integral calculus of vector-valued functions of a vector variable. Jacobians, inverse and implicit function theorems, change of variables in multiple integrals; theorems of Green, Gauss, and Stokes; applications."

We will approach this subject in a novel way, by looking at the subject both physically and historically. We will begin with Newton and the early problem of planetary motion and possibly end with Einstein. At the same time we will look at the mathematical structure underlying the applications of calculus. You are expected to be familiar with the calculus you have seen in MAT 161, 162 and 261, though we will spend some time reviewing and going deeper into the theory and applications from the latter course.

Learning Outcomes

After successfully completing the course, students should

- ▶ state and apply key theorems, prove special cases of each theorem, and prove some of the lemmas used in their proofs (e.g., Chain Rule, Taylor's Theorem, Implicit Function Theorem, Fubini's Theorem, Green's, Gauss' and Stokes' Theorems);
- ▶ further the basic knowledge in the analysis of functions of several variables (partial derivatives, total differential, local extremes, integration in 2 and 3 dimensions);
- ▶ develop ability to solve problems, working in groups;
- ▶ be able to compute line and surface integrals of vector functions using differential forms;
- ▶ have greater appreciation of the place of calculus in mathematics and related sciences.

Materials on the Web

More information will be posted on the web related to the topics we are studying. Links can be found with summaries to the material, study suggestions, homework assignments, etc. These will be accessible through the instructor's homepage at <http://people.uncw.edu/hermanr/mat365>

Course Requirements:

Homework: Homework assignments will be collected on a regular basis and you will be told when the work is due. As doing homework is very important for learning the material in this course, it will count as 30% of your grade.

Group Work: You will be assigned a group project. This will involve using the computing facilities. This will count 10% of your grade.

Exams and Grades: There will be two regular exams and a final exam. The exams will cover the basic material up to the date of the exam. The tentative dates for the exams are below.

Exam I	Oct 18
Exam II	Nov 15
Final	Dec 14, 8:00 AM

Your final grade will be based on the following:

Homework	30%
Projects	10%
Exams	40%
Final	20%

89.5-100	A
79.5-89.5	B
69.5-79.5	C
59.5-69.5	D

Homework Assignments

You are required to turn in all of the assigned problems for grading on the due date. All work is expected to be neat, complete with no scratch work attached, stapled, in order, and with all relevant work provided. Homework assignments are listed at the course website.

This syllabus is subject to change!

Academic Honor Code: All members of UNCW's community are expected to follow the academic Honor Code. Please read the UNCW Honor Code carefully (as covered in the UNCW Student Handbook). Academic dishonesty in any form will not be tolerated in this class. Please be especially familiar with UNC-W's position on plagiarism as outlined in the UNCW Student Handbook. Plagiarism is a form of academic dishonesty in which you take someone else's ideas and represent them as your own.

Student Disabilities: UNCW Disability Services supplies information about disability law, documentation procedures and accommodations that can be found at <http://uncw.edu/disability/>. To obtain accommodations the student should first contact Disability Services and present their documentation to the coordinator for review and verification.

Campus Respect Compact. UNCW has recently instituted a Respect Compact to affirm our commitment to a civil community, characterized by mutual respect. That Compact will soon be affixed to the wall of each classroom and can be accessed at: <http://uncw.edu/diversity/documents/ApprovedSeahawkRespectCompact8x10.08.09.pdf>

Lost Instructional Time

Due to Hurricane Florence, class times will be extended to make up for lost instructional time within UNCW guidelines and homework assignments have been rescheduled with problem sets adjusted to still meet the learning outcomes of the course. Test dates have been changed in accordance with the new schedule and there will only be one project.