

Northern Virginia Community College
MTH 166-141 (43305) **PRECALCULUS with TRIGONOMETRY (5 CR.)** Fall 2016
Syllabus

Instructor: Dr. Alexander Krantsberg

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Office: Bisdorf, Room AA-354

Class Time: Tuesdays, Thursdays 4:30 PM - 7:15 PM.

Classroom: Bisdorf, AA 355

Office hours: Mondays and Wednesdays 11:00 AM -12:00PM, 2:30 PM: 4:30 PM
and Thursdays 1:00 PM –2:00 PM, 3:30 PM - 4:30 PM

Important Dates

September 6

September 21

November 7

November 24-25

December 12

Classes begin

Last day to drop a class with a tuition refund

Last day to withdraw without grade penalty

Thanksgiving holiday. College closed

Final Exam

Course Content

(visit <http://www.nvcc.edu/academic/coursecont/summaries/MTH166.pdf> for details)

Course Description

MTH 166– presents college algebra, analytic geometry, trigonometry and algebraic, exponential, and logarithmic functions.

Course Purpose

The general purpose of this one-semester course is to prepare the student for a course in a rigorous calculus sequence by providing them with the necessary competencies in algebra, functions (including polynomial, rational, exponential, logarithmic, and trigonometric functions), and analytic geometry, as well as competence in using a graphing utility. At NVCC, this course will prepare the student for the calculus sequence, MTH 173-174 - "Calculus with Analytic Geometry I-II".

Prerequisites

Competency in Math Essentials Units MTE 1-9 as demonstrated through the placement and diagnostic tests, or by completion through unit 9 in an MTT course. Credit will not be awarded for both MTH 163 and MTH 166.

Course Objectives

After completion this course, you should be able to:

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- Solve problems involving equations, inequalities, and systems of equations
- Operate on functions (addition, multiplication, composition, and inverses)
- Graph linear, quadratic, exponential, logarithmic, and trigonometric functions
- Graph conic sections
- Factor polynomials and find zeroes of polynomials
- Evaluate trigonometric and inverse trigonometric functions
- Use trigonometric formulas to prove trigonometric identities, solve triangles, and trig equations
- Use a graphing utility as an aid to problem solving

Major Topics

Optional Review of Algebraic Expressions

- A. Polynomials
- B. Factoring
- C. Rational Expressions
- D. Rules of Exponents for positive integer exponents
- E. Solution of linear equations
- F. Quadratic Formula and Quadratic-type equations
- G. Use of the theorem: Solutions of $p=q$ are a subset of the solutions of $p^2=q^2$

Required Topics

A. Exponents and radicals

- 1. Definitions
 - a. The zero exponent
 - b. Negative integer exponents
 - c. Rational exponents
- 2. Rules for rational exponents
 - a. Simplifying radicals
 - b. Rationalizing numerator or denominator

B. Inequalities and Absolute Value

- 1. Inequalities
 - a. Definition
 - b. Interval notation
 - c. Graphing on the number line
 - d. Solution of linear, quadratic, and rational inequalities
- 2. Absolute Value
 - a. Definition
 - b. Solution of equations and inequalities containing absolute values

C. Complex Numbers

- 1. Definition
- 2. Arithmetic operations

D. Functions

- 1. Definitions, including domain and range
- 2. Operations
 - a. Arithmetic
 - b. Composition
- 3. Inverses with respect to composition

E. Polynomial Functions

- 1. Definition
- 2. Graphs (including transformations and symmetry)

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3. Remainder Theorem and Factor Theorem
4. Division of Polynomials
5. Fundamental Theorem of Algebra
6. Finding zeros of polynomial functions with integral coefficients

F. Rational Functions

1. Definitions
2. Graphs (including asymptotes)

G. Exponential and Logarithmic Functions

1. Definitions
2. Graphs
3. Finding common and natural logarithms and antilogarithms
4. Solution of equations involving exponentials and/or logarithms
5. Growth and Decay Problems and other applications

H. Analytic Geometry

1. Basic Concepts
 - a. distance between two points in the plane
 - b. midpoint of line segment
2. Linear Functions
 - a. slope
 - b. intercepts
 - c. graphs of linear functions
 - d. parallel and perpendicular lines
 - e. derive line equations
3. Conic sections of form $Ax^2 + By^2 + Cx + Dy + E = 0$
 - a. parabolas
 - (1) finding vertex
 - (2) graphing
 - b. circles
 - (1) finding center and radius by completing the square
 - (2) graphing
 - c. ellipses
 - (1) find axes and center
 - (2) graphing
 - d. hyperbolas
 - (1) axes and asymptotes
 - (2) graphing

I. Solving systems of equations

1. Algebraically
2. Graphically

J. Trigonometric Functions

1. Unit circle
2. Circular functions
 - a. definitions
 - b. simple properties (Pythagorean, Reciprocal, Complementary)
3. Formulae for $f(x+y)$, $f(2x)$, $f(x/2)$
4. Graphs of trigonometric functions
5. Inverses of trigonometric functions
6. Proving trigonometric identities
7. Solution of trigonometric equations
8. DeMoivre's Theorem

K. Applications of Trigonometric Functions to triangles

1. Trigonometric functions for right triangles
2. Solution of right triangles
3. Law of Sines
4. Law of Cosines

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Textbook

Precalculus, 5th Edition, by Robert Blitzer.

MyMathLab

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

If you purchased access to MyMathLab, the course ID is **krantsberg36857**

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.

Grading Policy

Grading Categories

- Homework and Writing 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 January 30, 2014.** **The last day to withdraw without grade penalty is March 24, 2014.** 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, 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.

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

The tentative schedule for the tests is this.

Test 1 September 19

Test 2 October 12

Test 3 November 7

Test 4 December 5

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, December 12, 2016 from 5:30 PM to 7:**. 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 exam.

Classroom Behavior

You should silence cellular phones. No texting during class time.

Inclement Weather or Other Emergency Events

If the college is closed, a text alert will be sent to cell phones registered on NOVA Alert, a notice will be posted on the College's website www.nvcc.edu/emergency. You can also call the College Call Center at 703.323.3000.

Contingency plans for canceled classes will be posted on Blackboard.

Special Needs and Accommodations

Please address with me any special problems or needs at the beginning of the semester. If you are seeking accommodations based on a disability, you must provide a disability data sheet, which can be obtained from the counselor for special needs, who is located in Bisdorf (AA) 229, phone (703) 933-1840. More information may be found at the following website:

<http://www.nvcc.edu/current-students/disability-services/index.html>

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	09/07	P.1 Algebraic Expressions P.2 Exponents P.3 Radicals and Rational Exponents P.4 Polynomials	14,22,31,59,95,99,120,125,133 1,3,5,9,11,19,33,43,47,61,89,73,79,85,101 1,3,7,9,11,13,19,29,35,41,43,47,51,57,59,65,71,77,85,89,105,117 1,3,7,11,13,17,21,39,43,73
1	09/12	P.5 Factoring Polynomials P.6 Rational Expressions P.7 Equations P.9 Linear Inequalities	1,3,7,15,19,29,41,47,55 5,9,15,45,51 3,9,15,21,33,49,55,59,73,113,123 3,13,19,27,37,45,61,71,79
2	09/14	1.1 Graphs and Graphing Utilities 1.2 Basics of Functions and Their Graphs 1.3 More on Functions 1.4 Linear Functions	150-152:3,9,13,19,23,29,33,41,43,55,81 172:3,5,13,15,19,31,43,55,57,59,63,71,73,75,101 CV6, CV9, 1,7,13,15,17,19,21,29,31,33,41,53,59,83 3,5,23,31,35,45,55,65,71,89,101
2	09/19	Test 1 1.5 More on Lines 1.6 Transformations of Functions	1,3,5,11,15,21,27,31 3,7,9,15,21,39,47,63,71,89,103
3	09/21	1.7 Combinations of Functions 1.8 Inverse Functions	9,15,23,35,47,53,57,67,75,81,83,93 3,23,29,31,41,49,55,67
3	09/26	1.9 Distance and Midpoint Formulas; Circles 2.1 Complex Numbers	pp.264-265:7,15,23,29,37,51,57,63 :3,5,11,19,21,27,31,35,41,45,47
4	09/28	2.2 Quadratic Functions 2.3 Polynomial Functions and their Graphs 2.4 Dividing Polynomials	3,7,11,17,31,41,59,65 1,3,5,9,11,13,15,17,19,21,27,31,35,41,55,73 pp.343-345:1,5,15,19,23,35,37
4	10/03	2.5 Zeros of Polynomial Functions	pp.356-358:1,3,11,13,19,27,43
5	10/05	2.6 Rational Functions	3,5,7,9,11,13,15,17,19,21,25,33,37,39,51,57,61,77,87,99
5	10/10		Professional Development days for Faculty. No Classes. College offices

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			open.
6	10/12	Test 2 2.7 Polynomial and Rational Inequalities	1,7,11,29,35,43,53,55,71,79
6	10/17	Review	
7	10/19	3.1 Exponential Functions 3.2 Logarithmic Functions	1,5,7,11,17,19,21,23,29,45,51,65 1,3,5,7,9,11,13,19,21,25,29,35,37,41,49,55,59,65,75,79,81,85,95,117
7	10/24	3.3 Properties of Logarithms	3.3.CV-1, CV-2 , CV-3, CV-4, 3,23,25,33,29,45,49,57,65,69,71,77,87,103
8	10/26	3.4 Exponential and Logarithmic Equations 3.5 Exponential Growth and Decay	3,9,19,27,29,41,43,55,61,71,75,89,91,105,107 5,15,27,37,49,71
8	10/31	4.1 Angles and Radian Measure 4.2 Trigonometric Functions 4.3 Right Triangle Geometry	5,11,13,17,21,25,27,29,33,35,39,45,49,59,67,77,81,85,91 3,5,7,9,11,13,19,21,23,27,31,35,37,41,51,57,58,61,65,69,83 3,7,17,19,23,25,33,53,58
9	11/02	4.4 Trigonometric Functions of Any Angle 4.5 Graphs of Sine and Cosine Functions	3,7,11,13,15,19,25,29,35,41,55,57,63,67,77,87,89,91,93,95,97,99,101,103 1,5,13,19,27,31,33,37,41,45,47,85,101,107
9	11/07	Test 3 4.6 Graphs of Other Trigonometric Functions	1,3,5,11,13,15,17,23,25,27,31,33,41,43,77,79,83,85
10	11/09	4.7 Inverse Trigonometric Functions *4.8 Applications of Trigonometric Functions 5.1 Trigonometric Identities 5.2 Sum and Difference Formulas	1,5,7,9,13,17,19,23,27,31,35,41,45,47,49,57,95,111 3,5,9,13,25,45,49 1,5,9,21,35,49,85 3,7,11,21,31,49,53,61
10	11/14	5.3 Double-Angle, Power-Reducing Formulas 5.4 Product-to-Sum 5.5 Trigonometric Equations	1,3,5,7,9,19,25,31,39,43,79,95 11,3,5,9,11,13,21,23,29,47 1,3,5,7,11,13,15,25,27,29,37,85,87,89,129
11	11/16	6.1 The Law of Sines 6.2 The Law of Cosines	1,3,5,11,13,17,19,45,53 1,3,7,13,19,27,41
11	11/21	6.3 Polar Coordinates 6.5 Complex	1,3,5,15,21,33,43 1,3,5,11,19,23,29,37,41,47,53,57

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		Numbers, DeMoivre's Theorem	
12	11/23		No Classes. College offices close at noon.
12	11/28	7.1 Systems of Equations in Two Variables 7.2 Systems of Equations in Three Variables 7.4 Systems of Nonlinear Equations	1,3,7,15,25,29,45 1,3,5,9,17,19,31,47 7,31,43,67
13	11/30	9.1. The Ellipse 9.2 The Hyperbola 9.3 The Parabola	1,5,15,27,43,53,65 1,3,5,7,23,39 1,3,7,11,19,35,63
13	12/05	Test 4	
14	12/07	Review	
14	12/12	Final Exam	5:30 PM – 7:10 PM

