

Course Name: Paradigms of Programming

Approval: 9<sup>th</sup> senate meeting

Course Number: CS 302

Credits: 0-0-3-2

Prerequisites: IC 150 Computation for Engineers

Intended for: UG

Distribution: Compulsory for CSE; CS elective for EE and ME

Semester: 5th

### ***Course Modules:***

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1. *Lambda Calculus* - Syntax, Conversion, Reduction and Normal Order, Church-Rosser Theorem, Order of Evaluation, Currying, Integers, Booleans and Recursion.
2. *Functional Programming* - Scheme/Lisp syntax - expressions and functions/procedures, evaluation - naming, environment and the substitution model of function application, Higher-order functions and higher-order programming, Data abstraction.
3. *Object-oriented Programming* - Mutable data, modularity and state, Objects, Closures - data structures encapsulated into functions.
4. *Delayed Evaluation, Laziness and Infinite Data-structures* - Stream Programming, Infinite streams, Streams as lazy Lists.
5. *Logic Programming* - Deductive Information retrieval, declarative programming - facts and rules, Search trees and Backtracking, Non-deterministic programming, Continuations and back-tracking, Prolog - arithmetic, recursion, cuts and negation, Real-life applications of Prolog. Prolog implementation in Scheme/Lisp - use of continuations and macros.