AP Calculus AB
2017-2018

Course Goals:

1. Build a strong foundation for future courses and careers
2. Connect calculus to the real world and to other subjects and math topics
3. Explore and discover math concepts graphically, analytically, numerically and verbally.
4. Prepare students for the AP Test

Calculus is the study of four main ideas: limits, differentiation, definite integrals and indefinite integrals. It is a college-level course culminating with the Advanced Placement exam in May. A satisfactory score on the AP exam in most cases will result in college credit for the first semester of calculus. To be successful on the exam, students will need to spend a substantial amount of time outside of class working on the course. I assign students group tutorials after the Christmas break. Students are expected to actively participate in each class session—we do numerous activities where the student must teach to their classmates using the rule of four (analytically, graphically, numerically and verbally). They also should be prepared to explain problems to others, practice at the whiteboard, collaborate with others in-group work, and contribute to classroom discussions.

Students taking AP Calculus are expected to have had a strong Algebra and Pre-Calculus foundation. As a group we work extensively on study habits, algebra skills, appropriate use of the graphing calculators, and student communication—both oral and written. I begin the year by setting high expectations for student performance, requiring clear work and providing time for collaborative learning. While many classes require some lecture, I depend on it as little as possible. I spend some time presenting material to the class and then I try to actively engage students in the learning process. This tends to ensure that they understand the material.

Assessment

Either a test or a quiz, is given weekly in addition to a written assignment that is due each week. A multiple-choice (with calculator and with out calculator) Chapter test is given at the end of each Chapter. I also give a free-response test at end of each chapter. As incentive to study and do well on the Chapter test, I allow students to use their Chapter test score to replace a low weekly test/quiz grade. I collect

homework to give student feedback. This is done on all assignments and is given a grade based on the rule of four.

In addition to the regular assignments, my students have AP problems due each week beginning in January. All of these problems are from previous AP Free Response Examinations. Students write up these problems according to pre-determined teacher guidelines. Students are allowed to talk with each other about the problems and may seek additional help from me during Wednesday morning tutorials. I collect these assignments each Friday and grade each question on a point scale with the plan of four. I also let students grade the questions of their peers and see if their grading fits the point scale for the plan of four that I have set. We strengthen communication skills, review topics, and discover weaknesses in understanding by working these problems.

Technology in the Classroom

Technology can be used in the classroom in a variety of ways. Students can use technology as a discovery tool to learn new material. Technology can reinforce concepts and visualize what they have already learned. Technology is also a problem-solving tool that can assist in solving a problem with difficult mechanics. Students need to practice using their calculator to solve multiple-choice and free response questions.

Course Outline:

Chapter 1 Prerequisites for Calculus (2 weeks)

1.1. Lines
1.2. Functions and Graphs
1.3. Exponential Functions
Example Activity—Students research population data for state. Find an exponential model for data or explain why exponential model is not appropriate.
1.4. Parametric Equations
1.5. Functions and Logarithmic
1.6. Trigonometric Functions

Chapter 2 Limits and Continuity (2 weeks)

2.1 Rates of Change and Limits

2.2. Limits involving Infinity
2.3. Continuity
2.4. Rates of Change and Tangent Lines
Review and Test

Chapter 3 Derivative (6 weeks)

3.1 Derivative of a Function
3.2 Differentiability
3.3 Rules for Differentiation
3.4 Velocity and Other Rates of Change
3.5 Derivatives of trigonometric functions
3.6 Chain rule
3.7 Implicit Differentiation
3.8 Derivatives of Inverse Trigonometric Functions
3.9 Derivatives of Logarithmic and Exponential Functions
Review and Test

Chapter 4 Applications of Derivatives (6 weeks)

4.1 Extreme Values of Functions
4.2 Mean Value Theorem
4.3 Connecting f' and f'' with graph of f
4.4 Modeling and Optimization
4.5 Linearization
4.6 Related Rates
Review and Test

First Semester Exam Review (1 week)

Chapter 5 The Definite Integral (5 weeks)

5.1 Estimating with Finite Sums
5.2 Definite Integrals
5.3 Definite integrals and Antiderivatives
Example Activity--- the Broad Side of the Barn Writing assignment
5.4 The Fundamental Theorem of Calculus
5.5 Trapezoidal Rule
Review and Test

Chapter 6 Differential Equations and Mathematical Modeling (4 weeks)

6.1 Slope Fields and Euler's Method
6.2 Antidifferentiation by Substitution
6.3 Antidifferentiation by Parts
6.4 Exponential Growth and Decay
6.5 Logistic Growth
Review and Test

Chapter 7 Applications of Definite Integrals (4 weeks)

7.1 Integral as Net Change
7.2 Areas in the Plane
7.3 Volumes
7.4 Lengths of Curves
7.5 Applications from Science and Statistics
Review and Test

REVIEW FOR AP EXAM (3 Weeks) ---I use the internet and research (AP Central) for as many practice AP exams that my students can finish in the three weeks. We spend classroom as well as outside time getting ready for the exam.

Textbook:
Finney, Ross L., Frankin D. Demana, Bert K. Waits ,Daniel Kennedy and David Bressoud. *Calculus—Graphical, Numerical, Algebraic*. AP Edition. Boston: Pearson Prentice Hall, 2016

Resources:
Student Practice workbooks--*Finney*
Teacher's AP Correlations and Preparation Guide—*Finney*
Assessment Resources—TestGen—*Finney*
Video lectures on CD---*Finney*
Presentation Express CD-ROM---*Finney*
Teacher Express CD-ROM---*Finney*

Materials Required for this Course:
Notebook (3 ring 3 in.), loose-leaf notebook paper, Pencils, Graphing calculator (TI 84 Plus) and materials for projects

Grading Policy :
70% Exams/Major Grades
30% Quizzes/ Homework/Daily Grades