MATHEMATICS 141
CALCULUS I

BULLETIN INFORMATION
MATH 141- Calculus I (4 credit hours)
Course Description:
Functions, limits, derivatives, introduction to integrals, the Fundamental Theorem of Calculus, applications of derivatives and integrals
Prerequisites: placement code MA4-9 or MD0-9 required; earned by grade of C or better in MATH 112. 115, 116, or by Precalculus Placement Test

SAMPLE COURSE OVERVIEW
For most students, Calculus I is the first serious contact with Mathematics. The core of Calculus I is the understanding of Derivatives and Integrals. We will also study the graphs of functions as the main application of the above. The nature of this course requires more the understanding of the above notions rather than memorizations of formulas. Throughout the history, the study of these notions and ideas was fundamental and necessary for the development of Mathematics, Physics and Mechanics. Some of the main contributors were Eudoxus (400-347) , Archimedes (287-212), Leibniz (1646-1716), Euler (1707-1783), Cauchy (1789-1857), Riemann (1826-1866).

ITEMIZED LEARNING OUTCOMES
Upon successful completion of Math 141, students will be able to:
1. Demonstrate understanding of the following concepts: Limits and Continuity of Functions, The Derivative, Applications of the Derivative: Study of Graphs, Minima-Maxima, Mean Value Theorem, The Integral, The Fundamental Theorems of Calculus\
2. Compute derivatives and basic integrals
3. Apply these concepts to modeling real life problems at the usual level of first semester calculus.

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS
1. *Calculus Early Transcendentals,* James Stewart, 6E

SAMPLE ASSIGNMENTS AND/OR EXAM
1. **Homework**
   a. Homework will be assigned regularly (on BlackBoard) but will not be graded. However, it is very important that you do the homework as soon as we cover the appropriate material, since otherwise you will not be able to solve problems yourself and consequently will not do well on quizzes and tests.

2. **Quizzes**
    a. Quizzes will be given regularly and unannounced, both in the lectures and in the recitations.
3. **Midterm Exams:** 3 midterm exams
4. **Final Exam:** The final exam will be cumulative.

SAMPLE COURSE OUTLINE WITH TIMELINE OF TOPICS, READINGS/ASSIGNMENTS, EXAMS/PROJECTS

Class 1:   1.1   Intro to calculus;
                        Functions: the Rule of Four

Class 2:   1.2, 1.3A Catalog of Essential Functions; New Functions from Old

Class 3:   1.4, 1.5Exponential and Logarithmic Functions

Class 4:   2.1   The Tangent and Velocity Problems

Class 5:   2.2, 2.3The Limit of a Function; Calculating Limits

Class 6:   2.4   Definition of Limit; Continuity
                 2.5

Class 7:   2.6   Limits at Infinity; Horizontal Asymptotes

Class 8:   2.7   Derivatives and Rates of Change

Class 9:   2.8   Derivative as a Function

Class 10:   Review

Class 11:   Exam 1

Class 12:   3.1   Derivatives of Polynomials and Exponential Functions

Class 13:   L3.2   Product and Quotient Rules

Class 14:   3.3   Derivatives of Trig Functions

Class 15:   3.4   Chain Rule

Class 16:   3.5   Implicit Differentiation

Class 17:   3.6   Derivatives of Log Functions

Class 18:   Differentiation Rules: summary and Additional Practice

Class 19:   3.9   Related Rates

Class 20:   4.1   Max and Min Values

Class 21:   4.2   Mean Value Theorem

Class 22:   4.3   Derivatives and the Shape of a Graph

Class 23:   4.4   Indeterminate Forms and L'Hospital Rule

Class 24:   4.4   Indeterminate Forms; Curve Sketching

Class 25:   4.5   Summary of Curve Sketching

Class 26:   Review

Class 27:   Exam2

Class 28:   4.7   Optimization Problems

Class 29:   4.7   Optimization Problems

Class 30:   4.9   Antiderivatives

Class 31:   5.1   Areas and Distances

Class 32:   5.2   The Definite Integral

Class 33:   5.3   The Fundamental Theorems of Calculus

Class 34:   5.4   Indefinite Integrals and the Net Change Theorem

Class 35:   5.5   The Substitution Rule

Class 36:   5.5   More on Substitution,
                                     6.1   Intro to Area between Curves

Class 37:   6.1   Areas between Curves

Class 38:   Review

Class 39:   Exam 3

Class 40:   6.2   Volumes: Disks and Washers

Class 41:   6.2
                  Review
                  More on Volume

Class 42:   Review

FINAL EXAM   **<u>Final Exam according to University exam schedule</u>**