KINGDOM OF SAUDI ARABIA
AL-IMAM MOHAMMAD IBN SAUD ISLAMIC UNIVERSITY
COLLEGE OF SCIENCES
DEPARTMENT OF BIOLOGY

المملكة العربية السعودية
جامعة الإمام محمد بن سعودالإسلامية
كلية العلوم
قسم الاحياء

Calculus (1)

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	101	Calculus (1)	4	3	0	2	

Objectives:

- To understand the concept of limits and continuity of a function.
- To be able to find and interpret the derivatives of functions.
- To understand the meaning of derivative in terms of a rate of change and local linear approximation and to use derivatives to solve a variety of problems.

Syllabus:

Preliminaries: Functions and their graphs, Operations on functions, Composition of functions, Inverse function. Trigonometric Functions and their inverses, Exponential and Logarithmic Functions, Hyperbolic functions.

Limits and Continuity: The Concept of Limit, Formal definition of limit, Limit Theorems, Limits Involving Infinity, Asymptotes, The natural number e as a limit. Continuity of functions, Operations on continuous functions, Intermediate value theorem, The Bisection Method.

Differentiation: Tangent Lines and Velocity, The Derivative, Computation of Derivatives: The Power Rule, Higher Order Derivatives, The Product and Quotient Rules, The Chain rule, Derivatives of Trigonometric Functions and their inverses, Derivatives of Exponential and Logarithmic Functions, Derivatives of hyperbolic functions, Implicit Differentiation, The Rule Theorem, The Mean Value Theorem, Numerical Differentiation.

Applications of Differentiation: Differential and Linear approximation, Newton's Method, Maxima and Minima Values, Monotonic Functions and the First Derivative Test, Concavity and the Second Derivative Test, Graphing functions, Indeterminate Forms and L'Hopital's Rule, Optimization, Related Rates. Exponential growth and decay.

References:

- *Calculus*; R. T. Smith and R. B. Minton, McGraw-Hill, 2012
- *Calculus, 6th Ed.*; O. Swokowski, et al, PWS Pub. Co.; 1994.
- *Calculus Early Transcendentals*; C. Henry Edwards, David E. Penney, Prentice Hall, 2008.