



**Math 1325: Calculus for Business & Social Sciences**

**COURSE OUTLINE**

(Revised August 2019)

3 hour lecture course / 48 hours per semester

Textbook: **Mathematics with Applications In the Management, Natural, and Social Sciences**; 12th ed.; Margaret Lial, Thomas Hungerford, John Holcomb, Jr., Bernadette Mullins. ISBN-13: 978-0134767628

The ISBN for hard bound text with MML is: 978-0135335215

**Catalog Description:** MATH 1325 Elements of Calculus with Applications. This course is the basic study of limits and continuity, differentiation, optimization and graphing, and integration of elementary functions, with emphasis on applications in business, economics, and social sciences. This course is not a substitute for MATH 2413, Calculus I.

**Prerequisites:** A grade of C or better in MATH 1314 or a grade of C or better in MATH 1324 or the equivalent.

**Course Intent:** The intent of this course is to provide the student certain manipulative skills with limits insofar as they apply to concrete but elementary problems in the social and natural sciences. Mathematical rigor will be kept to a minimum.

**Audience:** This course is intended for students majoring in business, and the natural and social sciences.

**Course Student Learning Outcomes (SLO):**

1. Apply calculus to solve business, economics, and social sciences problems.
2. Apply appropriate differentiation techniques to obtain derivatives of various functions, including logarithmic and exponential functions.
3. Solve application problems involving implicit differentiation and related rates.
4. Solve optimization problems with emphasis on business and social sciences applications.
5. Determine appropriate technique(s) of integration.
6. Integrate functions using the method of integration by parts or substitution, as appropriate.
7. Solve business, economics, and social sciences applications problems using integration techniques.

**Course Objectives:** Upon completion of this course, a student should be able to:

1. Find the limit of a function as  $x$  approaches  $a$ .
2. Find the average and instantaneous rate of change.
3. Use a limit to find the derivative of a function.
4. Use the quotient rule to find the derivative of a function.
5. Use the power rule to find the derivative of a function.
6. Find the derivative of exponential and logarithmic functions.

7. Tell if a function is continuous at given values of  $x$ .
8. Find the absolute extrema of a given function.
9. Use the second derivative to find all relative extrema for a function.
10. Use derivatives for various applications and sketching of curves.
11. Find antiderivatives for indefinite integrals and find indefinite integrals using substitution.
12. Given a definite integral, find the area under the curve.
13. Evaluate the results of a summation.
14. Using the fundamental theorem of calculus, evaluate definite integrals.
15. Apply definite integrals for various applications and use the table of integrals to find antiderivatives.
16. Find general solutions for given differential equations.
17. Graph the first octant portion of a given plane.
18. Given a function  $f(x,y)$ , find all second-order partial derivatives.
19. Given a function  $f(x,y)$ , find the values of any relative extrema and identify saddle points.

**Course Outline:** Instructors may find it preferable to cover the course topics in the order listed below. However, the instructor may choose to organize topics in any order, but all materials must be covered.

APPROXIMATE TIME	TEXT REFERENCE
<b>UNIT I</b>	<b>Algebra Review (8 hours)</b>
1.5 hours	1.3 Factoring
1.5 hours	2.3 Linear Models
1.5 hours	3.6 Rational Functions
1.5 hours	4.1 Exponential Functions
2 hours	4.3 Logarithmic Functions
<b>UNIT II</b>	<b>Differential Calculus (12 hours)</b>
1.5 hours	11.1 Limits
1.5 hours	11.2 One-sided Limits and Limits Involving Infinity
1 hour	11.3 Rates of Change
1 hour	11.4 Tangent Lines and Derivatives
1.5 hours	11.5 Techniques for Finding Derivatives
1.5 hours	11.6 Derivatives of Products and Quotients
1.5 hours	11.7 The Chain Rule
1.5 hours	11.8 Derivatives of Exponential and Logarithmic Functions
1 hour	11.9 Continuity and Differentiability
<b>UNIT III</b>	<b>Applications of the Derivative (10 hours)</b>
1.5 hours	12.1 Derivatives and Graphs
1.5 hours	12.2 The Second Derivative
2 hours	12.3 Optimization Applications
1.5 hours	12.4 Implicit Differentiation
1.5 hours	12.5 Related Rates

2 hours      12.6 Curve Sketching

**UNIT IV      Integral Calculus (12 hours)**

2 hours      13.1 Antiderivatives  
 2 hours      13.2 Integration by Substitution  
 2 hours      13.4 Area and the Definite Integral  
 2 hours      13.5 The Fundamental Theorem of Calculus  
 2 hours      13.6 Applications of Integrals  
 2 hours      13.7 Differential Equations

**UNIT V      Multivariate Calculus (6 hours)**

2 hours      14.1 Functions of Several Variables  
 2 hours      14.2 Partial Derivatives  
 2 hours      14.3 Extrema of Functions of Several Variables

**Departmental Policies:**

1. Each instructor must cover all course topics by the end of the semester. The final exam is comprehensive and questions on it can deal with any of the course objectives.
2. Each student should receive a copy of the instructor's student syllabus for the course during the first week of class.
3. A minimum of three in class tests and a comprehensive final examination must be given. The final examination must be taken by all students.
4. All major tests should be announced at least one week or the equivalent in advance.
5. The final exam must count for at least 25 to 40 percent of the final grade.
6. The final course average will be used in the usual manner (90-100 "A"; 80-89 "B"; 70-79 "C"; 60-69 "D"; Below 60 "F").
7. Either an open book or a take home major test may be given at the discretion of the instructor.
8. Any review sheet should be comprehensive and the student should not feel that classroom notes, homework, and tests may be ignored in favor of the review sheet for any examination.
9. **For distance Ed (Online courses):**
  - i. At least **45%** of your course grade must consist of scores from in-person proctored exams in the Testing Center.
  - ii. At least two exams in your online Math 1325 course must be proctored in the Testing Center.

**Resource Materials:** Any student enrolled in Math 1325 at HCCS has access to the Academic Support Center where they may get additional help in understanding the theory or in improving their skills. The Center is staffed with mathematics faculty and student assistants, and offers tutorial help, video tapes and computer-assisted drills. Also available is a student's Solutions manual which may be obtained from the Bookstore.

**Suggested Methods:** It is helpful to begin each class with questions concerning the material discussed and the assigned homework problems. In presenting new material, it is suggested that an explanation be

followed by students working examples in class. Students should be encouraged to work the review exercises at the end of each chapter. Also, they should be encouraged to visit the Academic Support Center at their respective colleges.

**Academic Honesty:** All students are required to exercise academic honesty in completion of all tests and assignments. Penalties for academic dishonesty (cheating on a test, collusion on an assignment, etc.) include, but are not limited to, a reduced grade, a “0” on that test or assignment, a “W” in the course, or an “F” in the course. The use of recording devices, including camera phones and tape recorders, is prohibited in all locations where instruction, tutoring, or testing occurs. Students with disabilities who need to use a recording device as a reasonable accommodation should contact the Disability Services Office for information.

**Withdrawal policy:** If your name is on the roll at the end of the term, you WILL receive a grade. If you wish to drop the class, then it is your responsibility to do that before the final drop date. Neither you nor your instructor will be able to perform the drop after the final drop date. Please refer to the following notice before dropping the class.

**NOTICE:** Students who take a course three or more times will face significant tuition or fee increases at HCC and other Texas public colleges and universities. In addition, state law dictates that students are allowed a maximum of 6 course withdrawals during their entire college career. Starting in the fall of 2007, students with more than 6 drops will be required to pay additional fees. Prior to course withdrawal, you must confer with your professor or counselor about your study habits, homework, test-taking skills, attendance, course participation, and tutoring or other assistance that is available.

**Americans With Disabilities Act (ADA):** Any student with a documented disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the Disability Services Office at their college at the beginning of each semester. Faculty members are authorized to provide only the accommodations requested by the Disability Support Services Office.

**Sexual Harassment:** It is a violation of HCCS policy for an employee, agent, or student of the college to engage in sexual harassment as defined in the EEOC guidelines (EEO/AA Compliance Handbook 47).