

MATH-110: TECHNIQUES OF CALCULUS I
Spring 2023

Calculus works by making visible the
infinitesimally small.

Keith Devlin, 2003

Professor:	Thomas R. Cameron	Time:	M T W F 12:20 – 1:10 pm
Email:	trc5475@psu.edu	Place:	Nick 171
Office:	Benson 87		

Course Page: https://www.thomasrcameron.com/courses/Math-110/math_110.html

Canvas Page: <https://psu.instructure.com/courses/2245430>

Office Hours: M,T,W,F: 10:00 – 11:30 am, and by appointment

Textbook: Larson, *Brief Calculus, An Applied Approach*, (10e), 2013, ISBN-10: 1-305-86092-6, ISBN-13: 978-1-305-86092-6

Technology: You may use technology on homework and lab assignments. However, the use of any technology is prohibited on exams and quizzes.

Prerequisite: Math 22, Math 40, Math 41, or satisfactory performance on the mathematics placement examination.

Course Format: As Paul Halmos noted, “The only way to learn mathematics is to do mathematics”. Hence, we will spend the majority of our in-person class time doing mathematics. In particular, there will be a short quiz at the beginning of each class, which usually covers important definitions and concepts related to the current material. The quiz is turned in during the first 5 minutes of class. Afterwards, I will give a short lecture and students will break into groups to work on the daily exercises, which are not turned in for credit. At the end of class, solutions to the exercises are discussed.

Course Description: Business Calculus is a critical component in the education of any business, financial, or economics professional who uses quantitative analysis. This course introduces and develops the mathematical skills required for analyzing change, and the underlying mathematical behaviors that model real-life economics and financial applications. The primary goal of our business calculus courses is to develop the students’ knowledge of calculus techniques, and to use a calculus framework to develop critical thinking and problem solving skills.

Masking: Masks are not required at campuses located in counties with low or medium COVID-19 Community Levels, according to the CDC. If the COVID-19 Community Levels in Erie County reach the high, or red, level, the campus community will be alerted and masks will be required in all buildings on campus.

Learning Outcomes: Upon successful completion of the course, students will be able to

- Find limits graphically and evaluate limits analytically.
- Relate the derivative of a function to the tangent line.
- Evaluate the derivative of explicitly and implicitly defined functions.
- Use derivatives to solve related rates problems.
- Explain Rolle’s, Mean-Value, and the Fundamental Theorem of Calculus with examples.
- Use first and second derivative tests to find extrema on an interval.

- Use derivatives and limits to accurately sketch the graph of a function.
- Apply derivatives to perform marginal analysis of basic economics models.
- Apply derivatives to calculate elasticity of basic economics models.
- Relate the derivative and antiderivative of a function.
- Use the Riemann sum to define and evaluate the definite integral of a function.
- Use the Fundamental Theorem of Calculus to evaluate the definite integral of a function.
- Apply concepts of integration to solving basic business model applications.
- Evaluate improper integrals and apply the ideas and techniques to evaluate perpetuities.

Grading Policy:

Your final grade is broken up as follows.

Category	Percentage
Daily Quizzes	15%
Lab Assignments	10%
Homework Assignments	20%
Exams (10% each)	40%
Final	15%

Your final letter grade is based on the following scale.

Grade	Percentage Interval	Grade	Percentage Interval
A	[93, 100]	C+	[77, 80)
A-	[90, 93)	C	[70, 77)
B+	[87, 90)	D	[60, 70)
B	[83, 87)	F	[0, 60)
B-	[80, 83)		

Daily Quizzes: Daily quizzes are assigned during the first 5 minutes of each class period. These short quizzes cover pertinent definitions, concepts, and problem solving techniques. In addition, these quizzes serve as an attendance marker. Students with an approved absence are eligible for a makeup quiz during office hours.

Lab Assignments: On lab day, students will interact with Desmos Activities, which provide an interactive learning environment where students can gain intuition for the course concepts. These labs are administered online but should be done in class, which allows students to interact with each other and myself to enhance their learning experience. If the student has an excused absence, they will be expected to complete the lab remotely.

Homework Assignments: To help develop a mastery of the material, students will be given several homework assignments which cover the material in greater depth. Not only are these problems more challenging, but the students are held to a higher expectation with regards to the clarity and precision of their solution. If the student has an excused absence, they will be given additional time to complete the assignment. Regarding this matter, the student must communicate with the instructor prior to the assignment deadline.

Exams: We will have 4 exams throughout the semester. These exams are intended to test your general understanding of the concepts covered up to that point, with a heavy emphasis on the main definitions, concepts, and problem solving techniques covered. See the section on disabilities and learning differences if you require additional time. If the student has an excused absence, they will be able to take the exam on another date. Regarding this matter, the student must communicate with the instructor prior to the exam date.

Final: We will have a final exam during finals week. The final is comprehensive and will include questions on limits, derivatives, first and second derivative tests, optimization and business applications, the fundamental theorem of calculus, area between two curves, integration by parts, calculus with exponential and logarithmic functions, and improper integrals.

Academic Integrity: Academic integrity is a basic guiding principle for all academic activity at the University, and all members of the community are expected to adhere to this principle. Specifically, academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. It includes a commitment not to engage in or tolerate acts of falsification, misrepresentation, or deception. Such acts violate the fundamental ethical principles of the University community and undermine the efforts of others.

Violations of academic integrity are not tolerated at Penn State Behrend. Violators will receive academic sanctions and may receive disciplinary sanctions, including the awarding of an XF grade. In cases such as these, an XF grade is recorded on the transcript and states that failure of the course was due to an act of academic dishonesty. All acts of academic dishonesty are recorded so those repeat offenders can be sanctioned accordingly. For more information:

<http://behrend.psu.edu/for-faculty-staff/faculty-resources/academic-integrity>

Extra Help: Do not hesitate to come to my office during office hours or by appointment to discuss a homework problem or any aspect of the course. You also may want to consider the Math Lab (located on the second floor of Roche Hall) or the Learning Resource Center (located in the library). Hours can be found here:

<http://psbehrend.psu.edu/Academics/academic-services/lrc>.

See a schedule for all options on TutorTrac at <https://tutorapp.bd.psu.edu>

Disabilities and Learning Differences: Penn State is strongly committed to providing full access to its programs and services for all individuals. The University encourages academically qualified students with disabilities to take advantage of the educational programs and accommodations offered at Penn State Behrend. For more information:

<http://behrend.psu.edu/student-life/educational-equity-and-diversity/student-resources/students-with-disabilities-and-learning-differences>

Educational Equity Concerns: Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, harassment, and/or incivility due to age, ancestry, color, disability, gender, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity at the Report Bias site: <https://equity.psu.edu/reportbias>

Counseling and Psychological Services: Students with academic concerns related to this course should contact the instructor in person or via email. Students also may occasionally have personal issues that arise in the course of pursuing higher education that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek confidential assistance at the Penn State Behrend Personal Counseling Services at (814) 898-6504. For more information: <http://psbehrend.psu.edu/student-life/student-services/personal-counseling>

Copyright of Class Materials: You may not share any information from this course (including notes and assignments) with others who are not currently registered for the course, nor post such information electronically without the permission of the instructor—this includes online note-taking/note-sharing services (See Penn State Administrative Policy AD-40). Also prohibited in the policy is the posting of audio, video, or photographs posted to social media sites or other publicly accessible resources. Unless you have my permission, you risk disciplinary sanctions.

Title IX: Penn State is committed to fostering an environment free from sexual or gender-based harassment or misconduct. The Office of Sexual Misconduct Prevention and Response ensures compliance with Title IX, a federal law that prohibits discrimination based on the sex or gender of employees and students. Behaviors including sexual harassment, sexual misconduct, dating violence, domestic violence, and stalking, as well as retaliation for reporting any of these acts violate Title IX and are not tolerated. The University is also committed to providing support to those who may have been impacted by incidents of sexual or gender-based harassment or misconduct and may provide various resources and support services to individuals who have experienced one of these incidents. For more information: <http://titleix.psu.edu/> or

<http://titleix.psu.edu/resources-penn-state-erie-the-behrend-college/>

Important Dates:

Classes Begin	January 9
Regular Drop Deadline	11:59 pm January 14
Regular Add Deadline	11:59 pm January 15
Martin Luther King Day (No Class)	January 16
Exam 1	January 25
Final Exam Conflict Filing Period	February 13 – March 5
Exam 2	February 21
Spring Break	March 6 – 10
Exam 3	March 28
Late Drop Deadline	April 7
Exam 4	April 21
Classes End	April 28
Final Exams	May 1 – 5

Disclaimer: I reserve the right to diverge from this syllabus in the best interest of my students learning and achievement. Any changes made will be announced in advance.