MONTGOMERY COLLEGE - Germantown Campus
Mathematics & Statistics Department
Course Syllabus

I. Instructor Information

Professor: Zhou Dong
Email: Zhou.Dong@MontgomeryCollege.edu
[1]Phone: (240) 567-7810
[2]Office: HT 134

Office Hours:

Drop-in virtual office hours	MWF 10:30am – 11:00 am
Click here to join the drop-in office hours	
Appointment hours	TR 9:30 am – 11:00 am and 1:00 pm – 2:00 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.

HONORS ELIGIBILITY:

- SAT score of 600 or above on each section
  OR
- Completion of at least 12 Montgomery College credits with 3.2+ GPA
- Grade of A or B in ENGL 101/011 or Eligible for ENGL 102

Spring 2021: CRN 33497
Class Times: MWF 9:00 am – 10:25 am
Teams meeting link for class meetings

[1] If you call, please leave a message.
[2] I will not be available in my office during Remote Instruction. Virtual class meetings and office hours held online via Microsoft Teams. Best way to reach me during Remote Instruction is to message me on Microsoft Teams.

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 1161 6280**
- *Graphing calculator* - A TI-83 or TI-83 Plus (http://wabbitemu.org/) or 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. **Teams code: av7s0mv**

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 Requirements

This course is designed to give the student a high degree of autonomy and students are expected to self-direct 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). All assignments (pre-class, in-class, and homework) are provided for the student to use at his/her discretion. Feedback on these 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.

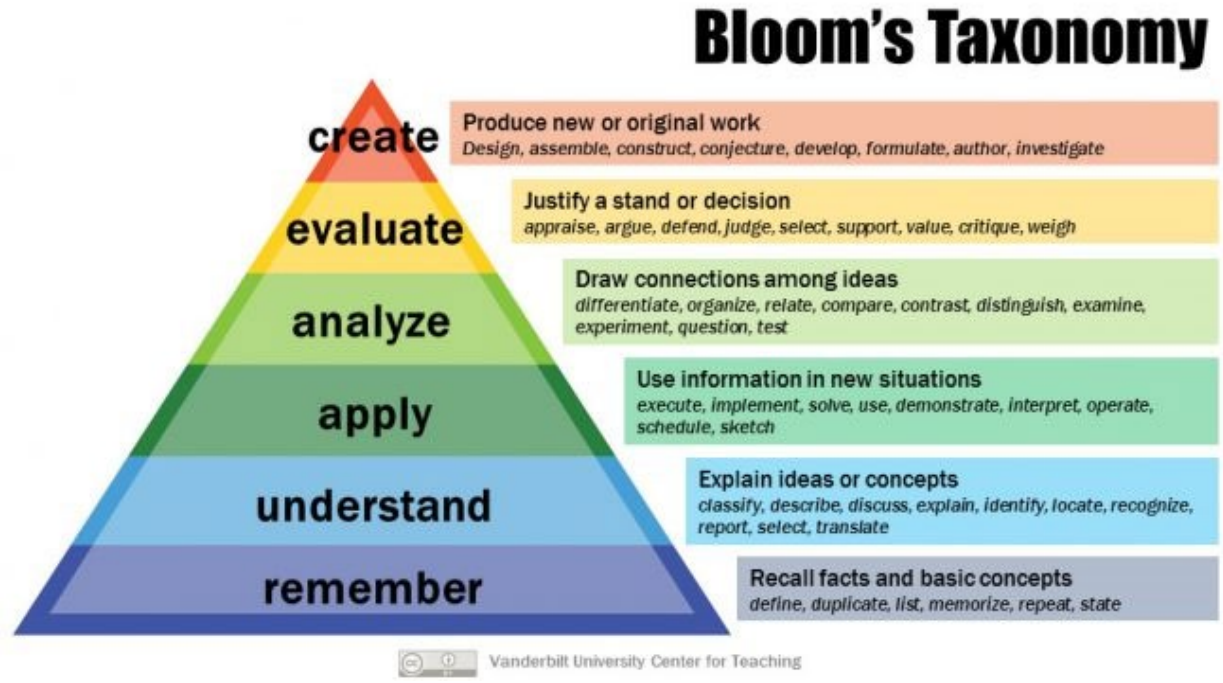

Figure 1 - Bloom's Taxonomy, from https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/

B. Flipped Classroom Instruction

Under the flipped classroom model, students begin learning the course material at home before class, while class time is focused on solidifying understanding through active discussion and problems solving:

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 facilitated by the instructor
- Work in groups or individually on in-class assignments, with instructor support
- 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 and LA office hours
  - Utilize MAPEL Center tutoring
- Take assessments and reassessments as needed

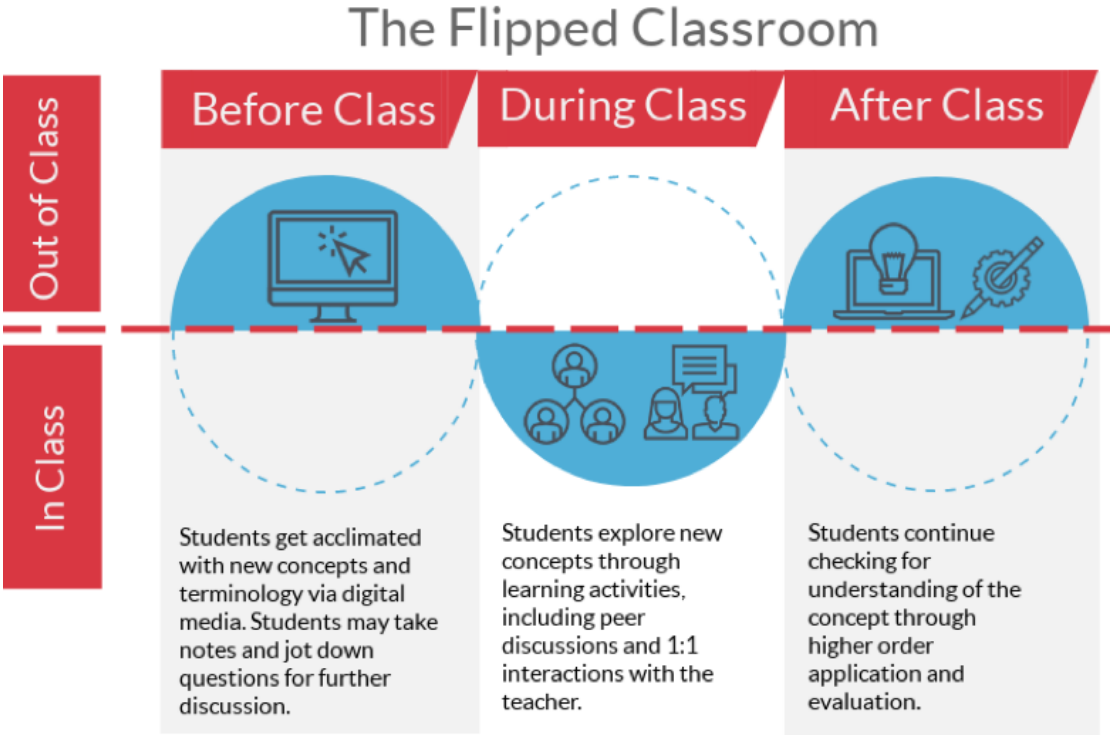

Figure 2 - The Flipped Classroom, from https://www.odysseyware.com/blog/using-classpace-flipped-classroom

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.

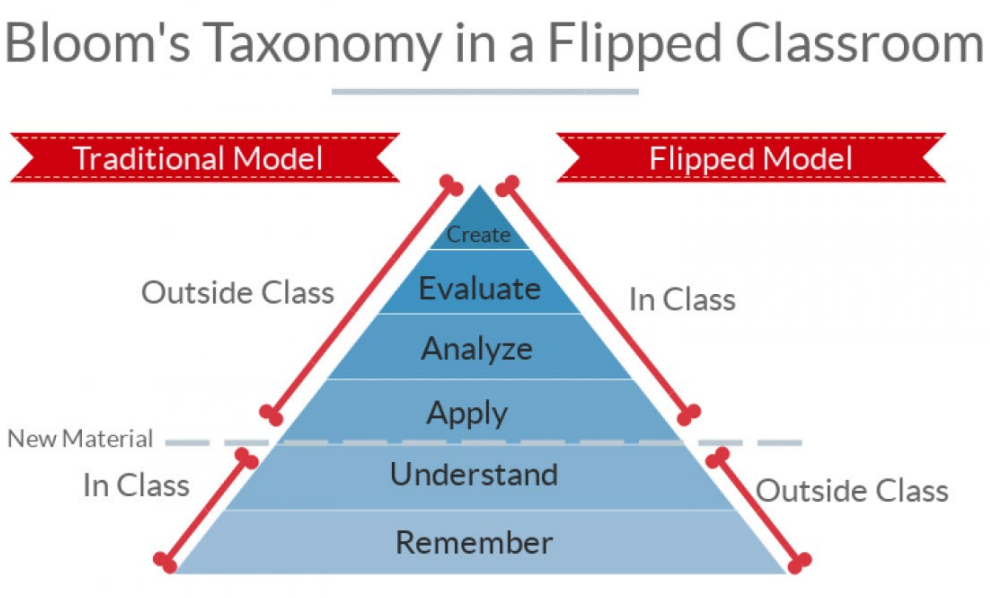

Figure 3- Bloom's Taxonomy in a Flipped Classroom, from https://www.odysseyware.com/blog/using-classpace-flipped-classroom

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.***

C. Course Standards

This course has 29 core standards and 24 elective standards (53 standards total). The 29 core standards are essential material which must be mastered in order to pass the course with 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 additional topics or a higher level question for a core standard topic. Mastery of elective standards are required to earn "A" or "B" grades provided the student has mastery of all core standards. Detailed grading criteria can be found in section D. Course Grade and section E. Standards.

MATH182 Calculus II Course Standards		
		Classes of functions analyzed in MATH182: algebraic functions, trigonometric and inverse trigonometric functions, exponential functions, logarithmic functions, parametric functions, polar functions.
	Code	**Standard**
C	**5.5SR**	**Evaluate indefinite and definite integrals via application of the substitution rule only.**
C	**5.6IBP**	**Evaluate indefinite and definite integrals via a single application of integration by parts only.**
E	5.6BPS	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 of rational functions by partial fraction decomposition.
E	5.8NI	Recognize when an elementary function does not have an elementary antiderivative and cannot be evaluated using the techniques of integration we have learned.
C	**5.9CA**	**Compute left endpoint, right endpoint, midpoint rule, trapezoidal rule, and Simpson's rule approximations of definite integrals.**
E	5.9AE	Apply the error bound formula for midpoint, trapezoidal, and Simpson's rule approximations to compute error bounds and number of intervals needed for the given approximation to be within a specified error.
C	**5.10RI**	**Recognize improper integrals and rewrite them as limits.**
E	5.10CI	Determine whether an improper integral converges or diverges.
C	**6.1AF**	**Set up integrals representing 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	Set up integrals representing areas bounded by parametric curves. (Evaluation of the integral may be done using technology.)
E	6.2VS	Set up integrals representing volumes by the general slicing method. (Evaluation of the integral may be done using technology.)
C	**6.2VR**	**Set up integrals representing volumes of solids of revolution by the washer or disk method. (Evaluation of the integral may be done using technology.)**
E	6.3CS	Set up integrals representing volumes of solids of revolution by the cylindrical shell method. (Evaluation of the integral may be done using technology.)
C	**6.4AC**	**Set up integrals representing 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	Set up integrals representing arc length of parametric curves. (Evaluation of the integral may be done using technology.)
C	**6.5AV**	**Set up integrals representing average value of functions. (Evaluation of the integral may be done using technology.)**
E	6.5MVT	Apply the Mean Value Theorem of Integrals in various settings.
C	**6.6WK**	**Set up integrals representing work. (Evaluation of the integral may be done using technology.)**
E	6.6CM	Compute the center of mass for regions in the xy-plane.
C	**6.8PB**	**Compute the probability of various outcomes from a given probability density function.**
E	6.8MM	Compute the mean and median for a probability density function.
C	**H.G**	**Graph a polar function.**
C	**H.A**	**Set up integrals representing areas of polar regions. (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	Applications of geometric 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	**8.4AST**	**Apply the Alternating Series Test appropriately.**
C	**8.4RT**	**Apply the Ratio Test appropriately.**
E	8.4ASE	Apply 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 to approximate functions.**
E	8.8ER	Compute error bounds for Taylor polynomial approximations of functions, including the use of Taylor's Inequality, the Alternating Series Estimation Theorem, and graphs.
C	**7.1DE**	**Testing 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.
C	**7.4EX**	**Generate exponential growth and decay models and analyze their solution curves.**
E	7.4CH	Solve a Newton's law of cooling or heating problem.
E	7.5LG	Generate logistic growth models and analyze their solution curves.
C	**29**	***Core Standards***
E	24	*Elective Standards*

D. 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:

1. Initial assessments weekly on Tuesdays
2. Reassessment the week following the initial assessments
3. Final assessment during final exam week on Wednesday, May 12.

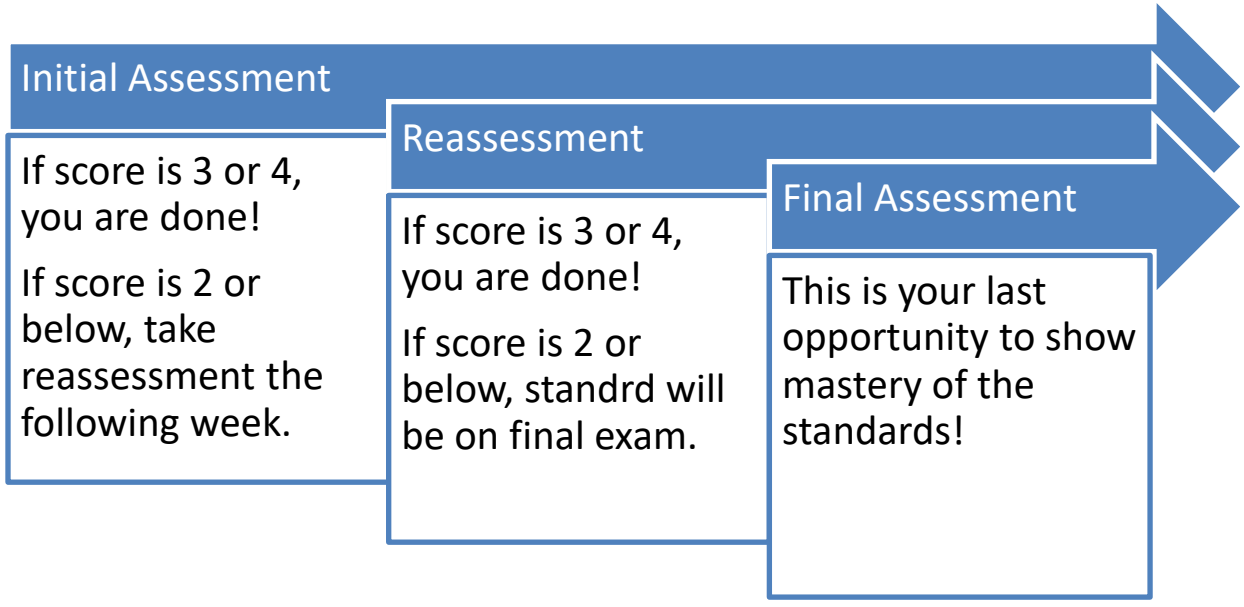

Figure 4 Assessment flow chart

E. Standards

Final letter grades will be determined according to this rubric:

Core Standards	Elective Standards	Honors Coursework*	Final Grade
Mastery on all	Average score is 3 or above	Complete and satisfactory	A
Mastery on all	Average score is between 2 and 3	Partially complete and satisfactory	B
Mastery on all	Average score is below 2	Unsatisfactory	C
Not all mastered Average score is 2 or above	Not applicable	Not applicable	D
Not all mastered Average score is below 2	Not applicable	Not applicable	F

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.
- Elective Standards and Honors Coursework are NOT considered for final grade determination until ALL Core Standards are mastered.
- *See Section VIII. Honors Coursework for more details.

F. Assessments and Make-up Policy

Students have a 24-hour window to take initial and reassessments each week (starting in Week 2) each Tuesday between 12:01 am and 11:59 pm.

The Final Exam will be given during the 24-hour window on Wednesday, May 12, between 12:01 am and 11:59 pm.

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

VI. Student Code of Conduct

A. Standards of College Behavior

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

B. Academic Honesty

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 or LA prior to the due date

Students should refer to the Student Code of Conduct or the following excerpt for more details:
https://www.montgomerycollege.edu/_documents/academics/support/learning-centers/writing-reading-learning-ctr-germantown/academic-dishonesty-and-how-it-is-handled.pdf

VII. Collegewide Policies and Procedures

A. Attendance Policy

Students are expected 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.

B. Withdrawal and Refund Dates

- Refund Drop Deadline – January 31, 2021
- No Grade Drop & Audit/Credit Deadline – February 14, 2021
- W Grade Drop Deadline – April 18, 2021

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 accom-modations, 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.

VIII. Honors Coursework

A. Requirements

The student will select one full-length or two mini "Primary Source Projects" (PSPs) in consultation with the instructor from these two repositories:

- Transforming Instruction in Undergraduate Mathematics via Primary Historical Sources (TRIUMPHS) https://blogs.ursinus.edu/triumphs/
- Learning Discrete Mathematics and Computer Science via Primary Historical Sources https://www.cs.nmsu.edu/historical-projects/

Students are not limited to topics within calculus. Each PSP's tasks and exercises must be typeset in LaTeX on Overleaf (https://www.overleaf.com/).

The student will create a presentation (oral or poster) along with an annotated bibliography based on their selected PSPs. The presentation will be delivered during the last week of classes.

B. Honors Coursework Schedule

Date	Honors Coursework due
Wed 2/03	Selection of PSPs
Mon 2/08	Overleaf Basics
Fri 2/12	PSP part 1
Fri 2/26	PSP part 2
Fri 3/12	PSP part 3
Fri 3/29	PSP part 4
Fri 4/02	Presentation outline
Fri 4/16	Presentation draft 1
Fri 4/23	Presentation draft 2

Fri 4/30	Presentation and Bibliography final draft
Mon 5/03 – Fri 5/07	Presentations
Fri 5/14	PSP part 1-4 final drafts in Overleaf, Presentation + Bibliography

IX. Schedule

A. Class Meeting Schedule

MATH 182 Spring 2021 Class Meeting Schedule		
Date	**Topic**	**Text**
Mon 1/25	Course Introduction	Syllabus
Wed 1/27	The Substitution Rule	5.5
Fri 1/29	Integration by Parts	5.6
Mon 2/01	Additional Techniques of Integration (Trig)	5.7
Wed 2/03		
Fri 2/05	Additional Techniques of Integration (Partial Fractions)	5.7
Mon 2/08	Integration Tables and CAS	5.8
Wed 2/10	Approximate Integration	5.9
Fri 2/12	Improper Integrals	5.10
Mon 2/15	Area	6.1
Wed 2/17	Volumes	6.2
Fri 2/19		
Mon 2/22	Volumes by Cylindrical Shells	6.3
Wed 2/24	Arc Length	6.4
Fri 2/26	Average Value	6.5
Mon 3/01	Applications to Physics and Engineering	6.6
Wed 3/03		
Fri 3/05	Probability	6.8
Mon 3/08	Polar Coordinates	App H
Wed 3/10		
Fri 3/12	Sequences	8.1
Spring Break (3/15 - 3/19)		
Mon 3/22	Series	8.2
Wed 3/24		
Fri 3/26	The Integral and Comparison Tests; Estimating Sums	8.3
Mon 3/29		
Wed 3/31	Other Convergence Tests	8.4
Fri 4/02	Power Series	8.5
Mon 4/05	Representation of Functions as Power Series	8.6
Wed 4/07		
Fri 4/09	Taylor and Maclaurin Series	8.7

Mon 4/12	Applications of Taylor Polynomials	8.8
Wed 4/14	Modeling with Differential Equations	7.1
Fri 4/16	Direction Fields and Euler's Method	7.2
Mon 4/19 Wed 4/21	Separable Equations	7.3
Fri 4/23	Exponential Growth and Decay	7.4
Mon 4/26	The Logistic Equation	7.5
Wed 4/28	Predator-Prey Systems (optional)	7.6
Fri 4/30	Final Exam Review / Presentations	
Mon 5/03	Final Exam Review / Presentations	
Wed 5/05	Final Exam Review / Presentations	
Fri 5/07	Final Exam Review / Presentations	
Wed 5/12	**Final Exam (12:01 am - 11:59 pm)**	

B. Assessment Schedule

Weekly assessment windows are Tuesdays 12:01 am – 11:59 pm.

Assessment Schedule		
	Initial Assessment	**Reassessment**
Tue 2/02	5.5, 5.6	
Tue 2/09	5.7	5.5, 5.6
Tue 2/16	5.8, 5.9	5.7
Tue 2/23	6.1, 6.2	5.8, 5.9
Tue 3/02	6.3, 6.4, 6.5	6.1, 6.2
Tue 3/09	6.6, 6.8	6.3, 6.4, 6.5
Tue 3/23	App H, 8.1	6.6, 6.8
Tue 3/30	8.2, 8.3	App H, 8.1
Tue 4/06	8.4. 8.5	8.2, 8.3
Tue 4/13	8.6, 8.7	8.4, 8.5
Tue 4/20	8.8, 7.1, 7.2	8.6, 8.7
Tue 4/27	7.3, 7.4, 7.5	8.8, 7.1, 7.2
Tue 5/04		7.3, 7.4, 7.5
Wed 5/12	**Final Assessment (12:01 am - 11:59 pm)**	

C. Important Dates

Date	**Event**
Sun 1/31	Refund drop deadline – you must drop the course by this date for a refund
Fri 2/05	WebAssign grace period ends – you must purchase access to WebAssign by this date
Sun 2/14	No grade drop deadline – you must drop the course by this date to not receive a grade
Sun 4/18	W grade drop deadline – you must drop the course by this date to receive a W grade

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

Last Updated June 28, 2021