Calculus I – MATH 2413.006 (& LAB 2413.261)
Department of Mathematics and Statistics
Spring 2016

A. COURSE INFORMATION

Course number/section: 2413.006
Class meeting time: Class: T & R 3:30 – 4:45 PM. Lab: T 1:30 – 3:20 PM
Class location: Class: CI 127 Lab: CI 222

B. INSTRUCTOR INFORMATION

Instructor: Dr. Sherry L. Bair
Office location: CI 358
Office hours: TR: 8:30 – 9:15 AM T: 12:30 – 1:00 PM
W: 9:30 AM – noon R: 12:30 – 1:15 PM
Other hours by appointment
Office Telephone: (361) 825-2819
E-mail: sherry.bair@tamucc.edu
Appointments: scheduled by email or in person

C. COURSE DESCRIPTION

Math 2413 (Catalog Description): Limits, continuity, derivatives, applications of the derivative, and an introduction to integrals through differential equations. The course counts as the mathematics component of the University Core Curriculum. It contains a laboratory component.

This 4-credit course focuses on single-variable differential calculus. Emphasis is on technical skills, conceptual foundations, and applications of differentiation and basic integration.

Emphasis of this course is on skill development, understanding concepts, sense making, and reasoning while making connections among concepts, as well as using appropriate mathematical communication. You will be expected to occasionally provide written explanations of the reasoning you use to solve problems and these explanations should make sense to you, Dr. Bair and others. You will also be expected to use appropriate mathematical notation and terminology at all times.

D. PREREQUISITES AND COREQUISITES

Successful completion of either MATH 1314 (College Algebra) and 1316 (Trigonometry), or MATH 2312 (Pre-Calculus), or placement beyond MATH 2312. You are expected to know the content from these courses.

No co-requisites.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook


Supplies

You will also need a graphing calculator, preferably with a computer algebra system. A TI-89 will be
used for instruction and class demonstrations, and is the instructor’s calculator of choice for students. The instructor may not be able to help you with the use of other calculators.

It is also highly recommended that you keep a three ring binder with college ruled notebook paper. This is preferable over a spiral notebook, so you can add in lab materials and other materials distributed by the instructor and keep all content organized.

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 this course, students who attend class regularly and spend sufficient time completing tasks and studying outside of class should be able to:

1. Calculate and determine the existence of limits using the definition of limit, basic properties, and l'Hospital'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.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Class meetings will include a variety of instructional methods an activities including lecture, small group work on problem solving tasks and discussions. Additionally, lab time will be used to explore ideas in ways that allow us to build on prior knowledge, and make connections between various ideas both within calculus and across disciplines. Technology explorations and instruction will also occur during lab times. Finally, lab times will be utilized for quizzes and exams, to not detract from time for presenting new material, and to allow extended time allocations for exams.
H. MAJOR COURSE REQUIREMENTS AND GRADING

All course tasks and assignments fall into one of the following weighted categories:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Tests (3)</td>
<td>45</td>
</tr>
<tr>
<td>Homework &amp; Lab Quizzes (3-4)</td>
<td>10</td>
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<tr>
<td>Graded Homework Sets (3-4)</td>
<td>10</td>
</tr>
<tr>
<td>Participation &amp; Attendance</td>
<td>10</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25</td>
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</table>

All graded assignments should be submitted on or before the date they are due. Late papers will not be accepted. Make-up tests/quizzes are given only in extreme circumstances, and only if the instructor has been notified in advance that you will be absent during the period the test/quiz is given.

**Participation** will be judged through teacher evaluation, based upon your positive contributions to class discussions. This means if you attend class regularly, but never ask questions or suggest solution strategies, you will not receive above a 2. Negative attitudes, causing distractions in class, or inattentive behavior during class will receive lower scores, depending on the frequency of the infractions. Questions that promote understanding or clarify concepts for yourself and others are highly encouraged, as well as discussion with other classmates. These positive contributions are expected to raise your participation grade above the C level, and increase frequency with raise the grade to an A. Additionally, participation in group activities during labs and small group work are expected. If an individual chooses to not participate in small group settings, and simply work alone, their participation score will be lowered to reflect a lack of active participation with their group.

**Attendance** will be taken daily, during both class and lab sessions. Note if you miss lab and class both on a Thursday that does count as two absences! A semester grade will be assigned based on the number of sessions missed, with late arrivals by less than 15 minutes counting as ½ an absence, and after 15 minutes counting as a full absence. Grading for total absences: 0-2 – A; 2.5 –4 – B; 4.5 – 6 – C; 6.5 - 8 – D; >8 – F. In special situations this attendance grade may be waived, however this would happen only under extreme extenuating circumstances, and should be discussed with the instructor as soon as any extenuating situation arises.

**Graded Homework:** While homework is assigned daily it is not generally collected for a grade. This homework is designed for you to practice new ideas and make sure you understand new content prior to being graded on it. After several sections of daily homework, another set of problems is distributed, which will be collected and graded. These generally will be assigned once every 3-4 weeks, and are designed to help you check your understanding and review prior to exams. While you may work collaboratively with others on these items, each individual will turn in their own assignment for grading purposes.

Several **homework quizzes** will be given throughout the semester. These will be given with or without notice, at the discretion of the instructor. These quizzes will generally be based on the homework that has been previously assigned and discussed in class. You may use your notes and
book for these quizzes, but you are given only a short time to complete 3-5 questions. If you have done the items when they were assigned, and have them in your notes, you can easily copy the items onto the quiz in the allotted time. If you have not done the problems, or taken notes, you will find it difficult to complete the problems in the 15-20 minutes allowed.

*Lab* content will vary week to week. The sessions are generally designed to have you work in groups on activities to develop conceptual understandings related to the class presentations. Typically, each group will be responsible to complete an activity collaboratively, and help each other make connections between ideas. Generally, Dr. Bair will run her own lab sessions, however some sessions may be run by a TA and will involve solving additional practice problems that may be collected as a lab quiz grade. Attendance is taken in lab as well as during class.

**Unit Tests**
There will be 3 unit tests spread throughout the semester. Notice will be provided at least one week prior to each of these tests. Each test will take the entire class period. Tests include two parts, one part that must be completed without the calculator, and a second part that allows/requires calculators. While most tests will focus on the content most recently completed, many of the ideas build off earlier concepts, so all are fairly cumulative in nature. If for any reason you must miss class on an exam date, you must make alternative arrangements with Dr. Bair on or before the scheduled time of the exam, or the missed exam cannot be made up.

**Final Exam**
The final exam is comprehensive. All Calculus I finals are currently scheduled for 2 – 4:30 PM Friday, May 6. *Note:* This is different than the normal university final exam schedule would determine by meeting time. All students are expected to complete the exam on that date and time. Any conflicts or extenuating circumstances should be discussed with the instructor at least one week prior to the scheduled exam time. *No makes up will be given for missed final exams.*

**Evaluation and Grading:**
Each assignment, text or quiz item will be graded in a holistic manner, based on the following rubric. This material in parenthesis is specific to graded homework problems. Each item is scored on a basis of 0 to 4 points. At the end of the semester grades are determined by a weighted average, using the following cut scores for determining letter grades:

- A (3.4 – 4.0), B (2.75 – 3.39), C (2.0 – 2.74), D (1.5 – 1.99), F (0 – 1.49).

This scale makes a full distribution of grades from A to F plausible, with A's being reserved for truly outstanding performance and a grade of C representing the minimal acceptable performance for continuing to the next course.

- **A (4)**  **Outstanding performance.** Student demonstrates solid conceptual understanding, excellent skills, and makes insightful connections between ideas. Material is well written, demonstrating correct and coherent logical reasoning as well as utilizing appropriate mathematical terminology, and notation.

- **B (3)**  **Good performance.** Student demonstrates a good understanding of concepts and skills. Material is fairly well written, demonstrating good reasoning, and uses appropriate mathematical terminology and notation. Minor gaps in logic may be present.

- **C (2)**  **Adequate performance.** Student demonstrates basic skills, and an adequate understanding of concepts. Material is understandable, but may contain minor errors in mathematical terminology,
notation, and/or have major gaps in logic.

D (1) **Inadequate performance.** Student demonstrates inadequate understanding and insight. Writing is difficult to read and understand. Students may have used multiple incorrect mathematical terms and/or notations, which reflect a lack of understanding of the content. Work may be incomplete.

F (0) **Totally unacceptable performance.** Student demonstrates little to no understanding of the content. Work is very incomplete or not turned in at all. Writing indicates virtually no effort.

### I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Review of expectations &amp; Prerequisites</td>
<td>Chapter 1</td>
<td>Review Problem Set</td>
</tr>
<tr>
<td>Week 2</td>
<td>Velocity, Slopes of secants and tangents, &amp; Limits at a point</td>
<td>Chapter 2</td>
<td>2.1 &amp; 2.2 Exercises</td>
</tr>
<tr>
<td>Week 3</td>
<td>Limit Laws, Continuity &amp; Limits at infinity</td>
<td>Chapter 2</td>
<td>2.3, 2.5 &amp; 2.6 Exercises HWK QUIZ #1</td>
</tr>
<tr>
<td>Week 4</td>
<td>Derivative as rates of change and as a function,</td>
<td>Chapter 2</td>
<td>2.7 &amp; 2.8 Exercises GDHWK #1 Exam #1</td>
</tr>
<tr>
<td>Week 5</td>
<td>Rules for finding basic derivatives</td>
<td>Chapter 3</td>
<td>3.1 &amp; 3.2 Exercises</td>
</tr>
<tr>
<td>Week 6</td>
<td>Derivatives of trig functions, the chain rule and implicit differentiation</td>
<td>Chapter 3</td>
<td>3.3, 3.4 &amp; 3.5 Exercises</td>
</tr>
<tr>
<td>Week 7</td>
<td>Derivatives of exponentials, logarithms &amp; logarithmic differentiation</td>
<td>Chapter 3</td>
<td>3.6 Exercises HWK QUIZ #2</td>
</tr>
<tr>
<td>Week 8</td>
<td>Applications of Derivatives</td>
<td>Chapter 3</td>
<td>3.7 – 3.9 exercises</td>
</tr>
<tr>
<td>Week 9</td>
<td>More applications. Linearization &amp; Differentials</td>
<td>Chapter 3</td>
<td>3.10 exercises GDHWK #2 EXAM #2</td>
</tr>
<tr>
<td>Week 10</td>
<td>Extrema, graphs and derivatives</td>
<td>Chapter 4</td>
<td>4.1 – 4.3 Exercises</td>
</tr>
<tr>
<td>Week 11</td>
<td>Indeterminant forms, L’Hospital’s rule and Curve Sketching refined</td>
<td>Chapter 4</td>
<td>4.4 - 4.6 Exercises</td>
</tr>
<tr>
<td>Week 12</td>
<td>Applications of Derivatives and optimization problems</td>
<td>Chapter 4</td>
<td>4.7 Exercises HWK QUIZ #3 GDHWK #3</td>
</tr>
<tr>
<td>Week 13</td>
<td>Antiderivatives &amp; Areas under curves</td>
<td>Chapter 5</td>
<td>EXAM #3 4.9 &amp; 5.1 Exercises</td>
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<tr>
<td>Week 14</td>
<td>Fundamental Theorem of Calculus, Definite &amp; Indefinite Integrals &amp; Integration with u du substitution</td>
<td>Chapter 5</td>
<td>5.2 - 5.5 Exercises</td>
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<tr>
<td>Week 15</td>
<td>Review &amp; FINAL EXAM</td>
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<td>GDHWK #4</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.
J. COURSE POLICIES

Attendance/Tardiness/Participation
Attendance is expected daily, and you are expected to be on time and be an active participant in classroom activities. Please see section on grading for penalties for absences and late arrivals and for participation expectations related to grading.

Late Work and Make-up Exams
Late assignments are not accepted. If you are going to be absent the day an assignment is due, turn it in early or submit it via email to Dr. Bair before class time on the day it is due.

Extra Credit
There is no extra credit in this course!

Cell Phone Use
Cell phones are not allowed during class time, and should be silenced throughout each class and lab period. If you have an emergency situation and need to take a call, please leave the room to do so.

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.

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.

L. **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**

Dr. Bair reserves the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. She will announce such changes in a timely manner during regularly scheduled lecture and/or lab periods, and/or via email notification when necessary.