MATH-2134-005: SYLLABUS
COLLEGE OF DUPAGE: SPRING 2022

CONTENTS

1. Course Information

- Course Title: Calculus for Business and Social Sciences
- Course Number: 2134
- Credit Hours: 4; Clinical Hours: 0; Lecture Hours: 4; Lab Hours: 0
- Meet Times: Tuesday, Thursday 10:00AM - 11:50AM
- Meet Location: BIC 3517
- 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 avaiable by appointment)

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.

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6. Schedule

6.1. Academic Calendar.
- First Day: 1/24/2022
- No Class: 03/28/2022 to 04/03/2022 (Spring Break)
- Last Day to Withdraw: 04/17/2021
- Final Exam: TBD

6.2. Exam Dates (Tentative). 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 Fundemental 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:**

(1) Exams [Weight 20%]
  (a) There will be at least 3 exams throughout the semester.
  (b) Accommodations will be available, please refer to the Office of Access and Accommodations for the method of requesting accommodations.
  (c) Each exam:
      (i) Will be taken in class with the expectation to take 1 hour to complete.
      (ii) Don't expect to have open book, open notes, or "cheat-sheets".
      (iii) Aimed to have at least 10 to 15 worked out problems with an addition 2 extra credit problems. (Days before the exam the a good approximation of the number of problems on the exam will be stated.)
  (d) Do not expect dropped exams.
  (e) It is important to email prior to the start of the exam if unable to attend the exam. It is better email before the start of the exam, rather than after the exam. I necessary email the day before of any concerns, I will work with you to accommodate.
  (f) Advice:
      (i) Historically, poor performance on exams are due to miscommunication on shown work.
          (A) The work done for each problem is more important than the final answer.
          (B) Each problem involves multiple topics covered throughout the lectures prior to the exam. The goal of the exam is to assess understanding, as many of those topics as possible.
          (C) Each questions should be answered like it is a presentation for the class.
          (D) Practice for this process of answering is done through the Turn-In assignments.
      (ii) One week before the exam is assigned, expect to receive an outline of the exam. With this outline attempt to create a mock exam. With the mock exam construct a test taking environment and attempt the mock exam (I will not be creating this mock exam, but I am willing to help). The idea is that, by treating the mock exam as a real exam will hopefully alleviate some of the pressure of the actual exam.
      (iii) Questions on the exam may not be something you have seen before, this aims to assess understanding and not memorization.
(2) My Open Math(MOM) Homework Sets [Weight 20%]
  (a) There will be several homework sets focused on specific topics covered in the course throughout the semester.
  (b) There will be at least 3 dropped assignments at the end of the semester.
  (c) Outside of required accommodations from the Office of Access and Accommodation, there will be no extensions or make-ups for these homework sets. Why?

(i) There will be several drops at the end of the semester; life happens, if unable to complete an assignment it is safe to count it as a dropped assignment.

(ii) Throughout this semester we will be covering almost too much content, extending an MOM homework set can cause a student to fall behind.

(iii) It is not uncommon for me to push due dates. Through constructive communication via Discord or Email, it is possible to alleviate stresses where ever possible.

(d) It is okay to seek help from office hours and learning commons to complete MOM homework sets.

(3) Turn-Ins [Weight 20%]

(a) Turn-Ins [Weight 20%]

(i) The purpose of the Turn-Ins is to put pencil to paper with very little consequence on correctness. Furthermore, the purpose of the Turn-Ins is to practice how to answer questions on the Exams throughout the semester.

(ii) Another purpose of the Turn-Ins is to be a source of questions to ask during office hours or lecture.

(iii) There will be at least 3 drops at the end of the semester.

(iv) The due dates on these assignments are suggestive; HOWEVER, waiting until the last minute degrade the intention of the assignment.

(v) You can find the Turn-In under: Weekly Stuff >> Week [current #].

(vi) The Turn-In will be a "worksheet" located in the Blackboard Assignment.

(vii) Turn-Ins will be submitted to Blackboard via Blackboard Assignment.

(viii) How to submit? Do you have a iPad Pro or 2-in-1 laptop with a digital pen?

(A) Download the Turn-In.

(B) Open your favorite digital annotation tool and annotate your work on the file.

(C) Export the entire Turn-In as a single pdf file and upload them into designated Blackboard Assignment.

(ix) How to submit? Traditional Method

(A) If possible print the Turn-In. If not possible use a blank sheet of paper. If using a blank sheet of paper please label the sheet with the title of the Turn-In and label the question numbers for the submitted solutions.

(B) Scan the Turn-In with a scanner or a smart phone app. I suggest Office Lens; however, there are many free scanning apps that can be used. Watermarks are allowed.

(C) CAUTION: When scanning Turn-Ins make sure the result is a single pdf file. Please do not submit a pdf file for each page.

(D) Please come to office hours if the submission process is confusing or ask during class. After submitting an assignment you should receive an email. It is common for Blackboard to freeze up, clicking multiple times can result into multiple submissions.

(4) Attendance and Participation [Weight 20%]
   (a) I will attempt to record attendance, there will be at least 3 drops. Thus, there will be no make-ups or extensions.
   (b) I will attempt to record participation through MOM polling system. There will be at least 3 drops; thus, there will be no make-ups or extensions.

(5) Final Exam [Weight 20%]
   (a) Test on everything covered throughout the semester (Cumulative Exam).
   (b) Constructed to be completed during a 2 hour time limit on the scheduled Final Exam day.
   (c) I plan to construct the Final Exam with about 20 questions, with 2 extra credit questions.
   (d) I plan to construct the Final Exam similar to twice the amount of a regular exam.

7.2. **How to Calculate Grade:** Create a spreadsheet (Excel File) similar to the following:

MOM	%	Turn-Ins	%	Exams	%	Final	%	Attend./Partic.	%
Section 1.3	89	Week 1	100	Exam 1	75	Final	87	Day 1 Attend.	100
								Day 1 Partic.	100
⋮	⋮	⋮	⋮	⋮				⋮	⋮
% Ave W/ drops		% Ave W/ drops		% Ave		% Ave		% Ave W/ drops	

Apply the weights:

Category	%	Weight	% times Weight
Final		20	
Exam		20	
MOM		20	
Turn-Ins		20	
Attend./Parti.		20	
		Grade->	

Example. This is an example on how to calculate:

• The values used is based on averaging the MOM, Turn-Ins, and Attend./Parti. with the dropped assignments. That is, if the list of percentages for the MOM homework sets is:

$$\{90, 91, 90, 90, 100, 85, \emptyset, 82, \emptyset, \cancel{76}, 98, 76, 84, 98, 93, 85, 95, 100, 89, 98, 89, 76, 98, 91, 100, 99\}$$

then with the drops we have:

$$\{90, 91, 90, 90, 100, 85, 82, 98, 76, 84, 98, 93, 85, 95, 100, 89, 98, 89, 76, 98, 91, 100, 99\}$$

then the average is about:

91.17

However, if you didn't calculate with drops then you have the incorrect average:

$$83.58$$

- Consider the following outcomes:

Category	List of ALL scores in Percent Form
Final	$\{83\}$
Exams	$\{95, 84, 93\}$
MOM	$\{90, 91, 90, 90, 100, 85,$ $0, 82, 0, 76, 98, 76,$ $84, 98, 93, 85, 95, 100,$ $89, 98, 89, 76, 98, 91, 100, 99\}$
Turn-Ins	$\{90, 80, 70, 90, 90, 80,$ $90, 80, 100, 100, 80, 90,$ $80, 80, 70, 70\}$
Attend./Parti.	$\{83, 97, 85, 81, 83, 93,$ $85, 80, 80, 88, 84, 95,$ $81, 77, 80, 80, 75, 80,$ $99, 83, 92, 94, 92, 87, 0, 0\}$

- With the drops:

Category	%	Weight	% times Weight
Final	83	20	1660
Exam	90.6666	20	1813.332
MOM	91.1739	20	1823.478
Turn-Ins	86.9231	20	1738.462
Attend./Parti.	85.9565	20	1719.13
	Totals	100	8754.402
		Grade:	$\frac{8754.402}{100} = 87.54402$

Which means an 87.54402% in the class which would be an A.

Example. What if...

Category	%	Weight	% times Weight
Final	?	20	
Exam	59	20	1180
MOM	55	20	1100
Turn-Ins	80	20	1600
Attend./Parti.	80	20	1600
	Totals	100	5480
		Grade:	54.8%

What is needed on the final in order to pass the course?

Solution. Assume a C is a passing grade, which below indicates is at least 65%. Currently, this "what if..." states a 54.8% if the final was not taken. What grade is needed on the final to get a 65% overall grade? For this we solve a linear equation:

$$20x + 5480 = 6500$$

where 20 is the weight of the final exam with respect to the overall grade, 5480 is the total points so far received, and 6500 is the desired outcome (since $\frac{6500}{100} = 65$).

Subtracting 5480 from both sides yields

$$20x = 1020.$$

Dividing 20 from both sides yields

$$x = \frac{1020}{20} = 51.$$

This means that at 51% on the final will pass the course with a letter grade of C.

7.3. **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

11. Coronavirus Information

11.1. **Conronavirus Information.** For up to date information about what the College of DuPage is doing in response of the Coronavirus please visit the website https://www.cod.edu/coronavirus/.

As of 8/17/2021:

- Due to the highly contagious Delta variant of COVID-19, the Centers for Disease Control and Prevention (CDC) updated their masking guidelines, recommending that fully vaccinated people wear a mask in public indoor settings in areas of substantial or high transmission. Our mask protocol (https://www.cod.edu/coronavirus/mask-protocol.aspx) has been updated for unvaccinated or not fully-vaccinated individuals and for fully-vaccinated individuals.
- The College of DuPage Library is open to employees, students, and the public. For hours of operation, visit the Library's website (https://library.cod.edu/).
- All doors are now unlocked from 5 a.m. to 11 p.m. on days the College is open. Additional staff from areas around the College will be called back to work, in-person, to ensure appropriate support for the summer and beyond. The Bookstore is also open.
- Those who enter a facility are expected to follow safety guidelines.

- College faculty and staff should continue to work from home to the maximum extent possible.

For information on how we are keeping students safe and support services that are available, view Frequently Asked Questions.

11.2. **What to Expect on Campus.** As of 8/17/2021:

- Individuals who are unvaccinated or not fully vaccinated for COVID-19 are required to wear a facemask covering their mouth and nose while inside campus buildings and when outside on College property.
- Individuals who are fully vaccinated for COVID-19 are required to wear a facemask covering their mouth and nose while inside campus buildings. COD's mask protocol outlines exceptions to the protocol, which include actively eating and drinking.
- All screening will be eliminated at the main campus and centers and employees no longer need supervisor approval to enter the College.
- Maintain social distancing. Stand six feet apart when meeting, talking or standing in line.

While regular classroom cleaning will be followed and hand sanitizer will be available, students are encouraged to bring their own wipes for cleaning their space and their own hand sanitizer.

11.3. **Additional Information.** As of 8/17/2021

11.3.1. *COVID-19 Protocols and Instruction.* The following documents are used to screen and self-report COVID-19 symptoms to help prevent the spread of the virus on campus:

- Coronavirus (COVID-19) Student Self-Reporting Form
  (https://cm.maxient.com/reportingform.php?CollegeofDuPage&layout_id=9)
- Student Concern Form – Communicable Disease
  (https://cm.maxient.com/reportingform.php?CollegeofDuPage&layout_id=10)
- Suspected or Confirmed Exposure
  (https://www.cod.edu/coronavirus/pdf/suspected_confirmed_exposure.pdf)
- Instructions
  (https://www.cod.edu/coronavirus/pdf/instructions.pdf)

11.3.2. *ICCB/College of DuPage COVID-19 Case Reporting.* College of DuPage is keeping track of confirmed cases of students and employees:

- View information on confirmed COVID-19 cases.
  (https://www.cod.edu/coronavirus/case-reporting.aspx)

11.3.3. *If you Experience COVID-19 Symptoms.* If you or a person you know is experiencing symptoms such as fever, cough and difficulty breathing, seek medical care right away. Report your symptoms by filling out the Student Concern Form (https://cm.maxient.com/reportingform.php?CollegeofDuPage&layout_id=10).

For additional questions, contact the Dean of Students Office at (630) 942-2485 or email deanofstudents@cod.edu. Include your name and student ID number in your message.

11.4. **Mask Protocol.** Wearing a facemask that covers the mouth and nose can help reduce the transmission of the virus responsible for COVID-19 and its variants.

As of 8/17/2021. If someone refuses to comply with COD's mask protocol, according to https://www.cod.edu/coronavirus/mask-protocol.aspx.

- Staff and Faculty: If an employee declines or fails to wear a facemask as required, the employee's supervisor is responsible for addressing the issue with the employee. Employees should refrain from addressing noncompliance or perceived noncompliance directly with other employees, and should instead report issues to their supervisor.
- Students: If a student declines or fails to wear a facemask as required, they should be asked to comply with the protocol, or leave the campus immediately. If they fail to comply or refuse to leave the campus, the College Police should be called to handle the situation, and the student should be reported to the Dean of Student Affairs.
  If the situation occurs in a classroom or other academic setting, it is considered a classroom management issue, and the faculty member should remind the student of the requirement and give the student a chance to comply. If the student refuses to comply, the faculty member should ask the student to leave the classroom or academic setting immediately, and should report the student to the Dean of Student Affairs. If the student refuses to leave the classroom or academic setting, the College Police should be called to handle the situation, and the student should be reported to the Dean of Student Affairs.
- Visitors/members of the Public: If a visitor or member of the public declines or fails to wear a facemask as required, they should be asked to comply with the protocol, or leave the campus immediately. If they fail to comply or refuse to leave the campus, the College Police should be called to handle the situation.

11.5. **Contact Information:**

- For Student Affairs Related Questions
  – Campus Central
  – (630) 942-3000
  – campuscentral@cod.edu
- For Campus Health and Safety or COVID-related Specific Questions
  – Phil Gieschen
  – Coordinator of Risk Management
  – (630) 942-2993
  – giesche@cod.edu

12. SHUTDOWN OR QUARANTINE

If me/I (the instructor) or you (the student) are required to quarantine or the campus shuts down. Here are some (not all) things to consider if a quarantine or shutdown is implemented.

(1) Blackboard Collaborate will be used for remote instruction. If you are required to quarantine notify Access and Accommodations and they will contact me with instructions.

(2) Twitch, in the event Blackboard Collaborate fails to work, I do have a twitch page (twitch.tv/codmccabe).

(3) It is okay to request videos from me on any topic covered in class.

(4) It is possible for the method of administrating exams to change in the event of a campus shutdown. All other methods of assessments will be and are already be tracked electronically.

(5) More information will be provided via Blackboard Announcements in the event of campus shutdown or other events causes the presentation of lecture to change.