Honors Applied Calculus

2410

2006-2007

Honors Applied Calculus

Course Description:	Honors College Preparatory - Applied Calculus provides those students who have successfully completed Trig / Advanced Mathematics in their junior year with the opportunity to build a fundamental understanding of calculus. The emphasis of this course will be on the mechanics of calculus. Both differential and integral calculus will be studied. The primary aim will be to provide a solid base for the study of calculus at the collegiate level.
Grade Level:	12, Weighted Course 1.10
Length of Course:	Frequency: 6 days per 6 day cycle Duration: 44 minutes Length: full year course Credits: 1
Prerequisites:	Minimal course completion of Trig / Advanced Mathematics. Teacher recommendation required.
Textbook:	**CALCULUS: AN APPLIED APPROACH, 7TH EDITION**
Expected Level of Achievement	Students will be required to maintain a 70% or better. They will be required to come to class prepared to learn. 93-100% = A 85 – 92% = B 77 – 84% = C 70 – 76% = D Below 70% = F

Northern York County School District Curriculum

Course Name:	Honors Applied Calculus
Content:	A Precalculus Review
Key Learning(s):	Many relationships in Calculus are related to previous knowledge and skills of functions.
Essential Question(s):	How are the skills and knowledge developed from previous courses married to the study of calculus?
Grade Level:	12

Number	***Student Learning Experiences***	**Procedures for Assessment**	**Resources**
2.1.11 A 2.2.11 A 2.2.11 F 2.3.11 D 2.5.11 B 2.5.11 C 2.8.11 D	The student will investigate order and intervals on the real number line. The student will solve inequalities through routine and applied problems. The student will determine absolute value, distance and interval solutions in routine and applied problems. The student will solve expressions involving exponents or radicals, perform operations with exponents and designate the domain of an algebraic expression. The student will utilize factorization techniques, factor polynomials of degree of three or more, and define the rational zero theorem. The student will perform operations with fractions, simplify algebraic expressions involving radicals, and investigate rationalization techniques.	Notebook Oral presentation and explanation of problem solution Written quizzes Written Test	Textbook Black-line masters Graphing Calculators Graph links and computer word processing Teacher generated handouts Supplemental Texts College Board web site Transparencies Computer Lab

Northern York County School District Curriculum

Course Name:	Honors Applied Calculus
Content:	Functions, Graphs, and Limits
Key Learning(s):	The limit process is a fundamental concept of calculus. Limits are the foundation for differential calculus.
Essential Question(s):	How are limits determined analytically, graphically and numerically? What is continuity and how do limits apply?
Grade Level:	12

Number	***Student Learning Experiences***	**Procedures for Assessment**	**Resources**
2.1.11 A 2.2.11 A 2.2.11 C 2.2.11 F 2.5.11 A 2.5.11 B 2.5.11 C 2.5.11 D 2.8.11 E 2.8.11 K 2.8.11 L 2.8.11 N 2.8.11 O 2.8.11 Q 2.8.11 R 2.8.11 S 2.8.11 T 2.9.11 H 2.9.11 I	The student will investigate the Cartesian Plane and translation of points through routine and applied problems. The student will determine graphs of functions, intercepts, points of intersection, and mathematical models for functions in routine and applied problems. The student will solve, write and compare linear functions in routine algebraic and applied problems. The student will utilize function notation to investigate functions, graphs, composition of functions and inverse functions. The student will find the limit of a function, use properties of limits and evaluation techniques. The student will find one sided limits as well as apply single sided limit concepts to determine unbounded behavior of functions. The student will define and discuss continuity of a variety of functions.	Notebook Oral presentation and explanation of problem solution Written quizzes Written Test	Textbook Black-line masters Graphing Calculators Graph links and computer word processing Teacher generated handouts Supplemental Texts College Board web site Transparencies Computer Lab

Northern York County School District Curriculum

Course Name:	Honors Applied Calculus
Content:	Differentiation
Key Learning(s):	The derivative process is the first fundamental problem in the study of calculus.
Essential Question(s):	How are the essential components of derivatives determined?
Grade Level:	12

Number	***Student Learning Experiences***	**Procedures for Assessment**	**Resources**
2.1.11 A 2.2.11 A 2.2.11 B 2.2.11 F 2.4.11 A 2.4.11 E 2.5.11 A 2.5.11 B 2.5.11 C 2.9.11 G 2.11.11 C	The student will find the slope of a graph and calculate derivatives using the limit definition. The student will use the Constant Rule, Power Rule, Constant Multiple Rrule as well as the Sum and Difference Rules for determining derivatives. The student will find rates of change: velocity, marginal profit, marginal revenue, and marginal cost. The student will use the Product, Quotient, Chain, and General Power Rules for finding derivatives. The student will calculate higher-order derivatives. The student will determine derivatives of functions using implicit differentiation. The student will differentiate to solve related-rate problems and other applications.	Notebook Oral presentation and explanation of problem solution Written quizzes Written Test	Textbook Black-line masters Graphing Calculators Graph links and computer word processing Teacher generated handouts Supplemental Texts College Board web site Transparencies Computer Lab

Northern York County School District Curriculum

Course Name:	Honors Applied Calculus
Content:	Applications of the Derivative
Key Learning(s):	First and second derivatives will be used to analyze graphs of functions.
Essential Question(s):	How does one determine and justify the essential behaviors of functions using differential calculus? How is the behavior of functions used to justify optimization problems? How are the components of differential calculus applied to Business, Economics and Marginal Analysis?
Grade Level:	12

Number	***Student Learning Experiences***	**Procedures for Assessment**	**Resources**
2.1.11 A 2.2.11 A 2.2.11 D 2.2.11 F 2.4.11 C 2.4.11 E 2.5.11 A 2.5.11 B 2.5.11 C 2.5.11 D 2.8.11 N 2.8.11 Q 2.8.11 S 2.9.11 G 2.9.11 I 2.11.11 A 2.11.11 B 2.11.11 C	The student will find the open intervals on which a function is increasing or decreasing. The student will determine relative and absolute extrema of a function. The student will determine the concavity and points of inflection on a graph. Using characteristics of a function's first and second derivatives, the student will solve and justify real-life optimization problems. The student will solve real-life business and economic problems. The student will determine vertical and horizontal asymptotes of a graph. The student will use calculus to analyze the shape of the graph of a function. The student will use differentials in marginal analysis applications.	Notebook Oral presentation and explanation of problem solution Written quizzes Written Test	Textbook Black-line masters Graphing Calculators Graph links and computer word processing Teacher generated handouts Supplemental Texts College Board web site Transparencies Computer Lab

Northern York County School District Curriculum

Course Name:	Honors Applied Calculus
Content:	Logarithmic and Exponential Functions in Calculus
Key Learning(s):	Due to the inverse function relationship of these transcendental functions, the calculus operations require unique rules. Exponential and logarithmic functions have many applications in real life.
Essential Question(s):	How are derivatives determined and applied to these two transcendental functions?
Grade Level:	12

Number	***Student Learning Experiences***	**Procedures for Assessment**	**Resources**
2.1.11 A 2.2.11 A 2.2.11 F 2.3.11 D 2.4.11 E 2.5.11 B 2.5.11 C 2.8.11 D 2.8.11 E 2.8.11 H 2.8.11 J 2.8.11 N 2.8.11 O 2.8.11 Q 2.8.11 R 2.8.11 S 2.8.11 T 2.9.11 G 2.9.11 I	The student will graph the natural exponential function and use it in applications. The student will calculate derivatives of exponential functions. The student will apply exponential derivative rules in functions which require Product, Quotient and/or Chain Rule patterns as well. The student will graph the natural logarithmic function. The student will use the inverse qualities of these functions to solve exponential and logarithmic equations. The student will calculate derivatives of logarithmic functions. The student will apply logarithmic derivative rules in functions which require Product, Quotient and/or Chain Rule patterns as well. The student will solve exponential growth and decay applications.	Notebook Oral presentation and explanation of problem solution Written quizzes Written Test	Textbook Black-line masters Graphing Calculators Graph links and computer word processing Teacher generated handouts Supplemental Texts College Board web site Transparencies Computer Lab

2.11.11 A 2.11.11 B 2.11.11 C	The student will investigate exponential and logarithmic applications such as: Property Value, Present Value, Normal Probability Density, Human Memory Model, Effective Yield, or Earthquake Intensity.		

Northern York County School District Curriculum

Course Name:	Honors Applied Calculus
Content:	Integration and Its Application
Key Learning(s):	The limit process can be used to find areas of a wide variety of regions. This process is called integration (antidifferentiation).
Essential Question(s):	How are antiderivatives determined with the limit process, basic identities and using the Fundamental Theorem of Calculus? What are some applications integral calculus?
Grade Level:	12

Number	***Student Learning Experiences***	**Procedures for Assessment**	**Resources**
2.1.11 A 2.2.11 A 2.2.11 B 2.2.11 F 2.3.11 D 2.4.11 A 2.4.11 E 2.5.11 A 2.5.11 B 2.5.11 C 2.5.11 D 2.8.11 C 2.8.11 E 2.8.11 N 2.8.11 Q 2.8.11 R 2.8.11 S 2.8.11 T 2.9.11 E	The student will find the antiderivative *F* of a function *f*. The student will use the General Power Rule to calculate antiderivatives. The student will use the Exponential Rule to calculate antiderivatives. The student will use the Log Rule to calculate antiderivatives. The student will evaluate definite integrals. The student will apply the Fundamental Theorem of Calculus. The student will use the fundamental theorem of calculus to find area between two curves. The student will find the volume of a solid of revolution by using integration techniques. The student will use the Midpoint Rule to approximate definite integrals.	Notebook Oral presentation and explanation of problem solution Written quizzes Written Test	Textbook Black-line masters Graphing Calculators Graph links and computer word processing Teacher generated handouts Supplemental Texts College Board web site Transparencies Computer Lab

2.9.11 G 2.9.11 I 2.11.11 D 2.11.11 E	The student will investigate integral calculus applications such as: Demand Function, Vertical Motion, Marginal Propensity to Consume, Annuity Capital Accumulations, Consumer and Consumer Surpluses as well as the Lorenz Curve.		

Northern York County School District Curriculum

Course Name:	Honors Applied Calculus
Content:	Techniques of Integration
Key Learning(s):	Various integration techniques are necessary for real-life applications.
Essential Question(s):	What integration processes are available to help with calculus applications?
Grade Level:	12

Number	***Student Learning Experiences***	**Procedures for Assessment**	**Resources**
2.1.11 A 2.2.11 A 2.2.11 F 2.4.11 E 2.5.11 A 2.5.11 B 2.5.11 C 2.8.11 C 2.8.11 E 2.8.11 N 2.8.11 Q 2.8.11 R 2.8.11 S 2.8.11 T 2.9.11 E 2.9.11 G 2.9.11 I 2.11.11 D 2.11.11 E	The student will find indefinite and definite integrals using integration by substitution. The student will evaluate integrals using integration by parts and apply integration to present value applications. The student will evaluate integrals using partial fractions and apply integration to logistics growth model. The student will use tables of integrals and graphing calculator technology to evaluate indefinite and definite integrals. The student will use the Trapezoidal Rule and Simpson's Rule as numeric methods to approximate definite integrals.	Notebook Oral presentation and explanation of problem solution Written quizzes Written Test	Textbook Black-line masters Graphing Calculators Graph links and computer word processing Teacher generated handouts Supplemental Texts College Board web site Transparencies Computer Lab