University of Pittsburgh

Outlier

Fundamentals of Calculus I

MATH 0217

3 Credits

Instructors

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Course Description

An introduction to calculus with a focus on limits; derivatives; the differentiation of algebraic functions; the examination and uses of the maxima, minima, and convexity of functions; the definite integral; the fundamental theorem of integral calculus; and applications of integration.

Course Learning Outcomes

- Find limits of functions presented as graphs, tables, or algebraic expressions
- Use the concept of limit to define the derivative of functions
- Differentiate functions involving polynomials, exponentials, logarithms and trigonometric terms
- Apply the concepts of differentiation to solve optimization problems
- Apply the concepts of differentiation to solve related rates problems
- Use the derivative to draw the graphs of functions involving polynomials, exponentials, logarithms and trigonometric terms
- Find indefinite integrals involving polynomials, exponentials, logarithms, and trigonometric functions
- Find definite integrals involving polynomials, exponentials, logarithms and trigonometric functions
- Apply the definite integral to compute work, distance, and volumes
- Find net area, area under a curve, and area between curves

Course Materials

This is an online course. All course materials (including lecture videos, interactive textbook, and practice exercises) are provided by Outlier.org through its course website, calculus.outlier.org. Additional tools will be made available incorporated into or linked to from Outlier.org.

Class Policies

1. **Attendance & Attention to Course Materials** – As an online course, attendance is asynchronous and is tracked by students viewing the required lectures, engaging with interactive online materials, and completing problem sets. Each student will also have the option to spend as much time as needed learning and practicing with additional materials and practice questions; the level of their

understanding will be demonstrated by their performance on a set of mastery assessments in the form of quizzes, midterm exams, and a final exam.

2. **Access to Online Course Platform:** All course materials will be accessed through the course website calculus.outlier.org. Course progress, lectures, active learning, problem sets, and quizzes will be tracked and saved once you log in. Please reference your Course Homepage to view your grades and academic progress, and the Course Info page for details and instructions on the Outlier course features.
3. **Assessment Completion & Late Work** – Mastery assessments (quizzes, midterm exams, and the final exam) must be completed by their due dates (as indicated on Outlier.org). Failure to complete an assessment by the indicated due date will result in a grade of 0 for that assessment. Midterm and final exams are eligible to receive a 24-hour extension of the scheduled due date. Extensions can be requested by submitting a short request form within the site, available within 24 hours of the assessment deadline. For assessments offering multiple opportunities for completion (only quizzes in this course), only the highest grade of any completed instance of that assessment will count towards the student's final grade. Late work will not be accepted.
4. **Calculators** – Students are allowed to use calculators for all assignments. We suggest Desmos, available on both desktop and as an app for Android and iOS. Note that smartphones cannot be used during your Midterm Exams or Final Exam and that, if you choose to use Desmos during an exam, it must be in a separate tab in the same browser window that the student is using to complete the exam.
5. **Exams** – In order to maintain high standards of academic integrity we use online technology to proctor exams. You will be asked to confirm your identity with a photo ID and you will be required to grant access to your computer, including its webcam, screen, and microphone, for the duration of the exam. Each exam can be taken anytime during the exam open period but must be completed in a single contiguous sitting. Times and dates below are all based on Pacific Standard Time. Exams will be available from the open date at 9:00am PT through the closing date at 9:00am PT.
6. **Exam Materials** – Students are allowed to use a graphing calculator on exams, including Desmos. If using Desmos, it must be used in a separate tab in the same browser window that the student is using to complete the exam. Students may not use any other kind of notes, websites, books, or any other type of aid on course exams.
7. **Academic Integrity** – Students in this course will be expected to agree to and comply with the Outlier.org Academic Integrity Policy. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process as outlined in the Outlier.org Academic Integrity Policy.
8. **Student to Instructor Communications** – Most of your learning will happen within the Outlier course. Use the button in the bottom right corner to submit feedback or if you have a question(s) about any of the content in the lectures, active learning, or problem sets. You can also reach a Success Advisor by sending an email to success@outlier.org or by engaging in the course Discussion Community.
9. **Course Participation** – Join Outlier's Discussion Community and participate in weekly conversations with the course facilitators and your peers to earn the discussion group portion of your grade. Course participation is counted as sharing an interesting article you read that pertains to the chapters you're working on, or asking a question of your fellow classmates to try to solve a difficult problem. You can also answer your peers' questions by starting a thread under their post. Derogatory and sarcastic comments and jokes that marginalize anyone are fundamentally unacceptable, especially

in the classroom. Offensive language—or language that could be construed as offensive—should be avoided.

10. **Administrative Drops** – Students who do not meaningfully participate by the time 20% of the term has passed will be administratively dropped from the course. For 15-week terms, the 20% mark is the third week of the course. Meaningful course participation includes regularly logging into the course, completing quizzes, engaging in the Discussion Community, and responding to Student Success outreach.
11. **Withdrawals** – If a student decides to exit from a course AFTER the drop deadline and BEFORE the withdrawal deadline, it is defined as a withdrawal. This is different from having dropped the course, as a grade of W will appear on your transcript. Withdrawals do not affect your GPA, but they do count towards the number of credits attempted. Students will still have access to review the lectures and active learning, but progress in the course will not be saved. Students who Withdraw are not eligible for a refund.
12. **Disability Accommodations** – If you have a request for reasonable disability accommodations, contact success@outlier.org. Please include specifics regarding the accommodation you are seeking. Additionally, if you have a disability accommodations letter from a school you are currently attending, please submit it as well. Outlier is committed to ensuring that learners with accessibility needs have equal opportunity to succeed in our courses.
13. **Religious observances** – Outlier will make a reasonable attempt to accommodate student needs in the case of serious incompatibility between a student's religious creed and a scheduled test or examination. Students should make such requests via success@outlier.org during the first two weeks of an academic term.
14. **Transfer Credit** – University of Pittsburgh grades and credits earned in this course appear on an official University of Pittsburgh transcript, and the course credits are likely to be eligible for transfer to other colleges and universities. Students are encouraged to contact potential colleges and universities in advance to ensure their credits would be accepted. If students decide to attend any University of Pittsburgh campus, the University of Pittsburgh grade earned in the course will count toward the student grade point average at the University, and the earned credits will count towards the overall credits required for graduation. At the University of Pittsburgh, the grade from this course supersedes any equivalent AP credit.

Grading Criteria
A student's grade in this course will be comprised of the following elements:

- 25% Final exam
- 20% Midterm exams (two midterm exams, 10% each)
- 50% Section quizzes (40 quizzes)
- 5% Participation in student group discussions

At the end of each section, each student is required to complete a quiz designed to assess their mastery of the material covered in that section. Each student will be able to attempt five versions of each section's quiz: three of these will be made available to the student at the end of each section, one more version will become available to the student when the midterm covering the material of that section is presented, and one final version will become available to the student when the final is presented. For sections whose material is only covered on the final, two additional versions of those sections' quizzes will become available to the student when the final is presented. Each student is required to attempt and complete at least one version of each section's quiz. Failing to do so will result in a grade of 0% for that section. If a student completes more than one quiz for a section, only the highest grade achieved will be counted for that section. As such, the student is encouraged to use these multiple quiz attempts as opportunities to identify areas that are in need of further practice. A diligent effort in this will allow the student to improve their understanding, their mastery of the material, and their grade in the course.

Grading Scale
A: 92.5 -100%
A-: 89.5 – 92.49%
B+: 86.5-89.49%
B: 82.5 – 86.49%
B-: 79.5 – 82.49%
C+: 76.5 – 79.49%
C: 72.5 – 76.49%
C-: 69.5 – 72.49%
D: 59.5 – 69.49%
F: 0 – 59.49%

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Course Materials, Problem Sets, & Assessments

Section Assignments and Assessments subject to change and will be announced through Outlier.org as applicable within a reasonable time frame.

Week	Day	Section Number	Section Topics	Assessments
Week 1	Day 1	1.1, 1.2	Representing Functions, Modeling with Functions	1.1 Quiz, 1.2 Quiz
	Day 2	1.3	Transforming Functions	1.3 Quiz
	Day 3	1.4, 1.5	Exponential Functions, Inverse and Logarithmic Functions	1.4 Quiz, 1.5 Quiz
Week 2	Day 1	2.1	Tangents and Instantaneous Velocity	2.1 Quiz
	Day 2	2.2, 2.3	Limits of Functions, Limit Laws	2.2 Quiz, 2.3 Quiz
	Day 3	2.4, 2.5	Continuity of Functions, Limits at Infinity	2.4 Quiz, 2.5 Quiz
	Day 4	2.6, 2.7	Derivatives, Derivatives as Functions	2.6 Quiz, 2.7 Quiz
	Day 5	**1.1 - 2.7**	**Midterm Exam 1 opens at 9am PT (12pm ET)**	**Midterm 1, Retake 1.1 - 2.7 Quizzes as needed**
Week 3	Day 1	3.1, 3.2	**Midterm Exam 1 closes at 9am PT (12pm ET)** Differentiating Polynomials and Exponential Functions, The Product and Quotient Rules,	3.1 Quiz, 3.2 Quiz
	Day 2	3.3	Differentiating Trigonometric Functions	3.3 Quiz
	Day 3	3.4	The Chain Rule	3.4 Quiz
	Day 4	3.5	Implicit Differentiation	3.5 Quiz
	Day 5	3.6	Differentiating Logarithmic Functions	3.6 Quiz
Week 4	Day 1	3.7, 3.8	Differentiating in the Sciences, Differentiating Exponential Functions	3.7 Quiz, 3.8 Quiz
	Day 2	3.9	Related Rates	3.9 Quiz
	Day 3	3.10	Linearization and Differentials	3.10 Quiz
	Day 4	3.11, 4.1	Hyperbolic Functions, Finding Maximums and Minimums	3.11 Quiz, 4.1 Quiz
	Day 5	4.2, 4.3	The Mean Value Theorem, Derivative Tests	4.2 Quiz, 4.3 Quiz
Week 5	Day 1	4.4	Indeterminates and l'Hospital's Rule	4.4 Quiz
	Day 2	4.5	Sketching Curves	4.5 Quiz
	Day 3	4.6	Optimization	4.6 Quiz
	Day 4	4.7	Antiderivatives	4.7 Quiz
	Day 5	**3.1 - 4.7**	**Midterm Exam 2 opens at 9am PT (12pm ET)**	**Midterm 2, Retake 3.1 - 4.7 Quizzes as needed**

Week 6	Day 1	5.1	**Midterm Exam 2 closes at 9am PT (12pm ET)** Approximating Area and Distance	5.1 Quiz
	Day 2	5.2, 5.3	Definite Integrals, The Fundamental Theorem of Calculus	5.2 Quiz, 5.3 Quiz
	Day 3	5.4	Indefinite Integrals	5.4 Quiz
	Day 4	5.5	Using Substitution	5.5 Quiz
	Day 5	6.1	Finding Areas Between Curves	6.1 Quiz
Week 7	Day 1	6.2	Volume by Integration	6.2 Quiz
	Day 2	6.3	Volume by Integration - Cylindrical Shells	6.3 Quiz
	Day 3	6.4	Calculating Work	6.4 Quiz
	Day 4	6.5	The Mean Value Theorem for Integrals	6.5 Quiz
	Day 5	**1 - 6**	**Final Exam opens at 9am PT (12pm ET)**	**Final Exam, Retake 1.1 - 6.5 Quizzes as needed**
Week 8	Day 1		**Final Exam closes at 9am PT (12pm ET)**	

Exams are the only scheduled coursework. Quizzes can be completed at any time, once their corresponding chapter has been unlocked. All other active learning, exercises, and lectures are provided for your learning and practice and are not time-sensitive or graded.