## ****CS3301 – SYLLABUS****

**UNIT I LISTS**  
Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT – Radix Sort – Multilists.

**UNIT II STACKS AND QUEUES**  
Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

**UNIT III TREES**  
Tree ADT – Tree Traversals – Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees – Priority Queue (Heaps) – Binary Heap.

**UNIT IV MULTIWAY SEARCH TREES AND GRAPHS**  
B-Tree – B+ Tree – Graph Definition – Representation of Graphs – Types of Graph – Breadth-first traversal – Depth-first traversal –– Bi-connectivity – Euler circuits – Topological Sort – Dijkstras

**UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES**  
Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

## ****MA3354 – SYLLABUS****

**UNIT I LOGIC AND PROOFS**  
Propositional logic – Propositional equivalences – Predicates and quantifiers – Nested quantifiers – Rules of inference – Introduction to proofs – Proof methods and strategy.

**UNIT II COMBINATORICS**  
Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

**UNIT III GRAPHS**  
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

**UNIT IV ALGEBRAIC STRUCTURES**  
Algebraic systems – Semi groups and monoids – Groups – Subgroups – Homomorphism’s – Normal subgroup and cosets – Lagrange’s theorem – Definitions and examples of Rings and Fields.

**UNIT V LATTICES AND BOOLEAN ALGEBRA**  
Partial ordering – Posets – Lattices as posets – Properties of lattices – Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra – Sub Boolean Algebra – Boolean Homomorphism.

## ****CS3351 – SYLLABUS****

**UNIT I COMBINATIONAL LOGIC**  
Combinational Circuits – Karnaugh Map – Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder – Magnitude Comparator – Decoder – Encoder – Multiplexers – Demultiplexers

**UNIT II SYNCHRONOUS SEQUENTIAL LOGIC**  
Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation – Registers – Counters.

**UNIT III COMPUTER FUNDAMENTALS**  
Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language.

**UNIT IV PROCESSOR**  
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards.

**UNIT V MEMORY AND I/O**  
Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA

### ****CS3391 – SYLLABUS****

**UNIT I INTRODUCTION TO OOP AND JAVA**  
Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors Methods -Access specifiers – Static members- Java Doc comments

**UNIT II INHERITANCE, PACKAGES AND INTERFACES**  
Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.

**UNIT III EXCEPTION HANDLING AND MULTITHREADING**  
Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java’s Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

**UNIT IV I/O, GENERICS, STRING HANDLING**  
I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

**UNIT V JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS**  
JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – MenuItem. algorithm – Minimum Spanning Tree – Prim’s algorithm – Kruskals algorithm

**UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES**  
Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

## ****CS3352 – SYLLABUS****

**UNIT I INTRODUCTION**  
Data Science: Benefits and uses – facets of data – Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation – Exploratory Data analysis – build the model– presenting findings and building applications – Data Mining – Data Warehousing – Basic Statistical descriptions of Data

**UNIT II DESCRIBING DATA**  
Types of Data – Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages – Describing Variability – Normal Distributions and Standard (z) Scores

**UNIT III DESCRIBING RELATIONSHIPS**  
Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r2 –multiple regression equations –regression towards the mean

**UNIT IV PYTHON LIBRARIES FOR DATA WRANGLING**  
Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables

**UNIT V DATA VISUALIZATION**  
Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting – Geographic Data with Basemap – Visualization with Seaborn