I. COURSE INFORMATION

Meeting          TR 9:30-10:45 am CS 101
                  Lab MW 3:30-5:20 pm CI-222
Professor:       Dr. Jose H. Giraldo
Office Phone     825-5827
Office Address   CI 317
E-mail address:  jose.giraldo@tamucc.edu
Class Web Address http://sci.tamucc.edu/~jgiraldo/calculus1/
Office Hours:    TR 12:00 – 2:00 pm

II. COURSE DESCRIPTION

The main concepts to discuss in this class are **limits of functions**, **continuity of a function**, the **derivative** function and applications, and an introduction to the **integral** of a function and applications.

After reviewing the key concepts on functions, including the library of basic functions, the concept of the integral of a function on a closed interval will be discussed. Then a detailed discussion of limit of function will be tied to integrals and to define continuity of a function at a point. The concept of the derivative of a continuous function at a point will be discussed from a graphical, numerical, and algebraic point of view. Key ideas about derivatives such as local maximum/minimum, critical points, and inflection points will be discussed in great detail. Following it, we will study some applications of the derivatives. Finally, the concept of the integral and the derivative of a function will be related by the Fundamental Theorem of Calculus.

III. PREREQUISITES

Math 1316 (Trigonometry), Math 2312 (Precalculus), or by placement test.

IV. TEXT AND OTHER SUPPLIES REQUIRED

*You have access to the Calculus I class notes developed by Dr. Giraldo, which will be used for class and lab discussions. The class notes are available through the class website. You can also supplement class discussions using any calculus textbook.*
Although a textbook is not required, you are required to get printouts of all the workbooks, which contain the exercises to be worked out during class and in the lab period. I recommend having a dedicated binder for the workbooks apart from the class notes. It is part of the organization you should have.

A graphing calculator is required for this class. The mathematics department supports the TI-83 plus, but in general you can use any graphing calculator. I will support the TI-83 plus, and the TI-89. The TI-89 has a computer algebra system (CAS) that facilitates your work in calculus. I will use a TI-89 for all the class demonstrations.

V. GOALS AND LEARNING OUTCOMES

GOALS OF THIS COURSE
The student should achieve the following general goals:

• Improve his attitude toward:
  o Appreciation and value of mathematics
  o The likelihood of success and satisfaction
  o Ways to learn math effectively
  o The link between math and the student’s discipline
• Strengthen his general academic skills in:
  o Critical thinking
  o Writing
  o Giving clear verbal explanations
  o Working collaboratively
  o Assuming responsibility
  o When and how to use technology.
• Improve his quantitative reasoning skills:
  o Ability to translate a word problem into a math statement, and back again to words.
  o Ability to form reasonable descriptions and judgments based on quantitative information.

STUDENT LEARNING OUTCOMES (SLO)

As a core class you should:

• Be able to collaborate effectively as both an effective leader and follower.
• Be able to apply mathematical concepts to new situations.
• Communicate about interdisciplinary topics verbally and in writing, via poster presentation, and via multimedia presentation.
• Use mathematical skills to analyze data
• Develop skills to translate data into appropriate visual representations (charts, graphs).
• Take personal responsibility and become a self directed college learner.
• Get along with others.
• Develop awareness of one's present and future role in the science community.
• Use technology effectively.
• Be successful.

CONCEPTUAL LEARNING OUTCOMES

At the end of the course the student should be able to:

• Calculate limits and apply the concept of limits to continuity, derivatives and other contexts.

• Calculate derivatives of functions in a variety of ways: from the definition, by applying rules to a standard catalog of functions, for implicitly defined functions and for related rates.

• Interpret derivatives as slopes of tangent lines and instantaneous rates of change. Relate units of a derivative to the units of the dependent and independent variable. Also, find and apply linearization and differentials of functions.

• Apply derivatives to optimization of functions, determining geometric features of graphs of functions, and to sketching graphs of functions.

• Determine whether functions meet hypotheses of theorems and draw appropriate conclusions.

• Use Riemann sums to approximate areas under curves and estimate accumulations of rates. Also, find anti-derivatives and apply them to evaluate indefinite integrals and, using the Fundamental Theorem of Calculus, to evaluate definite integrals.

VI. INSTRUCTIONAL METHODS AND ACTIVITIES.

The concepts in the course will be learned emphasizing a graphical, numerical, algebraic, verbal, and written approach. It is expected that you come to class prepared to discuss the assignments.

In general the class is structured to have three parts:

• Group discussion of homework or other assignments within your group, and then extended to the whole class.
• Presentation of new concepts and activities aimed to its understanding.
• Work in groups on problems dealing with the new concepts discussed in class.

The instructor presents the key concepts and examples for the day. Then the students work in groups doing activities or solving problems related to the class presentation.
Group work is an essential component of this class and an essential part for you to understand the concepts and to your success.

*Keep in mind that you CAN ONLY REMEMBER*

<table>
<thead>
<tr>
<th>Percentage</th>
<th>What You Remember</th>
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<tbody>
<tr>
<td>10%</td>
<td>what you read</td>
</tr>
<tr>
<td>20%</td>
<td>what you hear</td>
</tr>
<tr>
<td>30%</td>
<td>what you see</td>
</tr>
<tr>
<td>50%</td>
<td>what you see and hear</td>
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<tr>
<td>70%</td>
<td>what you discuss with others</td>
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<tr>
<td>90%</td>
<td>what you teach someone else</td>
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</table>

In this course YOU will be an active participant in the learning process. *I expect you to be a scholar, not a spectator.*

You will work in groups of three or four. Research shows that students who *work* in groups tend to be more successful. From participating actively in the activities/problems assigned, you will reach the level that enables you to discuss the concepts with others, or teach those concepts to someone else.

*The only way to learn mathematics is with and active individual work. This implies to be prepared for each class and do (and understand) as many problems as needed to reach the desired mastery of the concepts.*

*Don’t forget that making mistakes is crucial in any learning process!! I have never met anybody who learns without making mistakes.*

**VII. EVALUATIONS AND GRADE ASSIGNMENTS**

All the activities leading to accomplish the goals for this class will be considered for your final grade. The table below shows the weight of each of the items considered to determine your grade.

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
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<tbody>
<tr>
<td><strong>Quizzes</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Computational Proficiency (Limits, derivatives)</strong></td>
<td>(100, 100)</td>
</tr>
<tr>
<td><strong>Lab</strong></td>
<td>50</td>
</tr>
<tr>
<td><strong>Special Problem Set: Optimization, linearization, Related Rates</strong></td>
<td>50</td>
</tr>
<tr>
<td><strong>Test Readiness</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Tests (two)</strong></td>
<td>200</td>
</tr>
<tr>
<td><strong>Homework Sets</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Final Exam</strong></td>
<td>200</td>
</tr>
</tbody>
</table>

**QUIZZES**

There will be a quiz at the end of each lab period, except when there is another assessment (exam or gateway). There will between 10 and 12 quizzes.
The quizzes are aimed to help master the basic concepts and your understanding of the homework. Information about the Learning Outcomes to be assessed in each quiz and sample questions will be available through the course web page.

**HOMEWORK SETS and REGULAR HOMEWORK**

Homework is probably the most important part of your learning process. Regular homework will be assigned from the class workbooks, but there will also be homework sets (10%) of your grade that will be done through the web using **WebWork**.

I expect you to work on the assigned problems from the workbooks. Don’t worry if you struggle with a problem, since it is part of the learning process. All what it means is that you need to work more on that concept. The lab period will be devoted to the discussion of problems from the workbooks. The way you discuss the homework will help us determine your understanding of the concepts and give you proper feedback. You are welcome to ask questions about homework at the beginning of each class period.

At the end of each lab I will choose randomly one of the problems assigned as homework and grade it. Make sure you bring the workbook to the class. If you don’t submit your workbook, the grade for homework will be zero.

*You need to have a binder exclusively dedicated to the workbooks.*

**LAB PERIOD**

The lab period will be devoted to discussion and solution of problems from homework or new assigned problems, the write up of some solutions, and assessment. You will be working in groups of three or four people.

Time allocation for lab period:

- a. Group discussion of selected problems assigned in the previous class period. You are expected to have worked on those problems before the lab. For the lab discussion you can use your notes and workbooks (60 minutes).
- b. One of the problems assigned for group discussion will be chosen so that all the members of the group know how to solve the problem. Use of notes or notes taking are not allowed in this period. (20 minutes)
- c. At the end of the discussion of the problem, the group will have to answer some questions about the problem discussed (closed notes)- 4 pts for lab grade- See Writing below.

It is expected that you work on the workbooks. The mentor and I will ask for your work whenever we are having discussions. It is to your benefit to work on those problems on time.

The grade for each lab will be assigned as follows:

Participation (6 pts)
- Attending lab (2 pts)
- You are willing to help others (1 pt)
• You answer questions asked by others (1 pt)
• You are prepared to discuss the problems (work on workbooks) (2 pt)

Writing. The problem to be submitted for the group will count as four points
  a. Indication of steps to solve the problem (1 pt)
  b. Execution of each step (2 pts)
  c. Verification and explanation of final answer (1 pt)

COMPUTATIONAL PROFICIENCY (Gateway Tests)

The approach of this course emphasizes understanding of the mathematical concepts as well as computational abilities. To guarantee that you have the computational skills needed to solve the problem for this class and succeed in other classes, you will take two computational proficiency tests. One test is about limits and the other one is about derivatives. Those tests deal exclusively with the computational part of those concepts. You can take each computational test up to three times to achieve the minimum proficiency required for each one.

Each of these tests has a qualifying component, which you need to satisfy to be eligible to take the actual test. The questions for the qualifying component will be available through the website.

Gateway on Limits
For the proficiency test on limits, you will be given a set of problems (forty to fifty) to practice. The problems in the actual test will be similar to, or identical to the practice problems.

You are expected to solve ALL the practice problems following the given instructions. The solution has to be clear and easy to follow (scratch work is not accepted). Before you take the actual gateway test, you have to qualify for it.

To qualify for the test you need to satisfy the following requirement in the given order:
  a. Show the written solutions to all the problems. I will look for completeness, clarity, and correctness of the solutions. In case a solution is missing or an incorrect solution is identified, your work will not be accepted. I advise you to work with your peers and mentors when you are working on the problems. The mentors will not solve the problems for you, but will guide you through the process. If you have any doubts about a specific problem, discuss it with me, or the mentors before turning in the solutions. Now, assuming everything is fine, go to part (b).
  b. Pass a quiz on basic concepts on limits (100%). The questions for this part are available through the web. This counts as 3 points toward the 10-point value of the test. This part of the test will be administered in class.
  c. The final part of the process is to take the written part of the Gateway. This part is individual where the only device allowed to use is pen or pencil. You will be presented with ten problems similar to the list of problems you already solved. It is expected that you write a complete solution to each of the problems according to the instructions.
This part will count as 70% of the grade (7/10). Your grade for this part is assigned according to the scale below

<table>
<thead>
<tr>
<th>No. Incorrect /Incomplete Solutions</th>
<th>0-1</th>
<th>2</th>
<th>3</th>
<th>More than 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

You have up to three attempts to pass the gateway on limits. However, you have only one week between the first time you take the quiz on basic concepts and the last attempt to pass it.

**Gateway On Derivatives**

For the computational proficiency in derivatives you will be presented with a list of problems to practice. You are expected to work out those problems before taking the actual test. For this test you also have a qualifying component. You need to obtain at least 90% in the qualifying component, which deals with the basic rules for differentiation.

The gateway test has ten problems and this is the grading grid:

<table>
<thead>
<tr>
<th>No. Incorrect /Incomplete Solutions</th>
<th>0-1</th>
<th>2</th>
<th>3</th>
<th>More than 3</th>
</tr>
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<tbody>
<tr>
<td>Score</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>0</td>
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</table>

**TESTS READINESS**

These 30-minute assessments are more comprehensive than the quizzes and will assess readiness for the test. These tests will be taken during the lecture period the day before each exam. The questions will be about understanding of concepts/computations required to solve the problems to be assessed in each test. SAMPLE QUESTIONS WILL BE PROVIDED

**TESTS**

There are two tests. Each test has two components: basics (70%) and essay (30%). For the essay part of these exams you are allowed to use your calculator, and a sheet (notebook size) of notes with any information you want, except examples or solutions to problems. The sheet of notes has to be attached to your test.

*Your performance in the homework, quizzes, and readiness assessments should be a good indicator of how you will do in the exams and the course in general.*

The exams will be administered during the lab period. A review session for the test will happen outside class on either Monday or Wednesday before the test.

**Special Problems/APPLICATIONS**

There will be one set of application problems. Information about this, timetable, and rubric will be available on the class website.

**FINAL EXAM**
The final exam will assess the students’ learning outcomes set for this course. Any information about the final exam will be posted on the class website.

VIII. POLICIES AND OTHER INFORMATION

- Use the resources you have available: your classmates, the STEP mentors, the Teaching Assistant, the professor, the Center for Academic Student Achievement (CASA). All of this will lead to our main objective, which is YOUR LEARNING.
- The course requires a solid and continuous effort. Since this is a four-credit course, you are expected to devote for each hour of class between two and three hours outside the class working on the subject. Some people need more time than others. Each individual has a different way to learn. All of us are different.
- I do expect that you come to each class prepared to talk about any assigned work and readings. One of the best ways to learn any subject and specially mathematics is by talking to others about a problem after you have read and attempted the problems on your own. Listening to a solution without attempting to solve it and struggling through the process will not benefit you very much. *Be aware that reading the solutions and be able to follow the explanation does not mean that you know how to do the problem and understand all what is involved in it.*
- At the beginning of each class you have the opportunity to ask questions about the homework. *Use that time wisely.* Remember that making a serious attempt to solve a problem and later discuss your solution or to clarify doubts is key in the learning process.
- Feel absolutely free to ask any questions. Your question will benefit you and most likely others around you. One of the driving forces of mathematics is the questioning part. Why? Why? Why? *Rote memorization is not a great help here* but is needed too at some point.
- Do not hesitate to contact me in case you want to discuss your performance in the class. I am here to lead your learning but you are the one responsible for it. **I AM A COACH, YOU ARE THE PLAYER.**
- After you receive your grades you have up to the next class meeting to dispute it. I am the only person you can dispute your grade with. After the two days I assume that you accepted your grade. **NO EXCEPTIONS.** Grades are posted on the web immediately after I return a graded paper.
- You are expected to be on time for class. Arriving late or leaving the classroom before the end of the period will be considered impolite, and rude to your classmates and professor. **BE ON TIME FOR EACH MEETING.** Your attendance will be monitored. The attendance sheet will be in the front of the classroom for each meeting. Make sure you check it on daily basis.
- If at any point in the semester 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.
- Do not be late in the work you have to turn in. For any work to be collected this is the policy on tardiness: **For your late work to be accepted you need to present an excuse to the professor. If the professor accepts to take the work, it will be graded**
over 80% of the initial grade. Work ahead of schedule. Do not wait for last minute surprises.

- The most basic rule to work as part of a group is to respect others. I will appreciate all your effort to make it the golden rule. Refer to others with respect.
- You are always on your honor.

Please turn your cellular phones off. Do not disturb the class with them.

IX. TENTATIVE COURSE SCHEDULE

<table>
<thead>
<tr>
<th>TOPIC</th>
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<tbody>
<tr>
<td>1  Course overview. Main ideas to discuss in the semester.</td>
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<tr>
<td>Introduction to logic. Pretests. Consent forms. Pictures</td>
</tr>
<tr>
<td>2  What is a function?</td>
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<tr>
<td>3  More on What is a function? Review of library of basic functions.</td>
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<tr>
<td>4  Estimating areas. Absolute and relative areas. Use of technology</td>
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<tr>
<td>Application of areas. Units. Average value of a function.</td>
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<tr>
<td>5  Rules of integration of basic functions. Application Problems.</td>
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<tr>
<td>6  (Area of a lake).</td>
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<tr>
<td>7  Linear and Exponential Functions. Inverse Function. Logarithmic</td>
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<tr>
<td>function. Operations with functions (except quotient).</td>
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<tr>
<td>Polynomial functions (roots, end behavior). Introduction to</td>
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<tr>
<td>dominance of functions.</td>
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<tr>
<td>8  Composition of functions. Transformation of functions</td>
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<tr>
<td>9  Quantities Infinitely large, infinitely small</td>
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<tr>
<td>10 Applications of sequences (integration, others)</td>
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<tr>
<td>11 Transformation of sequences under a function. Limit of a function</td>
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<tr>
<td>at a point. Limit of functions toward infinity</td>
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<tr>
<td>12 Continuity at a point. Intermediate value theorem.</td>
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<td>13 Instantaneous velocity. Definition of the derivative</td>
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<tr>
<td>14 Derivative at a point. Definition of a critical point. Applications</td>
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<tr>
<td>interpreting the concept of derivative</td>
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<td>15 The derivative function.</td>
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<tr>
<td>17 Chain rule</td>
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<tr>
<td>18 Implicit Differentiation</td>
</tr>
<tr>
<td>19 Chain Rule</td>
</tr>
<tr>
<td>20 Local max/min.</td>
</tr>
<tr>
<td>21 Second Derivative</td>
</tr>
<tr>
<td>22 Linearization. The mean value theorem</td>
</tr>
<tr>
<td>23 L’Hopital’s rule.</td>
</tr>
<tr>
<td>24 Global max/min. Optimization</td>
</tr>
</tbody>
</table>
X. 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. Look at the calendar to find the last day to drop a class with an automatic grade of “W” this term. You are allowed to have only 6 W’s during your whole program. It means, drop the class if this is in your best interest.

XI. ACADEMIC HONESTY

Academic Honesty: 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, forgery or plagiarism.

XII. DISABILITY SERVICES

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 reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Disability Services Office at (361) 825-5816 or go to the office at Driftwood 101.

XIII. GRADE APPEALS PROCESS

As stated in University Rule 13.02.99.C2, Student Grade Appeals, 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 Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.
LIABILITY STATEMENT
A student is responsible and has to abide by any information given in class and through the web page of the course. It may include changes on dates for tests, format of the test, and so on. Hence, if you miss class, make sure you get the information from somebody else or from the web page.

*Notice to Students with Disabilities
Texas A&M University-Corpus Christi complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. If you suspect that you may have a disability (physical impairment, learning disability, psychiatric disability, etc.), please contact the Services for Students with Disabilities Office, located in Driftwood 101, at 825-5816. If you need disability accommodations in this class, please see me as soon as possible.

**ACADEMIC ADVISING
The College of Science and Technology requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. The College's Academic Advising Center is located in Faculty Center 178, and can be reached at 825-6094.