Syllabus

Instructor: Dr. Alexander Krantsberg
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Office: Bisdorf, Room AA 466

Class Time: Mondays, Tuesdays, Wednesdays, and Thursdays: 6:00 PM - 8:55 PM.
Classroom: Bisdorf / AA 466

Office hours: Monday 4:00 PM - 6:00 PM

Tuesday 4:00 PM - 6:00 PM

Wednesday 4:00 PM - 6:00 PM

Thursday 4:00 PM - 6:00 PM

Important Dates

Classes begin	**May 20**
Drop a class on NOVAConnect with tuition refund	May 26
Memorial Day holiday for students, faculty and staff. College offices closed.	May 27
Last day to withdraw without grade penalty	June 14
Final exam week	June 24-30
Final Exam	June 27
Final exams end	June 30

Course Content
 (visit http://www.nvcc.edu/academic/coursecont/summaries/MTH167.pdf for details)

Course Description
MTH 167 – Presents topics in power, polynomial, rational, exponential, and logarithmic functions, systems of equations, trigonometry, and trigonometric applications, including Law of Sines and Cosines, and an introduction to conics. Credit will not be awarded for both MTH 167, and MTH 161/MTH 162 or equivalent. Lecture 5 hours. Total 5 hours per week

Course Purpose
The general purpose of this one-semester course is to prepare students for the skills and level of rigor needed for successful study in a sequence of courses in calculus with analytic geometry.

Prerequisites/Corequisites

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Prerequisite(s): Competency in MTE 1-9 as demonstrated through placement or unit completion or equivalent or Corequisite: MCR 7.

Course Objectives
- Relations and Functions
  - Distinguish between relations and functions.
  - Evaluate functions both numerically and algebraically.
  - Determine the domain and range of functions in general, including root and rational functions.
  - Perform arithmetic operations on functions, including the composition of functions and the difference quotient.
  - Identify and graph linear, absolute value, quadratic, cubic, and square root functions and their transformations.
  - Determine and verify inverses of one-to-one functions.
- Polynomial and Rational Functions
  - Determine the general and standard forms of quadratic functions.
  - Use formula and completing the square methods to determine the standard form of a quadratic function. o Identify intercepts, vertex, and orientation of the parabola and use these to graph quadratic functions.
  - Identify zeros (real-valued roots) and complex roots, and determine end behavior of higher order polynomials and graph the polynomial, and graph.
  - Determine if a function demonstrates even or odd symmetry.
  - Use the Fundamental Theorem of Algebra, Rational Root test, and Linear Factorization Theorem to factor polynomials and determine the zeros over the complex numbers. o Identify intercepts, end behavior, and asymptotes of rational functions and graph. o Solve polynomial and rational inequalities.
  - Interpret the algebraic and graphical meaning of equality of functions $(f(x) = g(x))$ and inequality of functions $(f(x) > g(x))$
  - Decompose partial fractions of the form $P(x)/Q(x)$ where $Q(x)$ is a product of linear factors.
- Exponential and Logarithmic Functions
  - Identify and graph exponential and logarithmic functions and their transformations.
  - Use properties of logarithms to simplify and expand logarithmic expressions.
  - Convert between exponential and logarithmic forms and demonstrate an understanding of the relationship between the two forms.
  - Solve exponential and logarithmic equations using one-to-one and inverse properties. o Solve application problems involving exponential and logarithmic functions.
- Systems of Equations
  - Solve three variable linear systems of equations using the Gaussian elimination method.
- Trigonometric Functions
  - Identify angles in standard form in both degree and radian format and convert from one to the other.
  - Find the arc length.
  - Find the value of trigonometric functions of common angles without a calculator using the unit circle and right triangle trigonometry.
  - Use reference angles to evaluate trig functions.
  - Find the value of trigonometric functions of angles using a calculator.
  - Use fundamental trigonometric identities to simplify trigonometric expressions.
  - Graph the six trigonometric functions using the amplitude, period, phase and vertical shifts.
  - Use trig functions to model applications in the life and natural sciences.
- Analytic Trigonometry
  - Use the fundamental, quotient, Pythagorean, co-function, and even/odd identities to verify trigonometric identities.
  - Use the sum and difference, double angle, half-angle formulas to evaluate the exact values of trigonometric expressions.

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- o Determine exact values of expressions, including composite expressions, involving inverse trigonometric functions.
  - o Solve trigonometric equations over restricted and non-restricted domains.
- • Applications of Trigonometry o Solve right triangles and applications involving right triangles.
  - o Use the Law of Sines and Cosines to solve oblique triangles and applications.
  - o Apply concepts of trigonometry to extended topics such as plotting polar coordinates, converting rectangular and polar coordinates from one to the other, identifying vector magnitude and direction, or performing operations with vectors such as addition, scalar multiplication, component form, and dot product.
- • Conics
  - o Identify the conic sections of the form: $Ax^2 + By^2 + Dx + Ey + F = 0$.
  - o Write the equations of circles, parabolas, ellipses, and hyperbolas in standard form centered both at the origin and not at the origin
  - o Identify essential characteristics unique to each conic
  - o Graph equations in conic sections, centered both at the origin and not at the origin. o Solve applications involving conic sections.
- • Sequences and Series (Optional unit at the discretion of the department. Not required for transfer.)
  - o Identify the terms of geometric sequences.
  - o Find a particular term of geometric sequence.
  - o Determine the formula for the nth term of geometric sequences.
  - o Find the sum of first n terms of finite geometric series.
  - o Find the sum of infinite geometric series.
  - o Introduce arithmetic concepts as time allows.
  - **Major Topics to be Included**
    - a) Relations and Functions
    - b) Polynomial and Rational Functions
    - c) Exponential and Logarithmic Functions
    - d) Systems of Equations and Inequalities
    - e) Trigonometric Functions
    - f) Analytic Trigonometry g) Applications of Trigonometry h) Conics

Textbook and other Resources

The course is based on this textbook.

Precalculus, by Julie Miller and Donna Gerken 1

ISBN: 978–0–07–803560–9

We will be using the electronic version: Precalculus, 1st ed. (McGraw Hill) - **ALEKS** 360. "ALEKS (**A**ssessment and **LE**arning in **K**nowledge **S**paces) is an online, mastery-based assessment and learning system". ALEKS provides an adaptive learning: it "interacts with students like a personal human tutor, delivering the exact instruction they need, right when they need it".

If you have a laptop, notebook, iPhone, or other device that can be connected to the Internet, please bring it to the first class meeting.

For registration you need the 10-character class code:

Calculator

This course requires a graphing device TI-83 or better. If you plan to take calculus courses, TI-89 (+) would be the best option.

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Grading Policy
Grading Categories
- Homework and
  Class Assignments -   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 May 26, 2019**. **The last day to withdraw without grade penalty is June 14, 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 quizzes, or exams will be dropped. My experience shows that regular attendance, doing homework, and active class participation, in most cases, results in a passing grade.
Please see The Attendance/Student Participation policy in the NOVA 2018-2019 Catalog for details.

Grading Assignments

Homework:
You will do homework online using ALEKS 360. Homework assignments are individualized; the number of questions depends on a student's readiness to master the objective.
ALEKS provides an online calculator for all questions except those that should be answered without a calculator.

Quizzes: We will have quizzes on most class days when there is no test. You can make up one quiz.

Tests:
There will be four tests, one hour each. The tentative schedule for the tests is this.

Test 1   **May 28**
Test 2   **June 5**
Test 3   **June 13**
Test 4   **June 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

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The final exam is set by the college for **Thursday, June 24, 2019 from 6:00 PM to 7:40 PM**. Please do not make other plans on the date of the final exam.
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.

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 exam.

Course Policies

- **Classroom Behavior**
  You should silence cellular phones. No texting during class time is allowed.
- **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

- **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.
  The Academic Success Center (ASC) in Room AA229 also provides free peer tutoring in Math.
  Call 703-845-6363 for more information.

- **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 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

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Alert Registration: https://alert.nvcc.edu In event of an emergency just regarding this class, check Blackboard for announcements regarding course progress/assignments.

Note: <u>The syllabus is subject to change.</u>

Course Outline
(Subject to change at any time)

Week	Date	Topic	Section
1	5/20	Functions and Relations Linear Equations in Two Variables and Linear Functions Applications of Linear Equations and Modeling	1.3 1.4 1.5
1	5/21	Transformations of Graphs Analyzing Graphs of Functions and Piecewise-Defined Functions Algebra of Functions and Function Composition	1.6 1.7 1.8
1	5/22	Algebra of Functions and Function Composition Quadratic Functions and Applications	1.8 2.1
1	5/23	Introduction to Polynomial Functions Division of Polynomials The Remainder and Factor Theorems	2.2 2.3 2.4
2	5/27	**NO CLASSES – Memorial Day**	
2	5/28	**Test 1** The Remainder and Factor Theorems Zeros of Polynomials	2.4 2.4
2	5/29	Rational Functions	2.5
2	5/30	Polynomial and Rational Inequalities Systems of Linear Equations in Two Variables	2.6 8.1
3	6/3	Systems of Linear Equations in Three Variables Partial Fraction Decomposition	8.2 8.3
3	6/4	Solving Systems of Linear Equations Using Matrices Inconsistent Systems and Dependent Equations	9.1 9.2
3	6/5	**Test 2** Inverse Functions Exponential Functions	3.1 3.2
3	6/6	Logarithmic Functions Properties of Logarithms	3.3 3.4
4	6/10	Exponential and Logarithmic Equations; Applications Modeling with Exponential and Logarithmic Functions	3.5 3.6
4	6/11	The Circle Angles and Their Measure	1.2 4.1
4	6/12	Trigonometric Functions on the unit Circle Right Triangle Geometry Applications of Right Triangles	4.2 4.6. 6.1
4	6/13	**Test 3**	

		Trigonometric Functions of Any Angle	4.4
		Graphs of Sine and Cosine Functions	4.5
5	6/17	Graphs of Other Trigonometric Functions	4.6
		Inverse Trigonometric Functions	4.7
5	6/18	Fundamental Trigonometric Identities	5.1
		Sum and Difference Formulas	5.2
		Double-Angle, Power-Reducing, and Half-Angle Formulas	5.3
5	6/19	Double-Angle, Power-Reducing, and Half-Angle Formulas	5.3
		Trigonometric Equations	5.5
5	6/20	Law of sines	6.1
		Law of Cosines	6.2
		Polar Coordinates	7.1
6	6/24	**Test 4**	
		Polar Coordinates	7.1
		Vectors	7.4
		Dot Product	7.5
6	6/25	The Ellipse	10.1
		The Hyperbola	10.2
		The Parabola	10.3
6	6/26	**Review**	
6	6/27	**Final Exam**	**6:00 PM - 7:40 PM**