**Computer Science Curriculum Outline**

**Core Filed Foundations**

1. Introduction to computer science and computer programming (3 Hours)

* Computer Science overview
* Programming languages evolution

1. C and C++ programming language (C how to program 8th edition) (72 Hours)

* Introduction to Computers, the Internet, and the Web
* Introduction to C Programming
* Structured Program Development in C
* C Program Control
* C Functions
* C Arrays
* C Pointers
* C Characters and Strings
* C Formatted Input/output
* C Structures, Unions, Bit Manipulations, and Enumerations
* C File Processing
* C Data Structures
* C Preprocessor
* Other C Topics
* C++ as a Better C; Introducing Object Technology
* Introduction to Classes, Objects, and Strings
* Classes: A Deeper Look; Throwing Exceptions
* Operator Overloading: Class String
* Object-Oriented Programming: Inheritance
* Object-Oriented Programming: Polymorphism
* Stream Input/Output: A Deeper Look
* Exception Handling: A Deeper look
* Introduction to Custom Templates

1. Data Structures (36 Hours)

* Introduction to data structures
* Stacks
* Queues
* Lists
* Trees
* Graphs
* Hash

1. Discrete Mathematics (discrete mathematics and its applications 7th edition) (72 Hours)
2. Algorithms (72 Hours)

* Introductions to algorithms
* Searching and Sorting algorithms
* Divide and conquer algorithms
* Brute Forces algorithms
* Greedy algorithms
* Dynamic programming

1. Java programming language (Java how to program 10th edition) (36 to 50 Hours)

* Java history and JVM Concept
* Core java concepts, variables, arrays, data types, loops, conditioning, etc.
* Strings processing
* Collections API
* Files processing in java
* OOP concepts
* Exception handling
* Java Generics
* Java streaming and lambdas
* Graphical user interface GUI with swing and java FX
* Multi-threading programming
* Network programming
* Java reflection API
* Java database connectivity JDBC
* Java security basics
* Logging
* Remote method invocation RMI concept
* Class loader and JVM memory management basics

1. Software Design patterns (Head First Design Patterns third edition) (36 Hours)
2. Software Engineering Concepts (36 Hours)
3. Databases Core Concepts and SQL (72 Hours)
4. Operating Systems Concepts and Linux (72 Hours)
5. Networking core concepts (72 Hours)