

MATH-2134-005: SYLLABUS

1. COURSE INFORMATION

- Course Title: Calculus for Business and Social Science
- Course Number: 2134
- Credit Hours: 4; Clinical Hours: 0; Lecture Hours: 4; Lab Hours: 0
- Meet Times: Tuesday and Thursday from 11:00 am to 12:50 pm
- Meet Location: BIC 2465
- Course Description: Students will be introduced to basic concepts of differential and integral calculus. This course is intended for students planning to major in business, or the behavioral, social, or biological sciences.
- Repeatable for Credit: NO
- Pre-Enrollment Criteria: N/A
- Prerequisite: MATH 1431 Precalculus I with a grade of "C" or better, or equivalent or a qualifying score on the mathematics placement test.

2. INSTRUCTOR INFORMATION

- Name: Michael McCabe, M.S.
 - Email: mccabem85@cod.edu
 - Office: 3436B or Blackboard Collaborate
 - Office Phone: 630 942 2152
 - Office Hours: Labeled on Blackboard (always available by appointment)
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3. GENERAL COURSE OBJECTIVES

Upon successful completion of the course the student should be able to do the following:

- 1 Solve exponential, polynomial, rational, and logarithmic equations
- 2 Analyze functions
- 3 Graph functions
- 4 Construct mathematical models
- 5 Apply limit theorems and algebraic techniques to evaluate limits
- 6 Differentiate functions and equations
- 7 Analyze properties of functions using derivatives
- 8 Solve application problems using derivatives
- 9 Determine extrema of functions of several variables
- 10 Determine antiderivatives using the rules of integration
- 11 Solve application problems using the fundamental theorem of calculus

4. TOPICAL OUTLINE

- 1.: Functions
 - a.: Power and exponential functions
 - b.: Polynomial functions

- c.: Rational functions and asymptotes
- d.: Natural logarithms
- e.: Graphing
- 2.: Differential calculus
 - a.: Limits and continuity
 - b.: Derivative process
 - c.: Derivative rules for products and quotients
 - d.: The chain rule
 - e.: Higher order derivatives
 - f.: Maxima and minima of functions of one variable
 - g.: Functions of more than one variable
 - h.: Maxima and minima for functions of more than one variable
 - i.: Maxima and minima using Lagrange multipliers
 - j.: Applications from business, biology, and other areas
- 3.: Integral calculus
 - a.: Anti-derivatives including substitution and parts
 - b.: Area and the definite integral
 - c.: Fundamental theorem of calculus
 - d.: Improper integrals
 - e.: Numerical integration (optional)
 - f.: Applications

5. REQUIRED TEXTS, MATERIALS, AND SUPPLIES

5.1. **Required Text.** The reference Textbook is: Calculus B (with free online interactive materials) by Jim Fowler and Bart Snapp, edited to meet Math 2134 standards by Michael McCabe.

5.2. **Materials.** A notebook for class lecture to take notes, A notebook for homework (suggested, not required), writing devices, and access to the internet.

5.3. **Supplies.** Notebooks, writing devices, and internet.

6. SCHEDULE

6.1. Academic Calendar.

- First Day: 8/23/2022
- No Class: 11/25 to 11/28 (Fall Break)
- Last Day to Withdraw: 11/14/2022
- Final Exam: TBD

6.2. **Exam Dates.** Exams will take place at the end of the week and the beginning of class. There will be lecture on new material after.

- Exam 1: Week 4
- Exam 2: Week 8
- Exam 3: Week 12

6.3. Content Coverage.

Here is the tentative daily schedule:

- Week 1: Review all functions that will be used throughout the semester: constant, power, polynomials, rational, quotient, radical, exponential, and logarithmic.
- Week 2: Introduce the limit function with an intuitive and precise definition. Furthermore, we will explore the applications of the limit.
- Week 3: Explore the calculus definition of continuity, and consequential properties - like the Intermediate Value Theorem (IVT). Also, we will look at the limit definition of the derivative.
- Week 4: Wrap-up the discussion of limits and have an exam on the topics of limits.
- Week 5: Continue the discussion of the derivative and its notation. We will also investigate derivatives rules like: constant, power, sum, difference, exponential, and logarithmic.
- Week 6: We will build on the derivative rules: product, quotient, and chain.
- Week 7: Finally, we will talk about higher order derivatives, implicit differentiation, logarithmic differentiation, differentiable.
- Week 8: Wrap-up the derivative discussion which will pave the way for derivative applications. In this week will also have an exam on the derivative rules, definitions, and theorems.
- Week 9: Here we will explore how the derivative gives the reader insight into the behavior of the functions curve. Important topics are: critical points, inflection points, increasing, decreasing, concave up, and concave down. This will help pave the way to curve sketching.
- Week 10: Our ultimate goal will be sketch the curve of almost any function using the properties of the derivative. However, first we will look at global and local extremes, asymptotes (with the help of limits), and end behaviors of functions (again with the help of limits).
- Week 11: This week we will change directions to more specific example found in life sciences like:
 - What is the optimal dimensions of a box for production to minimize cost? (Optimization)
 - At what rate is profit changing with the increasing of product production? (Related rates)
 - What is the approximate value of $\sqrt{4.01}$? (Linearization and Differentials)
 - What is the cost to produce one more item? (Marginals and Elasticity)
- Week 12: Wrap-up applications of the derivative and have an exam on what we have explored.
- Week 13: Introduction to the antiderivative (the integral). We will look at the rules involved with the definite integral: constant, power, sum, difference, u-sub, and by-parts.
- Week 14: Explore the numerical approach to calculate the area under a curve. For the area under a constant function one could use geometry and the area of a rectangle; however, many of the functions we have dealt with in the semester will not be a constant function. This week will look at how to find the area under the curve of many different functions. This will lead

to the discussion of Riemann Sums and

The Fundamental Theorem of Calculus (FTC)!

- Week 15: We will look at the consequence of FTC and practice life science models. This week will conclude the discussion of integration.
- Week 16: The last major topic we will talk about this semester is using the derivative to functions of many variables; specifically, we will mostly look at functions with two variables. Define the partial derivative and look at find the extremes of a two variable function. Lastly, the Lagrange Multiplier.

7. METHOD OF EVALUATION

7.1. Assessment Categories.

- Final Exam (Weight 20%)
- Exams (Weight 20%)
- My Open Math (Weight 20%)
 - At least 3 drops
- In-Class Polling (Weight 20%)
 - At least 3 drops
- Turn-In (Weight 20%)
 - At least 3 drops

7.2. Grade Scale.

- A:** 85% to 100%
- B:** 75% to 84%
- C:** 65% to 74%
- D:** 55% to 64%
- F:** 54% or less

I do round.

8. ACADEMIC HONESTY

As members of the College of DuPage community, we share a commitment to the highest standards of learning and ethical behavior. The College and its faculty strive to build meaningful and productive relationships with our students. The expectation of honesty and effort is the foundation of that relationship. Academic dishonesty damages the learning partnership built between student and faculty and is considered a serious breach of the principles of learning and growth. Violations of the Code of Academic Conduct will be dealt with appropriately and may become part of a student's educational record. Please don't risk it! For further information about the expectations, please review the Code of Academic Conduct found at the following website: Code of Academic Conduct.

9. ACCESS AND ACCOMMODATIONS

- As a course policy, I do not accept late work/make up for My Open Math assignments, attendance, and participation. I am committed to providing fair, equal, and unbiased accommodations. If you believe that your circumstances qualify you for accommodations, please contact the Center

for Access and Accommodations at access@cod.edu. Staff from the Center can help you better understand if your situation qualifies you for an accommodation.

- If you are student who is registered with the Center for Access and Accommodations, please send me your Letter of Accommodation as soon as possible.
- Please do not send me personal medical records or similar personal documents.
- Here is a to start the process for accommodations: Center for Access and Accommodations Intake Form (https://cod-accommodate.symplicity.com/public_accommodation/).

The College of DuPage is committed to the equitable access of educational opportunities for students with disabilities in accordance with The Americans with Disabilities Act, As Amended and Section 504 of the Rehabilitation Act of 1973. Any student who feels they may need an accommodation on the basis of an illness, injury, medical condition, or disability should contact the Center for Access and Accommodations to determine eligibility for accommodations and to obtain an official Letter of Accommodation. The Center for Access and Accommodations can be reached via email at access@cod.edu. Students may also initiate a request for services by going to www.cod.edu/access and clicking on the green box labeled “complete form to request accommodations.” If you are already registered with the Center for Access and Accommodations, please email me your Letter of Accommodation as soon as possible. Please DO NOT send any private health documentation or Doctor’s notes to me.

10. WITHDRAW POLICY

Withdrawal from a Class. The final day for a student to withdraw from any course will be equal to 75% of the time for the respective academic session (see the Registration Calendar) through MyAccess or in person at the Registration office, Student Services Center (SSC), Room 2221.

Administrative Withdrawal. After the deadline, students will be required to appeal for late withdrawal and provide appropriate documentation to the Student Registration Services Office for all requests. Students who are granted approval to withdraw by petition will not be eligible for refunds of tuition or fees and will receive a ‘W’ grade on their transcript. Appeals must be submitted prior to the designated final exam period for 16-week classes and before the last class meeting for all other session classes.

Coronavirus Information. Stay up to date with information provided by the college about alternative withdrawal policies. Coronavirus Information