Worcester Polytechnic Institute

MA 1021: Calculus 1
Department of Mathematical Sciences
C Term 2021

Instructor:
Professor Marcel Blais
myblais@wpi.edu, 508-831-5677

Peer Learning Assistant (PLA):
Ally Salvino
amsalvino@wpi.edu

Required Textbook:
Thomas' Calculus: Early Transcendentals, 14th Edition by Thomas, Weir, & Hass.
ISBN-13: 978-0134439020
No license for MyMathLab is required for this course

Course Description:
This C Term course is offered in both online and hybrid formats. The only difference between the two formats is the format of the weekly active learning session. The online course will have a virtual active learning session and the hybrid course will hold an in-person active learning session. The online and in-person versions of the active learning sessions will cover the same material.

All video lectures, written homework assignments, and WebWork assignments are posted in the Modules section of the Canvas course webpage. The lectures can be viewed asynchronously on a computer, tablet, or smart phone. Students are expected to watch the lecture videos & maintain pace with the course lectures & assignments per the schedule at the end of this document and in the Canvas modules.

We will cover chapters 2 through 4 of the textbook.
The topics covered include rates of change, limit concepts, limits of trig functions, infinite limits, continuity, the derivative, chain rule, generalized power rule, optimization in 1 dimension, derivatives of transcendental functions, implicit differentiation, related rates, Newton's method, differentials, linear approximation, the mean value theorem, extreme values, first & second derivative tests, concavity, curve sketching.

Prerequisite Material:
Recommended background: Knowledge of pre-calculus, particularly algebra, geometry, and trigonometry.

Worcester Polytechnic Institute

Learning Outcomes:
By the completion of this course, learners will be able to:

- Use differential calculus to model and solve problems involving rates of change and tangent lines.
- Apply the concept of limits to derive differential calculus models.
- Compute derivatives of differentiable functions using both the definition of derivative & standard differentiation rules.
- Solve problems involving related rates and single-variable optimization.
- Use information involving continuity, differentiability, and asymptotic behavior to graph functions.

Communication:
The primary interface for communication with the instructor & PLA will be email, the Canvas course website, office hours, conference sessions, active learning sessions & Piazza. All information about the course will be maintained on the course web page in WPI's Canvas system. Check it often.

Check your *WPI* email *daily*. Students can expect a response to email within 24 hours on weekdays and within 48 hours on weekends.

The use of Piazza in Canvas is *strongly* encouraged for discussion with peer students, the instructor, and the PLA. It provides a forum where students can post questions anonymously if preferred.

Active Learning Sessions:
These are weekly problem solving sessions with the instructor. Students will collaborate in teams on assignments that will be completed during the session.

- Online Session	Monday	2:00pm - 2:50pm	Zoom
- In-person Session	Tuesday	2:00pm – 2:50pm	AK 233

- Note that there will be no active learning sessions on Monday February 22 or Tuesday February 23 due to the midterm exam.

- The first two Tuesday active learning sessions (Feb 2 & Feb 9) will be held remotely via Zoom due to WPI COVID restrictions.

Conference Sessions:
These are interactive sessions with the PLA that will meet virtually & will be held virtually using Zoom. Students are *strongly* encouraged to attend these sessions.

- Friday 3:00pm - 3:50pm

Worcester Polytechnic Institute

Office Hours:
Both the instructor and the PLA will hold regular office hours for this course. Per WPI's official policy during the COVID pandemic, these are held virtually over Zoom and are managed in the Canvas course calendar. Students are *strongly* encouraged to attend office hours.

Course Structure:
This is a 7-week course.

- Each week begins on Thursday at 6am US Eastern Time and ends on the following Wednesday at 11:59pm US Eastern Time.
- The Canvas course webpage will be used to manage all aspects of the course. Content will be managed primarily in the announcements, modules, assignments, calendar, & Piazza sections of the Canvas page.
- Each week the course will consist of:
    - Up to 4 hours of lecture via online lecture modules.
    - One 50 minute of conference
    - One 50 minute active learning session
    - Online office hours via Zoom.
    - Multiple WebWork assignments, integrated into the modules.
    - 1 written homework assignment
- All written homework for a given week will be turned in on Wednesdays at 11:59pm US Eastern Time. Submissions will be done with a *single-file* PDF upload to Canvas.

Worcester Polytechnic Institute

Course Requirements:

1. **Assignments**
   There are two primary assignment categories for this course:
   - **Written Homework**
     These assignments involve handwritten solutions to mathematics problems from the course textbook. Solutions should be second draft and thoroughly demonstrate solutions and derivations, including justifications of steps. These assignments are due once per week, submitted as scanned PDF files in Canvas. Each assignment should be submitted as *one* PDF file.

     Written homework will be due at 11:59pm US Eastern Time every Wednesday.

Written Homework Assignment Rubric:

Each homework problem is graded out of 10 points according to the criteria below:

Grade	10
10	Completely correct, clear, & thorough write-up of problem solution, citing appropriate rules & theorems where appropriate. Quality is neat and easily readable.
9	Correct, clear, & thorough write-up of methodology & problem solution, citing appropriate rules & theorems where appropriate, with 1 minor mistake or omission. Quality is neat and easily readable.
6-8	Mostly correct write-up of methodology & problem solution with a few minor mistakes or omissions. Quality is neat and readable.
2-5	Incorrect solution. Partial credit is given according to key insights for the problem. Quality is readable.
0-1	Little to no work shown, giving only answers.

- **WebWork**
  These are online assignments that are accessed through a web browser and constitute the bulk of the assigned work for this course. A link to each WebWork assignment will be provided in the Assignments section of the Canvas website and within the modules in which the material is covered. The WebWork assignments should be accessed *exclusively* via these individual assignment links. You can login using your WPI username (must be all lowercase) and password.

  WebWork assignments will be due at 11:59pm US Eastern Time on Mondays, Tuesdays, and Fridays of each week. WebWork problems are graded instantaneously upon answer submission.

  You are encouraged to discuss the homework & WebWork problems with other students, but all homework & WebWork assignments must be completed and submitted independently.

  Note that *all* WebWork and homework assignments are posted during the first week of the course.

  Feedback on all written assignments will be given within one week.

3. **Exams**
   There are two exams for this course, a midterm and a final exam. The exams will be taken remotely using remote proctoring software.

Midterm Exam	**Tuesday,**	**February 23,**	**2-2:50pm**
Final Exam	**Thursday,**	**March 18,**	**2-3:50pm**

   - Note that Thursday, March 18 follows a Friday schedule per the WPI academic calendar, and thus the final exam period uses both the 2-2:50pm lecture time and the 3-3:50pm conference time.

   Make-up Exam Policy:
   Make-up exams will only be allowed in the event of a documented emergency. You are responsible for avoiding conflicts with the exams.

4. **Late Work Policy**
   Late assignments without prior consent of the professor will not be accepted and will receive a grade of 0. Extensions will be granted only in the event of unforeseen emergencies or extenuating situations that you discuss with the professor in advance.

POLICIES

Grading Policy:

The numerical course grade will be determined by the maximum of Scheme A and Scheme B below:

	Scheme A	Scheme B
WebWork & Homework Average	40%	40%
Active Learning Average	10%	10%
Midterm Exam	20%	10%
Final Exam	30%	40%

Each homework and WebWork grade will be converted to a percentage, and then those percentages are averaged to compute the WebWork & homework average. The lowest of such WebWork & homework grades will be dropped.

Final course letter grades are based on a student's performance as follows:

Letter Grade	Percentage
A	90 - 100
B	80 - 89
C	70 - 79
NR	0 - 69

The instructor may adjust these grade cutoffs at the end of the course, but such an adjustment can only happen in the students' favor. For example, the minimum score for a grade of B could be decreased from 80 to 79, but it would never increase above 80.

Course incompletes may be granted if the major part of the course is completed; however, no additional credit can be given for missed work beyond the end of the course. In addition, in the case of an incomplete, the student is responsible for handing in the final work within the WPI required timeframe of one (1) year. After this time, an incomplete grade changes to a failing (NR) grade.

Worcester Polytechnic Institute

Disability Services:
If you need course adaptations or accommodations because of a disability, or if you have medical information to share with me, please make an appointment as soon as possible. If you have not already done so, students with disabilities, who believe that they may need accommodations in this class, are encouraged to contact the Disability Services Office (DSO), as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in Daniels Hall, and its phone number is (508) 831-5235.

Academic Integrity:

You are expected to be familiar with the *Student Guide to Academic Integrity at WPI* that is downloadable from here. Consequences for violating the Academic Honest Policy range from earning a zero on the assignment, failing the course, or being suspended or expelled from WPI.
Common examples of violations include:

- Copying and pasting text directly from a source without providing appropriately cited credit
- Paraphrasing, summarizing, or rephrasing from a source without providing appropriate citations
- Collaborating on individual assignments
- Turning in work where a good portion of the work is someone else's, even if properly cited

This syllabus is subject to change at the professor's discretion.

Worcester Polytechnic Institute

Course Schedule:

Week/Topic	Content Delivery	Assignments
1 Limits & Continuity	Modules: • Introduction • Limits • Continuity • Rational Functions	• WW1_Limits • WW2_Continuity • WW3_Rational_Functions
2 Derivative	Modules: • Rates of Change & Derivative • Differentiation • Chain Rule	• Homework 1 • WW4_Derivative_&_Rates_of_Change • WW5_Differentiation • WW6_Chain_Rule
3 Functions & Their Derivatives	Modules: • Derivative of Trig Functions • Exponential Functions • Inverse Functions • Logarithms • Inverse Trig Functions	• Homework 2 • WW7__Trig_Derivatives • WW8_Exponentials • WW9_Logarithms • WW10_Inverse_Trig
4 Midterm, Higher-order Derivatives, & Related Rates	Modules: • Higher-Order Derivatives • Implicit Differentiation • Related Rates • Extrema of Functions	• Homework 3 • WW11_Implicit_Diff_&_Related_Rates • WW12_Extrema • **Midterm Exam**
5 Mean Value Theorem, Tests for Extrema, Polynomial Sketching	Modules: • Mean Value Theorem • 1st Derivative Test • 2nd Derivative Test • Polynomial Curve Sketching	• Homework 4 • WW13_Mean_Value_Theorem • WW14_First_Derivative_Test • WW15_Higher_Derivatives
6 Curve Sketching, Optimization, Approximation	Modules: • Rational Function Curve Sketching • General Curve Sketching • Applied Optimization • Linear Approximation	• Homework 5 • WW16_Curve_Sketching • WW17_Optimization • WW18_Linear_Approximation
7 Newton's Method, Final Exam	Modules: • Newton's Method	• Homework 6 • WW19_Newton_Method WebWork 12 • **Final Exam**