

Instructor: Dr. Alexander Krantsberg
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Phone: 703-845-6548
Office: Bisdorf, Room AA 352

Class Time: Tuesdays and Thursdays 9:00 AM - 10:50 AM.
Classroom: Bisdorf / AA 354

Office hours: Monday 11:00 AM-12:00 PM, 3:00 PM-5:00 PM
Tuesday 11:00 AM-12:00 PM, 2:00 PM-3:00 PM (MML)
Wednesday 11:00 AM-12:00 PM, 3:00 PM-5:00 PM
Thursday 11:00 AM-12:00 PM, 2:00 PM-3:00 PM (MML)

Important Dates

Classes begin	January 10
Drop a class on NOVAConnect with tuition refund	January 10 – January 29
Martin Luther King, Jr. Holiday. College offices closed.	January 15
Last day to drop a class with a tuition refund or change to audit	January 29
Spring Break	March 12-18
Last day to withdraw without grade penalty	March 22
Final exam week	May 2-8
Final Exam	May 8
Final exams end	May 8

Course Content

(visit <http://www.nvcc.edu/academic/coursecont/summaries/mth277.htm> for details)

Course Description

Vector Calculus MTH 277 presents vector valued functions, partial derivatives, multiple integrals and topics from the calculus of vectors. Lecture 4 hours per week.

Course Purpose

This course is primarily for students in mathematics, engineering, science, and other areas requiring strong mathematical backgrounds. The purpose is to give students a basic understanding of the concepts of differential calculus and integral calculus of several variables.

Prerequisites

Satisfactory completion of MTH 174 - Calculus with Analytic Geometry II or equivalent.

Course Objectives

Syllabus

After completion this course, you should be able to:

- A. determine the equation of lines, planes, spheres, cylinders, and quadric surfaces in 3- dimensional space
- B. define a three-dimensional vector function and compute its higher order derivatives
- C. determine the arc length of a vector function and determine the tangent, normal, binormal, velocity and acceleration vectors and curvature for a vector function at a given point
- D. define limit and continuity of a function of two or three variables
- E. define and compute the partial derivative, total derivative, directional derivatives and extrema of functions of two and three variables
- F. compute exact differentials and line integrals
- G. compute double integrals in Cartesian and polar coordinates
- H. compute triple integrals in Cartesian, cylindrical, and spherical coordinates
- I. apply Green's Theorem to the solution of line integrals
- J. compute area, volume, mass and center of mass using double and triple integrals
- K. obtain competency in the use of a graphing utility and CAS in the topics below

Major Topics

A. Three-Dimensional Geometry and Vector Functions

1. Definition
2. Vector algebra (dot and cross products, direction cosines)
3. Equations of lines, spheres, cylinders and quadric surfaces
4. Derivatives and definition of vector functions
5. Arc Length
6. Tangent, normal, binormal vectors; velocity and acceleration

B. Partial Derivatives

1. Limit and continuity of functions of two and three variables
2. Partial and total derivatives: directional derivatives
3. Extrema of functions of two and three variables
4. Exact differentials

C. Double and Triple Integration

1. Definition
2. Double and triple integrals in various coordinates (Cartesian, cylindrical and spherical)
3. Line Integrals
4. Green's Theorem
5. Area, volume, mass and center of mass using double and triple integrals

Textbook

Calculus: Early Transcendental Functions, 6th Edition, by Ron Larson and Bruce Edwards; ISBN: 978-1-285-77477-0

You will get access to the electronic version of the textbook if you purchase an access code to **WebAssign**.

WebAssign is a valuable tool for study and review, but it is not required. There will be an extra credit of 10% for homework if you do it online using WebAssign.

If you purchased access to WebAssign, the class key is **nvcc 5624 0307**

Syllabus

Solutions to odd-numbered numbers problems in the textbook can be found at <http://www.calcchat.com>

Calculator

This course requires a graphing device TI-83 or better; TI-89 is recommended.

Grading Policy

Grading Categories

- Homework - 10%
- Quizzes - 15%
- Exams - 45 %
- Final Exam - 30 %

Course Grade

The course grade will be a letter grade:

- A - 90%-100%
- B - 80%-89.9%
- C - 70%-79.9%
- D - 60%-69.9%
- F - below 60%

No audits are given in this class. **The last day to withdraw with refund is January 29, 2018.** **The last day to withdraw without grade penalty is March 22, 2018.** You are responsible for doing all paperwork before these last dates.

Attendance:

It is very important to attend this class. If you miss no more than two classes, your lowest grade on homework assignments, quizzes, or tests will be dropped. My experience shows that regular attendance and active class participation, in most cases, results in a passing grade.

Grading Assignments

Homework: Problems will be assigned for every section covered in class. The homework is due the following week of class. Do not forget to put your name, the text book section, pages and problem numbers.

Note: If your average grade on the tests is more than 70%, you will get a 5% extra credit for your homework.

Quizzes: We will have quizzes on most weeks when there is no test. You can make up two quizzes.

Tests: There will be four tests, one hour each.

The tentative schedule for the tests is this.

Test 1 January 25

Test 2 February 27

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Test 3 March 27

Test 4 April 24

Please let me know in advance if you are not able to attend the class on any of these days. You may make up a test within two weeks after the test. It is your responsibility to schedule the make-up test with me.

Final Exam

The final exam is scheduled for **Tuesday, May 8, 2018 from 7:30 AM to 9:10 AM**. The exam will be comprehensive and cover all course material.

All students are expected to attend the final exam. There is no make-up for the final.

Exam and Test Policy

You may not share calculators during exams or quizzes. You may not use cell phones as calculators during exams and quizzes.

Cheating – receiving or giving unauthorized help- will result in a score of 0 on that quiz/test.

Course Policies

- **Classroom Behavior**
You should silence cellular phones. No texting during class time is allowed.
- **Late Assignment Policy**
Penalty of 20 % is imposed for every two weeks after the assignment due date.
- **Exams and Make-Up Exams**
You may make up a test within two weeks after the test. It is your responsibility to schedule the make-up test with me.
- **Cellphones, Smartphones, Laptops and Other Electronic Devices**
You should silence all electronic devices. No texting during class time. You are not allowed to use any electronic device, except a graphing calculator during in-class assessments.
- **Student Professionalism**
All students are considered adults and will conduct themselves in a professional manner at all times. Please read the section titled Student Conduct, Rights, and Responsibilities: B. Student Conduct in the [Student Handbook](#).

Student Support Resources

- **IT Helpdesk The IT**
Help Desk provides first-level technical support to all faculty, staff and students of Northern Virginia Community College. Additional details and resources are located at <http://www.nvcc.edu/ithd/>.
HOURS OF OPERATION

The Help Desk offers assistance 24 hours a day, 7 days a week.
Service is available nights, weekends and holidays.

Phone: 703.426.4141

Alexandria IT 703.845.6226

Email: ithelpdesk@nvcc.edu

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- **Disability Services for Students:**

The College is committed to the goal of providing each qualified student an equal opportunity to pursue a college education regardless of disability. Efforts will be made toward meeting reasonable requests for services to students with disabilities eligible under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA).

Please read the section titled Disability Services for Students in the Student Handbook.

Students requiring special needs in accordance with the American's With Disabilities Act must provide to the professor the NOVA Accommodation Form. Every effort will be made to meet student's special needs when the student makes those needs known appropriately. It is the student's responsibility, not a counselor's, to present the NOVA Accommodation Form to the professor. Accommodations will begin as soon as the form is received and are not retroactive. Please visit the Disability Support Service (DSS), Disability Documentation Guidelines, and Disability Services Intake Packet NOVA website pages for additional details and list of Disability Counselors by Campus.

Northern Virginia Community College, Disability Services <http://www.nvcc.edu/current-students/disabilityservices/>

- **Tutoring**

Tutoring is available in my office during my office hours or by appointment.

- **Emergencies**

Anyone observing an emergency situation should contact the Campus Police Office or the dean of students.

Alexandria Police Office

Bisdorf Building, Room 240 Phone: 703.764.5000 Email: PoliceDispatch@nvcc.edu

Hours: 24 hours a day, 7 days a week

Dean of Students

Bisdorf Building, Room 195 Phone: 703.845.6219 Email: vdiaz@nvcc.edu

- **Classroom Emergency Response Procedures**

All classrooms have an evacuation plan and directions (showing the route to the nearest building exit) posted next to the light switch by the doorway of each room. When the fire alarm sounds, immediately leave the classroom or lab with all of your belongings in accordance with the Evacuation Plan. Do not take the elevator. Do not activate cell phones or radios and please help assist the disabled.

- **Inclement Weather Policy**

If the college is closed, a text alert will be sent to cell phones registered on NOVA Alert and a notice will be posted on the College's website www.nvcc.edu/emergency. You may find out whether the college is closed by checking the web site, the TV or radio news, or by signing up for text message announcements. Please visit <http://www.nvcc> for detailed information.

Individuals may also call the College Call Center at 703-323-3000 or NOVACONNECT Phone at 703-323-3770. Do not call individual offices.

If weather conditions cause the College to close, all NOVA campuses and off-campus locations are closed.

In all cases of delayed openings, classes that would have started prior to an opening time and continued at least 45 minutes after the opening time will go on at the opening time. For example, in the case of a two-hour delay, a two-hour class that normally begins at 9:00 a.m. and continues to 11:00 a.m. would start at 10 a.m. and continue as usual until 12:00 p.m.

- **Emergency Procedures for Class Continuance**

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In the event of a College-wide emergency, course requirements, classes, deadlines, and grading schemes are subject to changes that may include alternate delivery methods, alternate methods of interaction with the instructor, class materials, and/or classmates, a revised attendance policy, and a revised semester calendar and/or grading scheme. In case of a College-wide emergency, please refer to the following about changes in this course:

Website: Blackboard (through learn.vccs.edu or MyNOVA) For general information about an emergency situation, please refer to: <http://www.nvcc.edu> or 703-450-2540 Nova Emergency Alert Registration: <https://alert.nvcc.edu> In event of an emergency just regarding this class, check Blackboard for announcements regarding course progress/assignments.

Note: The syllabus is subject to change.

Course Outline

(Subject to change at any time)

Week	Date	Section	Assignment (due the following week on Monday)
1	01/11	11.1 Vectors in the Plane 11.2 Space Coordinates 11.3 The Dot Product	1,7,12,25,28,31,38,40,41,49,68,75 1,14,24,36,38,42,45,57,65,70 8,16,18,21,26,32,63,69
2	01/16	11.4 The Cross Product	2,6,8,16,22,28,30,31,34,37,49
2	01/18	11.5 Lines and Planes in Space 11.6 Surfaces in Space	1,8,16,22,25,31,33,38,44,52,61,63,74,84,93 1,2,4,6,13,15,19,21,23,31
2	01/23	11.7 Cylindrical and Spherical Coordinates	1,8,10,16,20,25,32,38,44,51,60,62,66,87
3	01/25	TEST 1	
3	01/30	12.1 Vector-Valued Functions 12.2 Differentiation and Integration of Vector-Valued Functions	2,9,15,22,27,37,48,53,67,70 14,22,25,30,39,42,44,52,60
4	02/01	12.3 Velocity and Acceleration 12.4 Tangent Vectors and Normal Vectors	3,14,20,21,33,45,50 2,8,14,22,41,49
4	02/06	12.5 Arc Length and Curvature	3,12,20,26,33,37,42,53,81
5	02/08	13.1 Introduction to Functions of Several Variables	3,12,20,26,33,37,42,53,81
5	02/13	13.2 Limits and Continuity	6,16,26,31,43,57,64,76
6	02/15	13.3 Partial Derivatives 13.4 Differentials	3,12,18,29,41,47,52,56,62,67,84 2,8,14,17,26,33,37
6	02/20	13.5 Chain Rules	1,4,6,10,11,14,15,17,22,28,34,49
7	02/22	13.6 Directional Derivatives and Gradients	3,7,10,15,20,25,33,40,47,54,61
7	02/27	TEST 2	
8	03/01	13.7 Tangents Lines and Normal Lines	6,12,19,25,29,32,40,45,51
8	03/06	13.8 Extrema of Functions of Two Variables 13.9 Applications of Extrema	5,8,24,43,47,62 1,6,10,17,31
9	03/08	*13.10 Lagrange Multipliers	3,6,9,14,27,39
9	03/13		Spring Break

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10	03/15		Spring Break
10	03/20	14.1 Iterated Integrals and Area in the Plane 14.2 Double Integrals and Volume	1,5,10,11,14,18,27,31,32,36,43,46,54,61,68 1,2,7,10,13,16,21,24,25,31,35,46,51
11	03/22	14.3 Change of Variables	1,6,8,9,14,19,22,25,28,31,36,43,39,59
11	03/27	TEST 3	
12	03/29	14.4 Center of Mass and Moments of Inertia *14.5 Surface Area	1,5,8,11,14,21,23,28,35
12	04/03	14.6 Triple Integrals and Applications *14.8 Change of Variables	1,6,9,11,14,18,21,25,28,33,35,38,51
13	04/05	14.7 Triple Integrals in Cylindrical and Spherical Coordinates	2,6,8,10,13,21,24
13	04/10	15.1 Vector Fields	1,7,25,38,39,60
14	04/12	15.2 Line Integrals	1,9,14,16,19,22,25,27,35,51
14	04/17	15.3 Conservative Vector Fields	*6,8,14,20,26,37,50
15	04/19	15.4 Green's Theorem	2,8,12,16,22,26
15	04/24	TEST 4	
16	04/26	Review	
16	05/01	Review	
17	05/03		
17	05/8	Final Exam	7:30 AM – 9:10 AM