Tennessee Technological University
Mathematics Department

MATH 1910: Calculus I

I. COURSE DESCRIPTION FROM CATALOG:

Limits, continuity, derivatives and integrals of functions of one variable with applications. Lec. 4. Cr. 4.

II. PREREQUISITE(S):

ACT mathematics score of 27 or above and four years of high school mathematics including algebra, geometry, trigonometry and advanced or pre-calculus mathematics; or, special permission of the Mathematics Department; or, C or better in MATH 1730; or C or better in MATH 1720 and MATH 1710; or equivalent.

III. COURSE OBJECTIVE(S):

Build on (not replicate) the competencies gained through the study of two years of high school algebra and one year of high school geometry. Use mathematics to solve problems and determine if the solutions are reasonable. Use mathematics to model real world behaviors and apply mathematical concepts to the solution of real-life problems. Make meaningful connections between mathematics and other disciplines. Use technology for mathematical reasoning and problem solving. Apply mathematical and/or basic statistical reasoning to analyze data and graphs. To study the topics of limits, continuity, and derivatives of functions of one variable and their applications in the physical and life sciences. After finishing the course students are expected to know the importance of the definitions and have the ability to use them.

IV. STUDENT LEARNING OUTCOMES:

Upon successful completion of the course the student will have a conceptual understanding of the notion of a limit, derivative, and integral of a function of a single variable; be able to find limits using various tools, including approximations, algebraic manipulations, the Squeeze Theorem, and L'Hospital's Rule and be able to recognize when a limit does not exist; be able to use both the definition of derivative and various differentiation rules to differentiate algebraic, logarithmic, exponential, trigonometric, and inverse trigonometric functions as well as combinations and compositions of these functions; be able to apply knowledge of derivatives to solve related rates, optimization, and curve sketching problems; be able to find antiderivatives and use the Fundamental Theorem of Calculus to determine indefinite integrals and evaluate definite integrals of the aforementioned types of functions; and be able to apply knowledge of integrals to determine the net area between a curve and the x-axis.

V. TOPICS TO BE COVERED:

Chapter 1:
1.1, 1.2, 1.3: Brief review of functions
1.4: Exponential Functions
1.5: Inverse Functions and Logarithms
Sequences and mathematical Induction: section 11.1, Appendix E (optional)

Chapter 2:
2.1: The Tangent and Velocity Problems (optional)
2.2, 2.3, 2.4: Limits
2.5: Continuity
2.6: Limits at Infinity, Asymptotes
2.7: Derivatives and Rates of Change (optional)
2.8: The Derivative as a Function

Chapter 3:
3.1: Derivatives of Polynomials and Exponential Functions
3.2: The Product and Quotient Rules
3.3: Derivatives of Trigonometric Functions
3.4: The Chain Rule
3.5: Implicit Differentiation
3.6: Derivatives of Logarithmic Functions
3.8: Exponential Growth and Decay (optional)
3.9: Related Rates
3.10: Linear Approximations and Differentials
3.11: Hyperbolic Functions

Chapter 4:
4.1: Maximum and Minimum Values
4.2: The Mean Value Theorem
4.3: How Derivatives Affect the Shape of a Graph
4.4: Indeterminate Forms and L'Hospital's Rule
4.5: Summary of Curve Sketching
4.7: Optimization Problems
4.8: Newton's Method
4.9: Antiderivatives

Chapter 5:
5.1: Area and Distances
5.2: The Definite Integral
5.3: The Fundamental Theorem of Calculus
5.4: Indefinite Integrals and the Net Change Theorem
5.5: The Substitution Rule

VI. POSSIBLE TEXTS AND REFERENCES:

Calculus Early Transcendentals, 8th edition by James Stewart

VII. ANY TECHNOLOGY THAT MAY BE USED:

Scientific Calculator
WebAssign

VIII. STUDENT ACADEMIC MISCONDUCT POLICY:

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the

definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy217 – Student Academic Misconduct at Policy Central.

IX. DISABILITY ACCOMMODATION:

Students with a disability requiring accommodations should contact the Office of Disability Services (ODS). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The ODS is located in the Roaden University Center, Room 112; phone 372-6119. For details, view the Tennessee Tech's Policy 340 – Services for Students with Disabilities at Policy Central.