Calculus II Honors Course Overview

Content Area: **Math**
Course(s): **CALCULUS II 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 II Honors-Course Number: 1183

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Course Adoption:

Curriculum Adoption: 11/2/2017

Date of Last Revision Adoption: 9/1/2017

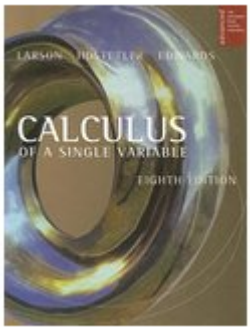
Course Overview

COURSE DESCRIPTION:

This course will build on the students' understanding of the concepts of calculus including the understanding of the derivative and the integral. The course emphasizes the relationship between the graphical, numerical, verbal and analytical representations of problems and solutions. Through the exploration of problems, students also develop fluency in computational procedures for find derivatives and antiderivatives of algebraic, rational, exponential, parametric and trigonometric functions. Technology is used regularly by students to reinforce the understanding of the relationships.

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 – Calculus 1 Review **Students will find and evaluate finite and infinite limits numerically, graphically, and analytically. Students will determine and use properties of continuity at a point and on open and closed intervals. Students will find the derivatives of a variety of functions both explicitly and implicitly, and find related rates. Students will use first and second derivatives to analyze the behavior and sketch the graphs of functions, and solve optimization applications. Students will find antiderivatives of basic functions and find indefinite integrals, evaluate definite integrals and find areas using the Fundamental Theorem of Calculus, and integrate by substitution.**	**1**	**Text Chapters** **1 – 4**	**Test**
Unit 2 – Logarithmic and Exponential Functions **Students will differentiate and integrate natural logarithmic and natural exponential functions (base *e*). Students will find derivatives of inverse functions, and differentiate and integrate logarithmic and exponential functions that have bases other than *e*. Students will use exponential functions to model compound interest and logistic growth.**	**1**	**Text Chapter 5** **Sections 1 – 5**	**Quiz** **Test**
Unit 3 – Inverse Trigonometric Functions **Students will develop properties of the six inverse trigonometric functions, and differentiate inverse trigonometric functions. Students will integrate functions whose antiderivatives involve inverse trigonometric functions.**	**1**	**Text Chapter 5** **Sections 6 – 7**	**Quiz** **Test**
Unit 4 – Differential Equations **Students will use initial conditions to find particular solutions of differential equations, and use slope fields and Euler's Method to approximate solutions of differential equations. Students will recognize and solve differential equations that can be solved by separation of variables, and solve homogeneous differential equations.**	**2**	**Text Chapter 6** **Sections 1 & 3**	**Quiz** **Test**
Unit 5 – Applications of Integration **Students will find areas of regions between curves using integration. Students will find volumes of solids of revolution using the disk method, the washer method, and the shell method. Students will find the arc length of a smooth curve, and find the area of a surface of revolution.**	**2**	**Text Chapter 7** **Sections 1 – 4**	**Quiz** **Test**
	2	**Text Chapter 8** **Sections 1 – 4**	

Unit 6 – Integration Techniques **Students will find an antiderivative using integration by parts, including using the tabular method. Students will solve trigonometric integrals involving powers of trigonometric functions. The student will use trigonometric substitution to solve integrals.**			**Quiz** **Test**
Unit 7 – Integration Techniques, L'Hopital's Rule, Improper Integrals **Students will use partial fraction decomposition to integrate rational functions. Students will evaluate indefinite integrals using a table of integrals and reduction formulas. Students will recognize limits that produce indeterminate forms, and apply L'Hopital's Rule to evaluate limits. Students will evaluate improper integrals that have infinite limits of integration, and that have infinite discontinuities.**	**3**	**Text Chapter 8** **Sections 5 – 8**	**Quiz** **Test**
Unit 8 – Infinite Sequences and Series **Students will determine whether a sequence converges or diverges, and use properties of monotonic and bounded sequences. Students will use the *n*th-Term Test for Divergence of an infinite series, and use properties of *p*-series and harmonic series. Students will use the Integral Test, the Direct Comparison Test, the Limit Comparison Test, the Alternating Series Test, the Ratio Test, and the Root Test to determine whether an infinite series converges or diverges. Students will classify convergent series as absolutely or conditionally convergent.**	**3**	**Text Chapter 9** **Sections 1 – 6**	**Quiz** **Test**
Unit 9 – Taylor Polynomials, Power Series, and Taylor and Maclaurin Series **Students will find polynomial and Taylor and Maclaurin polynomial approximations of elementary functions. Students will find the radius and interval of convergence, and determine the endpoint convergence of a power series. Students will find a geometric power series that represents a function, and construct a power series using series operations. Students will find a Taylor or Maclaurin series for a function, and find a binomial series.**	**4**	**Text Chapter 9** **Sections 7 – 10**	**Quiz** **Test**
Unit 10 – Parametric Equations and Polar Coordinates **Students will sketch the graph of a curve given by a set of parametric equations, eliminate the parameter in a set of parametric equations, and find a set of parametric equations to represent a curve. Students will find the slope of a tangent line to a curve, and find the arc length of a curve given by a set of parametric equations. Students will rewrite rectangular coordinates and equations in polar form and vice versa, sketch the graph of an equation given in polar form, and identify several types of special polar graphs.**	**4**	**Text Chapter 10** **Sections 2 – 4**	**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

SCED

02121 Calculus II Honors

These course assume a thorough knowledge of elementary functions, and cover all of the calculus topics in Calculus I as well as the following topics: vector functions, parametric equations, and polar coordinates; rigorous definitions of finite and nonexistent limits; derivatives of vector functions and parametrically defined functions; advanced techniques of integration and advanced applications of the definite integral; and sequences and series.