MA 1023B FALL 2023
CALCULUS III SYLLABUS

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Contact Information

Name	Email	Office Hours	Section	Lec/Dis Time	Location
Dr. Binan Gu	bgu@wpi.edu	TRF 10 - 11 AM Armenian Church 003	BL02	MTRF 9 - 10 AM	UH 520
Darshan Swami	dswami@wpi.edu	TBA	BD02	W 9 - 10 AM	Portable Classroom
			BD06	W 1 - 2 PM	Portable Classroom

Course Description

This course covers topics that are split between two main branches: 1) intermediate differential and integral calculus topics including indeterminate forms, improper integrals, sequences, series, Taylor series and Taylor polynomials, convergence tests, power series, and 2) an introduction to multivariable functions that prepare you for MATH 1024, including topics on parametric curves, polar coordinates, vectors and vector products, lines and planes in space, curves in space, motion, curvature and acceleration.

Recommended background: MA 1021 and MA 1022. Although the course will make use of computers, no programming experience is assumed.

Textbook

Thomas' Calculus : *Early Transcendentals 15th Edition*, J.R. Hass, C.E. Heil, M.D. Weir, P. Bogacki, Pearson ISBN: 9780137559879, 0137559879

Course Objectives

This course continues the exploration of fundamental ideas in modern calculus and mathematics – limits. Forming a solid understanding of limits in various mathematical contexts prepares the learner for adapting methods taught in advanced undergraduate courses in mathematics, science and engineering. The primary objectives of this course are:

- 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.
- Provide a prime example of each topic in an application.

Course Organization

The class typically meets 5 times per week: 4 lectures on MTRF, and 1 discussion section. Students are responsible for all material presented in lecture and discussion. My expectations for these activities are:

Lectures: The four quality hours we spend together every week are meant to **introduce** the subjects by recalling one-dimensional equivalents and examples. Students are expected to **know of** (i.e. *Lehr*) the introduced topics after every lecture. Mastery comes later after exercises. These lectures are recorded via Echo 360, and these videos can be accessed through the course Canvas page.

Practice Problems: The majority of your association with this course lies in problem solving outside the classroom. Students are expected to take the intuitions gained from lectures and put them into careful examinations by doing suggested homework exercises (i.e. *Kunst*). Solutions to these problems are neither collected nor graded, but they form the main topics of discussion during the Discussion section. The problem selection is a combination of examples of the types of problems to be found on the exams, along with problems that are more detailed and which enhance learning the topics at a deeper level.

Extra credit problems may be assigned during lecture time. They normally involve filling out the details of a derivation and/or more challenging problems within the context of the course. Grades earned from these problems will be complemented to your overall HW grade (see below), though they will not help one exceed the maximum number of points possible.

Discussion: Students have an opportunity to sit down and work through the practice problems on a topic with an instructor and have their individual questions addressed. It is through the Discussion that the student can get major questions asked so that after Discussion, the student can continue to work through the practice problems to develop mastery.

In each Discussion session, everyone will solve some of the practice problems posted under Discussion on a clean piece of paper, to be submitted at the end of the Discussion. You will be graded by your attendance and performance in class, each out of 1 point. Discussion performance includes asking good questions, helping your classmates and completing more than 75% of the assigned problem numbers. These points will be added to your HW grade with a 1:1 conversion rate (without exceeding the maximum HW points)

Canvas: Course materials can be found on the Canvas page. The material is organized by the section number of the topic in the text. In the event that lectures need to be delivered remotely, they will take place through Zoom.

Students are expected to spend an additional **8-12 hours per week** studying outside of class. This includes reading the text, organizing notes, and solving problems.

Communications: 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.

Assignments

There are three different types of assignments for this course.

Written Homework.

Written Assignments weigh considerably in this course. Take them seriously. These assignments involve handwritten solutions to mathematical problems from the course textbook and my lecture notes. Written solutions should be **second drafts** and thoroughly demonstrate your thought process, including justifications of steps. These assignments are due once a week, and they can be accessed through the Assignments Module on Canvas.

Collaborations among classmates are welcome. Every HW submission must declare a list of collaborators at the beginning, though each student is expected to compose his/her own solutions. **Extensive similarities between assignments without collaboration declarations will be considered as plagiarism and will be penalized severely.**

If the solution depends on online sources or textbooks, the student is responsible for citing them with a reference style of your choosing. Uncited solutions, if confirmed, will be considered as plagiarism and will not receive any credit.

A *return-and-correct policy* is as follows: each student has three days to correct his/her solutions after HW is returned. Resubmissions may be graded without penalty if the initial submission has sufficient effort in solving **every** problem. Poor attempts at the initial submission will receive little credit and no resubmission opportunities.

Every resubmission shall contain the original copy and must address every query to be considered valid. The corrections should be written using a different colored pen/pencil, either in a side column clearly marked for short corrections, or on new sheets of paper for long corrections.

The initial submission and later corrections are to be submitted as **a single PDF file** via the canvas assignment module.

Written Homework Assignment **and** Corrections abide by the following hierarchy of consideration:

Type	Submission Qualities
Presentation	Quality is neat and easily readable. Ample spacing between each problem.
Completion	Every problem has a committed attempt.
Syntax	Correct use of basic mathematical symbols: $=$ (equal to), $\implies$ (implies), lim (limit sign before evaluation), $\to$ (converges), $\int f(x)\,dx$ (correct variable), etc.
Correctness	Completely correct, clear, & thorough write-up of problem solution, citing appropriate rules & theorems where appropriate.

The instructor and the PLA/Grader reserve the rights to reject HW with poor presentation and careless completion without further review of its content. The first rejection acts as a warning, where its resubmission incurs a 10% penalty; any HW rejection after the first offense automatically receives a score of zero.

Any late HW abides by a "10% per day late submission policy" unless a valid excuse is supported with proper documentation.

Labs.

Provides instruction on use of software MATLAB and Desmos for Calculus applications. Students registered to labs (M or T) receive synchronous instruction in the first week introducing the topic and software commands required to execute the scheduled labs. Asynchronous videos assist the student through a systematic process leading to understanding of graphing, algebraic, and Calculus commands. In the next week, lab instructors offer office hours for questions.

There are three lab sessions for B-term:

(1) Thursday November 2nd and Friday November 3rd – lab work is due Wednesday November 8th
(2) Thursday November 16th and Friday November 17th – lab work is due Tuesday November 21st
(3) Thursday November 30th and Friday December 1st – lab work is due Wednesday December 6th

Exams.

Three 50-minute exams are given in lecture. Each exam covers approximately the same amount of content and has approximately the same level of difficulty. **All exams are closed book, closed notes, and no electronic devices are allowed**. The tentative exam dates are **Nov 3, 2023, Nov 21, 2023, and Dec 15, 2023**.

Unless there is extenuating circumstances, no makeup exams are allowed. Students requesting exams to be taken at times other than the proposed dates must provide valid reasons with proper documentation (medical, familial, or religious reasons). A temporary grade of Incomplete is assigned until all makeup exams are finished (typically given during the first week of C-term).

Grades

Written HW: 40%.

Labs: 10%.

Exams: 50% (20% best two, 10% worst).

Tentative Final Grades: A (>90), B(80-89), C(70-79), NR (<70). To pass the course, every student must score at least 60 points in two of the three exams.

Special Arrangements

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 with me as soon as possible. My office location and office hours are listed above. If you have not already done so, students who believe that they may need accommodations in this class are encouraged to contact the Office of Accessibility Services (OAS) as soon as possible to ensure that these accommodations are implemented in a timely fashion. The OAS is in Unity Hall, (508) 831-4908. Students who need accommodations for exams are required to make the arrangements to take these exams at the Exam Proctoring Center (EPC) on the day of the exam.

Additional Policies

Electronic Policy. All lectures (audio and video) are captured through course capture and can be found on the course Canvas page. **NO** recording of audio or video by students is allowed during lecture or during discussion. Laptops, phones, and tablets should be turned off during the lecture and conference sessions. If you take notes (typing/stylus only) using these devices during lecture, then you should sit somewhere in the room where your screen activity is not distracting to your neighbors.

Exam Policy. Prior to the start of each exam, you must place all of your belongings (e.g., cell phone, study materials, smart watches, etc.) in your backpack and under your desk, so that no items are visible during the exam. **All exams this term are closed book, closed notes, and no electronic devices are permitted.** Cheating is an extreme offense. Students involved in plagiarism will be reported to the Dean without grace periods and negotiations.