College of Dupage
Math 1431-003 Precalculus I
Monday, Wednesday, Friday 11:00 AM – 12:25 PM
BIC 3551

Contact Information:

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Course Objectives and Topic Outline:

Course description to appear in catalog:
Students will learn algebra with an emphasis on concepts needed for calculus. Topics include, but are not limited to, functions, conic sections, matrices and determinants, polynomial theory, rational functions, sequences and series, logarithmic and exponential functions, combinatorial mathematics, and mathematical induction.

Credit Hours: 5 Lecture Hours: 5 Lab Hours: 0
Prerequisite: Demonstrated geometry competency (level 2) and MATH 0482 Foundations for College Mathematics II with a grade of "C" or better, or equivalent or a qualifying score on the mathematics placement test

A. General Course Objectives:
Upon successful completion of the course the student should be able to do the following:

1. Solve equations and inequalities involving the following: quadratic, rational, and absolute value expressions
2. Analyze functions and relations, including their graphs
3. Determine limits of functions numerically and/or graphically
4. Analyze inverse functions, including their graphs
5. Construct the graphs of conic sections
6. Determine the equation of a conic section
7. Perform matrix operations
8. Calculate the value of determinants
9. Solve systems of linear equations using various methods
10. Solve systems of non-linear equations
11. Find the zeros of polynomials
12. Graph polynomial functions
13. Analyze exponential and logarithmic functions, including their graphs
14. Solve exponential and logarithmic equations
15. Solve applications of exponential growth and decay
16. Use the binomial expansion theorem
17. Use sequence and series notation including sigma notation
18. Determine elements and sums of arithmetic and geometric series
19. Use the principle of mathematical induction
20. Determine the domains and ranges of rational functions
21. Construct the graphs of rational functions indicating horizontal, vertical, and oblique asymptotes

B. Topical Outline:

1. Review of algebra
   a) Quadratic equations
   b) Absolute value equations
   c) Linear relations
      i. Slope of a line
      ii. Graphs of lines
      iii. Parallel and perpendicular lines
      iv. Equation for a line
   d) Exponents and radicals
2. Inequalities
   a) Quadratic inequalities
   b) Rational inequalities
   c) Inequalities with absolute value
3. Relations and functions
   a) Definitions
   b) Function notation
   c) Domain and range
   d) Algebra of functions
   e) Composition of two functions
   f) Graphs
      i. Graphs of function
      ii. Symmetry to the x-axis, y-axis, or origin
      iii. Graphs with symmetry
      iv. Horizontal and vertical translations
   g) Odd and even functions
   h) Special functions
      i. Absolute value function
      ii. Greatest integer function
      iii. Square root function
      iv. Piecewise functions
   i) Inverse of a function
      i. Function notation for f^{-1}
      ii. Domain and range of f-1
      iii. Graphs of f and f-1
   j) Introduction to limits (optional)
      i. Graphical approach
      ii. Numerical approach
4. Analytic Geometry
   a) Distance and midpoint formulas
   b) Parabolas
      i. Graphs of horizontal and vertical parabolas
      ii. Vertex, focus, directrix, and axis of symmetry
      iii. Graphs of half of a parabola
   c) Circles
      i. Center-radius equation
      ii. General form equation
      iii. Graphs of circles or semi-circles
   d) Ellipses
      i. Graphs of ellipses or half of an ellipse
      ii. Major and minor axes
      iii. Center, vertices, and foci
      iv. Eccentricity

e) Hyperbolas
    i. Graphs of hyperbolas or half of a hyperbola
    ii. Equations of the asymptotes
    iii. Transverse and conjugate axes
    iv. Center, vertices, and foci
    v. Eccentricity
f) Systems of non-linear equations
g) Systems of non-linear inequalities (optional)

5. Matrices and determinants
    a) Definition and dimension
    b) Operations with matrices
        i. Addition and subtraction
        ii. Scalar multiplication
        iii. Matrix multiplication
    c) Gaussian elimination
    d) Cofactors
    e) Determinant theorems
    f) Cramer's rule
    g) Inverse of a matrix
6. Theory of polynomials
    a) Synthetic division
    b) Remainder theorem
    c) Factor theorem
    d) Zeros of a polynomial
    e) Conjugate pair theorem
    f) Descartes' rule of signs
    g) Integral bounds for zeros
    h) Rational zero theorem
    i) Approximation of zeros(optional)
    j) Graphs of polynomial functions
7. Exponential and logarithmic functions
    a) Exponential functions
        i. Definition
        ii. Graphs
        iii. Exponential equations
    b) Logarithmic functions
        i. Definition
        ii. Graphs
        iii. Applications
        iv. Properties of logarithms
        v. Logarithmic equations
        vi. Natural logarithm
        vii. The change of base formula
    c) Exponential growth and decay
8. Combinatorial mathematics
    a) Factorial notation
    b) Binomial theorem
        i. Binomial expansion
        ii. kth term of a binomial expansion
9. Sequences and series
    a) Definitions
    b) nth term of a sequence
    c) Sigma notation

d) Arithmetic sequences and series
    i. Definition
    ii. nth term of an arithmetic sequence
    iii. Formula for an
    iv. Sum of an arithmetic series
e) Geometric sequences and series
    i. Definition
    ii. nth term of a geometric sequence
    iii. Formula for an
    iv. Sum of a geometric series
    v. Sum of an infinite geometric series

10. Mathematical induction
    a) Principle of mathematical induction
    b) Proofs
11. Partial fractions (optional)
    a) Distinct linear factors
    b) Repeated linear factors
    c) Distinct quadratic factor
    d) Repeated quadratic factors
12. Rational functions
    a) Domain and range
    b) Horizontal asymptotes
    c) Vertical asymptotes
    d) Oblique asymptotes

Textbook:

College Algebra, 13th ed. by Lial, Hornsby, Schneider, and Daniels

The online supplement to the textbook 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 written 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, *including work shown*, not its correctness.

Homework is due within the first 5 minutes of class. Late penalties or 0's may be given if homework is turned in late without a free pass.

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. Most quiz and exam problems are direct homework problems or are questions inspired by the homework.

The lowest four homework grades will be dropped before computing the Homework Average in the final grade. All homework assignments will count equally when computing the homework average.

Quizzes:

Quizzes will be taken in class and will be a check on how well students understand the material without using outside resources.

Calculators are not allowed during quizzes unless students are instructed otherwise. 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. All quizzes will be weighted equally when computing the quiz average.

"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 a free pass cannot be used on assignments due in the final week of the semester..

The 48-hour extension begins from the original deadline of the assignment, and students must complete the form found in Blackboard *before* the original deadline or quiz/exam start time.

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. Always check the COD Testing Center hours and locations before going in to make up a quiz or exam.

Exams:

There will be two (2) midterms 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 the last day of class, 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 Quiz Extensions 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.

Neither quizzes nor exams can 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. Grade Calculation:

Graded Assessment	Percentage of Final Grade
Homework (lowest 4 dropped)	15%
Quizzes (lowest dropped)	20%
Two Unit Exams	20% each
Final Exam (also replaces lowest unit exam)	25%

Letter Grade	**A**	**B**	**C**	**D**	**F**
Percentage	89.5% and Up	79.5% - 89.4%	69.5% - 79.4%	59.5% - 69.4%	Below 59.5%

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.

Sloppy writing gets no credit. Instructors are not mind-readers, and only the written work will be graded for completeness and accuracy.

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 written or video evidence to support their case.

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.

Communicable Disease Reporting

Students should adhere to COD's safety protocols throughout the semester if visiting campus. All relevant policies regarding masking, vaccinations, and reporting of communicable diseases can be found on the COD website at Communicable Disease Reporting | College of DuPage (cod.edu)

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 Academic 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