****

**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**
	1. 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**
	1. 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, 1.3 A Catalog of Essential Functions; New Functions from Old

**Class 3:** 1.4, 1.5 Exponential and Logarithmic Functions

**Class 4:** 2.1 The Tangent and Velocity Problems

**Class 5:** 2.2, 2.3 The 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 **Final Exam according to University exam schedule**