Worcester Polytechnic Institute

MA 1023: Calculus 3
Department of Mathematical Sciences
B Term 2022

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Textbook:
Thomas' Calculus: Early Transcendentals, 15th Edition by Thomas, Weir, & Hass.
ISBN-13: 978-0137559855

- No license for MyMathLab is required for this course
- Note that the "Early Transcendentals" part of the textbook title is important. There are other calculus books by these authors, and you won't want to make the error of buying the wrong book.

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Course Delivery:
This B Term course is offered in-person format on the WPI campus. Students will also occasionally be required to watch some asynchronous video content outside of regular class hours.

- All in-person meetings will be Echo360 Video captured and will be available on the course Canvas site. The video materials can be used by students who may need to transition to remote learning due to COVID-19 issues.
- Asynchronous videos, organized by topic, will also be provided for students' optional use for studying.

Lecture:	MTRF	Time & Location Depend on Section
Discussions:		Day, Time & Location Depend on Section
Labs		Day, Time & Location Depend on Section

Assignments will be posted in the Modules section of the Canvas course webpage. Students are expected to maintain pace with the course assignments per this syllabus and the schedule of assignments in the modules. The Modules section organizes the course content chronologically, with *all* assignments included. *All* deliverables for the course will appear in the Modules section.

We will cover Some of chapters 4 & 8 and chapters 10 through 13 of the textbook. Topics include indeterminate forms, improper integrals, sequences, series, Taylor series and Taylor polynomials, convergence tests, power series, parametric curves, polar coordinates, vectors and vector products, lines and planes in space, curves in space, motion, curvature, acceleration.

Prerequisite Material:
Single variable differential & integral calculus at the level of MA 1021 & MA 1022.

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

- Compute limits of indeterminate forms.
- Compute improper integrals.
- Determine convergence or divergence of sequences.
- Use a set of tests to determine convergence or divergence of infinite series.
- Determine the interval of convergence of a power series.
- Construct Taylor series & polynomials & use Taylor polynomials to approximate functions.
- Graph polar equations & compute areas of regions described by polar graphs.
- Use vectors in 2 and 3 dimensional space for various applications in calculus.
- Perform calculations & build models with lines and planes in 3 dimensional space.
- Construct models of motion in 3 dimensional space using parametric curves.

Communication:
The primary interface for communication with the instructor & course staff will be email, the Canvas course website, office hours, discussions, & 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 the instructor and peer students. It provides a forum where students can post questions anonymously if preferred.

Discussions:
These are interactive sessions with the course PLAs, or TA. Students are ***strongly*** encouraged to attend these sessions as they are an essential part of the course.

Office Hours:
These will be managed in the Canvas course calendar and will be a mix of in-person and virtual for both the instructor and the course staff.

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Course Structure:

This is a 7-week course.

- Each week begins on Monday at 6am US Eastern Time and ends on the following Sunday 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 sections of the Canvas page.
- Each week the course will consist of:
    - 4 hours of lecture in-person
    - 1 hour of Discussion
    - Lab work (some in-person, some asynchronous)
    - Occasional viewing of videos outside of class
    - Office Hours
    - Multiple WebWork assignments
    - 1 written homework assignment
    - 1 exam during exam weeks
- There will be lab assignments for the course that run independently of the lectures and discussions.
- All written homework will be turned virtually on Canvas on Tuesdays at 11:59pm US Eastern Time. Submissions will be done with a *single-file* PDF upload to Canvas.

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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 Tuesday, except for the last wees of the course when the due date will be different.

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 typically be due at 11:59pm US Eastern Time on *Mondays, Thursdays, 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. Labs

There will be labs for this course in which students will utilize software tools to enhance and deepen understanding of calculus concepts. The software tools Microsoft Excel, Desmos, and MATLAB will be used. Students register for these separately from lectures and discussions.

4. Exams

There are 3 exams for this course: 2 midterms and a final exam.

Midterm Exam 1	Friday,	November 11	In Class
Midterm Exam 2	Friday,	December 2	In Class
Final Exam	Friday,	December 16	In Class

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.

5. Late Work Policy

Extensions for assignments may be granted on a case-by-case basis. If you feel like you need an extension on an assignment, you are strongly encouraged to communicate with the professor about this as early as possible. Reasonable extension requests may be granted. Late assignments without approved extensions will receive a grade of zero.

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POLICIES

Grading Policy:

The numerical course grade will be determined by grading scheme below:

Item	Weight
WebWork & Homework Average	30%
Lab Average	10%
Midterm 1 Exam	20%
Midterm 2 Exam	20%
Final Exam	20%

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 an NR grade.

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Accessibility Services:

Students with approved academic accommodations should plan to submit their *accommodation* letters through the *Office of Accessibility Services Student Portal.* Should you have any questions about how accommodations can be implemented in this particular course, please contact me as soon as possible. Students who are not currently registered with the Office of Accessibility Services (OAS) but who would like to find out more information regarding requesting accommodations, documentation guidelines, and what that all entails should plan to contact them either via email *AccessibilityServices@wpi.edu* or via phone (508) *831-4908.*

Mental Health:

We are embarking on this course during a difficult time, one during which many are experiencing mental health issues. As your course instructor, I am invested in your success in this course and in your well-being, and I will support you to help you succeed.

Mental health challenges, including significant stress, anxiety, mood changes, excessive worry, or problems with eating and/or sleeping can interfere with learning. The source of issues like these might be related to your course work; if so, please meet with me to discuss these issues.

WPI provides mental health services to support the well-being and academic success of students. The Student Development & Counseling Center (*SDCC).* offers free, confidential services to help you manage personal challenges.

In the event I suspect you need additional support, I will express my concerns and the reasons for them and remind you of resources that might be helpful to you. It is not my intention to know the details of what might be bothering you, but simply to let you know I am concerned and that help, if needed, is available.

Getting help is a smart and courageous thing to do -- for yourself and for those who care about you.

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Academic Integrity:

You are expected to be familiar with the *WPI Academic Integrity Policy,* which can be found here. Consequences for violating the Academic Honesty 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.

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Course Schedule:

Week/Topic	Content Delivery	Assignments
1 Indeterminate Forms & Improper Integrals Sequences	Modules: • Introduction • Indeterminate Forms • Improper Integrals • Sequences	• WW1_Indetermiante_Forms
2 Sequences & Series	Modules: • Sequences • Series • Integral Test • nth Term Test • Comparison Tests	• Homework 1 • WW2_Improper_Integrals • WW3_Sequences • WW4_Geometric_&_Telescoping Series •
3 Ratio & Root Tests, Alternating Series Midterm Exam 1	Modules: • Ratio Test • Root Test • Alternating Series	• Homework 2 • WW5_Integral_Test • WW6_nth_Term_Test_&_Comparison_Tests • WW7_Ratio_&_Root_Tests • **Midterm Exam 1**
4 Alternating Series Estimation, Power Series, & Taylor Series	Modules: • Alternating Series Estimation • Power Series • Taylor Series • Taylor Polynomials • Taylor's Theorem	• Homework 3 • WW8_Alternating_Series • WW9_Power_Series
5 Taylor Polynomials & Polar Coordinates	Modules: • Taylor Polynomial Approximations • Polar Coordinates	• Homework 4 • WW10_Taylor Series
6 Polar Graphing & Parametric Curves Midterm Exam 2	Modules: • Polar Coordinates • Areas in Polar Coordinates • Parametric Curves	• Homework 5 • WW11_Taylor_Polynomials • WW12_Polar_Coordinates • **Midterm Exam 2**
7 Vectors, Lines in 3D, Planes,	Modules: • Vectors • Vector Dot Product • Vector Cross Product • Vector Projection • Lines • Planes	• Homework 6 • WW13_Polar_Areas • WW14_Parametric_Curves • WW15_Vectors • WW16_Vector_Multiplication • WW17_Vector_Projection
8 Curves in 3D, Motion, & Curvature Final Exam	Modules: • Curves in 3D • Motion • Curvature	• Homework 7 • WW18_Lines_in_3D • WW19_Planes • WW20_Curves & Motion • **Final Exam**