



AP Calculus AB

Craft 2016-2017

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Syllabus

Google Drive. Students will have access to a google drive account. Students will need a “professional” gmail account and will share that with the instructor to gain access to the files uploaded to the drive for their use. Students should use the cusd80 email above to communicate with the instructor rather than the gmail account used to establish the drive.

In AP Calculus AB, students study Functions, Graphs, and Limits; Derivatives and their Applications; and Integrals and their Applications. Calculus pulls together many of the concepts the students have studied in previous courses, and it also helps them to see the relevance of the material they were taught prior to Calculus. I believe that AP Calculus AB gives the students a strong foundation for the math and science courses they will take in college.

Advanced Placement

One great benefit of taking AP Exams is the opportunity to earn college credit and placement. Nearly all colleges and universities in the United States grant credit and placement for qualifying AP scores. You can save money and get a head start on your degree when you enter college with credit you’ve already earned through AP. Each college and university makes its own decisions about awarding credit and placement. Most have a written policy spelling out things like the minimum required score to earn credit for a given AP Exam, the amount of credit awarded and how credits are applied. For example, ASU will award 4 credits for Math 270 if a student earns a 3 or above on the AB exam. Check with your counselor regarding the use of tax credit monies to pay for AP fees.

Dual Credit

In conjunction with Chandler-Gilbert Community College the student has the opportunity to enroll in a dual credit situation. This course is listed as Calculus with Analytic Geometry I (4 credits)- Math221. In order to earn any credits, students must earn credit for both semesters. Dual enrollment students must meet the prerequisite criteria for the course or have a qualifying placement score by taking a free assessment test. Dual enrollment credits transfer to all Arizona public colleges and universities. Dual enrollment and advanced placement courses are both good options for students. The difference is dual enrollment students receive a grade and credit for the work performed throughout the year.

Supplies

Graphing Calculator (TI – 84 plus or TI-89 recommended)

Graph Composition Book: 1 for assignments; 1 for personal resource book

Pencils, Pens (red and other colors for color coding) & Highlighters (at least 3 colors)

Sticky notes (small in two colors)

3-Ring Binder with a section for Calculus Notes and a section for Calculus Warm Ups.

Attendance. It is essential that you come to class each day and that you are on time. When you are absent, it is your responsibility to find out what you missed, including copying notes or class work, and completing homework. You can ask a reliable classmate for this, check the folder on the class bulletin board, or check on my webpage. Make-up work is given one class period for each day a student is gone from class. If you miss the day of a test or quiz, you will take it upon your return. If you are leaving early for sports or a field trip, you must pick up your work prior to your absence.

Tardies. Students must be **in their seats** when the tardy bell rings or they will be considered tardy. Students will be assigned lunch detention after 3 tardies.

Cheating. Cheating means, but is not limited to: copying homework, tests and quizzes or using electronic devices during tests or quizzes. These behaviors are unacceptable. Please DO NOT do it. Students will receive a 0 for the assignment/test/quiz, have to call their parents/guardians, and be written a conduct referral.

Discipline. Minor infractions (dress code, food, drink, etc) will result in a lunch detention. Major infractions or repeated disruption will result in a conduct referral. This is not something that I would expect from a calculus student. Respect yourself and respect the education of those around you by participating and cooperating in a positive manner.

Grading

Scale:

A = 90-100%;	B = 80-89%;	C = 70-79%;	D = 60-69%;	F = 0-59%
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Do not expect rounding. In rare instances *if all opportunities for grade improvement have been utilized by the student*, grades may be rounded a partial percent. i.e. A student has 89.6% in the class AND has completed all test corrections and other provided opportunities without missing work, the grade may be rounded up to 90%.

Semester Cumulative

80% Assessments: Unit exams (or half unit exams): Students may earn back 1/3 of their points through test corrections. Test corrections and tests may NEVER leave the classroom (College Board Policy). Quizzes: Formula quizzes and Traditional Problems Quizzes (no retakes or corrections on quizzes.)

10% Daily Work: Daily work grades : Based upon *completion*, checked daily, scores entered weekly. Demonstration Points: Based upon a rubric for presented problems, submitted quarterly.

10% Assignments: Warm-Ups and other work collected assignments: graded upon *accuracy*. Personal Resource Book Checks: graded according to a rubric.

Students will receive one emergency late pass per quarter for assignments/dailywork. This gives the student 24 hours to submit an assignment of their choice. This may not be used during the last week of the quarter.

Semester Grade (the one that appears on the transcript)

80% Semester Cumulative + 20% Semester Exam

Parent Communication.

SchoolWires Site: Class blog and a page with useful links or attachments for each class. **You can also sign up to receive E-alerts email blasts. My blog is updated daily with class updates and reminders. I do not send out an e-alert each day just for big reminders and helpful information.**

Infinite Campus (grades): This site has new capabilities, in order to benefit from them, you will need to sign up for your parent portal that is separate from the student portal. There will be opportunities before and after school if you need assistance.

Email: This is often the best way to reach me; I will reply within 24 business hours. Craft.joycelyn@cusd80.com

Phone: 480-424-8052 I can return calls when I am not teaching, sponsoring math club, in meetings or holding office hours. I will endeavor to do so in a timely manner. Please note that I cannot call long distance from my work phone; be sure to give me a local number if this is your preferred form of contact.

Teaching Strategies

Learning by Discovery. I like to introduce each unit with a discovery exercise. I think that exploration and discovery are great ways for students to learn because they have more ownership in the material being covered than they have from a traditional lecture approach. It also gives them a chance to discuss the concepts with other students in the class. The discovery lessons are done in groups of two or three students. We do discovery exercises on limits, local linearity, meaning of a derivative, differentiation rules, relationships between the function and the first and second derivatives, the Fundamental Theorems of Calculus, and the average value of a function.

Graphing Calculator. Many of the discovery exercises rely heavily on the use of the graphing calculator. The calculator helps students develop a visual understanding of the material that they would not otherwise have.

My students use the graphing calculator almost every day in class (after the first few weeks of no calculator material) and also on homework. However, many homework problems and about half of the problems on quizzes and tests are done without the use of the graphing calculator. Since the AP Exam is half calculator and half non-calculator, I feel that it is very important for students to have practice working problems both ways. We spend time in class discussions talking about the types of questions that they must know how to work *with* their calculators and the types of questions that they must know how to work *without* their calculators. We also discuss the techniques needed to use the calculator most efficiently (storing functions in the $y =$ screen, storing values that will be used later in the problem, etc.).

Rule of Four. I give my students many opportunities to work problems presented in a variety of ways: graphical, numerical, analytical, and verbal. Many of the problems in my primary textbook are written with an analytical representation so I frequently supplement these problems with problems giving a graph or tabular data. Students are frequently given word problems in which they have the opportunity to apply the concepts they have learned to a real-world situation. Students are often asked for verbal explanations, both oral and written, to give them the opportunity to communicate their work and their reasoning in words. They are asked to discuss the meaning of their answers, particularly when working related rates problems, optimization problems, and applications of integration problems. I also ask them to discuss the steps they have used to arrive at their answers. They have additional opportunities for discussion when they work in small groups on the discovery exercises and when they present homework problems to the entire class.

Justification of Answers. I ask my students to justify their answers on homework, quizzes, and tests, and I prefer that they write the justifications in sentences. We talk a lot about the amount of work they need to show and about the correct way to justify their work on various types of problems.

Homework. My students have homework each night, usually requiring about 30 minutes of their time. In order to cover all of the Calculus AB topics, we move fairly quickly through each chapter; it is very important that students do their homework each night so that they gain the maximum benefit from the homework discussion that occurs the next day in class.

AP Review. During the third quarter, I will start giving the students an AP Review Sheet each week, which consists of free-response questions and multiple choice questions from previous AP Exams. The students work a few problems each night along with their homework on the topic being studied. I try to pick questions from topics that the students learned several weeks (or months) earlier so that they are reviewing as they work the problems. For example, as they are learning applications of integration, I might give them a related rates question or a problem in which they are given a graph of the derivative and asked questions about it. On each major test, I may also include a problem that is similar to the AP Review problems that they have worked on recently.

I will try to allot a minimum of three weeks before the AP Exam to devote to review. During this three-week period, students work on the sample questions in the *AP Calculus Course Description* and on multiple-choice and free-response questions from Released Exams. Some of these are assigned for homework, while others are given as a quiz or test. I will grade the practice exams, and we will spend the next few days discussing the problems. The practice exam lets students see which topics they need to review. It also gives them an idea of how

exhausting the “real” exam will be, so that they realize they need to get a good night’s sleep before exam day and eat a good breakfast before taking the exam.

Chandler Gilbert Community College required information.

STATEMENT REGARDING OUTCOMES AND ASSESSMENT

The faculty and programs at CGCC are dedicated to effective teaching and successful learning with emphasis in the following areas: communication, critical thinking, literacy, and personal development.

Periodically, students will participate in formal and informal assessment activities that will help faculty improve programs and teaching strategies. These activities are designed to facilitate student growth in whatever combination of the above outcomes applies to a course.

STATEMENT REGARDING STUDENTS WITH DISABILITIES

Students with disabilities are required to register for services in the Disability Resources and Services (DRS) office in the Student Center at the beginning of the semester. Do not wait to visit the DRS office if you want support with any CGCC classes. The DRS office will meet with you to determine accommodations based on appropriate documentation. Therefore, faculty members are not authorized to provide or approve any accommodations for students in this class without written instructions from the DRS office. This must be on file before any accommodation will be provided. You can contact the DRS office at (480) 857-5188.

INFORMATION ON LEARNING CENTER

The CGCC Learning Center's mission is to support students' academic learning by providing free tutoring and resources to reinforce and supplement classroom instruction and to assist CGCC students to achieve academic success. All Learning Center services are free to students currently enrolled at Chandler-Gilbert Community College. At the Pecos Campus, the Learning Center is located on the second floor of the Library, rooms LIB227, LIB228, LIB229 and LIB237. At the Williams Campus, the Learning Center is located in Bridget Hall, rooms BRID114 and BRID115. The Learning Center also provides instructional support resources in the form of videotapes, software, and print materials. For a schedule of tutoring hours, additional information, or assistance, students should contact the Learning Center at (480) 732-7231, or visit our website at <http://www.cgc.edu/lc>.

STATEMENT CONCERNING PLAGIARISM

Plagiarism is defined as presenting the work of another as one’s own. More than four consecutive words from a source other than the writer constitute plagiarism when the source is not clearly identified in appropriate documentation format.

From the *CGCC Student Handbook*:

“Plagiarism includes, but is not limited to, the use of paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgement. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.”

Course Planner

This planner is for general reference only, it may be adjusted slightly to fit student needs.

First Semester

Chapter 1: Limits and Their Properties (15 days)

Lab on limits

An introduction to limits, including an intuitive understanding of the limit process

Using graphs and tables of data to determine limits

Properties of limits

Algebraic techniques for evaluating limits

Comparing relative magnitudes of functions and their rates of change
Continuity and one-sided limits
Geometric understanding of the graphs of continuous functions
Intermediate Value Theorem
Infinite limits
Using limits to find the asymptotes of a function

Chapter 2: Differentiation (30 days)

Zooming-in activity and local linearity
Understanding of the derivative – graphically, numerically, and analytically
Approximating rates of change from graphs and tables of data
The derivative as: the limit of the average rate of change, an instantaneous rate of change, limit of the difference quotient, and the slope of a curve at a point
The meaning of the derivative---translating verbal descriptions into equations and vice-versa
The relationship between differentiability and continuity
Functions which have a vertical tangent at a point
Functions which have a point on which there is no tangent
Differentiation rules for basic functions, including power functions and trigonometric functions
Rules of differentiation for sums, differences, products, and quotients
The chain rule
Implicit differentiation
Related rates

Chapter 3: Applications of Differentiation (32 days)

Extrema on an interval and the Extreme Value Theorem
Rolle's Theorem and the Mean Value Theorem and their geometric consequences
Lab on the First Derivative Test
Increasing and decreasing functions and the First Derivative Test
Lab on concavity and points of inflection
Concavity and its relationship to the first and second derivatives
Second Derivative Test
Limits at infinity
A summary of curve sketching---using geometric and analytic information as well as calculus to predict the behavior of a function
Relating the graphs of f , f' , and f''
Optimization including both relative and absolute extrema
Tangent line to a curve and linear approximations
Newton's Method
Differentials
Application problems including position, velocity, acceleration, and rectilinear motion

Chapter 4: Integration (15 days)

Antiderivatives and indefinite integration, including antiderivatives following directly from derivatives of basic functions
Basic properties of the definite integral
Area under a curve
Meaning of the definite integral
Definite integral as a limit of Riemann sums
Riemann sums, including left, right, and midpoint sums
Trapezoidal sums
Use of Riemann sums and trapezoidal sums to approximate definite integrals of functions that are represented analytically, graphically, and by tables of data

First Semester Exam (two review days)

Second Semester

Chapter 4 (Continued): Integration (15 days)

Discovery lesson on the First Fundamental Theorem of Calculus
Use of the First Fundamental Theorem to evaluate definite integrals
Use of substitution of variables to evaluate definite integrals
Integration by substitution
Discovery lesson on the Second Fundamental Theorem of Calculus
The Second Fundamental Theorem of Calculus and functions defined by integrals
The Mean Value Theorem for Integrals and the average value of a function

Chapter 5: Logarithmic, Exponential, and Other Transcendental Functions (21 days)

The natural logarithmic function and differentiation
The natural logarithmic function and integration
Inverse functions
Exponential functions: differentiation and integration
Bases other than e and applications
Inverse trig functions and differentiation
Inverse trig functions and integration

Chapter 6: Differential Equations (12 days)

Solving separable differential equations
Applications of differential equations in modeling, including exponential growth
Use of slope fields to interpret a differential equation geometrically
Drawing slope fields and solution curves for differential equations

Chapter 7: Applications of Integration (20 days)

The integral as an accumulator of rates of change
Area of a region between two curves
Volume of a solid with known cross sections
Volume of solids of revolution
Arc length
Applications of integration in physical, biological, and economic contexts
Applications of integration in problems involving a particle moving along a line, including the use of the definite integral with an initial condition and using the definite integral to find the distance traveled by a particle along a line

AP Exam Review (minimum of 15 days)

AP Exam Tuesday, May 9, 2017.

After the AP exam

1. Introduction to Multivariable Calculus
2. A brief topical survey of post-Calculus mathematics with examples of applications.

Teacher Resources

Primary Textbook

- *Larson, Ron and Edwards, Bruce. Calculus Early Transcendental Functions.* 10th edition. 2014. Pearson.

Supplementary Texts

I supplement quite a bit with materials from other calculus textbooks, AP Released Exams, and free-response questions from AP Central. My resources include the following textbooks:

- Smith, Robert and Minton, Roland. *Calculus.* 4th edition, New York, NY: McGraw Hill Publishing. ISBN #: 978-0-07-353232-5
- Finney, Ross; Demana, Franklin; Waits, Bert; Kennedy, Daniel; and Bressoud, David. *Calculus.* 5th edition. 2016 Pearson.

- Stewart, James. *Calculus*. 8th edition. Boston, MA. Cengage Learning.
- Hughes-Hallet, Deborah, et. Al. *Calculus Singl Variable*. 2nd edition. 1998. John Wiley & Sons, Inc.
- Rogawski, Jon; and Cannon, Ray. *Calculus for AP*. 2nd edition. New York, NY. W.H. Freeman and Company.
- Briggs, William Cochran, Lyle; Gillett, Bernard; and Schulz, Eric. *Calculus AP Edition*. 2014. Pearson.

More Resources

- Bock, David, and Donovan, Dennis. *AP Calculus*. 13th ed. Hauppauge, N.Y.: Barron's Educational Series.
- Mathematical Association of America. *MAA Notes*. (Various Issues)
- Schwartz, Stu. *Lecture Notes for AP Calculus Manual*.