Calculus I Math 2413 (Math 2413.211)
Department of Mathematics and Statistics
Spring 2016

A. COURSE INFORMATION
   Course number/section: Math2413.001
   Class meeting time: TR 8:00-9:30 am  Lab M 3:30-5:20 pm
   Class location: IH 156   Lab CI 223
   Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
   Instructor: Dr. Jose H. Giraldo
   Office location: CI 317
   Office hours: TR 12:30-2:00 pm  W 11:00 am – 1:00 pm
   Telephone: 361-8255827
   e-mail: jose.giraldo@tamucc.edu
   Appointments: Contact me through email to arrange meetings outside office hours.

C. COURSE DESCRIPTION
   Catalog Course Description
   Limits, continuity, derivatives, applications of the derivative, and an introduction to integrals. Contain a laboratory component. Counts as the mathematics component of the University Core Curriculum.

   Extended Course Description

   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 functions will be tied to integrals and to the definition of 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.

D. PREREQUISITES AND COREQUISITES
   Prerequisites
   MATH 1314 and 1316, or MATH 2312, or placement beyond MATH 2312
Corequisites
None

E. REQUIRED TEXTBOOK, READINGS AND SUPPLIES

Required Textbook
There is not a required textbook for this section. You have access to the Calculus I class notes and power point presentations I have developed for this class, which will be used for class and lab discussions. Class discussions can be supplemented using any calculus textbook.

Optional Textbook(s) or Other References
Although a textbook is not required, you are expected to have access to printouts available through blackboard, which contain the exercises to be worked out during class and in the lab.

Supplies
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.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of the course, a student will be able to

1. Calculate and determine the existence of limits using the definition of limit, basic properties, and L’Hôpital’s Rule. Use calculations of limits to determine local and end behavior of functions.

2. Calculate derivatives of functions from the definition, by applying appropriate rules, and by using implicit and logarithmic differentiation.

3. 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.

4. Apply derivatives of functions appropriately to: create linearization and differentials of functions; determine and apply related rates of change to solve problems; solve optimization problems; and determine geometric features of graphs of functions.
5. Determine if functions meet hypotheses of theorems and draw appropriate conclusions. Give examples and counterexamples.

6. Use Riemann sums to approximate areas and to estimate accumulations of rates.

7. Use anti-derivatives, the Fundamental Theorem of Calculus, and appropriate u du substitutions to evaluate integrals. Then interpret the results of integration as either a signed area under a curve, or as a function.

8. Recognize and determine the relationships between the graphs of a function, its derivatives and its integral.

The student should achieve the following general goals in this class:

1. Improve his attitude toward:
   - Appreciation and value of mathematics
   - The likelihood of success and satisfaction
   - Ways to learn math effectively
   - The link between math and the student’s discipline

2. Strengthen his general academic skills in:
   - Critical thinking
     - Writing
     - Giving clear verbal explanations
   - Working collaboratively
   - Assuming responsibility
   - When and how to use technology.

3. Improve his quantitative reasoning skills:
   - Ability to translate a word problem into a math statement, and back again to words.
   - Ability to form reasonable descriptions and judgments based on quantitative information.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

The concepts in the course will be discussed emphasizing a graphical, numerical, algebraic, verbal, and written approach. The key to your success is that you come to class prepared to discuss the assignments.

In general each meeting is structured to have three parts:

1. Group discussion of homework or other assignments within your group, and then extended discussion to the whole class. It will be followed by an assessment of assigned homework using “voting systems” 10-15 minutes max
II. Presentation of new concepts and activities aimed to the understanding of the new concepts. 20-25 minutes

III. Work in groups on problems dealing with the new concepts discussed in class. 20-25 minutes

IV. Evaluation of new concepts using “voting systems” 10 minutes

Group work and working on homework are the essential component of this class. These are the key components for you to understand the concepts and leading to your success.

*Keep in mind that you CAN ONLY REMEMBER*

| 10% of what you read |
| 20% of what you hear |
| 30% of what you see |
| 50% of what you see and hear |
| 70% of what you discuss with others |
| 90% of what you teach someone else |

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.

**H. MAJOR COURSE REQUIREMENTS AND GRADING**

All the activities leading to accomplishing the goals for this class will be considered for your final grade. The table below shows the instruments that will be used to determine your grade.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid term Assessments (5%, 10%, 10%)</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
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<tr>
<td>-------------------------</td>
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</tr>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Computational Proficiency (5%, 10%, 10%)</td>
<td>25%</td>
</tr>
<tr>
<td>Lab Activities</td>
<td>10%</td>
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</tbody>
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**Midterm Assessments**

There are three assessments. Each one has two components: no calculator part and calculator part. Since the class will build on conceptual understanding and you will understand the concepts better as we progress into the semester, the assessments will have different weights. In a sense all the assessments are cumulative.

More information and rubrics on these assessments will be available in Black Board. There will be review questions for each of the assessments based on the learning outcomes to be assessed. About 40% of the questions in the assessment are coming from the review questions. **Solutions to the Reviews for test have to be submitted along with the test.** All the tests will be administered during the lab period.

I will make available to students a grid with the main categories to be assessed throughout the semester so you can keep track of how well you are doing on each of them

- Graphical understanding of calculus concepts.
- Computational skills needed in calculus: limits, derivatives, integrals
- Interpretation of results obtained by using limits, derivatives.
- Application of main results from calculus and conditions to apply those results.

**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 web site.

*The final exam for Calculus I will be on Friday December 4, 2:00-4:30 pm. Location to be announced the last week of classes.*

**QUIZZES**

There will be about ten (10) quizzes. These are formative assessments and will inform you how well you are getting the key concepts for this course. Topics and rubric for them will be available in Black Board. Only the best eight (8) scores will be considered for your grade.
HOMEWORK

There is homework assigned in each class either from the class handouts or extra problems posted on Black Board. You have to have a spiral devoted only to homework. It is important that you have the spiral with the homework available for each class and whenever you visit with me. You need to show evidence of your work when you ask questions about homework. The grade from your homework will come from homework quizzes you will have in class, almost every meeting. For those quizzes I will choose one or two of the assigned homework problems and ask you to write their solution or part of their solution. You can use your homework notebook to copy the solution.

COMPUTATIONAL PROFICIENCY

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 be tested on computation of:

- Basic skills needed for calculus
- Sketching of basic functions and interpretation of end behavior.
- Limits of functions defined by formulas
- Derivatives of functions defined by formulas

However, before you can take the limits or derivatives assessments, you need to demonstrate proficiency on basic functions and the concept of dominance of functions.

All information on these assessments will be available in BB under Computational Competences.

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction to logic</td>
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<td>2</td>
<td>Review of functions</td>
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<tr>
<td>3</td>
<td>Introduction to integrals</td>
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<td>4</td>
<td>Limit of Sequences</td>
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<td>5</td>
<td>Limit of functions and continuity</td>
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<td></td>
<td><strong>Assessment 1</strong></td>
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<td>6</td>
<td>Average and Instantaneous Velocity</td>
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<td>7</td>
<td>The derivative at a point and the derivative function</td>
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<td>8</td>
<td>Algebra of Derivatives</td>
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<td></td>
<td>Topic</td>
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<td>9</td>
<td>The second derivative</td>
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<td>10</td>
<td>Linearization</td>
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<td></td>
<td>Local max/min, Global max/min</td>
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<tr>
<td>12</td>
<td>Chain Rule</td>
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<td>13</td>
<td>L'Hopital's rule</td>
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<td></td>
<td><strong>Assessment 2</strong></td>
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<td>14</td>
<td>Implicit Differentiation</td>
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<td>15</td>
<td>Related Rates</td>
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<tr>
<td>16</td>
<td>Optimization</td>
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<tr>
<td>17</td>
<td>Integration (revisited)</td>
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<tr>
<td></td>
<td><strong>Assessment 3 (take home + interview)</strong></td>
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<tr>
<td></td>
<td>Final Exam Friday December 4th, 2:00-4:30. Room TBA</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

More details available in Black Board

**J. COURSE POLICIES**

**Attendance/Tardiness**
Attendance is not mandatory but I will keep track of it. The attendance to class and participation in the class discussions are paramount for you to understand the subject matter.

**Late Work and Make-up Exams**
I will not collect any late work. No makeups unless there is an extreme situation fully justified. Do not ask for exceptions.

**Extra Credit**
There is no extra credit in this class. You have plenty of opportunities to show your understanding of the material throughout different assessments.

**Cell Phone Use**
Only allowed to deal with class related issues: surveys in class, Google searches for class discussions, or info needed for a problem, et. Use of cell for personal purposes is not authorized.

**Laptop Use**
You are encouraged to bring your laptop to class. However, you are expected to use it
only for class related activities. Social media, mail, or personal searches are not allowed while we are in class.

Food in Class
No food please.

Missed Exam
No makeups.

Participation
Your participation in any class discussions is highly encouraged.

Others

- Use the resources you have available: your classmates, the SI leader or the mentor, 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 prepare 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 you 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 THE COACH AND YOU ARE THE PLAYER.
- After you receive s grade 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.

• The most basic rule to work as part of a group is the respect to others. I will appreciate all your effort to make it the golden rule. Refer to others with respect.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  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 a failing grade.

• 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.

• Statement of Civility
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that
infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
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 at [http://sci.tamucc.edu/students/GradeAppeal.html](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.

• **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 for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services 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.  http://disabilityservices.tamucc.edu/

• **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.

I. **OTHER INFORMATION**

**Academic Advising**
The College of Science & Engineering 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. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.