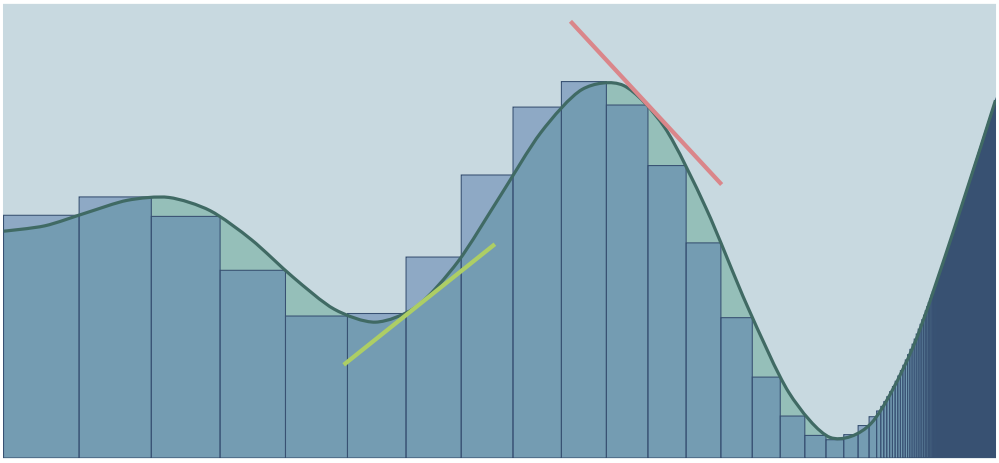


Math 170

Calculus I

Fall 2022 Syllabus

MERCYHURST UNIVERSITY

Course Information

Description

This is the initial course in a sequence of courses on the fundamental ideas of the calculus of one variable. It is here that truly significant applications of mathematics begin. Topics included are functions, continuity, limits, derivatives, maxima and minima and antiderivatives.

Objectives

On successful completion of the course, you will be able to:

- recognize, define, and apply properties of functions, such as their domain, range, intercepts, and inverses;
- be able to evaluate a variety of limits;
- identify discontinuities of a function presented either graphically or algebraically;
- find the derivative of functions using the limit definition;
- find the derivative of sums, products, and quotients of composite polynomial, trigonometric, exponential, and logarithmic functions;
- understand conceptual relationships between derivatives, rates of change, and tangent lines;
- use properties of functions and derivatives to graph functions;
- apply differentiation procedures to solve related rates and extreme value problems;
- identify and evaluate limits involving indeterminate forms;
- compute definite and indefinite integrals using formulas and substitution;
- understand the relationship between the integral and the derivative; and
- read and interpret mathematical theorems, including checking that hypotheses are satisfied and reaching correct conclusions.

Section Information

MTWF 8 - 8:50
Hirt 103
4 Credits

Instructor

Lauren Williams, PhD
lwilliams@mercyhurst.edu
(814) 824-2226
Old Main 404

Office Hours

Monday 10 - 11
Tuesday 9 - 11
Tuesday 1 - 1:50
Wednesday 10 - 11
Friday 10 - 11
and by appointment

Prerequisites

To remain enrolled in this course, you must satisfy at least one of the following criteria:

- Began studying at Mercyhurst prior to Fall 2016
- Score of 70 or better on the ALEKS Mathematics Placement Assessment
- Passed Math 118 (Math for the Natural Sciences), or transfer credit for equivalent
- Passed both Math 111 (College Algebra) and Math 112 (Trigonometry and Functions), or transfer credit for equivalent

If none of these apply, you should make arrangements to take the ALEKS Math Placement Assessment before the Add/Drop deadline on Monday, August 29th. **Students that do not meet the prerequisites by this deadline may be dropped from the course.** You will be contacted via email by the instructor reminding you to show proof of meeting prerequisites before any action is taken.

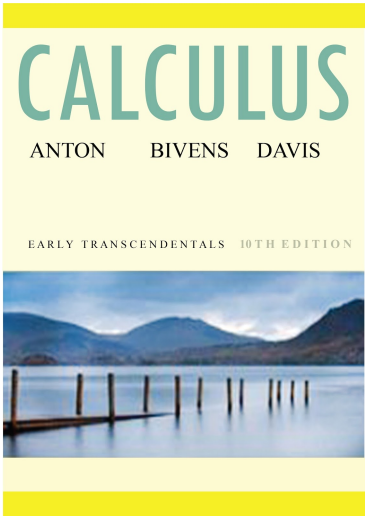
Office Hours

Drop in with any questions or just to chat during office hours - no appointment or notice required. If you need to meet with me outside those times, please email me to arrange a time. Zoom appointments on evenings and weekends are also possible with prior notice.

Materials

Textbook

Calculus, Early Transcendentals, 10th Edition
by Anton, Bivens, and Davis
ISBN 0470647698



You will not be expected to bring your textbook to class. If you prefer to purchase or rent an electronic version of the text, you're welcome to do so.

NO Calculators

You are not required to purchase a calculator for this course, and **you will not be permitted to use a calculator or other electronic device on any quizzes or exams**. You are strongly encouraged to avoid using a calculator while working on homework.

Other Requirements

Content for this course will be posted to Blackboard regularly. Be sure you have access to the course site and your university email, and check both frequently.

In class, you'll be expected to bring a notebook and pen or pencil. You will not need a computer or the textbook for any class meetings.

Quizzes and Exams

- Quizzes typically include 3-4 questions. You will have approximately 20-25 minutes to complete a quiz.
- Each midterm exam is designed to be completed during class time, over 50 minutes. You will be given the option of arriving to class early if you would like more time. I will generally not be able to give you extended time after class ends.
- All questions on quizzes and exams will be based on similar problems in the recommended homework and class examples.
- Quizzes and midterm exams will not be cumulative (within reason). You will be told in class before each quiz and exam which sections to focus on.
- All quizzes and exams are closed book/notes. You may not use a calculator on quizzes or exams.
- Your lowest quiz grade, including a missed quiz, will be dropped when calculating your final grade.
- Your lowest midterm exam grade, including a missed exam, will be replaced by the average of your other three midterm grades.
- If you are ill, please do not attend class, even for a quiz or exam. Get in touch with me as soon as possible to arrange a make up. Unless there is an exceptional circumstance, failure to contact me within 24 hours of the missed quiz or exam will result in a grade of 0 for the assessment.
- If you will miss a quiz or exam for a planned University related event, please make arrangements for a make up with me *before* the missed class meeting.
- The final exam is scheduled for Monday, December 12, at 8 am. The final exam is cumulative and is not optional.

Grading

Quizzes **20%**

- Ten quizzes throughout semester as shown on schedule
- Lowest quiz grade*, including a missed quiz, will be dropped when calculating your quiz average

Exams **60%**

- Four unit exams of equal weight towards grade, as scheduled
- Lowest exam grade*, including a missed exam, replaced by average of other three

Final Exam **20%**

- Monday, December 12, 8 - 10 am
- Required, regardless of current course grade
- Cumulative

** A grade of 0 on a quiz or exam due to academic dishonesty will not be dropped or replaced when calculating your final grade.*

Mathematics Department Grading Scale

Your final grade will be converted to a letter according to the following chart.

F	D	D+	C	C+	B	B+	A
0%	60%	67%	70%	77%	80%	87%	90%

Attendance and Make Up Policies

- Attendance is not required, but highly encouraged. You do not need to notify me of an absence *unless* you will be missing a quiz or exam.
- If you know ahead of time that you will not be able to attend class on the date of a quiz or exam, please make arrangements for an alternative time with me *before* that day.
- Make ups will generally need to be completed within two days. For a quiz or exam given on a Tuesday, you will need to complete the assessment by Thursday evening. This will give me the opportunity to return graded work to the entire class promptly. Please see me if you have any extended absences due to illness or travel.

Tips for Success

- Attend class whenever possible. Attendance is not required nor part of your grade, but is instrumental in keeping up with material and remaining engaged in the class.
- Give it time. You're expected to spend approximately 12-15 hours per week on this course, *in addition* to class meetings. Some students will need to devote more time to the course than others. Mathematics is not a fast subject to learn, and requires a lot of practice. Work on a few problems each day, and don't leave it all for the night before an exam.
- Find motivation. Calculus can be useful in *any* field, and knowing how it fits into your intended career can help you push through the inevitable obstacles you'll face in the course.
- Skim through relevant sections in the textbook before the class lectures. This will help in your understanding of the lectures, and alert you to any topics you'll need to focus on while in class.
- Form a study group with other people in the class. You may not need to meet regularly, but work on arrangements (where/when/how) *before* you need to.
- Mathematics is naturally cumulative. You will not be able to find and simplify a derivative without strong algebra skills, for instance. When you're having trouble with a problem, try to determine exactly where you're having the problem and review earlier sections in the book as needed.
- Construct a reference sheet with definitions, important theorems, and useful formulas. Add to it throughout the semester, and keep it nearby when working on homework. Keep practicing until you no longer need your sheet.
- If you're stuck on homework problems or lecture material, come to office hours with questions. You should make an attempt to work on any problems on your own or with a classmate first. I will fully explain any problems that will not be collected as part of an assignment, and give suggestions for graded problems.

Academic Honesty

- Your grade in this class should be a reflection of your understanding of the material. Academic dishonesty is a disservice to your classmates, instructors, future employers and colleagues, and ultimately, yourself.
- You may not use any notes, textbooks, or electronic devices of any kind (calculator, phone, computer, smart watch, etc) on quizzes or exams.
- You may not use the work of another classmate, with or without their knowledge, on quizzes or exams. This includes communicating during the assessment or simply copying from a nearby classmate.
- The first instance of academic dishonesty in this class will result in a grade of 0 on that assessment. This 0 will not be dropped or replaced as a low or missed grade, meaning your final grade will be impacted.
- A second or further instance of academic dishonesty will result in a report to the University as well as an F in this course if you remain enrolled past the withdrawal deadline.

University Policies and Information

Food and Drink in the Classroom

In light of the COVID-19 situation, eating is not permitted in classrooms, labs, or other academic spaces. A water bottle or cup with a lid (and preferably a straw) is permitted to be used in classrooms and labs.

ADA

Mercyhurst University values inclusion and is committed to the goal of providing equal opportunities for all. Mercyhurst abides by federal, state, and local laws in admissions, employment, academic programs, and all services provided. Mercyhurst University is committed to complying with its obligations under the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act and the Fair Housing Act to ensure that a person with a disability is granted reasonable accommodations, when such accommodations are necessary, to afford that person equal opportunity to obtain a Mercyhurst education and use university facilities. Please refer to the HUB

https://lakersmercyhurst.sharepoint.com/sites/StudentsHub

and select the Services tab, then ADA Accommodations from the dropdown for instructions to request an accommodation. You may also contact Susan Reddinger, ADA Coordinator, ADA@mercyhurst.edu, 814-824-2362, Egan Hall 200. For students with questions about Academic Support, please refer to the HUB

https://lakersmercyhurst.sharepoint.com/sites/StudentsHub

and select the Academic Resources tab, then Academic Support for more information.

Title IX Information

Mercyhurst is committed to providing an environment free from sex discrimination, including sexual harassment and sexual violence. Please refer to the HUB:

https://lakersmercyhurst.sharepoint.com/sites/StudentsHub

and select the Resources tab, then Title IX – Sexual Respect from the dropdown for more information. If you would like to file a sexual misconduct complaint, please contact Ann Miller, Title IX Coordinator and Compliance Officer, titleix@mercyhurst.edu, 814-824-2363. Please be aware that in compliance with Title IX, educators must report incidents of sexual assault/harassment, stalking, and domestic/dating violence. If you disclose any of these situations in class, in papers, or to me personally, I am required to report it to the Title IX Coordinator (or any of the Deputy Title IX Coordinators).

Academic Honesty

Students are expected to contribute actively to the development of an atmosphere of academic integrity. Mercyhurst University assumes, therefore, that students will not resort to plagiarism or any other form of academic dishonesty. Students who engage in willful academic dishonesty may be subject to a broad range of sanctions. At the discretion of their instructor, they may be required to redo the plagiarized assignment, or they may receive an automatic F for the exam/assignment and/ or course. Students found to be in collaboration with other students involved in willful academic dishonesty are also subject to disciplinary action.

Course Schedule

MONDAY	TUESDAY	WEDNESDAY	FRIDAY
No Class	*No Class*	**Aug 24** *First Class Meeting* Class Overview	**Aug 26** Section 0.1 Functions
Aug 29 *Add-Drop Deadline* Section 0.2 New Functions from Old	**Aug 30** Section 0.3 *Quiz* Families of Functions	**Aug 31** Section 0.4 Inverse Functions	**Sep 2** Section 0.5 Exp and Log Functions
Sep 5 *No Class* Labor Day	**Sep 6** Section 1.1 *Quiz* Limits: An Intuitive Approach	**Sep 7** Section 1.2 Computing Limits	**Sep 9** Section 1.2 Computing Limits
Sep 12 Section 1.3 Limits at Infinity	**Sep 13** Section 1.3 *Quiz* Limits at Infinity	**Sep 14** Section 1.5 Continuity	**Sep 16** Section 1.5 Continuity
Sep 19 Section 1.6 Cont. of Trig, Exp, Inverse	**Sep 20** Section 2.1 Rates of Change	**Sep 21** Exam	**Sep 23** Section 2.2 The Derivative Function
Sep 26 Section 2.2 The Derivative Function	**Sep 27** Section 2.3 *Quiz* Differentiation Techniques	**Sep 28** Section 2.4 The Product & Quotient Rules	**Sep 30** Section 2.5 Derivatives of Trig Functions
Oct 3 Section 2.6 The Chain Rule	**Oct 4** Section 2.6 *Quiz* The Chain Rule	**Oct 5** Section 3.1 Implicit Differentiation	**Oct 7** Section 3.1 Implicit Differentiation
Oct 10 Section 3.2 Derivatives of Log Functions	**Oct 11** Section 3.3 *Quiz* Exp & Inverse Trig Functions	**Oct 12** Section 3.3 Exp & Inverse Trig Functions	**Oct 14** *No Class* Mid Semester Break
Oct 17 Section 3.4 Related Rates	**Oct 18** Section 3.4 Related Rates	**Oct 19** Exam	**Oct 21** Section 3.5 Local Linear Approximation
Oct 24 Section 3.6 l'Hopital's Rule	**Oct 25** *Registration Starts* Section 3.6 *Quiz* l'Hopital's Rule	**Oct 26** Section 4.1 Increase, Decrease, Concavity	**Oct 28** Section 4.1 Increase, Decrease, Concavity
Oct 31 Section 4.2 Rel. Extrema & Polynomials	**Nov 1** *No Class* Advising Day	**Nov 2** Section 4.2 Rel. Extrema & Polynomials	**Nov 4** Section 4.3 Rational Functions
Nov 7 Section 4.3 Rational Functions	**Nov 8** Section 4.4 *Quiz* Absolute Extrema	**Nov 9** Section 4.4 Applied Min/Max Problems	**Nov 11** *Pass-Fail Deadline* Section 4.5 Applied Min/Max Problems
Nov 14 Section 4.6 Rectilinear Motion	**Nov 15** Review/Catch Up Day	**Nov 16** Exam	**Nov 18** *Withdraw Deadline* Section 4.8 Rolle's & Mean Value Thms
Nov 21 Section 5.1 The Area Problem	**Nov 22** Section 5.2 *Quiz* The Indefinite Integral	**Nov 23** *No Class* Thanksgiving Break	**Nov 25** *No Class* Thanksgiving Break
Nov 28 Section 5.3 Integration by Substitution	**Nov 29** Section 5.3 *Quiz* Integration by Substitution	**Nov 30** Section 5.5 The Definite Integral	**Dec 2** Section 5.6 Fundamental Thm of Calculus
Dec 5 Section 5.9 Def Integrals by Substitution	**Dec 6** Section 5.9 Def Integrals by Substitution	**Dec 7** Exam	**Dec 9** *Last Class Meeting* Semester Review
Dec 12 *Finals Week* Exam	**Dec 13** *Finals Week*	**Dec 14** *Finals Week*	**Dec 16** *Finals Week*

Homework List

Your homework will not be collected, but these problems (and similar questions) are likely to appear on quizzes and exams. Answers to most of the questions are available in the back of the textbook. Working on additional problems is highly recommended.

Section	Page	Problems
0.1	12	1, 3, 5, 7, 9, 15, 19, 23, 27, 29, 31a-c
0.2	24	1, 3, 5, 11, 13, 17, 25, 27, 29, 31, 33, 35, 39, 41, 49, 53, 61, 63
0.3	35	1, 3, 11, 15, 17, 19, 25, 29, 31
0.4	49	1, 3, 5, 9, 13, 17, 19, 25, 27, 31, 39, 41
0.5	61	1, 5, 9, 11, 13, 15, 17, 21, 23, 25, 27, 47, 57
1.1	77	1, 3, 5, 7, 9, 17-20, 21, 23, 25, 31
1.2	87	1, 3, 7, 11, 13, 15, 19, 21, 25, 31
1.3	96	1, 3, 5, 9, 13, 15, 21, 31, 33, 37, 43
1.4	106	You are not responsible for this section (but try #17 and #21 anyway!)
1.5	118	1, 3, 5, 7, 11, 13, 17, 21, 29, 31, 35, 45, 47
1.6	125	1, 7, 9, 13, 17, 19, 21, 23, 27, 31, 37, 49, 67
2.1	141	3, 11, 13, 15, 17, 23
2.2	152	1, 3, 7, 9, 11, 21, 23, 25, 29
2.3	161	1, 3, 5, 7, 9, 13, 15, 17, 21, 23, 29, 37, 39, 41, 43, 45, 49
2.4	168	1, 3, 5, 7, 11, 13, 19, 21, 23, 27, 29, 31, 33, 39
2.5	172	1, 5, 11, 15, 17, 21, 23, 27, 29, 31
2.6	178	3, 7, 9, 11, 15, 17, 19, 23, 27, 35, 37, 39, 45, 49, 51, 53, 77
3.1	190	3, 5, 7, 9, 11, 13, 15, 17, 27
3.2	195	1, 3, 7, 9, 13, 19, 23, 25, 27, 35, 37, 41
3.3	201	15, 17, 19, 21, 23, 25, 37, 43, 51, 65
3.4	208	1, 5, 13, 15, 17, 19, 25, 27
3.5	217	3, 5, 7, 23, 25, 29, 31, 43
3.6	226	1, 7, 9, 11, 13, 17, 21, 23, 27, 29, 33, 57
4.1	241	1, 5, 7, 9, 15, 17, 19, 21, 25, 29, 39
4.2	252	3, 5, 7, 9, 11, 19, 25, 27, 29, 33, 37, 41, 43, 45, 53
4.3	264	1, 3, 5, 9, 13, 19, 23, 25, 31
4.4	272	3, 7, 9, 11, 13, 21, 23, 25, 27, 31, 33
4.5	283	3, 5, 13, 19, 21, 23, 27, 29, 31, 37, 55
4.6	294	1, 3, 13, 17, 19, 33
4.8	308	1, 3, 5, 7, 15, 25, 41
5.1	321	7, 9, 13, 15, 17
5.2	330	5, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 43, 45
5.3	338	1, 3, 7, 9, 11, 15, 17, 21, 23, 27, 31, 33, 39, 41, 47, 53, 55, 61, 69, 71
5.5	360	13, 15, 19, 21, 23, 25, 33
5.6	373	7, 9, 13, 15, 17, 19, 23, 29, 31, 59, 61
5.9	393	1, 5, 9, 15, 17, 19, 21, 31, 33, 35, 37, 43, 45, 49, 53