I. COURSE INFORMATION

Instructor: Dr. Pablo Tarazaga  
Office Phone: 825-3187  
Office Address: CI 316  
E-Mail Address: pablo.tarazaga@tamucc.edu  
Office hours: TR 10:00 to 12:00  
M 10:00 to 11:00  

Meeting Time and Place: Math 2413.006 MWF 11:00-11:50 EN 107

II. COURSE DESCRIPTION

In this course we will deal with derivatives and integrals of functions in one variable. The course begins with limit, and uses it to define the derivative of a function. Then differentiation rules are discussed, followed by applications of differentiation. Finally, integrals are introduced followed by some applications of integrals.

III. PREREQUISITES

MATH 1314 (College Algebra) and MATH 1316 (Trigonometry), or MATH 2312 (Precalculus), or placement beyond MATH 2312.

IV. TEXT AND OTHER SUPPLIES REQUIRED


V. COURSE LEARNING OUTCOMES

At the end of the course the student should:

1. Understand and use the concept of the limit of a function
   a. Use properties of limits and other techniques, like L'Hospital's rule, to determine the existence or not of the limit of a function at a given value;
   b. Understand the definition of continuity of functions
1. From a function given in a graph determine the discontinuity point indicating which properties of continuity fail;
   ii. Given a piece-wise function defined by formulas determine the points at which the function is discontinuous.

2. Be able to provide examples and counterexamples dealing with important results discussed in this course, and specially to understand the necessity of the conditions for some of them:
   a. Give an example of a function which does not satisfy the Intermediate Value Theorem (IVT),
   b. Give an example of a function which does not satisfy the Mean Value Theorem (MVT);
   c. Give an example of a discontinuous function with a removable/non-removable discontinuity;
   d. Give an example of a function whose limit does not exist at a point.
   e. Give an example of a function that is continuous but not differentiable at a point.

3. Understand and interpret the concept of the derivative:
   a. Graphically, as the slope of the tangent line at a point;
   b. Analytically, as the instantaneous rate of change of the function;
   c. Use information about the first and second derivative to obtain information about the original function; interpret the units of the derivative.
   d. Points where the function is increasing the fastest, where it is constant, etc.
   e. From a given graph determine all the critical points and indicate at which the function is not differentiable.
   f. From a function defined piecewise determine whether or not the function is differentiable at the point(s) where the pieces join.

4. Find the linear approximation of a function at a differentiable point and use it to estimate the function.
   a. They will produce the linear approximation from a graph and determine if in a neighborhood of the point it will give an overestimate or underestimate
   b. From a function defined by an algebraic expression the student will find the linear approximation at a given point and use it to estimate the original function. The student has to justify whether it is an overestimate or underestimate.

5. Sketch the graph of a function or its derivative function:
   a. From the graph of a function, they produce the graphs of the first and second derivative functions;
   b. From the graph, or information, about the first and second derivative of a function they will generate the graph of the function.
c. From a function defined by a formula they will find the information to sketch its graph (domain, continuity points, increasing/decreasing, concave up/down, end behavior, asymptotes)

6. Use calculus techniques to the solution of problems:
   a. Optimization problems. Given an optimization problem the student will find the mathematical model for it, and will proceed to solve it using calculus techniques (for some they may need to use technology)
   b. Related rates problems.

7. Use implicit differentiation properly:
   a. Calculate derivatives using implicit differentiation
   b. Determine the equation of tangent lines to graphs obtained from expressions where one variable is given implicitly as a function of other.

8. Understand the concept of the integral
   a. Interpret the units of the integral in the solution of problems
   b. Evaluate basic definite integrals
   c. Calculate the area of regions by using integration
   d. Interpret integrals as area to evaluate them
   e. Estimate integrals using Riemann Sums
   f. Use the Fundamental Theorem of Calculus so that the student understands the relationship between integration and differentiation.

VI. INSTRUCTIONAL METHODS AND ACTIVITIES.

The class uses lecture format encouraging student participation and discussion.

VII. EVALUATIONS AND GRADE ASSIGNMENTS

The methods of evaluation and the criteria for grade assignments are:

The Lab part of the course is graded by the TA and consist of two or three computing labs using Matlab and the rest of the labs will be dedicated to solve problems.

Two test will be given during the semester. The comprehensive Final Exam (including chapter 5) is on Friday, December 5th, 2:00 AM - 4:30 PM in the usual classroom.

Homework will be assigned at the end of each section from the book and will be no collected. Office hours are a great opportunity to ask more questions about homework. On-campus free tutoring in CASA is another way of getting help with the homework.

It is important to note that learning Calculus imply several things, you need to study, assimilate, retain and apply concepts, definitions, rules, properties and theorems and then use all these tools to solve problems.
Because of this, every test (including the final exam) will have parts that evaluate each of these areas. This means that you will have to express and write down correctly definitions, basic concepts, rules, properties and theorems (even sketch basic proofs). Finally you will have to apply all these tools (justifying why you can use them) to solve problems.

For some problems you will get partial credit but for other not. There will be problems on computing limits, derivatives and integrals for which there is not partial credit.

**Note:** It is important to understand that the every STUDENT LEARNING OUTCOMES will be evaluated in quizzes and tests. They represent a basic list of concepts and techniques that need to be learn in the class.

Lab: 20%
Test 1: 25%
Test 2: 25%
Final exam: 30%

Your final grade will be determined using the following scale:

A: 90%-100%  B: 80%-89%  C: 70%-79%  D: 60%-69%  F: 0%-59

**VIII. TENTATIVE COURSE SCHEDULE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
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<tbody>
<tr>
<td>8/25</td>
<td>Introduction to vectors, length and dot product</td>
</tr>
<tr>
<td>9/1</td>
<td>System of linear equations.</td>
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<tr>
<td>9/8</td>
<td>The idea of Gauss elimination: elementary operations.</td>
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<tr>
<td>9/15</td>
<td>Gauss elimination using elementary matrices.</td>
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<tr>
<td>9/22</td>
<td>Operations with matrices</td>
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<tr>
<td>9/29</td>
<td>Inverse of a matrix.</td>
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<tr>
<td>10/6</td>
<td>LU factorization. Transposition, symmetric matrices.</td>
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<tr>
<td>10/13</td>
<td>Space of vectors.</td>
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<tr>
<td>10/20</td>
<td>Solving systems, Ax=0 and Ax=b.</td>
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<tr>
<td>10/27</td>
<td>Generators, independence and basis.</td>
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<tr>
<td>11/3</td>
<td>The four fundamental subspaces.</td>
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<tr>
<td>11/10</td>
<td>Orthogonality of the four subspaces. Projections</td>
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<tr>
<td>11/17</td>
<td>Least Squares and the Gram-Schmidt process.</td>
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<tr>
<td>11/24</td>
<td>Eigenvalues and eigenvectors, diagonalization , symmetric matrices</td>
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<tr>
<td>12/1</td>
<td>Positive Definite Matrices and Similar matrices</td>
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<tr>
<td>Dec 5</td>
<td>Final Exam (2:00 – 4:30)</td>
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IX. CLASS POLICIES

- Attendance: It will not be part of your grade, but it is required. Exceptions are sickness and emergencies.

- I do expect that you come to each class ready to learn and to participate. Also you have to be prepared to do any required work. You are expected to devote for each hour of class a minimum of two or three hours outside the class working in the subject (some people need more time than others).

- If you are missing a deadline, a quiz or a test, you have to tell me beforehand by any mean, examples: e-mail or phone.

- Grades: After you receive your grades you have up to a week to dispute it. I am the person you can dispute your grade with.

- If at any point during the course you are considering to drop the class, talk to me before you do it. I am here to help you in your learning experience and to help you to succeed in your college career.

- **PLEASE TURN YOUR CELLULAR PHONES OFF. DO NOT USE THEM DURING THE CLASS. DO NOT DISTURB THE CLASS WITH THEM. KEEP IT IN YOUR POCKET OR IN YOUR BAG.**

*Academic Integrity/Plagiarism*

University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in grade zero.

*Dropping a Class*

I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, **you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form.** Just stopping attendance and
participation WILL NOT automatically result in your being dropped from the class. **July 25. 2014** is the last day to drop a class with an automatic grade of “W” this term.

**Classroom professional behavior**

Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

**Grade Appeals**

As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage (http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

**Disabilities Accommodations**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

**Statement of Academic Continuity**

In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.