

Pre-Calculus College Prep A Course Outline

Course Number: 332
Level : College Prep A
Revised : August, 2008
Textbook : Blitzer Precalculus Third Edition, Pearson Prentice Hall 2007
Credits : 5 Credits

I. Prerequisites

Students taking this course should have completed Algebra 1, Geometry, and Algebra 2. All three courses should have been on the College Prep A level or Honors level. A student who had taken Algebra 2 on the College Prep B level may take this course if he/she meets any two of the following criteria: 1) received an “A” in Algebra 2, 2) has teacher recommendation, 3) takes the “Algebra 2 A” level final exam and receives at least a “C” grade.

II. Course Description

This is the fourth year of “College Prep A” level mathematics. The course provides a strong background for college level mathematics and is essential for any student anticipating taking calculus in college.

During the first semester students will study trigonometric functions and their graphs, trigonometric identities and equations, the trigonometry of triangles including the Law of Sines and Law of Cosines. The second semester topics include the study of polynomial and rational functions, exponential and logarithmic functions, sequences and series, matrices and determinants.

Students are expected to be active participants in the learning process with the teacher serving as a facilitator of the learning process. Understanding of concepts is stressed rather than rote memorization of skills. Class discussions enable students to clarify their understanding of the material being presented. The student is expected to participate actively in these situations, contributing his/her ideas, and ask questions

Homework will be given almost every day and is an important part of the course, providing students with the opportunity to both practice concepts learned in class, and strengthen their understanding of the material. It is imperative that students do homework regularly and conscientiously. Homework will be reviewed in class and it is the student’s responsibility during that time to ask questions about problems he/she doesn’t understand and to identify specific errors. Homework will not be graded, but will

be considered satisfactory if the work shows that the student made a conscientious effort to complete the assignment.

III. New Jersey Core Curriculum Content Standards Addressed

4.1, 4.2, 4.3, 4.5.

IV. Goals and Objectives

1. To help students acquire a solid foundation in algebra and trigonometry, preparing them for other courses, such as calculus, business calculus, and finite mathematics.
2. To show students how algebra and trigonometry can model and solve authentic real-world problems.
3. To enable students to develop problem-solving skills by fostering critical thinking.

V. Implementation of Technology

Graphing Calculators will be used throughout the course to encourage discovery, problem solving and to apply mathematics to real life situations. Students are encouraged to purchase their own TI-83+ or TI-84+ graphing calculator for use in this course and for future use in college courses.

Various websites, both interactive and informational, will be infused during class and encouraged to be used by students on their own time.

The Smart Board will be utilized, when appropriate, in presenting or clarifying the current math topic.

VI. Materials, Resources, Year Published, and Name of Text

- Blitzer Precalculus Third Edition, 2007, Pearson/Prentice Hall

VII. Student Evaluation Methods

A) Marking Period Grade

1. Classwork / Homework: 05 - 10%
2. Tests / Quizzes: 90 - 95%
3. Preparation / Participation: 00 – 05%

B) Final Grade

1. The four marking periods are each worth 20%.
2. Midterm Exam 10%
3. Final Exam 10%

VIII. District Policy: ACADEMIC INTEGRITY

Pupils are expected to be honest in all of their academic work. This means that they will not engage in any of the following acts:

- Cheating on examinations or other school assignments, including but not limited to, the non-authorized use of books or notes, the use of crib sheets, copying from other students' papers, exchanging information with other students orally, in writing, or by signals, obtaining copies of the examination illegally and other similar activities. Cheating through the use of technology to exchange information on any school assignment, examination, etc. is prohibited. Technology is defined as, but not limited to, computers, telephones, text messaging, palm pilots, calculators, cameras or any other hand held device.
- Plagiarism is not permitted in term papers, themes, essays, reports, images, take-home examinations, and other academic work. Plagiarism is defined as stealing or use without acknowledgment of the ideas, words, formulas, textual materials, on-line services, computer programs, etc. of another person, or in any way presenting the work of another person as one's own.
- Falsifications, including forging signatures, altering answers after they have been graded, inserting answers after the fact, erasing of grader's markings, and other acts that allow for falsely taking credit.

A pupil found guilty of academic dishonesty may be subjected to a full range of penalties including, but not limited to reprimand and loss of credit for all of the work that is plagiarized. Disciplinary action may also be a consequence of such behavior. Additional consequences may apply as defined in specific department policies and guidelines.

A teacher who believes that a pupil has been academically dishonest in his/her class should resolve the matter in the following manner:

- Reprimand the student orally and/or in writing. The teacher is also authorized to withhold credit in the work due to academic dishonesty.
- If warranted, the teacher shall file a written complaint against the student with the Administration, requesting a more stringent form of discipline. The complaint must

describe in detail the academic dishonesty that is alleged to have taken place, and must request that the matter be reviewed by the Administration.

- The Administration will determine if further discipline of the pupil is appropriate, and will determine the nature of the discipline on a case-by-case basis.
- If the pupil is not in agreement with the disciplinary action of the Administration, he/she may appeal the action first to the Principal and secondly to the Superintendent. If the pupil is dissatisfied with the Superintendent's disposition of the case, he/she may grieve the action in accordance with Policy No. 5710, Pupil Grievance.

IX. District Policy: Discrimination

High Point Regional High School's curriculum and instruction are aligned to the State's Core Curriculum Content Standards and address the elimination of discrimination by narrowing the achievement gap, by providing equity in educational programs and by providing opportunities for students to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

Course Proficiencies

Unit 1: Trigonometric Functions

Time: 25 Days

Unit Goal:

Students will learn the basic concepts of angles and triangles with respect to trigonometry.

Unit Objectives:

Students will be able to:

1. Recognize and use the vocabulary of angles.
2. Use degree and radian measures.
3. Convert between radians and degrees.
4. Draw angles in standard position.
5. Find coterminal angles.
6. Find the length of a circular arc.
7. Use a unit circle to define trigonometric functions of real numbers.
8. Recognize the domain and range of sine and cosine functions.
9. Use even and odd trigonometric functions.
10. Recognize and use fundamental identities.
11. Use right triangles to evaluate trigonometric functions.
12. Use equal co-functions of functions.

13. Use the definitions of trigonometric functions of any angle.
14. Use the signs of trigonometric functions.
15. Find reference angles.
16. Use reference angles to evaluate trig functions.

Teacher References.

1. Textbook, Chapter 4, section 4-1 - 4-4.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

Unit 2: Graphing and Inverses of trigonometric Functions. Times 20 Days

Unit Goal:

Students will be able to sketch the six basic trigonometric functions and evaluate the six inverse functions.

Unit Objectives:

Students will be able to:

1. Understand the graphs of $y = \sin x$ and $y = \cos x$.
2. Use vertical shifts of sine and cosine curves.
3. Understand the graph of $y = \tan x$, $y = \cot x$, $y = \sec x$ and $y = \csc x$.
4. Understand and use the inverse trig functions.
5. Solve a right triangle.
6. Solve problems involving bearings and harmonic motion.

Teacher References.

1. Textbook, Chapter 4, section 4-5 - 4-8.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

Unit 3: Analytic Trigonometry. Time: 28 Days

Unit Goal:

Students will be able to recognize, write and use the fundamental trigonometric identities.

Unit Objectives:

Students will be able to:

1. Use the fundamental trigonometric identities to verify identities.
2. Use the formula for the cosine of the difference of two angles.
3. Use sum and difference formulas for cosines and sines.
4. Use sum and difference formulas for tangents.
5. Use the double-angle formulas.
6. Use the half-angle formulas.
7. Use the product-to-sum formulas.
8. Use the sum-to-product formulas.
9. Find all solutions of a trigonometric equation.
10. Solve equations with multiple angles.
11. Solve trigonometric equations in quadratic form.
12. Use identities to solve trigonometric equations.

Teacher References.

1. Textbook, Chapter 5, section 5-1 - 5-5.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

Unit 4: Applications of Trigonometry.

Time: 12 Days

Unit Goal:

Students will be able to use advanced formulas for solving triangles.

Unit Objectives:

Students will be able to:

1. Use the Law of Sines to solve oblique triangles.
2. Use the Law of Sines to solve the triangle in ambiguous cases.
3. Find the area of an oblique triangle using the sine function.
4. Solve applied problems using the Law of Sines.

5. Use the Law of Cosines to solve oblique triangles.
6. Solve applied problems using the Law of Cosines.
7. Use Heron's formula to find the area of a triangle.

Teacher References.

1. Textbook, Chapter 6, section 6-1 - 6-2.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

Unit 5: Polynomial and Rational Functions

Time: 25 Days

Unit Goal:

Students will be able to sketch, analyze, and evaluate higher degree functions.

Unit Objectives:

Students will be able to:

1. Add, subtract, multiply and divide complex numbers.
2. Perform operations with square roots of negative numbers.
3. Solve quadratic equations with complex imaginary solutions.
4. Recognize characteristics of parabolas.
5. Graph parabolas.
6. Determine a quadratic function's minimum or maximum value.
7. Identify polynomial functions.
8. Recognize characteristics of graphs of polynomial functions.
9. Determine end behavior.
10. Use factoring to find zeros of polynomial functions.
11. Identify zeros and their multiplicities.
12. Use the Intermediate Value Theorem.
13. Graph polynomial functions.
14. Use long division to divide polynomials.
15. Use synthetic division to divide polynomials.
16. Use the Factor Theorem to solve a polynomial equation.
17. Use the Rational Zero theorem to find possible rational zeros.
18. Find zeros of a polynomial function.
19. Solve polynomial equations.
20. Use Descartes' Rule of Signs.
21. Find the domain of rational functions.

22. Identify vertical and horizontal asymptotes.
23. Graph rational functions.
24. Identify slant asymptotes.
25. Solve applied problems involving rational functions.

Teacher References.

1. Textbook, Chapter 2, section 2-1 - 2-6.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

Unit 6: Exponential and Logarithmic Functions

Time: 20 Days

Unit Goal:

Students will be able to recognize, evaluate, and graph exponential and logarithmic functions.

Unit Objectives:

Students will be able to:

1. Evaluate exponential functions.
2. Graph exponential functions.
3. Evaluate functions with base e .
4. Use compound interest formulas.
5. Change from logarithmic to exponential form.
6. Change from exponential to logarithmic form.
7. Evaluate logarithms.
8. Use basic logarithmic properties.
9. Graph logarithmic functions.
10. Find the domain of a logarithmic function.
11. Use the product, quotient, and power rules.
12. Expand and condense logarithmic expressions.
13. Use the change-of-base property.
14. Use like bases to solve exponential expressions.
15. Use logarithms to solve exponential equations.
16. Use the definition of logarithm to solve logarithmic equations.
17. Use the one-to-one property of logarithms to solve logarithmic equations.
18. Model exponential growth and decay functions.
19. Use logistic growth models.

20. Use Newton's Law of Cooling.
21. Model data with exponential and logarithmic functions.

Teacher References.

1. Textbook, Chapter 3, section 3-1 - 3-5.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

Unit 7: Sequences and Series

Time:16 Days

Unit Goal:

Students will be able to recognize, write and manipulate arithmetic and geometric sequences and series.

Unit Objectives:

Students will be able to:

1. Find particular terms of a sequence from the general term.
2. Use recursion formulas.
3. Use factorial notation.
4. Use summation notation.
5. Find the common difference for arithmetic sequences.
6. Write terms of an arithmetic sequence.
7. Use the formula for the general term of an arithmetic sequence.
8. Use the formula for the sum of the first n terms of an arithmetic sequence.
9. Find the common ratio of a geometric sequence.
10. Write the terms of a geometric sequence.
11. Use the formula for the general term of a geometric sequence.
12. Use the formula for the sum of the first n terms of a geometric sequence.
13. Use the formula for the sum of an infinite geometric series.
14. Evaluate a binomial coefficient.
15. Expand a binomial raised to a power.
16. Find a particular term in a binomial expression.

Teacher References.

1. Textbook, Chapter 10, section 10-1, 10-2, 10-3, 10-5.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

Unit 8: Matrices and Determinants

Time:18 Days

Unit Goal:

Students will be able to use matrices and solve systems of equations using various methods.

Unit Objectives:

Students will be able to:

1. Write the augmented matrix for a linear system.
2. Perform matrix row operations.
3. Use matrices and Gaussian elimination to solve systems.
4. Use matrices and Gauss-Jordan elimination to solve systems.
5. Apply Gaussian elimination to systems without unique solutions.
6. Apply Gaussian elimination to systems with more variables than equations.
7. Solve problems involving systems without unique solutions.
8. Use matrix notation.
9. Understand what is meant by equal matrices.
10. Add and subtract matrices.
11. Perform scalar multiplication.
12. Solve matrix equations.
13. Multiply matrices by hand and calculator.
14. Find the multiplicative inverse of a square matrix.
15. Use inverses to solve matrix equations.
16. Encode and decode messages.
17. Evaluate a second order determinant.
18. Use Cramer's rule to solve systems of equations.
19. Use determinants to identify inconsistent systems and systems with dependent equations.

Teacher References.

1. Textbook, Chapter 8, section 8-1 – 8-5.
2. Teacher prepared worksheets and transparencies.
3. Graphing calculator.
4. Smart Board.
5. Student CD_ROM

