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:

Drop-in hours	MWF 9:30 am – 10:50 am in HT134
Appointment hours	MTW 1:00 pm – 2:30 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

Fall 2023: CRN 24612
Class Times: TR 10:00 am – 12:15 pm
Classroom: HT 104 / Microsoft Teams Honors Calculus II Fall 2023

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:

- *Calculus: Concepts and Contexts*, 5th edition by James Stewart and Steve Kokoska
  - Available as ebook via WebAssign
- *WebAssign*
  - Online homework and ebook access
  - Class Key: **montgomerycollege 0260 0670**
- *Graphing calculator*
  - A TI-83 or TI-83 Plus (http://wabbitemu.org/)
  - Desmos (www.desmos.com/calculator)
- *Microsoft Teams*– for course announcements and communication outside of class
  - 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 online 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.

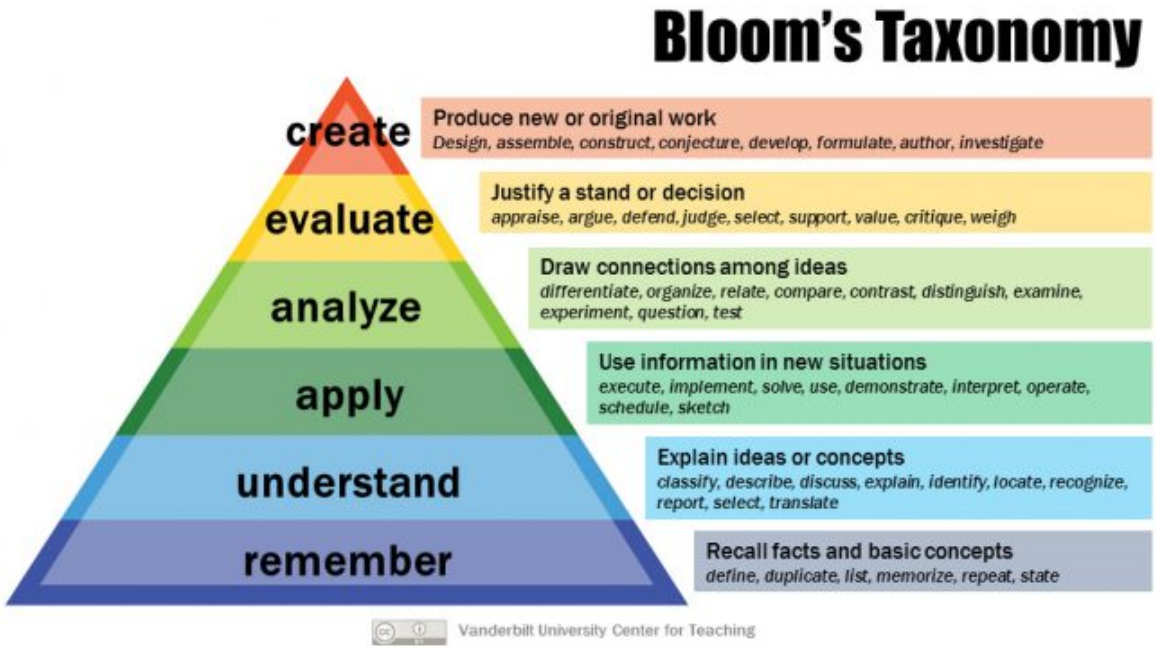

Figure 1 - Bloom's Taxonomy, from https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/

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
- Work in groups or individually on in-class assignments
- Receive individual and/or small group instruction as needed
- Take assessments as scheduled

After class:

- Complete Practice Problem Assignments on WebAssign
- Take practice quizzes in the Personal Study Plan on WebAssign
- Get help from instructor during office hours or by appointment
- Utilize MAPEL Center tutoring

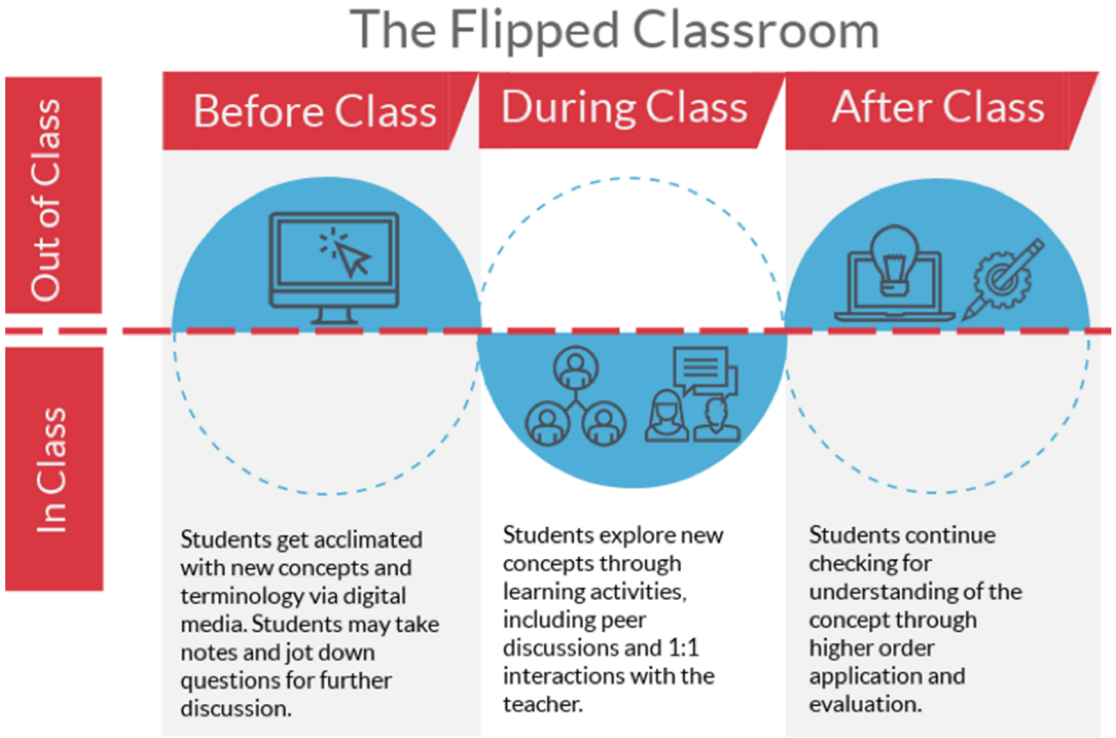

Figure 2 - The Flipped Classroom, from https://www.odysseyware.com/blog/using-classpace-flipped-classroom

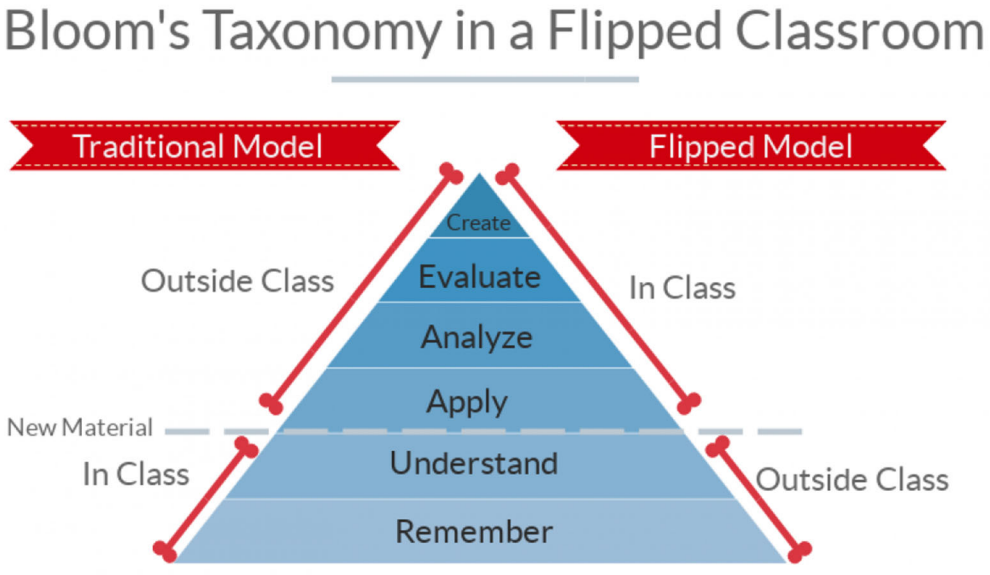

Figure 3- Bloom's Taxonomy in a Flipped Classroom, from https://www.odysseyware.com/blog/using-classpace-flipped-classroom

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.

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 uses Standards Based Grading (SBG). Under SBG, students are graded based on demonstrated mastery of the course standards. The standards are separated into core standards and elective standards. The 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.

MATH182 Calculus II Course Standards		
	Code	Standard
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.
C	**5.8CA**	**Use CAS (computer algebra systems) to solve integrals and interpret 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 by computing the associated limit(s).
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	**6.6SP**	**Use integrals to compute work done by a spring. (Evaluation of the integral may be done using technology)**
E	6.6WK	Use integrals to compute work done in lifting objects against gravity. (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).
E	6.7CS	Compute the consumer surplus (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**	**Translate between polar and rectangular coordinates and graph equations in polar coordinates.**
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, including bounding errors.
C	**7.1DE**	**Test possible solutions to differential equations analytically and graphically.**
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.
	29	**Core Standards**
	29	Elective Standards
	58	Total Standards

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:

1. Initial assessments (weekly)
2. Reassessment on the 4 Exams as scheduled
3. Final assessment on the Final Exam as scheduled

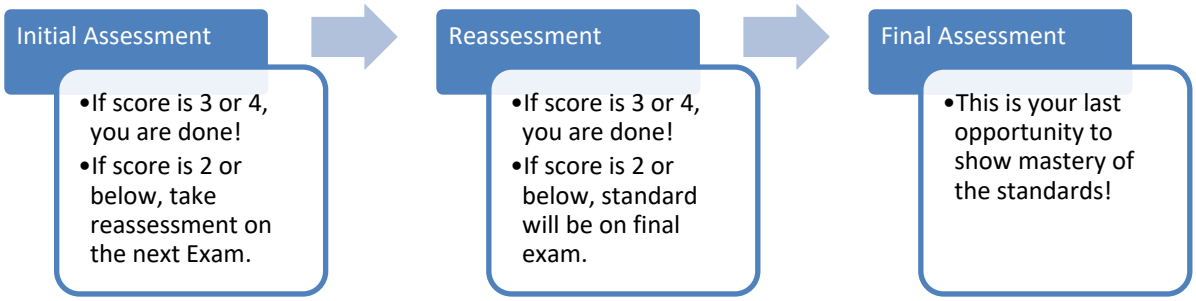

Figure 4 Assessment flow chart

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

Initial Assessments will be on Tuesday of each week starting on Week 2. Reassessments will be scheduled through the Assessment Center during the following times:

Week	**Reassessment Window**	**Material covered**
Week 5	Sunday 9/24 – Saturday 9/30	Chapter 5
Week 8	Sunday 10/15 – Saturday 10/21	Chapter 6
Week 12	Sunday 11/12 – Saturday 11/18	Appendix H, & 8.1 – 8.6
Week 15	Sunday 12/3 – Saturday 12/9	8.6, 8.7, & Chapter 7

Final Assessment for all standards will be on the Final Exam, Tuesday, 12/12, 10:15 am – 12:15 pm.

Make-up for missed assessments will not be available. All assignments on WebAssign have been set up to approve all extension requests automatically.

VII. 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. 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

VIII. 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 – September 6, 2023
- No Grade Drop & Audit/Credit Deadline – September 20, 2023
- W Grade Drop Deadline – November 15, 2023

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 information regarding opportunities, programs and/or services, please visit the Combat2College 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 Coursework

A. Requirements

Each student will complete a research project over the course of the semester. Project options:

1. The student can work individually on one full-length or two mini-length "Primary Source Projects" (PSPs) from these two repositories:
    a. Transforming Instruction in Undergraduate Mathematics via Primary Historical Sources (TRIUMPHS) https://blogs.ursinus.edu/triumphs/
    b. 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.
2. The student can select to work on a group project. The professor will present possible group projects in class.
3. The student can present individual an/or group project ideas to the professor for approval.

Written work from the projects (PSP tasks, project reports, etc.) must be typeset in LaTeX on Overleaf (https://www.overleaf.com/). Students must submit both the .tex and .pdf files.

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

B. Honors Coursework Schedule

Date	Honors Coursework due
Thu 9/07	Selection of project and formation of groups
Thu 9/14	Overleaf Basics
Thu 9/21	Project update 1
Thu 10/05	Project update 2
Thu 10/19	Project update 3
Thu 11/02	Project update 4
Thu 11/09	Project final writeup and presentation outline
Thu 11/16	Presentation draft 1
Thu 11/30	Presentation final draft and annotated bibliography
Tue 12/05 Thu 12/07	In-class presentations

C. Honors Course Grade

In addition to the regular course standards, final letter grades will be determined according to this rubric including the honors coursework:

Core Standards	**All Standards (Core and Elective)**	**Honors Coursework**	**Final Grade**
Mastery on all	Average score is 3.5 or above	Complete and satisfactory Or Partially complete and satisfactory	A
Mastery on all	Average score is 3.5 or above	Unsatisfactory	B
Mastery on all	Average score is between 3 and 3.5	Complete and satisfactory	A
Mastery on all	Average score is between 3 and 3.5	Partially complete and satisfactory	B
Mastery on all	Average score is between 3 and 3.5	Unsatisfactory	C
Mastery on all	Average score is below 3	Complete and satisfactory	B
Mastery on all	Average score is below 3	Partially complete and satisfactory Or Unsatisfactory	C
Not all mastered	Average score is 2 or above	Not applicable	D
Not all mastered	Average score is below 2	Not applicable	F

Honors coursework rubric:

Primary Source Project(s) and Group Project	**Complete and satisfactory** work means student completed all tasks within the selected project(s) and typeset the answers in LaTeX, submitting both the .tex and .pdf files. **Partially complete and satisfactory** work means student completed most tasks within the selected project(s) and made a good faith effort at typesetting the answers in LaTeX. All work below the level described above would be **unsatisfactory**.
Presentation	**Complete and satisfactory** work means student met with the professor to discuss drafts of the presentation, practiced delivering the presentation, and successfully delivered the presentation at the appointed time. **Partially complete and satisfactory** work means student did not turn in drafts of the presentation or did not make revisions as requested but still delivered the presentation. All work below the level described above would be **unsatisfactory.**
Annotated Bibliography	**Complete and satisfactory** work means student correctly cited all sources used in the presentation in APA format and provided annotation for each source. **Partially complete and satisfactory** work means student cited all sources used in the presentation but made mistakes in the format and/or failed to annotate each source. All work below the level described above would be **unsatisfactory.**

X. Schedule

A. Class Meeting Schedule

	MATH 182HC Fall 2023 Class Meeting Schedule			
Week	**Date**	**Topic**	**Initial Assessment**	**Reassessment**
1	Tue 8/29	Course Introduction 5.5 The Substitution Rule		
	Thu 8/31	5.6 Integration by Parts		
2	Tue 9/05	5.7 Additional Techniques of Integration (Trig)	5.5, 5.6	
	Thu 9/07	5.7 Additional Techniques of Integration (Partial Fractions)		
3	Tue 9/12	5.8 Integration Using Tables and CAS 5.9 Approximate Integration	5.6, 5.7	
	Thu 9/14	5.10 Improper Integrals		
4	Tue 9/19	6.1 Area	5.8, 5.9, 5.10	
	Thu 9/21	6.2 Volume		
5	Tue 9/26	6.3 Volume by Cylindrical Shells	6.1, 6.2	Chapter 5 Reassessments
	Thu 9/28	6.4 Arc Length 6.5 Average Value		
6	Tue 10/03	6.6 Applications to Physics and Engineering	6.3, 6.4, 6.5	

	Thu 10/05	6.7 Applications to Economics and Biology 6.8 Probability		
	Tue 10/10	Appendix H Polar Coordinates	6.6, 6.7, 6.8	
7	Thu 10/12	8.1 Sequences, 8.2 Series (1)		
	Tue 10/17	*Advising Day (no classes)*		Chapter 6 Reassessments
8	Thu 10/19	8.2 Series (2)		
	Tue 10/24	8.3 The Integral and Comparison Tests; Estimating Sums	Ap. H, 8.1, 8.2	
9	Thu 10/26	8.4 Other Convergence Tests		
	Tue 10/31	8.5 Power Series	8.3, 8.4	
10	Thu 11/02	8.6 Representation of Functions as Power Series		
	Tue 11/07	8.7 Taylor Series 8.8 Taylor Polynomials	8.5, 8.6	
11	Thu 11/09	7.1 Modeling with Differential Equations		
	Tue 11/14	7.2 Direction Fields and Euler's Method	8.7, 8.8, 7.1	Ap. H & 8.1-8.6 Reassessments
12	Thu 11/16	7.3 Separable Equations		
	Tue 11/21	7.4 Exponential Growth and Decay 7.5 The Logistic Equation	7.2, 7.3	
13	Thu 11/23	*Thanksgiving Break*		
	Tue 11/28	7.6 Predator-Prey System (optional)	7.4, 7.5	
14	Thu 11/30	Honors Project Presentations		
	Tue 12/05	Honors Project Presentations		8.7, 8.7, Ch. 7 Reassessments
15	Thu 12/07	Honors Project Presentations		
	Tue 12/12	**Final Exam (10:15am - 12:15pm)**		

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

Last Updated August 30, 2023