
MATH 170-01 Calculus I

Spring 2015 · Syllabus

Class Information

Instructor: Dr. Lauren Williams

Class Meeting: MTWF 8:00 - 9:15 in Zurn 207

Office: Old Main 401 (Tower)

Office Phone: (814) 824-2226

Office Hours: Mon 9:15-10:15 and 1-2, Tues 9:15-11:30, Wed 9:15-10:15 and 12:30-2, Fri 9:15-10:15

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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.

Course Objectives

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

- recognize, define, 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. No other supplies are required for the course.

Homework

When we finish a section in the book, you should immediately begin working on the homework problems from the list attached.

Your work will not be collected. However, actually working through these problems is the key to your success in this class. Attending every class is not enough; mathematics can only be learned through practice. You should plan to spend a significant amount of time on the homework. It is expected that you spend approximately 8-12 hours per week studying the material outside our class meetings, according to the typical 2-3 hour per credit rule of thumb.

Stay up to date with homework, and get help if you cannot understand a problem after trying it on your own. Do not ignore a problem that you are struggling with. If you are having trouble with a topic, please come talk to me during office hours, ask questions in class, seek help from a classmate, or go to the department tutors for assistance. You are expected to try to work on all problems on your own first; when coming to my office, be prepared to show me what you've already tried.

Quizzes

There will be several problems assigned from each section of the textbook. Homework quizzes will be given according to the attached schedule, generally every Tuesday and Friday. These will be brief quizzes, with questions 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.

Quiz grades will not be based strictly on whether or not you found the correct answer. Your work must also be written clearly, and with proper notation, to receive full credit.

Midterm Exams

We will have three in class exams on the dates below. 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.

Exam Dates:

Wednesday, February 25

Wednesday, April 1

Wednesday, April 29

Final Exam

The final exam will be cumulative, and is scheduled for **Monday, May 11, 8:00-10:00 am.**

Final Grades

Grades will be calculated as follows:

- 50% - Average of 3 midterm exams (lowest replaced by final exam, if better)
- 20% - Average of homework quizzes (lowest two grades dropped)
- 30% - 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

Quiz and exam grades will be posted on Blackboard, so you can keep track of your progress at any time.

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 7 - 9 pm	Monday 7 - 9 pm	Tuesday 7 - 9 pm	Thursday 7 - 9 pm
Rachel Lexi	Michael Lexi	Rachel Danielle Mary	Danielle Michael Jenna

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.

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.

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.

Math 170-01 Calculus I Spring 2015 Course Schedule

Date	Topic	Quiz
Jan 28	Class Introduction	
Jan 30	0.1 Functions	
Feb 2	0.2 New Functions from Old	
Feb 3	0.3 Families of Functions	Quiz 1 on Section 0.1
Feb 4	0.4 Inverse Functions; Inverse Trig Functions	
Feb 6	0.5 Exponential and Logarithmic Functions	Quiz 2 on Sections 0.2 and 0.3
Feb 9	1.1 Limits (An Intuitive Approach)	
Feb 10	1.2 Computing Limits	Quiz 3 on Sections 0.4 and 0.5
Feb 11	1.3 Limits at Infinity; End Behavior of a Function	
Feb 13	1.3 Limits at Infinity; End Behavior of a Function	Quiz 4 on Sections 1.1 and 1.2
Feb 16	1.4 Limits (Discussed More Rigorously)	
Feb 17	1.5 Continuity	Quiz 5 on Section 1.3
Feb 18	1.5 Continuity	
Feb 20	1.6 Continuity of Trig, Exponential, and Inverse Functions	Quiz 6 on Section 1.4
Feb 23	2.1 Tangent Lines and Rates of Change	
Feb 24	Review for Exam I	Quiz 7 on Sections 1.5 and 1.6
Feb 25	EXAM I	
Feb 27	2.2 The Derivative Function	
Mar 2	2.3 Introduction to Techniques of Differentiation	
Mar 3	2.4 The Product and Quotient Rules	Quiz 8 on Sections 2.1 and 2.2
Mar 4	2.5 Derivatives of Trig Functions	
Mar 6	2.6 The Chain Rule	Quiz 9 on Sections 2.3 and 2.4
Mar 9 - 13	<i>Mid Semester Break - NO CLASS</i>	
Mar 16	3.1 Implicit Differentiation	
Mar 17	3.2 Derivatives of Logarithmic Functions	Quiz 10 on Sections 2.5 and 2.6
Mar 18	3.3 Derivatives of Exp and Inverse Trig Functions	
Mar 20	3.4 Related Rates	Quiz 11 on Sections 3.1 and 3.2
Mar 23	3.4 Related Rates	
Mar 24	3.5 Local Linear Approximation	Quiz 12 on Sections 3.2 and 3.3
Mar 25	3.6 L'Hopital's Rule; Indeterminate Forms	
Mar 27	3.6 L'Hopital's Rule; Indeterminate Form	Quiz 13 on Section 3.4
Mar 30	4.1 Increase, Decrease, and Concavity	
Mar 31	Review for Exam II	Quiz 14 on Sections 3.5 and 3.6
Apr 1	EXAM II	
Apr 2	4.2 Relative Extrema; Graphing Polynomials	
Apr 3	<i>Easter Break - NO CLASS</i>	

Math 170-01 Calculus I Spring 2015 Course Schedule (Continued)

Date	Topic	Quiz
Apr 6	<i>Easter Break - NO CLASS</i>	
Apr 7	4.3 Rational Functions, Cusps, and Vertical Tangents	Quiz 15 on Section 4.1
Apr 8	4.3 Rational Functions, Cusps, and Vertical Tangents	
Apr 10	4.4 Absolute Maxima and Minima	Quiz 16 on Section 4.2
Apr 13	4.5 Applied Maximum and Minimum Problems	
Apr 14	4.5 Applied Maximum and Minimum Problems	Quiz 17 on Section 4.4
Apr 15	4.6 Rectilinear Motion and 4.7 Newton's Method	
Apr 17	4.8 Rolle's Theorem; Mean Value Theorem	Quiz 18 on Section 4.5
Apr 20	5.1 An Overview of the Area Problem	
Apr 21	5.2 The Definite Integral	Quiz 19 on Section 4.8
Apr 22	5.3 Integration by Substitution	
Apr 24	5.3 Integration by Substitution	Quiz 20 on Sections 5.1 and 5.2
Apr 27	Topic: 6.7 Singular Value Decomposition	
Apr 28	Review for Exam III	Quiz 21 on Section 5.3
Apr 29	EXAM II	
May 1	5.6 The Fundamental Theorem of Calculus	Quiz 22 on Section 5.5
May 4	5.7 Rectilinear Motion Revisited	
May 4	5.9 Evaluating Definite Integrals by Substitution	Quiz 23 on Section 5.6
May 6	Review for Final Exam	Homework 13 Due
May 8	<i>Reading Day - NO CLASS</i>	
May 11	FINAL EXAM 10:30-12:30	

Math 170-01 Calculus I Spring 2015 Homework Assignments

Note: Numbers always refer to problems in the "Exercise Set" portion, not the "Quick Check Exercises".

Section	Page	Problems
0.1	12	1, 3, 5, 7, 9, 15, 19, 23, 27, 31a-c
0.2	24	1, 3, 5, 11, 13, 17, 25, 27, 29, 31, 33, 35, 39, 41, 49
0.3	35	1, 3, 11, 15, 17, 19, 25, 29, 31
0.4	49	1, 9, 13, 17, 19, 25, 27, 31
0.5	61	1, 5, 9, 11, 13, 15, 17, 21, 23, 25, 27, 47
1.1	77	1, 3, 5, 7, 9, 21, 23, 25
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, 17, 21, 29, 35
1.6	125	1, 7, 9, 13, 21, 23, 27, 31, 37, 67
2.1	141	3, 11, 13, 15, 17, 13
2.2	152	1, 3, 7, 9, 11, 21, 23, 29
2.3	161	1, 3, 5, 7, 9, 13, 15, 17, 21, 41, 43
2.4	168	1, 3, 5, 7, 11, 13, 19, 31, 33
2.5	172	1, 5, 11, 15, 17, 21, 27
2.6	178	3, 7, 11, 15, 17, 19, 23, 35, 37, 39
3.1	190	3, 5, 7, 9, 11, 13, 15, 17
3.2	195	1, 3, 7, 13, 19, 23, 25, 35, 37, 41
3.3	201	15, 17, 19, 21, 23, 37, 43, 51, 65
3.4	208	1, 5, 13, 15, 17, 19
3.5	217	3, 5, 7, 23, 29
3.6	226	1, 7, 11, 13, 17, 21, 23, 47
4.1	241	1, 5, 7, 15, 19, 21, 29, 39
4.2	252	3, 5, 7, 9, 11, 19, 25, 29, 33, 37, 41, 45
4.3	264	1, 3, 9, 13, 25
4.4	272	3, 7, 9, 13, 21, 23, 25, 27
4.5	283	3, 5, 13, 19, 21, 31, 37
4.6	294	1, 3, 17, 19
4.8	308	1, 3, 5, 7, 15, 25
5.1	321	13, 15, 17
5.2	330	9, 11, 13, 15, 17, 19, 21, 23, 27, 43, 45
5.3	338	1, 3, 7, 9, 15, 17, 21, 23, 27, 31, 33, 41, 47
5.5	360	13, 15, 19, 21, 23
5.6	373	7, 9, 13, 17, 19, 23, 29, 31
5.7	381	5, 9, 13, 17
5.9	393	1, 5, 9, 15, 31, 33, 37, 43, 49