MATH 172: Calculus

Learning Outcomes
This course is focused on quantitative literacy in mathematics as applied to math and science. Upon successful completion of this course, students will be able to:

1. Understand and explain the relationship between Riemann Sums and definite integrals.

2. Use the concepts of definite integrals to solve problems involving area, volume, work, and other physical applications.

3. Use substitution, integration by parts, trigonometric substitution, and partial fractions to evaluate definite and indefinite integrals.

4. Apply the concepts of limits, convergence, and divergence to evaluate different types of improper integrals.

5. Use first-order differential equations to model real-world situations, and be able to solve these equations using appropriate techniques.

6. Determine convergence or divergence of sequences and series.

7. Use Taylor and MacLaurin series to represent functions.

8. Use Taylor or MacLaurin series to integrate functions not integrable by conventional methods.

Course Objectives

Critical Thinking: The following critical thinking skills will be assessed on in-class quizzes and exams:

- Students will use graphs and visual skills to formulate and evaluate definite integrals to calculate areas, volumes, work, and arclength.
- Students will analyze definite and indefinite integrals to determine and apply appropriate methods of evaluation of these integrals.
- Students will apply logical reasoning to determine the convergence or divergence of improper integrals and evaluate convergent improper integrals where appropriate.
- Students will apply logical reasoning to determine the convergence or divergence of sequences and series and evaluate convergent sequences and series where appropriate.
- Students will use Taylor and Maclaurin series to represent functions which cannot be integrated conventionally.
- Students will apply appropriate error estimates to determine the accuracy of integration using Taylor and Maclaurin series.

Problem Solving: The following problem solving skills will be assessed on in-class quizzes and exams:

- Students will formnlate and evaluate definite integrals to solve practical problems involving work, average value of a function, and hydrostatic force.
- Students will formnlate and solve first-order differential equations for practical problems.
- Students will use geometric series to model and solve numerical and practical problems.
- Students will apply operations of vectors in three dimensions to applications such as work and torque.

Communication: The following written communication skills will be assessed on in-class quizzes and exams:

- Students will clearly explain the relationship between Riemann sums and definite integrals.
- Students will clearly explain problem-solving strategies and analysis used to answer questions concerning topics discussed in class.
- Students will use appropriate theorems to present clear written arguments in support of the convergence or divergence of improper integrals, sequences, and series.
- Students will be able to explain (prove) varions formnlas and theorems used in the course.

Math 172 Course Syllabus

Instructor: David J. Manuel
Office Hours: MW 9-10am, TR 10am-12pm or by appointment
Contact Points: Office: Blocker 637 (862-4481), e-mail: dmanuel@math.tamu.edu
Web Page: http://www.math.tamu.edu/~dmanuel

Course Name: Calculus
Learning Outcomes: Math 172 is the second of a three semester beginning calculus sequence, which is taken, for the most part, by math, chemistry, and physics majors. The department expects that students passing Math 172 will be able to set up an appropriate definite integral to solve the applied problems (areas, volumes, arclength, work, and force) discussed in the course. Students must understand the relationship between definite integrals and Riemann sums, and be able to clearly state (write) this relationship. Regarding infinite series: students are expected to know what an infinite series is, how to use the convergence tests, be able to clearly state them, and explain (prove) why they work. Students are expected to know the alternating series test, including the error estimate for this test and the error estimate from the integral test for positive term series.
Text: Stewart, *Calculus-Early Vectors*, Preliminary Edition

Calculator Policy: Calculators are not allowed on assignments unless otherwise specified.

Grading Policy:

3 exams	500 points	A = 900-1000
Homework	100 points	B = 800-899
Quizzes	150 points	C = 700-799
Final Exam	250 points	D = 600-699
Total	1000 points	

Make-up Policy: If you miss a quiz or an exam you must contact me by the end of the next working day after the exam and provide appropriate documentation of the university-approved excuse within one week after the exam. Exams must be made up within 30 days of the date of the exam. Homework Assignments may be turned in up to 30 calendar days late (no penalty) with a *documented* University excused absence or up to 2 days late for any reason for a 30% penalty.

An Aggie does not lie, cheat, or steal or tolerate those who do. Please refer the student to the Honor Council Rules and Procedures on the web at http://www.tamu.edu/aggiehonor for more specific information regarding Scholastic Dishonesty.

ADA Statement: 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 contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For more information, visit http://disability.tamu.edu.

Expectations: I expect you to have read the material and stepped through the examples before class, and I expect you to treat me with respect. You can expect me to be prompt and fair in grading and treat you with respect.

Course Outline (tentative):
Week 1: 6.2-6.3, 6.4-6.5,
Week 2: 7.1, 7.2, 7.3;
Week 3: 7.3, 7.4, 7.5
Week 4: 8.1, 8.2, 8.3, 8.4
Week 5: 8.4, Review, **Exam I** (6.2-8.4), 8.9
Week 6: 8.9, 8.8, 9.1
Week 7: 9.2, 9.3, 9.6
Week 8: 10.1, Review, **Exam II** (8.8-9.3, 9.6)
Week 9: 10.1, 10.2
Week 10: 10.2, 10.3
Week 11: 10.3, 10.4
Week 12: 10.5, 10.6
Week 13: 10.7, 10.9
Week 14: 10.9, Review, **Exam III** (10.1-10.7, 10.9)
Week 15: Review for Final

Homework/Practice Problems: Suggested Practice Problems are listed at www.math.tamu.edu/courses/math172/currenthw.html. Do as many of these as you deem necessary to be able to master the concepts of the section on a quiz or an exam. Some of these problems will be turned in as part of homework grades (the rest of the homework problems will come from various sources, including www.math.tamu.edu/courses/eHomework/). I will distribute homework assignments at least a week in advance throughout the semester. Typically, homework will cover the week's (MWF) lecture and will be due the following Wednesday. Homework will account for 100 points, and I will drop the lowest homework grade.

Recitation Quizzes: Every Thursday (except exam weeks), students will attend recitation. During this time, students will have an opportunity to ask questions over the homework. At the end of recitation, a quiz will be administered. Quizzes will account for 150 points, and I will drop the lowest quiz grade.

Course Emphasis:
The priorities of this course are:

1. Ability to correctly solve problems and write the solutions in a coherent fashion.
2. Conceptual understanding of material
3. Ability to state and apply definitions and theorems and provide simple proofs

Because of this, each exam will consist of computational problems, applications, concept questions, statement of definitions and theorems, and simple proofs using definitions and theorems. On all assignments, emphasis will be placed on how a problem is solved and how a solution is written up. Bottom line: "getting the right answer" is not nearly as important as providing a clear detailed explanation of the reasoning behind your answer.