

Northern Virginia Community College
MTH 265-101A (43503) **Calculus III (4 CR.)** **Spring 2019**
Syllabus

Instructor: Dr. Alexander Krantsberg
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Office: Bisdorf, Room AA 438

Class Time: Mondays and Wednesdays 5:30 PM - 7:25 PM.
Classroom: Bisdorf / AA 434

Office hours: Monday 11:00 AM-12:00 PM, 4:00 PM-5:00 PM
 Tuesday 11:00 AM-12:00 PM, 2:30 PM-4:30 PM
 Wednesday 11:00 AM-12:00 PM, 4:00 PM-5:00 PM
 Thursday 11:00 AM-12:00 PM, 2:30 PM-4:30 PM

Important Dates

Classes begin	January 12
Drop a class on NOVAConnect with tuition refund	January 12 – January 29
Martin Luther King, Jr. holiday for students, faculty and staff. College offices closed.	January 21
Last day to drop a class with a tuition refund or change to audit	January 29
Spring Break for teaching faculty and students. College offices open.	March 9-15
Last day to withdraw without grade penalty	March 24
Final exam week	May 4-10
Final Exam	May 6
Final exams end	May 10

Course Content

(visit <https://www.nvcc.edu/academic/coursecont/summaries/MTH265.pdf> for details)

Course Description

Calculus III MTH 263 focuses on extending the concepts of function, limit, continuity, derivative, integral and vector from the plane to the three dimensional space. Covers topics including vector functions, multivariate functions, partial derivatives, multiple integrals and an introduction to vector calculus. Features instruction for mathematical, physical and engineering science programs. Lecture 4 hours.

Course Purpose

The general purpose of this third course in a three course sequence is to prepare students for further study in mathematics, engineering and science programs by providing the necessary competencies in calculus concepts in the three dimensional space.

Prerequisites

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Prerequisite: Completion of MTH 264: Calculus II or equivalent with a grade of C or better

Course Objectives

- **Vectors and the Geometry of Space**

- o Identify and apply the parts of the three-dimensional coordinate system, distance formula and the equation of the sphere
- o Compute the magnitude, scalar multiple of a vector, and find a unit vector in the direction of a given vector
- o Calculate the sum, difference, and linear combination of vectors
- o Calculate the dot product and cross product of vectors, use the products to calculate the angle between two vectors, and to determine whether vectors are perpendicular or parallel
- o Determine the scalar and vector projections
- o Write the equations of lines and planes in space
- o Draw various quadric surfaces and cylinders using the concepts of trace and cross-section

- **Vectors and the Geometry of Space**

- o Sketch vector valued functions
- o Determine the relation between these functions and the parametric representations of space curves
- o Compute the limit, derivative, and integral of a vector valued function
- o Calculate the arc length of a curve and its curvature; identify the unit tangent, unit normal and binormal vectors
- o Calculate the tangential and normal components of a vector
- o Describe motion in space

- **Partial Derivatives o Define functions of several variables and know the concepts of dependent variable, independent variables, domain and range.**

- o Calculate limits of functions in two variables or prove that a limit does not exist;
- o Test the continuity of functions of several variables;
- o Calculate partial derivatives and interpret them geometrically, calculate higher partial derivatives
- o Determine the equation of a tangent plane to a surface; calculate the change in a function by linearization and by differentials,
- o Determine total and partial derivatives using chain rules,
- o Calculate directional derivatives and interpret the results
- o Identify the gradient, interpret the gradient, and use it to find directional derivative o Apply intuitive knowledge of concepts of extrema for functions of several variables, and apply them to mathematical and applied problems. Lagrange multipliers.

- **Multiple Integrals**

- o Define double integral, evaluate a double integral by the definition and the midpoint rule and describe the simplest properties of them.
- o Calculate iterated integrals by Fubini's Theorem
- o Calculate double integrals over general regions and use geometric interpretation of double integral as a volume to calculate such volumes. Some applications of double integrals may include computing mass, electric charge, center of mass and moment of inertia
- o Evaluate double integrals in polar coordinates to calculate polar areas, evaluate Cartesian double integrals of a particular form by transforming to polar double integrals
- o Define triple integrals, evaluate triple integrals, and know the simplest properties of them. Calculate volumes by triple integrals

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o Transform between Cartesian, cylindrical, and spherical coordinate systems; evaluate triple integrals in all three coordinate systems; make a change of variables using the Jacobian

• Vector Calculus

o Describe vector fields in two and three dimensions graphically; determine if vector fields are conservative, directly and using theorems o Identify the meaning and set-up of line integrals and evaluate line integrals

o Apply the connection between the concepts of conservative force field, independence of path, the existence of potentials, and the fundamental theorem for line integrals. Calculate the work done by a force as a line integral o Apply Green's theorem to evaluate line integrals as double integrals and conversely

o Calculate and interpret the curl, gradient, and the divergence of a vector field

o Evaluate a surface integral. Understand the concept of flux of a vector field

o State and use Stokes Theorem

o State and use the Divergence Theorem

Major Topics to be Included

- a) Vectors and the Geometry of Space
- b) Vector Functions
- c) Partial Derivatives
- d) Multiple Integrals
- e) Vector Calculus

Textbook

The textbook is Calculus, Early Transcendentals, by James Stewart. 8th Edition; 2016.

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.

WebAssign gives you a 14-day grace period to view and complete your homework for free. After 14 days, you will need to purchase access to WebAssign.

You can access WebAssign through Blackboard.

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:

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- 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, 2019.** **The last day to withdraw without grade penalty is March 24, 2019.** 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 28**
- Test 2 February 27**
- 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 **Monday, May 6, 2019 from 5:30 PM to 7:10 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.

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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

- **Disabilit**

y 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.

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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**

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

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(Subject to change at any time)

Week	Date	Section	Assignment (due the following week on Monday)
1	1/14	12.1 Three-Dimensional Coordinate Systems 12.2 Vectors	1,3,4,5,6,9,16,18,31,37,40,45 3,5,13,16,19,24,27,32,37,47
1	1/16	12.3 The Dot Product 12.4 The Cross Product	1,2,5,7,10,17,23,26,29,31,34,41,46,50
2	1/21	NO CLASSES – Martin Luther King, Jr. Day	
2	1/23	12.4 The Cross Product 12.5 Equations of Lines and Planes	4,12,14,16,27,31,36,37,39,41 1,4,10,15,16,20,24,26,33,40,42,49,54,58,60,64,70,74
3	1/28	TEST 1	
3	1/30	12.5 Equations of Lines and Planes 12.6 Cylinders and Quadric Surfaces	1,3,5,8,11,13,19,22,24,29,32,43
4	2/4	13.1 Vector-Valued Functions and Space Curves 13.2 Derivatives and Integrals of Vector-Functions	3,7,12,18,21,25,27,32,39,42,50 3,7,10,15,19,21,26,32,35,39,42,49
4	2/6	13.3 Arc Length and Curvature 13.4 Motion in Space: Velocity and Acceleration	1,2,11,12,18,20,25,39,43,48,49,52 1,3,7,12,18,20,25,31,39
5	2/11	14.1 Functions of Several Variables	3,9,25,27,28,32,35,36,41,45,63,70
5	2/13	14.2 Limits and Continuity 14.3 Partial Derivatives	9,13,17,25,37,41 5,10,12,17,24,33,42,47,52,56,69,82,90
6	2/18	14.4 Tangent Planes and Linear Approximation 14.5 Chain Rules	6,11,21,27,38 1,4,12,15,21,24,29,31,39,43,51
6	2/20	14.6 Directional Derivatives and Gradients	1,4,6,7,9,11,17,21,23,31,32,41,45,50,59
7	2/25	14.7 Maximum and Minimum Values 14.8 Lagrange Multipliers	3,6,11,19,23,33,36,44,47,49,60 1,3,4,7,22,29,33,44
7	2/27	TEST 2	
8	3/4	15.1 Double Integrals over Rectangles 15.2 Double Integrals over General Regions	1,11,15,19,32,35,38,42,47 1,4,7,8,13,15,17,19,23,26,29,32,36,49,51,56,60
8	3/6	Review	
9	3/11	Spring Break	
9	3/13	Spring Break	
10	3/18	15.3 Double Integrals in Polar Coordinates	7,9,12,17,21,24,29,35
10	3/20	15.4 Applications of Double Integrals	3,6,12,16,17,23
11	3/25	15.5 Surface Area	3,5,10,17,23
11	3/27	TEST 3	
12	4/1	15.6 Triple Integrals	4,7,9,14,18,20,27,31,33,34,40,43,47
12	4/3	15.7 Triple Integrals in Cylindrical Coordinates 15.8 Triple Integrals in Spherical Coordinates 15.9 Change of Variables in Multiple Integrals	1,3,12,17,19,22,24,27,29 1,3,5,9,11,13,17,19,20,23,27,33 1,7,8,11,13,16,24
13	4/8	16.1 Vector Fields	1,5,6,11,15,23,31,33

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		16.2 Line Integrals	2,3,7,11,17,20,29,32,33,34,36,41,48
13	4/10	16.3 The Fundamental Theorem for Line Integrals	1,2,4,7,11,12,15,16,17,19,25,29,33
14	4/15	16.4 Green's Theorem	3,5,7,9,11,13,17
14	4/17	16.5 Curl and Divergence	3,7,9,12,19,30,33,37
15	4/22	16.6 Parametric Surfaces and Their Areas 16.7 Surface Integrals	3,5,13,16,21,33,37,41,59 5,10,23,26,42
15	4/24	TEST 4	
16	4/29	16.8 Stokes' Theorem 16.9 The Divergence Theorem	2,5,8,12,18 1,5,8,15,18
16	5/1	Review	
17	5/6	Final Exam	5:30 PM – 7:10 PM