MATH 162-550 DUAL

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COURSE DESCRIPTION: Limits, derivatives, integrals, and applications.

Prerequisites: (ACT=28-31 or SAT=640-700 or MATH 150 or Compass College Algebra >66) and (MATH 123 or compass Trig >59) or (ACT=>32 or SAT=>700)

REQUIRED MATERIALS:

- **Textbook (Or school Book)**

- **Pearson (MyMathtest:MMtest) Student Access Code:** This code will provide you access to all of the online materials for the course including the quizzes that will be required for the course.

- **Notebook, pencil, highlighter, notecards, calculator.**

- **Calculator:** A scientific calculator will be desired. Students may use a calculator for quizzes and exams. **No graphing calculators and/or phones** will be allowed on any exams or quizzes, unless otherwise announced. **Students cannot use their phone as a calculator during a quiz or exam AND students cannot share a calculator**.

Grading Scale (Note: + and – of grades are possible but only if of benefit to the student)

A	90 – 100%	CR	Credit 72 – 100%
B	80 – 89%	NC	No Credit < 70%
C	70–79%		
D	60–69%		
F	< 59%		

Grades Distribution

UNM Instructor

The UNM instructor will be in charge of the following part of the final grade of the students:

 The midterm Test: 20% of the final grade. (It will be prepared and graded by the UNM instructor).

Mymathtest: (online Homework) 20% of the final grade.

The Cumulative Final Test*: 25% of the final grade. (It will be prepared and graded by the UNM instructor).

The grand total for the unm instructor will be 65% of the final grade of the student.

The School Teacher

The school teacher will be in charge of the following part of the final grade of the students:

Unit Tests ___% , written homework ___%, in class participation ___%, attendance ___% and others ___%.

The grand total for the school teacher will be 35% of the final grade of the student.

IMPORTANT DATES with respect to this class: See The UNM online Schedule

  ATTENDANCE POLICY: The student bears full responsibility for the material and procedural information covered in class. If a student misses 2 classes in the first two weeks or 3 consecutive class periods or 5 total, the student may be dropped from the class. Each absence will result in a 5% reduction in the Attendance & Participation grade.

THE COURSE: Homework, Unit Exams: Please note that the book and MMt are not perfectly aligned.

- **Homework:** The online homework assignments are done and graded on MyMathtest. You should expect to spend 6-9 hours in addition to the lectures each week to study for this course and complete the homework assignments. The due date of each homework assignment is specified on MyMathtest. Please check there for homework after each class, note the due dates and allow ample time for completion. This class moves quickly. At least one new topic will be covered and a new homework assignment will be assigned every class. NOTICE: Written homework assignments might be given/assigned in class**.**

- **Journal (Optional for the school teacher to collect):** You are required to have a bound composition book of at least 75 pages for this semester long journal. A list of math terms or concepts commonly used in class will be posted on Blackboard. This terms/concepts will be separated by tests. For example: The first list of terms/concepts will be about the material that will be covered in test #1. For each term/concept, you must define each term in your own words and provide at least one example. When working on your journal, be creative, but be precise, and **organized**. The journal must be clear to read and follow. Each journal must include a table of content. The journal will be collected on every test day for check-up and grading.

- **Practice Tests (For the midterm and the final test):** Optional (but highly recommended). They will appear in Blackboard Learn as exams approach, there will also be an optional practice test in MMtest.

UNM EMAIL/BLACKBOARD LEARN ACCESS: Beginning Fall 2016 semester, all UNM-Valencia students will need a UNM Net ID which can be created by going to: http://it.unm.edu/accounts/. UNM Net ID will give you access to the computer labs on campus, Blackboard Learn and UNM Email.

SUPPORT SERVICES: The Valencia Campus Library provides a quiet atmosphere for study and is an excellent resource for supplementary materials. Audiotapes and videotapes are available for student use through the library. The STEM Center offers tutoring at no cost to the student. For best results, schedule appointments for tutoring at (505) 925-8515. The Learning Center (925-8907) also offers tutoring at no cost to the student.

EXPECTATIONS: Students are expected to conduct themselves in a polite, courteous, professional and collegial manner. Cell phones must be set on silent. Please step into the hall if you need to take a call during class. Cell phones must be turned off during exams.

UNM'S POLICY ON HONESTY IN ACADEMIC MATTERS: Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take

disciplinary action, including dismissal, against any student who is found responsible for academic dishonesty. Any student who has been judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course. Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests or assignments, claiming credit for work not done or done by others; hindering the academic work of other students; and misrepresenting academic or professional qualifications within or outside the University.

<u>DISABILITY STATEMENT:</u> If you have a documented disability, please provide me with a copy of your letter from Equal Access Services as soon as possible to ensure that accommodations are provided in a timely manner.

COMPUTER LAB RESPONSIBILITY: Please be advised that use of computer labs on UNM properties is governed by "Policy 2500: Acceptable Computer Use" which can be found at http://policy.unm.edu/university-policies/2000/2500.html. Food and drink are also prohibited in any computer lab on campus. Anyone violating these policies is subject to possible suspension and loss of computer lab privileges.

Communication:

◦ Use correct mathematical notation and terminology.

◦ Be able to read a mathematical text and reproduce its main ideas.

◦ Be able to verbalize the steps needed to solve a problem, without referring to a similar

   example worked out elsewhere.

◦ Read and interpret graphs of functions, of their derivatives, etc.

Basics:

◦ Use algebra to simplify expressions, solve equations, and solve inequalities.

◦ Graph basic functions such as polynomials, $e^x, \frac{1}{x}, \sqrt{x}, x^p, p > 0, |x|$ and their translations,

   also functions defined piecewise

◦ Work with functions of one variable that may contain several parameters.

The Concept of Limit:

◦ Draw a sketch illustrating what it means for a limit to exist and explain in words.

◦ Determine when the limit of a function exists and when it does not exist.

◦ Find finite limits, limits at infinity and infinite limits algebraically and from the graph of

   a function.

◦ Find limits for functions defined piecewise.

◦ Find vertical and horizontal asymptotes.

Continuity:

◦ State definition of continuity, interpret graphically.

◦ Determine when a function is continuous from its graph and algebraically.

◦ State and use the Intermediate and Extreme Value Theorems.

Derivatives:

◦ State the definition of the derivative. Explain in your own words how this definition is

   motivated. Use the definition to find derivatives.

◦ Understand the connection between the derivative, instantaneous rates of change and

   slopes of graphs. If the value of a function has units, what are the units of the derivative?

◦ Estimate derivatives from graphs of functions or from tabulated values.

◦ Use the rules to differentiate several types of functions, including trigonometric and exponential

   functions, functions defined implicitly, or functions defined piecewise. Use the

Fundamental Theorem to differentiate functions defined as integrals.

◦ Apply derivatives to graph functions, find extreme values, and solve optimization problems.

◦ Find equations of tangent lines. Find the linear approximation of a function near a base

   point. Use linear approximation to approximate function values or changes in functions.

◦ Given a relation between functions, find a relation between their derivatives ("related

   rates")

Differential Equations:

◦ Find anti-derivatives.

◦ Solve simple differential equations with initial conditions (Initial value problems). Include problems where the derivative is given by a piecewise function.

◦ Write down the initial value problem described in words in a paragraph of text.

Integration:

◦ State the steps used to obtain the area under a graph as a limit of a sum.

◦ Approximate definite integrals by finite sums.

◦ Evaluate definite integrals by interpreting them as areas, in simple cases.

◦ Use the Fundamental Theorem of Calculus and the rules of integration to evaluate definite integrals, with or without substitution. When using substitution, change bounds of integration.

◦ Use the Fundamental Theorem of Calculus to differentiate definite integrals.

◦ Use the definite integral to find areas under curves, volumes, arc length, and work done by a force.

◦ Interpret the definite integral of a rate of change as a total change.

◦ Interpret the definite integral as an averaging process. Find average values of functions over given intervals.

Week 1-3: Derivatives.

    Tangent and velocity problems. Rates of change.

    Limits: finite limits, infinite limits.

    Definition of the derivative.

    Rules for differentiation (power, product, quotient,

    chain rules, trigonometric, exponential, logarithm functions).

    Implicit differentiation.

Week 4: Review and Exam.

Weeks 5-8: Applications.

    Linearization

    Graphing

    Approximating functions by linear functions.

    Finding maximum and minimum values of functions.

    Solving optimization problems.

    Solving differential Equations.

Week 9: Review and Exam.

Weeks 10-12: Integrals

    The area problem. The distance problem.

    Definition of definite integral. Properties.

    Fundamental Theorem.

    Indefinite integral.

    Method of substitution.

Applications: Areas, Volumes, Arc length, Work, Averages

Week 13: Review and Exam.

Weeks 14-15: Wrap-up.

    Horizontal and vertical asymptotes. Graphing rational functions

Continuity. Differentiability. Integrability.

Proof of product/quotient rule.