

Wilson Area School District Planned Course Guide

Title of planned course: Calculus Honors

Subject Area: Calculus

Grade Level: 11 - 12

Course Description: Basic analytic geometric concepts are examined, including conic sections and selected loci involving algebraic and trigonometric functions and their properties. Consideration is given to the idea of relations and functions, both algebraic and circular. The concept of limit is carefully considered as well as related theorems. Differentiation rules and methods of integration for algebraic, trigonometric, exponential, and logarithmic functions are studied. Attention is given to applied problems including maximum and minimum values, areas, surface area and volume of revolution, velocity, and acceleration.

Time/Credit for this Course: 1 Academic Year / 1.0 Credit

Curriculum Writing Committee: Suzanne C. Lang

Curriculum Map

<u>August:</u>	Prerequisites Functions and Their Graphs
<u>September:</u>	Prerequisites Functions and Their Graphs Limits and Their Properties
<u>October:</u>	Limits and Their Properties Differentiation
<u>November:</u>	Differentiation Applications of Differentiation
<u>December:</u>	Applications of Differentiation
<u>January:</u>	Applications of Differentiation
<u>February:</u>	Integration
<u>March:</u>	Integration
<u>April:</u>	Integration Applications of Integration Exponential and Logarithmic Functions
<u>May:</u>	Exponential and Logarithmic Functions Trigonometric Functions and Calculus
<u>June:</u>	Trigonometric Functions and Calculus

**Wilson Area School District
Planned Course Materials**

Course Title: Calculus Honors

Textbook: Calculus I with Precalculus
Publisher: Brooks/Cole Cengage Learning
Copyright: 2007
Cengage.com/brookscole

Supplemental Books: Calculus – Alternate 5th Edition
Calculus – Early Transcendental Functions 4th Edition

Teacher Resources:

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Prerequisites

Time frame: 5 -6 class periods

State Standards: 2.5.11, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11D, 2.8.11H, 2.8.11J, 2.8.11L, 2.8.11Q, 2.9.11J

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Use correct interval notation
- Graph & solve inequalities
- Write equations of lines
- Find symmetry
- Complete the square

Core Activities: Students will complete/participate in the following:

- Practice problems at the board and their seats
- Have visual / graphical representations of functions using a graphing calculator

Extensions:

- Find equations of circles by completing the square
- Find symmetry with no graph

Remediation: Practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples, high order thinking questions

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Functions and Their Graphs

Time frame: 5 -6 class periods

State Standards: 2.5.11, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11E, 2.8.11H, 2.8.11K, 2.8.11L, 2.8.11N, 2.9.11O, 2.8.11Q, 2.8.11T

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Represent a function 4 different ways
- Find domain & range
- Use transformations of functions
- Find zeros
- Find even/odd functions

Core Activities: Students will complete/participate in the following:

- Practice problems / solving equations
- Connect algebra & the graph using a graphing calculator

Extensions:

- Find zeros using a graphing calculator
- More complicated transformations

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples, graphing calculator

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Finding Limits Graphically & Numerically

Time frame: 15 -16 class periods

State Standards: 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11A, 2.8.11E, 2.8.11H, 2.8.11L, 2.8.11S, 2.8.11T

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Evaluate limits graphically & numerically
- Find continuity at a point & on an interval
- Find infinite limits
- Find vertical asymptotes

Core Activities: Students will complete/participate in the following:

- Class problems using algebra
- Using a graphing calculator to find limits & vertical asymptotes
- Drawing sketches with vertical asymptotes

Extensions:

- Investigate more complex functions & their limits

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples, online graphs

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Differentiation

Time frame: 30 -32 class periods

State Standards: 2.11.11C, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11H, 2.8.11J, 2.8.11L

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Find derivatives using the rules (basic, product, quotient, chain, implicit)
- Find rate of change problems
- Writing equations of lines using the derivative

Core Activities: Students will complete/participate in the following:

- Solving problems using all the rules
- Using a graphing calculator to evaluate derivatives at a point

Extensions:

- Practice of more complex problems

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples, handouts

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Applications of Differentiation

Time frame: 40-42 class periods

State Standards: 2.11.11A, 2.11.11B, 2.5.11A, 2.5.11B, 2.5.11C, 2.5.11D, 2.8.11A, 2.8.11H, 2.8.11L, 2.8.11N, 2.8.11S

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Find extrema on an interval (1st & 2nd derivative test)
- Find inflection points
- Sketch the graph
- Apply concepts to solve optimization problems
- Find differentials
- Use the mean value theorem
- Use Rolle's theorem

Core Activities: Students will complete/participate in the following:

- Use a graphing calculator to find extrema
- Lima bean activity for the mean value theorem
- Group activity for curve sketching

Extensions:

- Find the extrema & graph complicated functions

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples

Materials & Resources: text book, handouts, graphing calculator, multimedia, lima beans, markers, rulers

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Integration

Time frame: 24 -25 class periods

State Standards: 2.11.11A, 2.11.11B, 2.11.11E, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11A, 2.8.11C, 2.8.11E, 2.8.11H, 2.8.11Q, 2.9.11I

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Find the area using integration rules
- Use Trapezoidal Rule
- Use Simpson's Rule
- Use the Fundamental Theorem of Calculus
- Indefinite integrals
- Definite integrals
- Riemann sums

Core Activities: Students will complete/participate in the following:

- Class problems on integration
- Graphing & shading the definite integral on a graphing calculator

Extensions:

- Explore the concept of Riemann sums
- Find the area of irregular shapes

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples, online graphs

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Application of Integration (Supplemental Book – Chapter 6)

Time frame: 20-21 class periods

State Standards: 2.11.11A, 2.11.11B, 2.11.11E, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11A, 2.8.11E, 2.8.11H, 2.8.11Q, 2.8.11R, 2.9.11I

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Find area between two curves
- Find volume using the Disc method
- Find volume using the Shell method

Core Activities: Students will complete/participate in the following:

- Class problems to complete
- Use graphing calculator to sketch & shade the region

Extensions:

- Find area and volume of complicated functions

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples, online examples and graphs

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Exponential & Logarithmic Functions & Calculus

Time frame: 18-20 class periods

State Standards: 2.11.11A, 2.11.11B, 2.11.11C, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11E, 2.8.11H, 2.8.11L, 2.8.11N, 2.8.11S

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Find derivatives & integrals of exponential functions
- Find derivatives & integrals of logarithmic functions

Core Activities: Students will complete/participate in the following:

- Class problems to complete
- Use a graphing calculator to evaluate derivatives & integrals

Extensions:

- Word problem applications (growth & decay)

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Trigonometric Functions & Calculus

Time frame: 15-17 class periods

State Standards: 2.11.11A, 2.11.11B, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11D, 2.8.11H, 2.8.11L, 2.8.11S, 2.8.11T, 2.10.11A, 2.10.11B

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Use trig concepts
 - sine, cosine, tangent, etc
 - 30° , 60° , 90° triangles
 - 45° , 45° , 90° triangles
- Find the limit of trig functions
- Find the derivatives of trig functions
- Find the integrals of trig functions

Core Activities: Students will complete/participate in the following:

- Find the limits using a calculator
- Find the limits algebraically
- Find the derivatives & integrals of trig functions

Extensions:

- Word problem applications

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes

Curriculum Scope & Sequence

Planned Course: Calculus Honors

Unit: Functions and Their Graphs

Time frame: 5 -6 class periods

State Standards: 2.5.11, 2.5.11A, 2.5.11B, 2.5.11C, 2.8.11E, 2.8.11H, 2.8.11K, 2.8.11L, 2.8.11N, 2.9.11O, 2.8.11Q, 2.8.11T

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to

- Represent a function 4 different ways
- Find domain & range
- Use transformations of functions
- Find zeros
- Find even/odd functions

Core Activities: Students will complete/participate in the following:

- Practice problems / solving equations
- Connect algebra & the graph using a graphing calculator

Extensions:

- Find zeros using a graphing calculator
- More complicated transformations

Remediation: practice, teacher/peer tutoring, online remediation, Study Island

Instructional Methods: notes with examples at the board, book examples, graphing calculator

Materials & Resources: text book, handouts, graphing calculator, multimedia

Assessments: teacher observation, homework, warm-ups, questioning, worksheets, test/quizzes