Crook County High School: AP Calculus AB

Course Length: Year Long

Instructor for 2017-2018: Amanda Groves

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Course Description

Goals: By the end of the year, 100% of students will meet or exceed the standards for a passing score (3 or higher) on the Advanced Placement Calculus A/B exam.

Expectations:

- Please arrive to class on time.
- No cell phone use
- Be **Respectful**, **Reasonable**, **Responsible**, and **Safe** at all times.
- Keep an organized notebook.
- Persevere.

Notebook Requirements:

- You will need to keep a notebook with all homework, classwork, notes, quizzes and distributed materials.
- Calculus builds on all the math you've learned before, and each new concept builds on the previous concepts we've learned this year. You should maintain your notebook in whatever fashion will make it easiest for you to refer to previous work throughout the year.

Supplies:

- Pencils (PLENTY) and an Excellent Eraser. Mistakes are part of the process.
- Notebook.
- Lined Paper and Graph Paper.
- Ink Pen and Highlighter.
- ***Graphing Calculator Required*** (TI-83 or TI-84 Recommended) - Available for rental from the Library

Assignment Requirements:

- **Homework** will be checked weekly, on Monday (or the first day of the school week if Monday is a holiday). Points will be awarded for completion of assignments. While I will spot-check the homework for accuracy, it is your responsibility to check your answers against those provided during class and ask questions if you are not finding correct solutions.
- Include name, date and heading on all work submitted.
- Write neatly and legibly.
- Copy the problem or write the critical information needed to solve the problem.
- Graphs and sketches should always include scale.

- Justify your answers. On written assignments and during class discussions, you will be expected to tell how you solved the problem, why you solved it that way, and why your answer makes sense. The objective is not to just do the math correctly and get the answer, but also to effectively communicate the problem-solving process.
- Write your solutions so that **anyone** reading your paper can follow the flow of your solution. Organization is as important as using the correct terminology and notation.
- Check that your answer has the correct units (inches, square meters, miles per hour, etc.) and is rounded to three decimal places, if appropriate.

Grading Policy:

Your final grade for the class will be calculated from the following categories:

70% Standards Assessments
10% Formative Assessments
20% Final Exam

Corresponding Letter Grade	Proficiency Scale	Percentage Scale
A	Exceptional Mastery	90 - 100
B	Mastery	80 - 89
C	Proficient	70 - 79
D	Minimal Proficiency	60 - 69
F	Does Not Meet	Below 60

Students must earn a minimum grade of a D to move on to the next mathematics class.
There will be no extra credit offered. Make-up work will have a 1-day extra per-day-absent time limit.

Students **cannot** retake any tests or standard assessments.

Textbook: Larson & Edwards: *Calculus*, 10th ed., AP ed., Cengage Learning, 2014.

Notification of the Right to Object to the Use of Materials:

Any resident of the district may raise objection to instructional materials used in the district's educational program despite the fact that the individuals selecting such materials were duly qualified to make the selection and followed the proper procedure and observed the criteria for selecting such material.

The first step in expressing objection is consultation with the classroom teacher or library staff and providing a brief written complaint. The staff member receiving a complaint regarding instructional materials shall try to resolve the issue informally through the discussion of the original assignment or the opportunity for an alternative assignment.

If not satisfied with the initial explanation or an alternative assignment, the person raising the questions will meet with a building administrator who, if unable to resolve the complaint, will provide a Request for Reconsideration form which will be given to the superintendent for action.

Standards

By the end of this course:

- Students should be able to work with functions represented in a variety of ways: graphical, numerical, analytical (using equations or formulas), or verbal. They should understand the connections among these representations.
- Students should understand the meaning of the derivative in terms of a rate of change and local linear approximation, and should be able to use derivatives to solve a variety of problems.
- Students should understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change, and should be able to use integrals to solve a variety of problems.
- Students should understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
- Students should be able to communicate mathematics and explain solutions to problems both verbally and in written sentences.
- Students should be able to model a written description of a physical situation with a function, a differential equation, or an integral.
- Students should be able to use technology to help solve problems, experiment, interpret results, and support conclusions. In particular, students should be able to use a graphing calculator to:
    - plot the graph of a function within an arbitrary viewing window;
    - find the zeros of functions (solve equations numerically);
    - numerically calculate the derivative of a function;
    - numerically calculate the value of a definite integral.
- Students should be able to determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.
- Students should develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.

In order to accomplish these goals, we will pursue the following broad units of study:

- **Functions, limits and continuity** considered graphically, numerically and analytically, aided by graphing calculators. (Chapter 1)
    - Students will use their graphing calculators to find the value of functions near a given point and make conjectures about their limits at those points. They will also gather evidence graphically by observing the function's behavior in the "neighborhood" of the point. Finally, they will compute the limit algebraically and compare the results to their predictions.
    - Students will use their graphing calculators to analyze end behavior and make conjectures about asymptotic behavior of functions.
    - Students will use their graphing calculators to investigate the continuity of functions over intervals and at given points.
- The **derivative** (both as a function and at a point), including the second derivative, and its applications. This will include a thorough grounding in the computation of derivatives of various functions as well as plenty of opportunities to solve problems using derivatives. (Chapters 2, 3 & 5)
    - Students will use their graphing calculators to "zoom in" on a variety of functions in order to use local linearity (or the absence thereof) to determine differentiability at that point.
    - Students will use their graphing calculators to approximate the value of derivatives found analytically, in order to determine whether those answers are reasonable.

    - Students will use their graphing calculators to solve problems involving maximum and minimum values of functions by finding zeros of their derivative functions.
- **Integrals**, their relationship to derivatives, and their applications. This will include a thorough grounding in techniques of integration as well as plenty of opportunities to solve problems using integration. (Chapters 4, 5, 7 & 8)
    - Students will use graphing calculators to compute values of the area function $A(x) = \int_1^{x} \frac{1}{t} dt$, and use those values to graph $A(x)$ in order to see the relationship between $A(x)$ and the integrand.
    - Students will use their graphing calculators to graph antiderivative functions determined analytically, and to determine the reasonability of those answers by analyzing increasing/decreasing behavior, concavity and zeros.
    - Students will use their graphing calculators to perform numerical integration.
- Separable **differential equations**, including the use of slope fields. (Chapter 6)

Calculus is beautiful and challenging! In order to provide an opportunity for everyone to truly understand, it is my job to make sure the following things happen:

- You (students) have the opportunity to regularly:
    - think independently;
    - write about your thinking;
    - discuss your thinking with peers during small-group and whole-class conversations;
    - ask questions and get help when needed;
    - assess your own understanding and receive feedback from me (the instructor).
- We make connections among and between:
    - graphical, numerical, analytical and verbal representations of functions;
    - limits and continuity;
    - derivatives and integrals (the Fundamental Theorem of Calculus);
    - derivatives and rates of change (slope);
    - integrals and areas and accumulated change;
    - derivatives and velocity;
    - second derivatives and acceleration;
    - calculus and the world.
- Instruction, homework assignments and chapter assessments provide you the opportunity to community mathematical ideas in written sentences.
    - You answer essential questions about concepts. Essential questions will be assigned periodically throughout the year.
    - You practice answering Free Response Questions from previous AP exams (and receive feedback on your written responses).
    - You answer all applied (word) problems in complete sentences that clearly respond to the given prompt. Every chapter assessment will include applied problems that must be answered in complete sentences in order to receive full credit.

I value your feedback. Please let me know how we can improve the course to provide even greater access to these incredible ideas!