

Department: Mathematics and Computer Sciences

Division: Computer Sciences

Level and Major: Undergraduate

Course Title: Calculus 1

Number of Credits: 3

Prerequisite: -

Lecturer:

Course Description: An introduction to complex numbers, real functions, sequences and series and their properties

Course Goals and Objectives: The student should be able to use the concepts of limit, derivative, integral and series to solve practical problems.

Course Topics:

1. Limits and continuous functions: Squeeze theorem, extreme value theorem, intermediate value theorem.
2. Differentiation and applications: Rolles theorem and mean value Theorem-Related rates- Extreme-value problems - LHopital theorem - modeling.
3. Transcendental functions: Exponential functions and logarithmic functions- Hyperbolic functions and their inverse.
4. Integration: The definite integral- Mean value theorem for integral- The fundamental theorem of calculus
5. Techniques of integration: Integration by parts, by substitutions, Integrals of rational functions, Improper integrals and convergence- comparison and limit comparison tests for improper integrals.
6. Applications of integrals: Volumes by slicing- Solids of revolution- Arc length- Areas of surfaces and surfaces of revolution- Mass and density- Moments and centers of mass.
7. Sequences and Series: Definition of sequence and convergence- Recursive sequences- Series and convergence- Convergence tests- Absolute and conditional convergence- The alternative series test- Rearranging the terms in a series.
8. Power series: Definition of power series- Convergence radius and interval- derivative and integral of power series- Taylor and Maclaurin series and their applications- Binomial theorem and the binomial series- Abels theorem for power series.
9. Complex numbers: Introduction to complex Numbers-Polar coordinate and De Moivres formula- The nth root of a complex number-proving some Trigonometric formulas by complex numbers.

Reading Resources: Robert Adams, Christopher Essex, Calculus: A Complete Course, (7th Edition), Pearson Education Canada, 2009.

Evaluation: