

MA 201: Differential Calculus
Alabama School of Math and Science
Classroom/Office: S201
Web site: mathemartiste.com
Office Hours: Mon, Tues, Wed, Fri 10:00 (3rd per); Thurs 1:45 (7th per); Mon 3:45 (9th per/"after school")
ASMS Math Lab (free peer tutoring): Sunday-Thursday 6:30-8:30pm in S305
Khan Academy Coach Code: 7X5KKB53

Winter 2018-19 Syllabus
Instructor: Sarah Brewer
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Text: Larson & Edwards, *Calculus*, 10th edition. **Coverage:** 1.2-1.5, 2.1-2.6, 3.1-3.5, 3.7, 5.1, 5.4-5.6, 8.7
Prerequisites: A or B in MA103 Trigonometry and MA104 Precalculus or permission of the department.

Course Description: This introduction to the theory, techniques, and applications of differential calculus includes functions, limits, derivatives, related rates, maximum/minimum problems, and curve sketching.

The Content for the Differential Calculus is based on the following big ideas:

Limits (Chapter 1): Computing limits graphically and numerically, Continuity

f is continuous at c if and only if (1) f is defined at c , (2) $\lim_{x \rightarrow c} f(x)$ exists, and (3) $\lim_{x \rightarrow c} f(x) = f(c)$ *****

Derivatives (Chapter 2-3):

Defining the derivative of a function in general and at a particular input value:

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \quad f'(c) = \lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c} \quad \text{*****}$$

Mean Value Theorem: If f is continuous on the closed interval $[a, b]$ and differentiable on the open interval (a, b) , then there exists at least one value $c \in (a, b)$ such that $f'(c) = \frac{f(b) - f(a)}{b - a}$. *****

Recommended Materials: Successful students are organized. By keeping your class notes, practice problems, assignments, and study materials organized, you will have an easier time asking for and receiving help, and will have an easier time reviewing for tests. I suggest that students keep a 3-ring binder with notebook paper and dividers, regularly updating this notebook with reflections on assignments, performance, and learning. Dividers could be labeled as follows:

1. Handouts – This section includes the syllabus, formula sheets, photocopies of supplementary texts, or any other materials that are distributed in class that do not fall into another category.
2. Lecture Notes – This section includes any notes taken by the student from class lectures, the textbook, and videos, including any handouts with fill-in note slides, clearly labeled with the date and section or topic title, ordered according to date. Note that any lecture notes presented using the Smart Board will be exported in .pdf format and posted to my teaching web site for student convenience.
3. Problem Solving – This section includes problem sets assigned from the textbook and Khan Academy, and any other practice problems worked by the student to support the lecture notes. These should be labeled neatly with your name, date, textbook chapter & section and/or video/topic title as relevant, and problem numbers.
4. Quizzes/Tests/Projects – This section includes any Quizzes, Tests, Projects, Papers, and Reports, clearly labeled and in order by date.
5. Reflection – This section includes study guides with material grouped by chapter/section/topic, written reflections and corrections after each graded assignment is returned, and copies of any Progress Reports received by the student.

Calculators: Students will have in-class access to both scientific (TI-36 X Pro) and graphing (TI-nSpire CX CAS) calculators, and will be assigned a number corresponding to the calculators they are to use throughout the term. For any out-of-class assignments requiring calculator use, students are encouraged to utilize wolframalpha.com and desmos.com. Calculators will not be allowed at all on many assignments.

Grade determination: Grades will be assigned based on total points earned out of total points possible. Assignments and grades will be posted on Netclassroom. Khan Academy assignments will be given regularly. It is the student's responsibility to check these daily to make sure they are not missing anything.

Tests/Exams are worth approximately 100 points each, and may include questions from any of the material covered prior to the test date. For test dates, see schedule on last page (tests are roughly every 2 weeks at the end of each week; plan accordingly). The final exam is worth 200 points.

Homework assignments will be made daily and it will be the student's responsibility to remember to hand these in for completion checks at the beginning of the next class. Assignments should be labeled neatly with your name, date, textbook chapter & section and/or video title as relevant, and problem numbers. Since many textbook problems assigned will be odd-numbered, students should check their own work for accuracy and ask the instructor or Math Lab proctors to check even-numbered problems. Credit will not be given for answers copied from the back of the book or from another student. Show all of your own work and make notes if there were problems that gave you particular trouble so that you can go back and practice similar ones. Some assignments may be submitted via turnitin.com. Assignments made on Khan Academy should be worked out on paper and kept in the appropriate notebook section. Even when not required, use of this resource is encouraged.

Quizzes will be given almost daily during the first five minutes of class, and will be a combination of theory (rules, definitions, and formulas) and problems similar to and/or directly from homework assignments.

Make-up policy: Any homework, quizzes, or tests missed due to unexcused absences will receive a grade of zero. Homework assigned during a student's absence must be turned in within three days of the student returning to class. If a student misses a quiz or test with an excused absence and a make-up assignment is available, it must be made up within 3 days of a student's return to class. Arrangements to make-up tests must be done BEFORE the test is missed. In case of unexpected illness, this can be done via email. Note: make-up assignments will, in general, be more difficult than the original.

Cell phone policy: Phones should be SILENT or OFF (not on vibrate) and away. I reserve the right to confiscate any phone that I deem a distraction. Use of cell phones during quizzes or tests will be considered academic dishonesty and result in a grade of zero. Cell phones, along with other personal belongings (including smart watches), will be placed at the front of the classroom during tests/exams. Occasionally, we may use smartphone apps in class, but phones should remain away unless otherwise specified.

Attendance and Tardiness Policy: Three tardies count as one unexcused absence. A student with three unexcused absences may be assigned a grade of WF for the course. Students are responsible for acquiring any missed notes and assignments.

Tutoring: All students are encouraged to attend my weekly Office Hours and the evening student-run Math Lab for help with homework and studying. Even if you do not have a specific question about the material, come by and work on your homework free from distractions and with math experts nearby to help. When you come, make sure you have both your notebook and textbook with you, and that you have at least attempted the problems and/or tried to read the relevant section of your textbook. The primary goal of tutoring is to help you figure out the answers for yourself, not to give you the answer, but if you get stuck, please speak up, even if a Math Lab proctor or myself are helping another student.

Differential Calculus Tentative Schedule

Note that only some of the problems listed will be assigned for homework. Some will be assigned for classwork and some will not be assigned at all. However, you are expected to be able to work all problems listed for each section. Always check the answers to odd-numbered problems in the back of your book, and if your answer looks different, before reworking the problem or asking for help, check to see if there is an algebraic way to get from your answer to the one listed in the book.

Week 1 - Nov 05-09

- Review based around Rational Functions
- 1.2 Finding limits graphically and numerically #1-6 all, 15-22 all
- 1.2 Epsilon-Delta definition of the limit #33,34,39,41 (page 56)

Week 2 - Nov 12-16 (11/16 is short day)

- 1.3 Evaluating limits analytically #11, 21, 27-61 odd; 83,87
- 1.3 Limits with trig; Squeeze Theorem #63-73 odd; 89, 90
- 1.4 Discontinuity and one-sided limits #1-19 odd; 27-30 all; 43-48 all
- **TEST 1**

Break Nov 19-23

Week 3 - Nov 26-30

- 1.4 Continuity with Trig and Intermediate Value Theorem #21,23,25,57,61,65,69,99,102
- 1.5 Infinite limits #1,3,23; 29-57 odd
- Ch 1 review pp. 91-92 #3-83 odd

Week 4 - Dec 03-07 (12/07 is 1st grade posting)

- 2.1 Find the derivative by the limit process; Find the equation of the tangent line #1-41 odd
- 2.1 Use the alternate form to find the derivative; Describe the x-values where the function is differentiable (given a graph) #65-89 odd
- **TEST 2**

Week 5 - Dec 10-14

- 2.2 Find derivative using basic rules #3-67 odd
- 2.2 Use derivative to solve rate of change word problems #87-95 odd; 97-100 all; 105,106,111,113,115

Week 6 - Dec 17-20 (12/20 is short day)

- 2.3 Product and quotient rules #1-53 odd, 63-85 odd, 91-105 odd, 111-115 odd
- 2.4 Chain rule #7-33 odd; 43-89 odd
- Logarithmic functions #41-59 odd, 69, 71
- 5.4 Exponential functions #33-51 odd, 59, 61
- 5.5 Log and exp functions with other bases #37-69 odd
- **TEST 3**

Break Dec 21-Jan 04

Week 7 - Jan 07-11 (01/11 is 2nd grade posting)

- 5.6 Inverse trig functions #39-63 odd
- 2.5 Implicit Differentiation #1-39 odd; 43, 47

Week 8 - Jan 14-18

- 2.6 Related Rates #15-27, 35
- 3.1 Absolute Extrema on an Interval #17-35 odd
- **TEST 4**

Week 9 - Jan 22-25 (01/21 is MLK holiday)

- 3.3 Increasing, Decreasing, and Relative Extrema #23-35 odd
- 3.4 Inflection Points and Concavity #19-29 odd
- 3.2 Rolle's Theorem #11-21 odd
- 3.2 Mean Value Theorem #33-45 odd

Week 10 - Jan 28-Feb 01 (02/01 is 3rd grade posting)

- 3.5 Limits at Infinity #15-31 odd
- 8.7 L'Hopital's Rule #11-35 odd; #47-55 odd
- 3.7 Optimization #3,5,17,19,23
- **TEST 5**

Week 11 - Feb 04-08

Feb 11- Review
Final Exams Feb 12-15