

MA 202: Integral Calculus
Alabama School of Math and Science
Classroom/Office: S201
Web site: mathemartiste.com

Spring 2019
Instructor: Sarah Brewer
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Syllabus

Office Hours: Mon, Tue, Wed, Fri 10:00-10:55 (3rd per), Mon 3:45-4:40 (9th per), Tue 1:45-2:40 (7th per)
Math Lab (free tutoring): Sunday-Thursday 6:30-8:30pm in S305
Khan Academy Coach Code: S3EZFFNU

Course Description: This introduction to the theory, techniques, and applications of integral calculus includes indefinite and definite integrals, area, volume, work, fluid force, derivatives and integrals related to exponential, logarithmic, trigonometric and inverse trigonometric functions, and integration techniques.

Prerequisites: 'B' or better in Differential Calculus or permission of the department.

Text: Larson & Edwards, *Calculus*, 10th edition.

Coverage: 3.9-4.5, 5.1-5.5, 5.7, 7.1-7.2, 7.4, 8.1-8.5; time permitting: 6.3, 5.8, 7.5-7.7

The Content for the Differential & Integral Calculus Sequence is based on three big ideas:

Big Idea 1 – 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) $\lim_{x \rightarrow c} f(x) = f(c)$

Big Idea 2 – Derivatives (Chapter 2-3): Defining the derivative, Mean Value Theorem

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

If f is continuous on $[a, b]$ and differentiable on (a, b) , then there exists $c \in (a, b)$ such that $f'(c) = \frac{f(b) - f(a)}{b - a}$

Big Idea 3 – Integrals and the Fundamental Theorem of Calculus: Defining the definite integral, the first Fundamental Theorem of Calculus, the Second Fundamental Theorem of Calculus

If f is continuous on $[a, b]$ then the function g defined by $g(x) = \int_a^x f(t) dt$ is an antiderivative of f .

That is, $g'(x) = f(x)$ for $a < x < b$.

If f is continuous on $[a, b]$ then $\int_a^b f(x) dx = F(b) - F(a)$, where $F(x)$ is any antiderivative of $f(x)$.

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 3 weeks at the end of each week; plan accordingly). The final exam is worth 200 points.

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.

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.

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.

Integral Calculus Tentative Schedule

Week 1 – Feb 25 – Mar 01 (3/01 is short day)

- 3.9 Differentials
- 4.1 Antiderivatives and Indefinite Integration

BREAK – Mar 4-8

Week 2 – Mar 11-15

- 4.2 Area
- 4.3 Riemann Sums and Definite Integrals

Week 3 – Mar 18-22 (Jury Duty)

- **Test #1**
- 4.4 The Fundamental Theorem of Calculus
- 4.5 Integration by Substitution

Week 4 – Mar 25-29

- 5.2 The Natural Logarithmic Function
- 5.3 Inverse Functions
- 5.4-5.5 Exponential Functions

Week 5 – Apr 1-5

- 5.7 Inverse Trigonometric Functions
- 7.1 Area between curves

Week 6 – Apr 8-12 (4/10 is 2nd grade posting)

- **Test #2**
- 7.2 Volume: Disk Method

Week 7 – Apr 22-26 (4/24 is ACT for Juniors)

- 7.4 Arc Length and Surfaces of Revolution
- 8.1 Basic Integration Rules

Week 8 – Apr 29 – May 3

- 8.2 Integration by Parts
- 8.3 Trigonometric Integrals

Week 9 – May 6-10 (5/08 is 3rd grade posting)

- 8.4 Trigonometric Substitution
- 8.5 Partial Fractions
- **Test #3**

Week 10 – May 13-17 (5/17 is short day/last day of classes)

- 6.3 Differential Equations: Separation of Variables
- 5.8, 7.5-7.7 Hyperbolic Functions, Physics Applications

FINAL EXAMS – May 20-22