Calculus Honors Course Overview

Content Area: **Math**
Course(s): **CALCULUS H**
Time Period:
Length: **Full Year**
Status: **Published**

Cover

EAST BRUNSWICK PUBLIC SCHOOLS

East Brunswick New Jersey

Superintendent of Schools

Dr. Victor P. Valeski

Mathematics

Calculus Honors-Course Number: 1168

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Course Adoption: 12/11/2003

Curriculum Adoption: 11/2/2017

Date of Last Revision Adoption: 9/1/2017

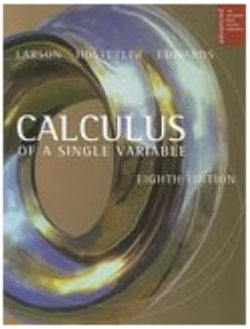
Course Overview

COURSE DESCRIPTION:

This course covers a full year study of the Calculus of algebraic, trigonometric, exponential and logarithmic functions. Topics include the study of limits, differentiation and its applications, basic forms of integration and applications of the definite integral. This course is offered in conjunction with Middlesex County College and is part of the Senior Math Experience. Modern technology provides tools for supplementing the traditional focus on procedures and proof so that students can then focus on understanding the relationship and behavior of the functions. Students further explore functions in real-life situations, including science, economics, and biology.

Textbooks and other resources

Textbook: Calculus of a Single Variable; Larson, Hoestetler, Edwards; Houghton Mifflin; copyright 2006; adopted 4/21/2007



TI-83 or TI-84 graphing calculator is required for this course

Scope and Sequence

Sequential Unit Description:	Marking Period Guide	Other Pacing Guide References	Proficiency (Summative) Assessments
Unit 1 – Preparation for Calculus **Students will use the features of the graphing calculator to identify points of intersection and zeros as well as sketch and anaylze graphs of functions.** **They will also write linear equations, identify domain and range, use function notation, use the zero-product property to solve quadratic equations, solve trigonometric equations, and apply properties of logs and exponential functions.**	**1**	**Chapter P:** **Sections 1-3** **9 days**	**Quiz** **Test**
Unit 2 – Limits **Students will develop an understanding of limits by estimating them from graphs and tables of data. They will find limits using algebraic techniques and applying the special trigonemtric limits.** **Students will determine continuity of a function, types of discontinuities, one-sided limits, and infinite limits (vertical asymptotes) and limits at infinity (horizontal asymptotes). They will also understand and use the Intermediate Value Theorem.**	**1**	**Chapter 1:** **Sections 2-5** **Chapter 3:** **Section 5** **18 days**	**Quiz** **Test**
Unit 3 - Differentiation **Students will find the slope of a secant and use the limit definition of the derivative in order to determine the slope of the line tangent to the curve.**	**1 & 2**	**Chapter 2:** **Sections** **1-5** **Chapter 5:** **Sections 1 and 4**	**Quiz** **Test**

Students will learn differentiation rules, including Power Rule, Product Rule, Quotient Rule, and Chain Rule. They will also find the derivative of trigonometric, natural log, and exponential functions. Students will apply differentiation rules, high-order, and implicit differentiation to solve problems that involve writing equations of tangent and normal lines, finding the velocity and acceleration of an object (e.g. vertical motion models), and related rates.		46 days	
Unit 4 – Applications of Differentiation Students will understand and use Rolle's Theorem and Mean Value Theorem. Students will use the first derivative to determine critical numbers and find absolute extrema of a function on a closed interval. Student will then use the first and second derivatives to analyze the behavior of a function, where it increases and decreases as well as determine concavity. This information will be used to identity relative extrema and points of inflection. Students will solve optimization problems in economics and other real-world situations. Given a function, students will sketch its first and second derivative graphs. They will also construct the graph of a function given information about the first and second derivative.	2 & 3	Chapter 3: Sections 1-4 and 6-7 36 days	Quiz Test
Unit 5 – Integration Students will find the anti-derivative of basic functions, including trigonometric, natural log, and exponential functions. They will find the general solution of a diffential equation as well as use intial conditions to find the particular solution. Calculus will be used to analyze vertical motion problems in which acceleration is determined by a gravitional force. Students will use Riemann Sums to approximate the area under a	3	Chapter 4: Sections 1-4 Chapter 5: Sections 2 and 4 26 days	Quiz Test

curve. The Fundamental Theorem of Calculus will be applied to evaluate definite integrals. **Additionally, students will apply the u-substitution method for finding anti-derivatives of more complicated functions.**			
Unit 6 – Applications of Integration **Students will find the area between two curves. Volumes of solids formed by rotation about an axis will be determined by the disc and washer methods.**	**4**	**Chapter 7:** **Sections** **1-2** **19 days**	**Quiz** **Test**

Standards for Mathematical Practices

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Grading and Evaluation Guidelines

GRADING GUIDELINES:

As per Math Department Policy, grades will be determined by a variety of assessment strategies, including Major Assessments, Minor Assessments, and Performance Assessments. In addition to tests and quizzes, students will be evaluated on a combination of performance assessment instruments, including homework completions, cooperative group participation, note-taking, open ended question responses, lab reports and/or supplemental projects.

GRADING PROCEDURES:

Grading procedures must be described in sufficient detail so that a pupil will understand, the minimal to advanced proficiency, expected of him/her as the outcome of each unit, for the marking period and for the course as a whole. Benchmark level assessments associated with the course also need to be identified. While assessments of proficiency levels must be valid and reliable they do not need be the same for all students. Other criteria to be considered in grading must be identified and the degree to which such criteria will be considered in a grade. Each pupil must receive a copy of the grading procedures, proficiencies and criteria for each unit and/or marking period.

COURSE EVALUATION:

Course achievement will be evaluated as the percent of all pupils who achieve the minimum level of proficiency (final average grade) in the course. Student achievement levels above minimum proficiency will also be reported. Final grades, and where relevant mid-term and final exams, will be analyzed by staff for the total cohort and for sub-groups of students to determine course areas requiring greater support or modification.

In terms of proficiency the East Brunswick grades are as follows:

A	**Excellent**	**Advanced Proficient**
B	**Good**	**Above Average Proficient**
C	**Fair**	**Proficient**
D	**Poor**	**Minimally Proficient**
F	**Failing**	**Partially Proficient**

In this course the goal is that a minimum of 95% of the pupil's will meet at least the minimum proficiency level (D or better) set for the course. The department will analyze the achievement of students on Unit Assessments, Mid-term and Final Exams and Final Course Grades, and for Final Course Grades the achievement of sub-groups identified by the state to determine if modifications in the curriculum and instructional methods are needed.

Course evaluation requires the answering of the following questions:
1. Are course content, instruction and assessments aligned with the required NJSLS? 2. Is instruction sufficient for students to achieve the Standards? 3. Do all students achieve the set proficiencies/benchmarks set for the course?

Other Details

Mathematics (AAAN)

Calculus Honors

Course No. 1044 (1168)

SCED

02151 General Applied Math

General Applied Math courses reinforce general math skills, extend these skills to include some pre-algebra and algebra topics, and use these skills in a variety of practical, consumer, business, and occupational applications. Course topics typically include rational numbers, measurement, basic statistics, ratio and proportion, basic geometry, formulas, and simple equations.