College of Dupage
Math 2231-005: Discrete Mathematics
Monday, Wednesday 7:00 – 9:25 PM
BIC 2H10

Contact Information:

Dr. Matt Wechter
Office: BIC 3530A
Email: wechterm@cod.edu
Phone: (630) 942-4405

Course Objectives and Topic Outline:

Course description: This is the first calculus course for students majoring in science, technology, engineering, and mathematics. Topics include lines, circles, functions, limits, continuity, the derivative, rules for differentiation of algebraic, trigonometric, and the transcendental functions, related rates, mean value theorem, optimization and curve sketching, differentials, Newton's method, antiderivatives and integration, and the fundamental theorem of calculus.

Credit Hours: 5   Lecture Hours: 5   Lab Hours: 0
Pre-Enrollment Criteria: MATH 1431 and MATH 1432 or college equivalents, both with a grade of C or better or a qualifying score on the mathematics placement test.

Course Objectives:

1	Use the definition of the limit of a function
2	Evaluate limits graphically, numerically, and algebraically
3	Evaluate one-sided limits
4	Determine the continuity of a function at a point and over an interval
5	Find the derivative of a function using the limit definition
6	Determine the differentiability of a function at a point and over an interval
7	Use the intermediate value theorem
8	Use the rules of differentiation to find the derivative of a function (including the product, quotient, and chain rules)
9	Differentiate implicitly
10	Use derivatives in geometry and other applications that involve rates of change
11	Determine higher order derivatives, with applications to linear motion
12	Determine the differential of a function and use it in error analysis
13	Find the location and type of all relative and absolute extrema of a function by using its first and second derivatives
14	Use derivatives to determine where a function is increasing, where it is decreasing, where its graph is concave upward, and where its graph is concave downward

15	Use the extreme value theorem
16	Use Rolle's theorem and the mean value theorem
17	Determine the limit of a function at infinity
18	Use L'Hopital's rule to evaluate limits for indeterminate forms
19	Evaluate limits having indeterminate forms
20	Compare and contrast relative rates of growth
21	Locate all (if any) vertical, horizontal, and slant asymptotes on the graph of a function
22	Construct the graph of a function by locating all intercepts, asymptotes, and relative extrema points, and by determining concavity over the domain of the function
23	Solve optimization problems including applications
24	Determine the approximate zeros of a function using Newton's Method
25	Solve related rate problems including applications
26	Determine the antiderivative of a function
27	Solve a separable differential equation and an initial value problem
28	Estimate a definite integral using a Riemann sum
29	Evaluate a definite integral by taking the limit of a Riemann sum
30	Use the fundamental theorem of calculus to evaluate a definite integral
31	Use substitution to determine definite and indefinite integrals
32	Use the properties of definite and indefinite integrals
33	Determine the mean value of a continuous function over a closed interval
34	Define the exponential and logarithmic functions
35	Graph the exponential and logarithmic functions
36	Simplify expressions using properties of logarithms
37	Differentiate logarithmic and exponential functions, including bases other than e
38	Integrate logarithmic and exponential functions, including bases other than e
39	Apply logarithmic differentiation
40	Evaluate integrals that result in logarithmic functions
41	Evaluate expressions involving inverse trigonometric functions
42	Differentiate expressions involving inverse trigonometric functions and trigonometric functions

Topical Outline:

1. Review
   1. Straight lines and circles
   2. Functions and their graphs
   3. Symmetry ii. Domain and range iii. Interval notation iv. Special functions
   4. Absolute value
   5. Polynomial
   6. Rational

7. The greatest-integer function
8. Logarithmic and exponential functions
9. Trigonometry
10. Special angles and radian measure ii. Trigonometric identities iii. Inverse trigonometric functions
2. Limits and continuity
   1. Limits
   2. Numerical and graphical approach to limits ii. Definition and proof using epsilon and delta iii. Limit theorems and techniques for evaluation of limits iv. One-sided limits
   3. Infinite limits vi. Trigonometric limits
   4. Continuity
   5. Definition ii. Properties
   6. The intermediate value theorem
3. The derivative
   1. Definition
   2. Derivative as a slope of tangent line ii. Derivative as instantaneous rate of change iii. Velocity and acceleration in linear motion
   3. Formulas for finding derivatives
   4. Sum, difference, product, and quotient rules ii. Power rule and chain rule iii. Sine, cosine, tangent, cosecant, secant, and cotangent iv. Logarithmic and exponential functions
   5. Implicit differentiation
   6. Logarithmic differentiation
   7. Higher order derivatives
   8. Derivatives and continuity
4. Application of the derivative
   1. Related rates
   2. Maxima and minima
   3. Extreme value theorem ii. Rolle's theorem iii. Mean value theorem iv. Test for increasing and decreasing functions
   4. First derivative test and second derivative test vi. Concavity and points of inflection vii. Applications
   5. Limits at infinity
   6. L'Hopital's Rule
   7. Asymptotes
   8. Newton's method
   9. Business applications (optional)
   10. Differentials
5. Definite and indefinite integrals
   1. Antiderivatives and the indefinite integral
   2. Integration by substitution
   3. Sigma notation and Riemann sums
   4. The definite integral and area
   5. The fundamental theorem of calculus
   6. The properties of the definite integral

7. Definite integrals with substitution
8. Mean value theorem for integrals
6. Transcendental functions
    1. Logarithmic and exponential functions
    2. Integration ii. Bases e, 10, and other
    3. Inverse trigonometric functions and their derivatives

Methods of Evaluation: Students will be evaluated by tests at appropriate intervals. Evaluation may also include quizzes, homework, projects, and/or a comprehensive final examination. All instructors must abide by the Math Department policies on assessments. The use of written material (note cards, textbooks, tables of formulas and integrals, etc.) will not be permitted on tests for Mathematics 2231.

Course Materials:

- *Thomas' Calculus: Early Transcendentals*, 14th Ed. by Hass, Heil, Weir (ISBN 9780134768496)

- The online supplement to the textbook will not be required.

- Calculators will not be required.

Classtime:

Students are expected to attend class and PARTICIPATE. Students are responsible for all material covered in each class, even if they missed that day. Exams will be held during class time.

    While in class, students should be respectful of other students as well as the instructor. All students are welcome to share their thoughts and the classroom will be an inclusive space.

    Students should not distract others with their computers or cell phones. Any distractible cell phone use should be done outside the classroom. All communication between instructor and students will be conducted either through Blackboard or via a COD email account. Make sure you check your COD email regularly.

Homework:

Homework will be assigned for every lecture out of the textbook. Students need to spend time and attempt every assigned homework problem to master the material and be prepared for quizzes and exams.

    Solution guides and online step-by-step solutions should not be overused when doing homework. Students who rely on these resources are not self-sufficient and will underperform on exams. When stuck on a problem, take the time to read class notes and the textbook for related examples. Set aside time for contacting the instructor or the [Math Assistance Area](#) for help.

Most homework will be collected and the due dates will be announced in advance. The homework turned in will be graded on its completion, not its correctness.

Students should spend time working and completing the homework correctly so that they can then demonstrate their knowledge on quizzes and exams in the course. Completed homework does not guarantee success on in-class assessments, even though most quiz and exam problems are either homework problems or are questions inspired by the homework.

Quizzes:

Some quizzes will be taken in class and are a check on how well students understand specific topics.

NO outside notes or resources are allowed on quizzes unless specifically stated in the instructions. Calculators are not allowed during quizzes. Quizzes in general are easier than exams with regards to the complexity or length of the questions asked.

In-class quizzes will be timed.

The lowest quiz will be dropped before computing the quiz average in the final grade.

"Free Passes":

Each student is allowed three "free passes" for the semester, good for a 48-hour extension on any assignment. *No more than one* of these passes may be used on a unit exam, and free passes cannot be used at all on the final exam. The 48 hours starts from the original deadline of the assignment, and students *must* email the instructor or speak to them in class to request the use of a free pass before submitting it. All exams or in-class quizzes must be taken in a COD Testing Center or using the Virtual Testing Center. There are no extensions after the 48 hours, even if the Testing Center has limited hours during that time.

Exams:

There will be three (3) unit exams and a cumulative final exam given in the course in class.

Scratch work will be graded on exams, and correct work will be rewarded partial credit even if the final answer is not correct.

The cumulative final exam will take place on Wednesday, May 17, as shown on the calendar. The final exam grade will replace the lowest unit exam grade if that helps a student's final grade in the course.

Attendance Policy:

Students are expected to attend every class and to understand material for classes they miss. See the Free Passes section for the policy regarding late work for quizzes.

The exam dates are all posted on the calendar. If a student knows in advance they will not be in class that day, they must plan to take the exam on an earlier day in a COD Testing Center. These situations are planned on an individual basis and the instructor should be notified at least two days in advance. Any exam missed without consulting the instructor beforehand will receive 0 points unless a free pass is used.

Exams CANNOT be made up after their due date under any circumstances except as an accommodation required by the Center for Access and Accommodations or as one of the free passes. Quizzes cannot be made up unless a request for a free pass is communicated to the instructor by email or in person.

One on One Meetings:

Each student is required to have a one-on-one meeting with the instructor at least once during the semester to pass the course. This meeting can take place during class and students will be able to sign up for the day in which the meeting takes place. The student may have to fill out a short questionnaire to bring to the meeting and help facilitate the conversation. It's just a friendly get-to-know-you and there will be no math involved.

Grade Calculation:

Graded Assessment	Percentage of Final Grade
Homework	5%
Quizzes	16%
Three Unit Exams	18% Each
Cumulative Final Exam	25%

Letter Grade	A	B	C	D	F
Percentage	89.5% and Up	79.5% - 89.5%	69.5% - 79.5%	60% - 69.5%	Below 60%

Written Style:

Student should practice and use good style when answering problems to receive any partial credit. If a student writes down a correct answer without sufficient work, they will receive no credit and may have to defend the academic integrity of their submission.

Any answer which requires an explanation should be written in complete sentences, all mathematical notation should be consistent and make sense, and anybody reading the solutions for the first time (namely, the grader) should have no confusion as to both the final answer and the work involved to get there. For example, "1 + 1 =2" is a complete sentence. It has a subject (1+1), a verb (=) and an object (2). Sloppy writing gets no credit. Professors are not mind-readers; Only the written work matters.

Academic Integrity:

Students should be aware of the Code of Academic Conduct and know the consequences should the code be violated. The document can be found at

Code of Academic Conduct

If a student is caught violating the Code they will receive a grade penalty and will be reported through COD's academic integrity reporting system.

Student academic dishonesty includes but is not limited to**:**

·   Dishonest use of course materials, such as student papers, examinations, reports and material posted on the Internet.

·   Knowingly posting course materials of any kind on Internet sites such as (but not limited to) Course Hero and Chegg without the consent of the instructor.

·   Knowingly assisting others in the dishonest use of course materials such as student papers, examinations and reports.

·   Knowingly providing course materials such as papers, lab data, reports and/or electronic files to be used by another student as that student's own work.

·   Plagiarizing, i.e., using language or ideas from materials without acknowledgement and/or copying work from other sources and submitting it as one's own.

·   Examples of plagiarism include but are not limited to:

§ Copying a phrase, a sentence, or a longer passage from a source (including an Internet source) and submitting it as one's own.

§ Summarizing or paraphrasing someone else's ideas without acknowledging the source.

§ Submitting group assignments individually as one's own independent work.

§ Copying or taking pictures of course materials such as videos, exams, quizzes or assignments and posting the copied items and/or pictures on the Internet **or** sharing these copied items and/or pictures with other students who have not yet completed the assignments.

§ Taking pictures or copying course materials that are considered confidential by the instructor such as exams or quizzes.

If an exam is being proctored, students should comply with the proctor's instructions. If a proctor accuses a student of violating the Code of Academic Conduct or not conforming to the assessment's instructions, and the student does not agree with the accusation, the student should provide countervailing evidence to support their case. Students caught violating the Code of Academic Conduct will receive a 0 on that assignment and possibly further penalties depending on the nature of the violation.

Center for Access and Accommodations:

The College of DuPage is committed to the equitable access of educational opportunities for students with disabilities in accordance with The Americans with Disabilities Act, As Amended and Section 504 of the Rehabilitation Act of 1973. Any student who feels they may need an accommodation on the basis of an illness, injury, medical condition, or disability should contact the Center for Access and Accommodations to determine eligibility for accommodations and to obtain an official Letter of Accommodation. The Center for Access and Accommodations can be reached via email at access@cod.edu. Students may also initiate a request for services by going to www.cod.edu/access and clicking on the green box labeled "complete form to request accommodations." If you are already registered with the Center for Access and Accommodations, please email me your Letter of Accommodation as soon as possible. Please DO NOT send any private health documentation or Doctor's notes to the course instructor.

Covid-19 Policy

Students should adhere to COD's Covid-19 safety protocols throughout the semester if visiting campus. All relevant policies regarding masking, vaccinations, reporting can be found on the COD website at

https://www.cod.edu/coronavirus/index.aspx

If you have been exposed to Covid-19 or have been diagnosed with Covid-19, please fill out the Student Self-Reporting form at

https://cm.maxient.com/reportingform.php?CollegeofDuPage&layout_id=9

Withdrawal Policy:

The final day for a student to withdraw from any course will be equal to 75% of the time for the respective academic session (see the Registration Calendar) through myACCESS https://myaccess.cod.edu or in person at the Registration office, Student Services Center (SSC), Room 2221.

After the deadline, students will be required to appeal for late withdrawal and provide appropriate documentation to the Student Registration Services Office for all requests. Students who are granted approval to withdraw by petition will not be eligible for refunds of tuition or fees and will receive a 'W' grade on their transcript. Appeals must be submitted prior to the designated final exam period for 16-week classes and before the last class meeting for all other session classes