MONTGOMERY COLLEGE - Germantown Campus
Mathematics & Statistics Department
Course Syllabus

I. Instructor Information

Professor: Zhou Dong
Email: Zhou.Dong@MontgomeryCollege.edu
Phone: (240) 567-7810
Office: HT 134 Germantown campus

Office Hours:

In-person office hours HT 134	MW 12:30 pm – 1:00 pm MW 2:45 pm – 3:15 pm
Appointment hours Virtual via Microsoft Teams	TR 9:30 am – 12:00 pm TR 2:00 pm – 3:00 pm
Click here to book an appointment	

II. General Course Information

Calculus II – MATH182 (Formerly MA182)

4 credits / 5 hours (For computation of tuition, this course is equivalent to five semester hours. Five hours each week.)

A continuation of MATH 181; intended primarily for students of the physical sciences, engineering, and mathematics. Further differentiation and integration of transcendental functions. Methods of integration with applications, indeterminate forms, improper integrals, Taylor's formula; infinite series; polar coordinates.

PREREQUISITE:
A grade of C or better in MATH 181 or equivalent, or consent of department.

Spring 2022 Sections

CRN 38933 MWF 9:00 am – 10:25 am Remote	CRN 34974 MWF 11:00 am – 12:25 pm HT 204

Microsoft Team (for both sections): Calculus II Spring 2022

III. Common Course Student Learning Outcomes

Upon course completion, a student will be able to:

- Evaluate integrals by using the appropriate techniques.
- Approximate definite integrals by using appropriate numerical techniques.
- Find limits involving indeterminate forms.

- Evaluate improper integrals.
- Set up, evaluate, and interpret integrals that represent arc length, area, volume, and average value.
- Set up, evaluate, and interpret integrals that model applications in physics.
- Solve selected differential equations using graphical, numerical, and analytic methods.
- Model applications such as population growth with differential equations.
- Determine the convergence or divergence of sequences and series.
- Represent functions with power series and approximate functions with Taylor polynomials.
- Graph polar equations.
- Use integration to find the area of a polar region.
- Use technology as an appropriate tool.

IV. Textbooks, Workbooks, and Supplies

Required materials for the course:

- *Single Variable Calculus: Concepts and Contexts* (4th edition), by James Stewart, Brooks-Cole, 2007. (The ebook is available with WebAssign).
- *WebAssign Access Code* – for access to online homework and the ebook WebAssign Class Key: **montgomerycollege 8413 0297**
- *Graphing calculator* - Desmos (www.desmos.com/calculator) is recommended.
- *Microsoft Teams and OneNote* – for course meetings, announcements and communication. MC students can download these programs for free from their Microsoft 365 account accessed through MyMC. **Link to Team.**

Requirements for remote instruction:

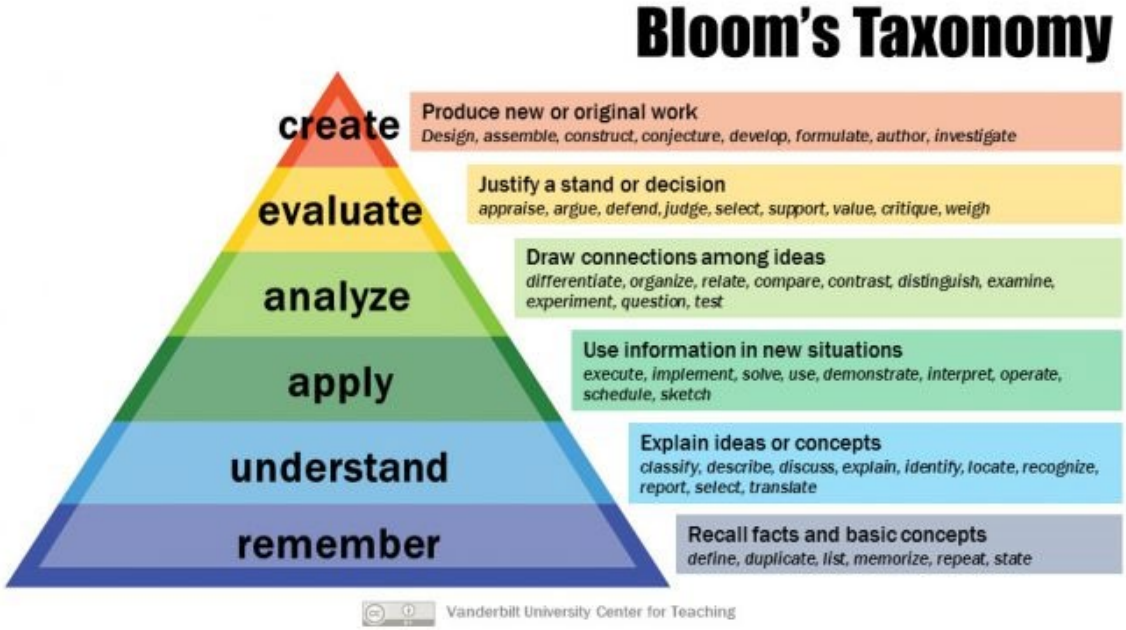
- New hardware specifications, for general and several specific programs, have been updated to help prepare students for online learning and ensure that all systems used will function properly. Please visit the Hardware Specifications page for the most up-to-date information.
- Cable service providers in the Montgomery County area (Comcast, RCN, and Verizon) are offering low-cost monthly internet service options to low-income residents. For eligibility requirements and additional information visit Low-Cost Home Internet Access.

V. Course Design

This course is designed to give the student a high degree of autonomy and students are expected to self-direct their learning. While many resources are provided for the student to aid in their learning, **the final course grade is based solely on the student's mastery of the course standards as determined through assessments** (see section B. Course Grade for details). This means it is up to the student to determine which resources to use (e.g. class attendance, textbook, lecture videos, online practice problems, etc.) in order to gain mastery of the course standards. Feedback on all assignments are provided for learning purposes only and will not affect the student's final course grade.

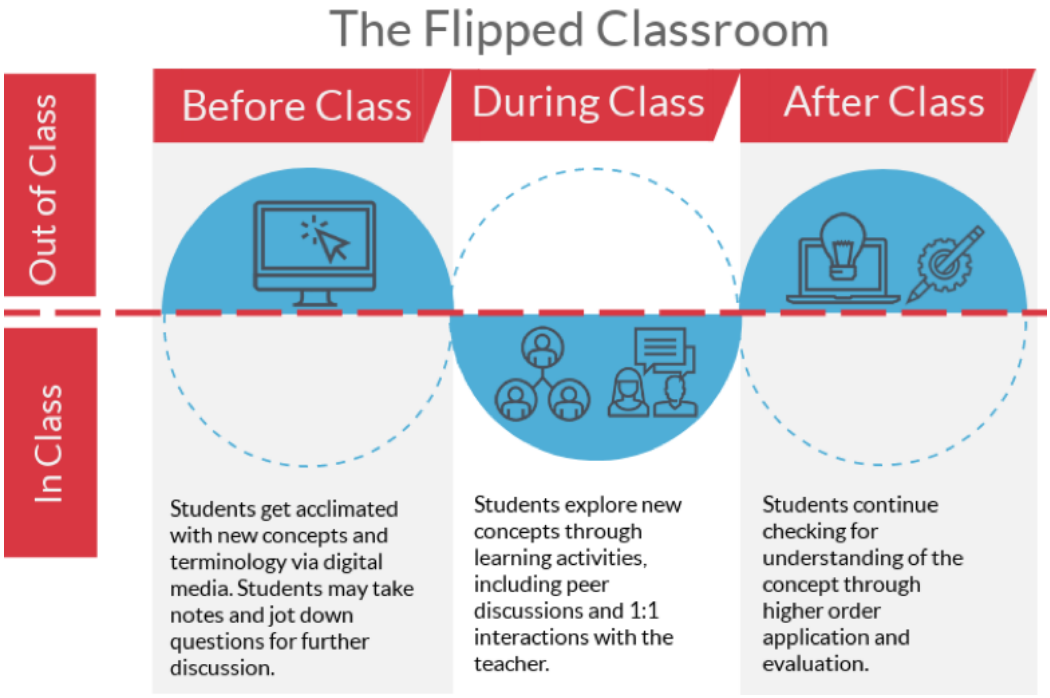
A. Bloom's Taxonomy

This class has been designed based on Bloom's Taxonomy. A basic understanding of Bloom's Taxonomy will help the student understand the course design as well as make better choices about how best to gain mastery of the material and be successful in this class.



B. Flipped Classroom Instruction

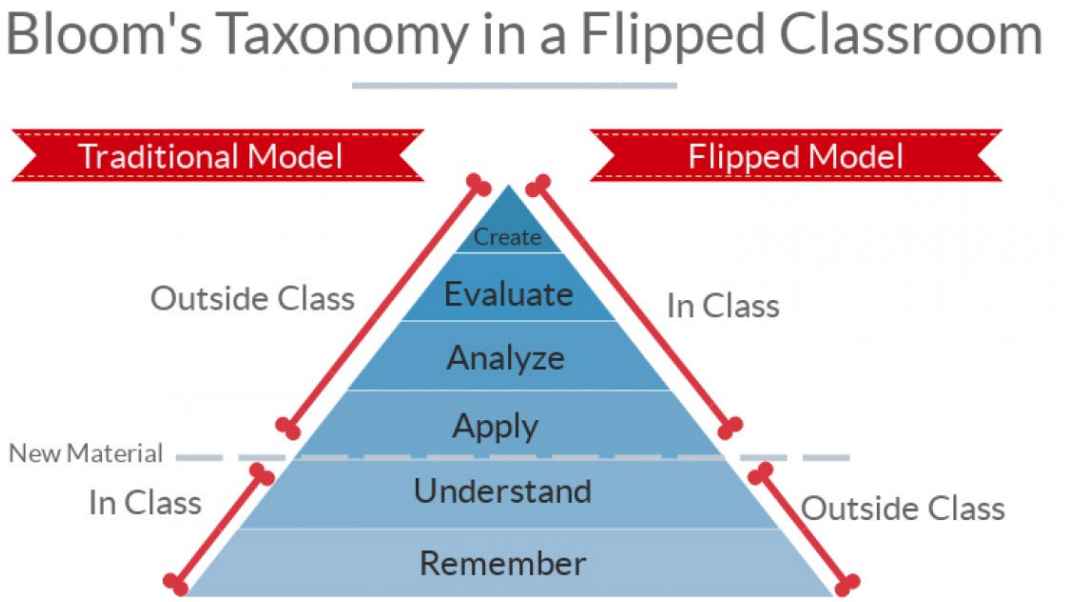
Under the flipped classroom model, students begin learning the course material at home before class and class time is focused on solidifying understanding through active discussion and problems solving. After class, students prepare for and take assessments.



While preparing for class, students have their initial exposure to the new material through reading the textbook and lecture slides and watching lecture videos. The focus at this time is on the *Remember* and *Understand* levels of Bloom's Taxonomy:

- Memorize definitions and theorems
- Paraphrase definitions and theorems
- Understand worked examples

During class, students work with each other and the instructor to develop the *Apply*, *Analyze*, and *Evaluate* levels of Bloom's Taxonomy. Occasionally, students are expected to reach the *Create* level of Bloom's Taxonomy. After class, students should focus on consolidating their learning through additional practice and self-assessment in order to demonstrate mastery of course standards.



Before class:

- Read textbook or lecture slides, or watch lecture videos
- Self-assess using Pre-class Assessment on WebAssign
- Prepare questions for class discussion

During class:

- Participate in class discussion
- Work in groups on in-class assignments
- Receive individual and/or small group instruction as needed

After class:

- Prepare for assessments and reassessments
  - Complete Practice Problem Assignments on WebAssign
  - Take practice quizzes in the Personal Study Plan on WebAssign
  - Attend instructor office hours
  - Utilize MAPEL Center tutoring
- Take assessments and reassessments as needed

It is essential that students put in the time and effort necessary in and out of class. It is generally recommended that for each hour of in-class time, the student spends 2-3

hours out of class studying. This class meets for 5 hours each week, therefore, ***students should expect to spend 10 – 15 hours outside class time studying for this class.***

VI. Course Requirements

A. Course Standards

This course has 28 core standards and 29 elective standards (57 standards total). The 28 core standards are essential material and EACH standard must be mastered in order to earn a grade of "C" or above. Most core standards are at the Apply and Analyze levels of Bloom's Taxonomy. The elective standards are either optional topics or a higher level question for a core standard topic. Detailed grading criteria can be found in section D. Course Grade and section E. Standards.

Core/ Elective	Standard Code	Standard Description
C	5.5SR	Evaluate indefinite and definite integrals via a single application of the substitution rule.
E	5.5SA	Evaluate indefinite and definite integrals via application of the substitution rule requiring algebraic or trigonometric manipulation of the integrand.
C	5.6BP	Evaluate indefinite and definite integrals via a single application of integration by parts.
E	5.6PS	Evaluate indefinite and definite integrals via multiple applications of integration by parts or integration by parts and the substitution rule.
C	5.7TI	Evaluate indefinite and definite integrals involving trigonometric functions by making appropriate use of the Substitution Rule and relevant trigonometric identities.
E	5.7TS	Evaluate indefinite and definite integrals by making a trigonometric substitution.
E	5.7PF	Evaluate indefinite and definite integrals by a partial fraction decomposition of the integrand.
E	5.8CA	Use CAS (computer algebra systems) to solve integrals and intepret the results appropriately.
C	5.9AI	Compute and analyze left endpoint, right endpoint, midpoint rule, trapezoidal rule, and Simpson's rule approximations of definite integrals.
E	5.9AE	Compute error bounds and number of intervals needed for error bound with midpoint, trapezoidal, and Simpson's rule approximations.
C	5.10RI	Recognize improper integrals and rewrite them as limits of integrals that are not improper.
E	5.10CI	Determine whether an improper integral converges or diverges.
C	6.1AF	Use integrals to compute areas bounded by functions, both with respect to x and with respect to y. (Evaluation of the integral may be done using technology)
E	6.1AP	Use integrals to compute areas bounded by parametric curves. (Evaluation of the integral may be done using technology)
E	6.2VS	Use integrals to compute volumes by the general slicing method. (Evaluation of the integral may be done using technology)
C	6.2VR	Use integrals to compute volumes of solids of revolution by the washer or disk method. (Evaluation of the integral may be done using technology)
E	6.3CS	Use integral to compute volumes of solids of revolution by the cylindrical shell method. (Evaluation of the integral may be done using technology)

C	6.4AC	Use integrals to compute arc length of functions with respect to x and with respect to y. (Evaluation of the integral may be done using technology)
E	6.4LP	Use integrals to compute arc length of parametric curves. (Evaluation of the integral may be done using technology)
C	6.5AV	Use integrals to compute average value of functions. (Evaluation of the integral may be done using technology)
E	6.5MV	Apply the Mean Value Theorem of Integrals appropriately.
C	6.6WK	Use integrals to compute work. (Evaluation of the integral may be done using technology)
E	6.6CM	Compute the center of mass for regions in the xy-plane (using integrals when necessary).
C	6.8PB	Compute the probability of various outcomes given a probability density function (using integrals when necessary).
E	6.8MM	Compute the mean and median for a probability density function (using integrals when necessary).
C	H.CG	Manipulate polar coordinates and equations, including their graphs.
E	H.AR	Use integrals to compute areas of polar regions. (Evaluation of the integral may be done using technology)
E	H.AL	Use integrals to compute arc length of polar curves. (Evaluation of the integral may be done using technology)
C	8.1SQ	Determine whether a sequence converges with justification and find the limit of the sequence if possible.
E	8.1RS	Compute the limit of a recursive sequence.
C	8.2TD	Apply the Test for Divergence appropriately.
C	8.2GS	Analyze geometric series for convergence or divergence.
E	8.2GA	Solve application problems using geometric series.
E	8.2TS	Analyze a telescoping series.
C	8.3IT	Apply the Integral Test appropriately.
C	8.3CT	Apply the Comparison and Limit Comparison Tests appropriately.
E	8.3RE	Use the Remainder Estimate for the Integral Test for error bounding in approximating series by partial sums.
C	8.4AS	Apply the Alternating Series Test appropriately.
C	8.4RT	Apply the Ratio Test appropriately.
E	8.4AE	Use the Alternating Series Estimation Theorem for error bounding in approximating series by partial sums.
C	8.5RI	Determine the radius and interval of convergence of power series.
C	8.6PS	Generate power series for new functions from power series of known functions by algebraic means.
E	8.6DI	Generate power series for new functions from power series of known functions by differentiation or integration
C	8.7MS	Memorize the Maclaurin series for important functions.
E	8.7TS	Generate Taylor series for functions from the definition.
C	8.8TP	Generate Taylor polynomials from the definition.
E	8.8TA	Solve application problems using Taylor polynomials.
E	8.8ER	Compute error bounds for Taylor polynomial approximations of functions.
C	7.1DE	Test possible solutions to differential equations.
C	7.2DF	Relate differential equations to direction fields, and sketch solutions curves in direction fields.
C	7.2EM	Apply Euler's Method to find approximate solutions of Initial Value Problems.
C	7.3SE	Solve separable differential equations.
E	7.3OT	Find the orthogonal trajectories of families of curves.

E	7.3MP	Solve a mixing problem.
E	7.4CH	Solve a Newton's law of cooling or heating problem.
C	7.4EX	Generate exponential growth and decay models and analyze their solution curves.
E	7.5LG	Generate logistic growth models and analyze their solution curves.
Core	28	
Elective	29	
Total	57	

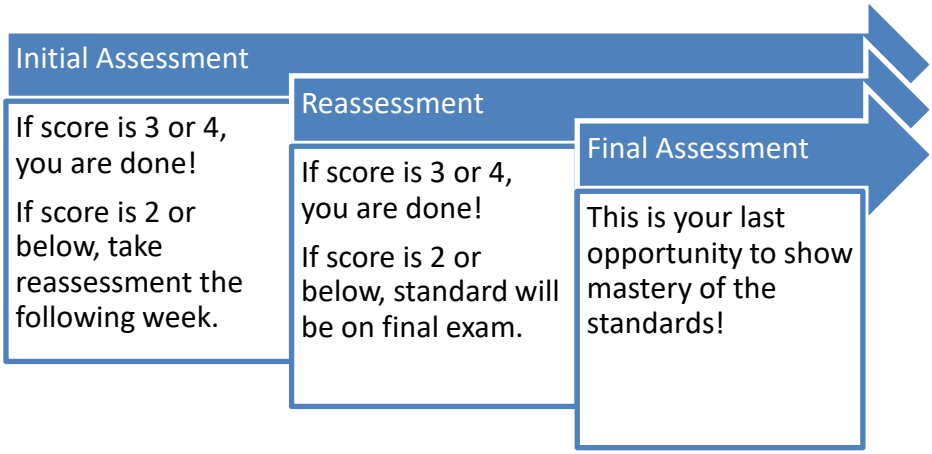
B. Course Grade

This course uses Standards Based Grading. Your course grade will be based solely on mastery of the course standards. Assessments of standards will be graded as follows:

Score	Mastery Level	Student work
4	Perfect Mastery	Demonstrates complete understanding of the underlying concept and provides correct solution with appropriate notation and use of language
3	Imperfect Mastery	Demonstrates complete understanding of the underlying concept but has minor errors in calculation and/or problems with notation and use of language
2	Developing	Demonstrates developing but incomplete understanding of the concept and/or major errors in the computation and presentation of the solution
1	Novice	Demonstrates little to no understanding of the concept with some relevant computations
0	No evidence	Demonstrates no evidence of understanding or not attempted

Both Perfect Mastery (score = 4) and Imperfect Mastery (score = 3) are considered mastery. A student is only required to demonstrate mastery on a standard once.

There will be three (3) opportunities for demonstrating mastery on each standard:



C. Standards

Final letter grades will be determined according to this rubric:

Grade	Core Standards	All standards (Core and Elective)
A	Mastery on all	Average score is 3.5 or above
B	Mastery on all	Average score is between 3 and 3.5
C	Mastery on all	Average score is below 3
D	Not all mastered	Average score is above 2
F	Not all mastered	Average score is below 2

Note:

- Mastery means a score of 3 or 4.
- For the grades of A, B, or C, you must demonstrate mastery on ALL Core Standards.

D. Assessments and Make-up Policy

Weekly assessments window will be Sunday 9:00 am – Monday 9:00 am. Students may take their initial and reassessments each week at any time during the 24-hour assessment window. Assessments will be administered electronically via the class Microsoft Teams and OneNote.

The Final Exam will be given according to the Montgomery College Final Exam Schedule.

All assessments in this class are closed-notes, closed-book, and individual. No collaboration is allowed on any assessment. All students are required to sign an honor pledge prior to taking any assessments for the course. Once the student has agreed to abide by the honor pledge the student will be able to self-proctor according to these rules:

- Student will not open the assessment questions prior to taking the assessment
- Student will not consult any resources (textbook, notes, internet, another person, etc.) other than the use of an approved calculator while completing the assessment
- Student will not discuss the assessment with anyone other than the instructor prior to the due date

Make-ups for missed assessments will not be available. All WebAssign assignments have been setup for automatic extensions when requested.

VII. Student Code of Conduct

A. Standards of College Behavior and Academic Honesty

Students are expected to adhere to the Montgomery College Student Code of Conduct (https://www.montgomerycollege.edu/_documents/policies-and-procedures/42001-student-code-of-conduct.pdf).

In particular, students should also familiarize themselves with the following excerpt regarding academic dishonesty: https://www.montgomerycollege.edu/_documents/academics/support/learning-centers/writing-reading-learning-ctr-germantown/academic-dishonesty-and-how-it-is-handled.pdf

B. Return to Campus

Students coming to campus are expected to adhere to Montgomery College's policies on returning to campus: https://www.montgomerycollege.edu/return-to-campus/index.html

VIII. Collegewide Policies and Procedures

A. Attendance Policy

Students are encouraged to attend and actively participate in all class meetings. As group work is often part of class, students who regularly miss class will no longer be assigned a group. Students who miss more than one week of class and assessments may be dropped from the course for excessive absences as per the Montgomery College Academic Regulations and Standards.

B. Withdrawal and Refund Dates

- Refund Drop Deadline – January 30, 2022
- No Grade Drop & Audit/Credit Deadline – February 13, 2022
- W Grade Drop Deadline – April 17, 2022

C. Audit Policy

All students registered for audit are required to consult with the instructor before or during the first class session in which they are in audit status, and students are required to participate in all course activities unless otherwise agreed upon by the student and instructor at the time of consultation. Failure to consult with the instructor or to so par-ticipate may result in the grade of "W" being awarded. This action may be taken by the in-structor by changing the "AU" to "W" before the drop with "W" date.

D. Disability Support Services

Any student who needs an accommodation due to a disability should make an appointment to see me during my office hours. In order to receive accommodations, a letter from Disability Support Services (G-SA 189; R-CB 122; or TP/SS-ST 122) will be needed. Any student who may need assistance in the event of an emergency evacuation must identify to the Disability Support Services Office; guidelines for emergency evacuations for individuals with disabilities are found at: http://www.montgomerycollege.edu/dss

E. Veteran's Services

If you are a veteran or on active or reserve status and you are interested in infor-mation regarding opportunities, programs and/or services, please visit the Combat2Col-lege website at http://www.montgomerycollege.edu/combat2college

F. Delayed Opening or Closing of the College

If a class can meet for 50% or more of its regularly scheduled meeting time OR if the class can meet for 50 minutes or more, it will meet. Montgomery College will always operate on its regular schedule unless otherwise announced. Depending on the nature of the incident, notifications of emergencies and changes to the College's operational status

will be communicated through one or more communication methods including the College's website http://www.montgomerycollege.edu. For the most up-to-date information regarding College openings, closings, or emergencies, all students, faculty, and staff are encouraged to sign up for email and text alerts via Montgomery College ALERT. Registration information is available at http://www.montgomerycollege.edu/emergency.

G. Communication

This course will use your official Montgomery College email address, Microsoft Teams, and Microsoft OneNote for communication. This course will NOT use Blackboard for communication.

IX. Honors Module

This class has an attached honors module for eligible students. Enrollment is limited to students who meet Honors Program eligibility standards. If you are interested in taking this as an honors class, you must meet with the instructor during the first two weeks of classes.

A. Honors Eligibility

- Completion of at least 12 Montgomery College credits
- Cumulative 3.4 grade point average or higher
- Grade of A or B in ENGL 101 or ENGL 101A

X. Schedule

A. Class Meeting Schedule

	MATH 182 Spring 2022 Class Meeting Schedule		
Week	**Date**	**Topic**	**Text**
1	Mon 1/24	Course Introduction	Syllabus
	Wed 1/26	The Substitution Rule	5.5
	Fri 1/28	Integration by Parts	5.6
2	Mon 1/31	Additional Techniques of Integration (Trig)	5.7
	Wed 2/02		
	Fri 2/04	Additional Techniques of Integration (Partial Fractions)	5.7
3	Mon 2/07	Integration Tables and CAS	5.8
	Wed 2/09	Approximate Integration	5.9
	Fri 2/11	Improper Integrals	5.10
4	Mon 2/14	Area	6.1
	Wed 2/16	Volumes	6.2
	Fri 2/18		
5	Mon 2/21	Volumes by Cylindrical Shells	6.3
	Wed 2/23	Arc Length	6.4

	Fri 2/25	Average Value	6.5
6	Mon 2/28	Applications to Physics and Engineering	6.6
	Wed 3/02		
	Fri 3/04	Probability	6.8
7	Mon 3/07	Polar Coordinates	App H
	Wed 3/09		
	Fri 3/11	Sequences	8.1
8	*Spring Break (3/14 - 3/18)*		
9	Mon 3/21	Series	8.2
	Wed 3/23		
	Fri 3/25	The Integral and Comparison Tests; Estimating Sums	8.3
10	Mon 3/28		
	Wed 3/30	Other Convergence Tests	8.4
	Fri 4/01	Power Series	8.5
11	Mon 4/04	Representation of Functions as Power Series	8.6
	Wed 4/06		
	Fri 4/08	Taylor and Maclaurin Series	8.7
12	Mon 4/11		
	Wed 4/13	Applications of Taylor Polynomials	8.8
	Fri 4/15	Modeling with Differential Equations	7.1
13	Mon 4/18	Direction Fields and Euler's Method	7.2
	Wed 4/20	Separable Equations	7.3
	Fri 4/22		
14	Mon 4/25	Exponential Growth and Decay	7.4
	Wed 4/27	The Logistic Equation	7.5
	Fri 4/29	Predator-Prey Systems (optional)	7.6
15	Mon 5/02	Final Exam Review / Presentations	
	Wed 5/04	Final Exam Review / Presentations	
	Fri 5/06	Final Exam Review / Presentations	
	Wed 5/11	**Final Exam 10:15 am – 12:15 pm**	

B. Assessment Schedule

Assessment Schedule		
	Initial Assessment	**Reassessment**
Mon 1/31	5.5, 5.6	
Mon 2/07	5.7	5.5, 5.6
Mon 2/14	5.8, 5.9, 5.10	5.7
Mon 2/21	6.1, 6.2	5.8, 5.9, 5.10
Mon 2/28	6.3, 6.4, 6.5	6.1, 6.2
Mon 3/07	6.6, 6.8	6.3, 6.4, 6.5
Spring Break (3/14 - 3/18)		
Mon 3/21	App H, 8.1	6.6, 6.8

Mon 3/28	8.2	App H, 8.1
Mon 4/04	8.3, 8.4	8.2
Mon 4/11	8.5, 8.6	8.3, 8.4
Mon 4/18	8.7, 8.8, 7.1	8.5, 8.6
Mon 4/25	7.2, 7.3	8.7, 8.8, 7.1
Mon 5/02	7.4, 7.5	7.2, 7.3
Wed 5/12		7.4, 7.5
Wed 5/12	**Final Assessment**	

The professor reserves the right to make changes to this syllabus.

Last Updated July 28, 2024