
MATH 170-02 Calculus I

Fall 2014 · Syllabus

Class Information

Instructor: Dr. Lauren Williams

Class Meeting: Hirt M209, MTWF 8:00 - 9:05 AM

Office: Old Main 401 (Tower)

Office Phone: (814) 824-2226

Office Hours: M 10:45 - 12 and 4 - 5, T 9:15 - 12, W 10:45 - 12, F 10:45 - 12, and by appointment

Email: llwilliams2@mercyhurst.edu

Website: <http://math.mercyhurst.edu/~lwilliams>

Course 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. Projects may be assigned requiring the students to use a Symbolic Computer Algebra System. Satisfies either the common or distribution core requirements in mathematics.

Course Objectives

On successful completion of the course, students should be able to:

- recognize, recall, and apply properties of functions, such as their domain and range, intercepts, and inverses.
- have an intuitive understanding of a limit, and 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 polynomials and rational 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.
- read and interpret mathematical theorems, including checking that hypotheses are satisfied and reaching correct conclusions.

Textbook

Calculus Early Transcendentals, Tenth Edition, by Anton, Bivens, and Davis. We will be covering chapters 0-5 in the textbook. You will not be required to bring the textbook to class, so feel free to purchase or rent an electronic version of the book if you prefer.

Homework Quizzes

There will be several problems assigned from each section of the textbook. In class quizzes will be given according to the attached schedule, generally every Tuesday and Friday. These will be brief quizzes, with questions taken directly from or very similar to problems in the homework. **There are no make ups for quizzes.** The two lowest quiz grades will be dropped. You may not use calculators, notes, or the textbook when taking quizzes.

Exams

We will have three in class exams on the following dates. You will be given an exact list of topics, along with a review sheet, approximately one week before each exam. Use of notes, textbooks, calculators, electronic devices, or other materials will not be permitted during an exam.

Your lowest exam grade will be replaced by your final exam grade, if your final exam grade is better. There are no make up exams; a missed exam grade will be replaced by your final exam grade. A second missed exam will receive a grade of 0, so please check your schedules carefully and ensure that you can attend all exams.

- Wednesday, September 24
- Wednesday, October 22
- Wednesday, November 19

The final exam will be cumulative, and will be given on **Wednesday, December 10, 8:30 - 10:30.**

Final Grades

Grades will be calculated as follows:

- 50% - Average of 3 in class exams
- 25% - Homework Quizzes (two lowest grades dropped)
- 25% - Final Exam

Grading scale:

F	D	D+	C	C+	B	B+	A
0-59	60-64	65-69	70-77	78-83	84-89	90-93	94-100

Support of the Mercy Mission

This course supports the mission of Mercyhurst University by creating students who are intellectually creative. Students will foster this creativity by: applying critical thinking and qualitative reasoning techniques to new disciplines; developing, analyzing, and synthesizing scientific ideas; and engaging in innovative problem solving strategies.

Learning Differences

In keeping with college policy, any student with a disability who needs academic accommodations must call Learning Differences Program secretary at 824-3017, to arrange a confidential appointment with the director of the Learning Differences Program during the first week of classes.

Tutoring

The Department of Mathematics offers free tutoring for Calculus I students in Zurn 213. No appointments are needed, just drop by according to the schedule below. You are free to ask tutors questions on any assigned homework and exam review sheets.

Sunday 6 - 8 pm	Monday 6 - 8 pm	Tuesday 7 - 9 pm	Thursday 6 - 8 pm
Michael Rebecca	Lexi Rachel	Danielle Rachel Rebecca	Danielle Lexi Michael

Other Information

1. You are neither expected nor required to purchase any materials for the course aside from the required textbook. Graphing calculators and mathematical software could be used to check your work, but should not be relied on to do the work for you.
2. I will attempt to return emails as thoroughly and promptly as possible. However, it is generally better to ask complicated questions during class or in office hours. If you have a question about the homework, it is quite likely someone else has the same question, so you're doing the class a favor by asking!
3. There are other textbooks available in the library and in my office. Due to book prices, you may not want to invest in a second book, but it can be helpful to have alternate sources or see topics explained in other ways.
4. I do not keep detailed lecture notes. It is highly recommended that you establish contacts among your classmates to get notes in case you miss class.
5. Attendance is not required, but coming to class regularly will generally improve your grade. You are responsible for any work material covered in your absence. Please contact me if you are absent for an extended period.
6. Calling my office phone is rarely the best way to get in touch with me, unless I am in my office. Email is the fastest way to get in touch with me outside of office hours.

Useful Resources The course website has a more extensive list (and constantly growing) list of resources that may help you succeed in the class. In particular, you may be interested in:

1. **Kahn Academy, www.kahnacademy.org** Features video tutorials for a range of topics we'll be covering. In addition to mathematics, Kahn Academy has videos for just about any class you might be taking, from art history and music to chemistry and computer science.
2. **Wolfram Alpha, www.wolframalpha.com** Incredibly powerful and easy to use, Wolfram Alpha is a web based mathematics program that can help you check your work, visualize functions, and view detailed examples.

Course Schedule

The schedule below is approximate - topics covered on a particular day are subject to change. Exams and quizzes will take place as scheduled, with adjustments to material covered made when necessary. Any changes to material covered on quizzes will be announced in class, and the schedule on the class website will be kept up to date.

Aug 27	Topic: Class Introduction
Aug 29	Topic: 0.1 Functions Homework: p 12 #1, 3, 7, 23
Sep 1	<i>NO CLASS</i>
Sep 2	Topic: 0.2 New Functions From Old Quiz 1: Section 0.1 Homework: p 24 #1, 5, 27, 29, 39
Sep 3	Topic: 0.3 Families of Functions Homework: p 35 #1, 17, 25
Sep 5	Topic: 0.4 Inverse Functions; Inverse Trigonometric Functions Quiz 2: Section 0.2 Homework: p 48 #3, 9, 13, 27
Sep 8	Topic: 0.5 Exponential and Logarithmic Functions Homework: p 61 #11, 15, 23, 27
Sep 9	Topic: 1.1 Limits (An Intuitive Approach) Quiz 3: Sections 0.3 and 0.4 Homework: p 77 #1, 3, 7, 21
Sep 10	Topic: 1.2 Computing Limits Homework: p 87 #1, 3, 7, 9, 21, 37
Sep 12	Topic: 1.3 Limits at Infinity; End Behavior of a Function Quiz 4: Sections 0.5 and 1.1 Homework: p 96 #3, 5, 9, 13, 15, 21, 41
Sep 15	Topic: 1.3 Limits at Infinity; End Behavior of a Function Homework: p 96 #3, 5, 9, 13, 15, 21, 41
Sep 16	Topic: 1.4 Limits (Discussed More Rigorously) Quiz 5: Section 1.2 Homework: p 107 #19
Sep 17	Topic: 1.5 Continuity Homework: p 118 #1, 11, 13, 17, 21, 29
Sep 19	Topic: 1.6 Continuity of Trigonometric, Exponential, and Inverse Functions Quiz 6: Section 1.3 Homework: p 125 #1, 21, 23, 27
Sep 22	Topic: 2.1 Tangent Lines and Rates of Change Homework: p 140 #3, 11, 13, 15
Sep 23	Topic: Review for Exam I
Sep 24	EXAM I
Sep 26	Topic: 2.2 The Derivative Function Quiz 7: Sections 1.5 and 1.6 Homework: p 152 #7, 9, 11, 23

Sep 29	Topic: 2.3 Introduction to Techniques of Differentiation Homework: p 161 #7, 11, 15, 17, 21, 41
Sep 30	Topic: 2.4 The Product and Quotient Rule Quiz 8: Sections 2.1 and 2.2 Homework: p 168 #3, 7, 11, 15, 21, 31
Oct 1	Topic: 2.5 Derivatives of Trigonometric Functions Homework: p 172 #1, 5, 11, 15, 17, 21, 31
Oct 3	Topic: 2.6 The Chain Rule Quiz 9: Sections 2.3 and 2.4 Homework: p 178 #3, 7, 11, 15, 19, 23, 35, 39
Oct 6	Topic: 3.1 Implicit Differentiation Homework: p 190 #3, 5, 9, 13, 15
Oct 7	Topic: 3.2 Derivatives of Logarithmic Functions Quiz 10: Sections 2.5 and 2.6 Homework: p 195 #1, 7, 13, 25, 35, 37
Oct 8	Topic: 3.3 Derivatives of Exponential and Inverse Trigonometric Functions Homework: p 202 #15, 19, 23, 37, 43, 51
Oct 10	<i>NO CLASS</i>
Oct 13	Topic: 3.4 Related Rates Homework: p 209 #5, 13, 15, 17, 19
Oct 14	Topic: 3.4 Related Rates and 3.5 Local Linear Approximation Quiz 11: Sections 3.2 and 3.3 Homework: p 209 #5, 13, 15, 17, 19
Oct 15	Topic: 3.6 L'Hopital's Rule; Indeterminate Forms Homework: p 226 #1, 7, 13, 17, 21, 27, 47
Oct 17	Topic: 3.6 L'Hopital's Rule; Indeterminate Forms Quiz 12: Section 3.4 Homework: p 226 #1, 7, 13, 17, 21, 27, 47
Oct 20	Topic: 4.1 Increase, Decrease, and Concavity Homework: p 241 #1, 7, 15, 19, 21, 29
Oct 21	Topic: Review for Exam II
Oct 22	EXAM II
Oct 24	Topic: 4.2 Relative Extrema; Graphing Polynomials Quiz 13: Sections 3.5 and 3.6 Homework: p 252 #3, 7, 19, 37, 51
Oct 27	Topic: 4.3 Rational Functions, Cusps, and Vertical Tangents Homework: p 264 #1, 3, 5, 7, 13
Oct 28	Topic: 4.3 Rational Functions, Cusps, and Vertical Tangents Quiz 14: Sections 4.1 and 4.2 Homework: p 264 #1, 3, 5, 7, 13
Oct 29	Topic: 4.4 Absolute Maxima and Minima Homework: p 272 #7, 21, 27, 47
Oct 31	Topic: 4.5 Applied Maximum and Minimum Problems Quiz 15: Section 4.3 Homework: p 284 #3, 11, 13, 21, 31, 37

Nov 3	Topic: 4.5 Applied Maximum and Minimum Problems Homework: p 284 #3, 11, 13, 21, 31, 37
Nov 4	Topic: 4.6 Rectilinear Motion and 4.7 Newton's Method Quiz 16: Sections 4.4 and 4.5 Homework: p 294 #17a-d, 33 and p 300 #1, 5
Nov 5	Topic: 4.8 Rolle's Theorem; Mean Value Theorem Homework: p 308 #1, 3, 5, 7, 25
Nov 7	Topic: 5.1 An Overview of the Area Problem Quiz 17: Sections 4.6 and 4.7 Homework: p 321 #13, 15
Nov 10	Topic: 5.2 The Indefinite Integral Homework: p 330 #9, 13, 15, 19, 21, 27
Nov 11	Topic: 5.3 Integration by Substitution Quiz 18: Sections 4.8 and 5.1 Homework: p 338 #1, 7, 15, 19, 23, 27, 29, 31, 53
Nov 12	Topic: 5.3 Integration by Substitution Homework: p 338 #1, 7, 15, 19, 23, 27, 29, 31, 53
Nov 14	Topic: 5.5 The Definite Integral Quiz 19: Sections 5.2 and 5.3 Homework: p 360 #13, 17, 19, 21, 25
Nov 17	Topic: 5.6 The Fundamental Theorem of Calculus Homework: p 373 #1, 5, 13, 17, 21, 45, 57
Nov 18	Topic: Review for Exam III
Nov 19	EXAM III
Nov 21	Topic: 5.7 Rectilinear Motion Revisited Quiz 20: Section 5.5 Homework: p 383 #5, 9, 13
Nov 24 - 28	<i>NO CLASS</i>
Dec 1	Topic: 5.9 Evaluating Definite Integrals by Substitution Homework: p 393 #1, 5, 19, 21, 31, 35, 37, 45, 47
Dec 2	Topic: 5.9 Evaluating Definite Integrals by Substitution Quiz 21: Sections 5.6 and 5.7 Homework: p 393 #1, 5, 19, 21, 31, 35, 37, 45, 47
Dec 3	Topic: Review
Dec 5	Topic: Review Quiz 22: Section 5.9
Dec 10	FINAL EXAM, 8:30 - 10:30 AM
