B.Tech CSE Cos

Course Code: BTCS301-18 **Course Title:** Data Structure & Algorithms **3L:0T:P 3Credits**

Course Outcomes:

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness;
2. Student will be able to handle operation like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity;
3. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity;
4. Students will be able to choose appropriate Data Structure as applied to specific problem definition
5. Demonstrate the reusability of Data Structures for implementing complex iterative problems.

Course Code: BTCS302-18	Course Title: Object Oriented Programming	3L:0T:0P	3Credits

Course Outcomes:

1. Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem;
2. Demonstrate the concept of constructors and destructors. And create new definitions for some of the operators;
3. Create function templates, overload function templates;
4. Understand and demonstrate the concept of data encapsulation, inheritance, polymorphism with virtual functions; &
5. Demonstrate the concept of file operations, streams in C++ and various I/O manipulators.

Course Code: BTCS303-18	Course Title: Data Structure &AlgorithmsLab	0L:0T:4P	2Credits

Lab Outcomes:

1. Improve practical skills in designing and implementing basic linear data structure algorithms;
2. Improve practical skills in designing and implementing Non-linear data structure algorithms;

3. Use Linear and Non-Linear data structures to solve relevant problems;
4. Choose appropriate Data Structure as applied to specific problem definition; &
5. Implement Various searching algorithms and become familiar with their design methods.

Course Code: BTCS304-18	Course Title: Object Oriented Programming Lab	0L:0T:4P	2Credits

Lab Outcomes:

1. Develop classes incorporating object-oriented techniques;
2. Design and implement object-oriented concepts of inheritance and polymorphism;
3. Illustrate and implement STL class of containers and need for exceptions to handle errors for object oriented programs; &
4. Design and implement any real world based problem involving GUI interface using object-oriented concepts.

BTAM304-18	Mathematics Paper-III (Calculus and Ordinary Differential Equations)	4L:1T:0P	4 credits

Course Outcomes: At the end of the course,
1. Understand the functions of several variables that are essential in mostbranches of engineering;
2. Apply multiple integrals to deal with areas and volumes of various structures which are quite significant in real world;
3. Formulate and solveengineering problems related to convergence, infinite series, power series and Taylor series;
4. Create, select and utilize the learnt techniques of first degree ordinary differential equationsto model real world problems &;
5. Be acquainted with the knowledge required to solve higher order ordinary differential equations.

Course Code:BTES301-18	Course Title: Digital Electronics	3L:0T:0P	3Credits

COURSE OUTCOME:At the end of course
1. Demonstrate the operation of simple digital gates, identify the symbols, develop the truth table for those gates; combine simple gates into more complex circuits; change binary, hexadecimal, octal numbers to their decimal equivalent an vice versa.
2. Demonstrate the operation of a flip-flop. Design counters and clear the concept of shift registers.
3. Study different types of memories and their applications.Convert digital signal into analog and vice versa.

Course Code:BTES302-18 **Course Title: Digital Electronics Lab** 0L:0T:2P **1Credits**

Course Outcomes

At the end of this course student will demonstrate the ability to:
1. Realize combinational circuits using logic gates.
2. Realize sequential circuits using logic gates.
3. Realize various types of Flip-flops and counters

Course Code: BTES401-18 **Course Title:** Computer Organization & Architecture **3L:0T:0P 3Credits**

Course Outcomes:

1. Understand functional block diagram of microprocessor;
2. Apply instruction set for Writing assembly language programs;
3. Design a memory module and analyze its operation by interfacing with the CPU;
4. Classify hardwired and microprogrammed control units; &
5. Understand the concept of pipelining and its performance metrics.

Course Code: BTCS402-18 **Course Title: Operating Systems** 3L:0T:0P **3Credits**

Course Outcomes:

1. Explain basic operating system concepts such as overall architecture, system calls, user mode and kernel mode;
2. Distinguish concepts related to processes, threads, process scheduling, race conditions and critical sections;
3. Analyze and apply CPU scheduling algorithms, deadlock detection and prevention algorithms;
4. Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory, and thrashing;
5. Design and implement file management system; &
6. Appraise high-level operating systems concepts such as file systems, disk-scheduling algorithms and various file systems.

Course Code: BTCS403-18 **Course Title:** Design and Analysis of Algorithms 3L:0T:0P **3Credits**

Course Outcomes:

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms;
2. Explain when an algorithmic design situation calls for which design paradigm (greedy/ divide and conquer/backtrack etc.);
3. Explain model for a given engineering problem, using tree or graph, and writethe corresponding algorithm to solve the problems;

4. Demonstrate the ways to analyze approximation/randomized algorithms (expected running time, probability of error); &
5. Examine the necessity for NP class based problems and explain the use of heuristic techniques.

Course Code: BTES402-18   **Course Title:** Computer Organization & Architecture Lab   **0L:0T:2P**   **1Credits**

Lab Outcomes:

1. Assemble personal computer;
2. Implement the various assembly language programs for basic arithmetic and logical operations; &
3. Demonstrate the functioning of microprocessor/microcontroller based systems with I/O interface.

Course Code: BTCS404-18   **Course Title: Operating Systems Lab**   **0L:0T:4P**   **2Credits**

Lab Outcomes:

1. Understand and implement basic services and functionalities of the operating system;
2. Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority;
3. Implement commands for files and directories;
4. Understand and implement the concepts of shell programming;
5. Simulate file allocation and organization techniques; &
6. Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.

Course Code: BTCS405-18   **Course Title:** Design and Analysis of Algorithms Lab   **0L:0T:4P**   **2Credit**

Lab Outcomes:

1. Improve practical skills in designing and implementing complex problems with different techniques;
2. Understand comparative performance of strategies and hence choose appropriate, to apply to specific problem definition;
3. Implement Various tree and graph based algorithms and become familiar with their design methods; &
4. Design and Implement heuristics for real world problems.

BTCS401-18   **Discrete**   **3L:1T:0P**   **4 Credits**
                        Mathematics

Course Outcomes
1. To be able to express logical sentence in terms of predicates, quantifiers, and logical connectives
2. To derive the solution for a given problem using deductive logic and prove the solution based on logical inference
3. For a given a mathematical problem, classify its algebraic structure
4. To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
5. To develop the given problem as graph networks and solve with techniques of graph theory.

BTES501-18   **Enterprise**   **3L:0T:0P**   **3 Credits**
                        Resource Planning

Course outcomes:
CO1: To know the basics of ERP
CO2: To understand the key implementation issues of ERP
CO3: To know the business modules of ERP
CO4: To be aware of some popular products in the area of ERP

Course Code: **Course Title:**   **3L:0T:0P**   **3Credits**
BTCS501-18   Database Management
                        Systems

Course Outcomes:
CO1: write relational algebra expressions for a query and optimize the Developed expressions
CO2: design the databases using ER method and normalization.
CO3: construct the SQL queries for Open source and Commercial DBMS-MYSQL, ORACLE, and DB2.
CO4: determine the transaction atomicity, consistency, isolation, and durability.
CO5: Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Course Code: **Course Title:**   **3L:1T:0P**   **3Credits**   **42 Hours**
BTCS502-18   Formal Language
                        & Automata
                        Theory

Course Outcomes:
CO1: Write a formal notation for strings, languages and machines.
CO2: Design finite automata to accept a set of strings of a language.
CO3: Design context free grammars to generate strings of context free language .
CO4: Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
CO5: Distinguish between computability and non-computability and Decidability and undecidability.

Course Code: **Course Title:**   **3L:1T:0P**   **3Credits**   **42 Hours**
BTCS503-18   Software
                        Engineering

Course Outcomes:
CO 1: Students should be able to identify the need for engineering approach to software development and various processes of requirements analysis for software engineering problems.
CO 2: Analyse various software engineering models and apply methods for design and development of software projects.
CO 3: Work with various techniques, metrics and strategies for Testing software projects.
CO 4: Identify and apply the principles, processes and main knowledge areas for Software Project Management
CO 5: Proficiently apply standards, CASE tools and techniques for engineering software projects

Course Code: BTCS 504-18	Course Title: Computer Networks	3L:1T:0P	3Credits	42 Hours

Course Outcomes:
CO1: Explain the functions of the different layer of the OSI Protocol;
CO2:. Describe the function of each block of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs);
CO3: Develop the network programming for a given problem related TCP/IP protocol; &
CO4: Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Course Code: BTCS505-18	CourseTitle: Database management System lab	0L:0T:4P	2Credits

Course Outcomes:
CO1: This practical will enable students to retrieve data from relational databases using SQL.
CO2: students will be able to implement generation of tables using datatypes
CO3: Students will be able to design and execute the various data manipulation queries.
CO4: Students will also learn to execute triggers, cursors, stored procedures etc.

Course Code: BTCS507-18	Course Title: Computer Networks Lab	0L:0T:2P	1 Credits

Course Outcomes:

CO1: Know about the various networking devices, tools and also understand the implementation of network topologies;
CO2: Create various networking cables and know how to test these cables;
CO3: Create and configure networks in packet trace rtool using various network devices and topologies;
CO4: Understand IP addressing and configure networks using the subnet in;
CO5: Configure routers using various router configuration commands.

Course Code:	**Course Title:**	**3L:0T:0P**	**3 Credits**	**42 Hours**
BTCS 510-18	Programming in Python			

Course Outcomes:
CO1: Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
CO2: Demonstrate proficiency in handling Strings and File Systems.
CO3: Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4: Interpret the concepts of Object-Oriented Programming as used in Python.
CO5: Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

Course Code:	**Course Title:**	**3L:0T:0P**	**3 Credits**	**42 Hours**
BTCS521-18	**Computational Biology**			

Course Outcomes:

CO1: Understand the basic of cell structure, divisions involved in reproduction of a cell, and its generic functionality;
CO2: Recognize the base line elements of a RNA and DNA; including fundamental behind their complex structure;
CO3: Comprehend primary structure of the protein and various related data-sets.
CO4: Demonstrate the concept of gene sequence alignment and simulate various related algorithms for the same.

Course Code:	**Course Title:**	**3L:0T:0P**	**3 Credits**	**45 Hours**
BTCS 515-18	Computer Graphics			

Course Outcomes: The students shall be able to:
CO1: Understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.
CO2: Make the student present the content graphically.
CO3: Work in computer aided design for content presentation for better analogy data with pictorial representation

Course Code:	**Course Title:** Web	**3L:0T:0P**	**3 Credits**	**42 Hours**
BTCS 520-18	Technologies			

CO1. Understand and apply the knowledge of web technology stack to deploy various web services.

CO2. Analyze and evaluate web technology components for formulating web related problems.

CO3. Design and develop interactive client server internet application that accommodates user specific requirements and constraint analysis.

CO4. Program latest web technologies and tools by creating dynamic pages with an understanding of functions and objects.

CO5. Apply advance concepts of web interface and database to build web projects in multidisciplinary environments.

CO6. Demonstrate the use of advance technologies in dynamic websites to provide performance efficiency and reliability for customer satisfaction.

| Course Code: BTCS601-18 | Course Title : Compiler Design | 3L:0T:0P | 3Credits |

Course Outcomes:

CO1: Build concepts on lexical analysis.
CO2: Understand strategies of syntax analysis.
CO3: Learn techniques of Intermediate code generation.
CO4: Understand code design issues and design code generator.
CO5: Design and develop optimized codes.

| Course Code:BTCS602-18 | Course Title : Artificial Intelligence | 3L:0T:0P | 3Credits |

Course Outcomes:

CO1: Build intelligent agents for search and games
CO2: Solve AI problems by learning various algorithms and strategies
CO3: Understand probability as a tool to handle uncertainity
CO4: Learning optimization and inference algorithms for model learning
CO5: Design and develop programs for an reinforcement agent to learn and act in a structured environment

| Course Code: BTCS 606-18 | Course Title: Simulation and Modeling | 3L:0T:0P | 3Credits |

Course Outcomes:

CO1: Discuss the fundamental elements of discrete-event simulation including statistical models, random processes, random variates, and inputs to simulation

CO2: Analyze a real world problem and apply modelling methodologies to develop a discrete-event simulation model Course Code: BTCS 606-18

Course Title: Simulation and Modeling

3L:0T:0P

3Credits

CO3 Interpret discrete-event techniques for solving a simulation problem

CO4: Compare and evaluate alternative system designs using sampling and regression

Course Code: BTCS608-18   Course Title: Internet of Things

Course Outcomes: After the completion of this course,
CO1: Understand internet of Things and its hardware and software components
CO2:Interface I/O devices, sensors & communication modules
CO3:Remotely monitor data and control devices
CO4:Develop real life IoT based projects

**Course Code:BTCS   Course Title : Digital   3L:0T:0P   3Credits
610-18   Image Processing**

Course Outcomes:

CO1: Understand the basic concepts of DIP.
CO2: Improve the quality of digital images.
CO3: Understand and De-noise Digital Images
CO4: Segment digital images and extract various features from digital images
CO5: Understand various image compression techniques and apply such techniques to compress digital
images for reducing the sizes of digital images.

**Course Code: BTCS   Course Title: Cloud   3L:0T:0P   3Credits
612-18   Computing**

CO1: Understand the core concepts of the cloud computing paradigm
CO2: Understanding importance of virtualization along with their technologies
CO3: Analyze various cloud computing service and deployment models and apply them to solve problems on
the cloud.
CO4: Implementation of various security strategies for different cloud platform

Course Code: BTCS 616-18
Course Title : Data Science

Course Outcomes:

CO1: understand of the basics of the ethical use of data science
CO2: Build skills in transformation and merging of data for use in analytic tools
CO3: Perform linear and multiple linear regression analyses.
CO4: Evaluate outcomes and make decisions based on data

Course Code: BTCS 614-18	**Course Title: Software Project Management**	**3L:0T:0P**	**3 Credits**

Course Outcomes:

☐ CO1: Explain project management in terms of the software development process

☐ CO2: Estimate project cost and perform cost-benefit evaluation among projects

☐ CO3: Apply the concepts of project scheduling and risk management.

☐ CO4: Explain Software configuration management and the concepts of contract management.

☐ CO5: Apply quality models in software projects for maintaining software quality and reliability

Course Code: BTCS 615-18	**Course Title: Software Project Management Lab**	**L:0;T:0; P:2**	**1 Credits**

Course Outcomes:

CO1: Plan and manage projects.
CO2: Consolidate and communicate information about their project.
CO3: Create Gantt charts and PERT (Project Evaluation Review Technique) chart of their project
CO4: Manage resources, assignments, work allocation and generate reports to assess project status, project cost status and resource utilization.
CO5: Identify factors affecting the critical path of their project.

Course Code: BTCS 618-18	**Course Title : Machine Learning**	**3L:0T:0P**	3Credits

Course Outcomes:

CO1: Analyse methods and theories in the field of machine learning
CO2: Analyse and extract features of complex datasets
CO3: Deploy techniques to comment for the Regression
CO4: Comprehend and apply different classification and clustering techniques
CO5: Understand the concept of Neural Networks and Genetic Algorithm

Course Code: BTCS620-18   **Course Title:Mobile Application Development**

Course Outcomes:
CO 1: Describe those aspects of mobile programming that make it unique from programming for other platforms,
CO 2: Critique mobile applications on their design pros and cons,
CO 3: Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
CO 4: Program mobile applications for the Android operating system that use basic and advanced phone features, and
CO 5: Deploy applications to the Android marketplace for distribution

Course Code: BTCS 701-18   **Course Title : Network Security and Cryptography**   **3L:0T:0P**   3Credits

Course Outcomes:

CO1: Understand the fundamental principles of access control models and techniques, authentication and secure system design Course Code: BTCS 701-18 Course Title : Network Security and Cryptography

CO2: Have a strong understanding of different cryptographic protocols and techniques and be able to use them.

CO3: Apply methods for authentication, access control, intrusion detection and prevention.

CO4: Identify and mitigate software security vulnerabilities in existing systems.

Course Code: BTCS 704-18   **Course Title : Deep Learning**   **3L:0T:0P**   3Credits
Course Outcomes:

CO1: Comprehend the advancements in learning techniques
CO2: Compare and explain various deep learning architectures and algorithms.
CO3: Demonstrate the applications of Convolution Networks
CO4: Apply Recurrent Network for Sequence Modelling
CO5: Deploy the Deep Generative Models

Course Code: BTCS706-18   **Course Title: Distributed Databases**   **3L: 0T: 0P**   **Credits: 3**

COURSE OUTCOMES

CO1: Design trends in distributed systems.
CO2: Apply network virtualization in distributed environment.

CO3: Apply remote method invocation and objects.

Course Code: **Course Title:** **3L: 0T: 0P** **Credits: 3**
BTCS708-18 Computer Vision
COURSE OUTCOMES

CO1: Understand image detection and analysis

CO2: Identify features to recognize object , scene and categorization from images.

CO3: Develop the skills necessary to build computer vision applications.

Course Code: BTCS **Course Title : Agile** **3L:0T:0P** 3Credits
710-18 **Software Development**
Course Outcomes:

CO1: Understand concept of agile software engineering and its advantages in software development.
CO2 Explain the role of design principles in agile software design.
CO3 Define the core practices behind Scrum framework.
CO4 Understand key principles of agile software development methodology-Kanban.
CO5 Describe implications of functional testing, unit testing, and continuous integration.
CO6 Understand the various tools available to agile teams to test the project.

Course Code: **Course Title: Block** **3L:0 T: 0P** **Credits: 3**
BTCS721-18 **Chain Technology**
COURSE OUTCOMES
CO1: Understand emerging abstract models for Block chain Technology.

CO2: Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain.
CO3: It provides conceptual understanding of the function of Blockchain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.
CO4: Apply hyperledger Fabric and Etherum platform to implement the Block chain Application.

BTCS 716-18	Adhoc and Wireless Sensor Networks	L:03, T:0, P: 0	Credits: 3

Course Outcomes:

CO1 Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks and apply this knowledge to identify the suitable routing algorithm based on the network.

CO2 Apply the knowledge to identify appropriate physical and MAC layer protocols

CO3: Understand the transport layer and Describe routing protocols for ad hoc wireless networks with respect to TCP design issues

CO4 Be familiar with the OS used in Wireless Sensor Networks and build basic modules CO 5:

CO5 Understand the Challenges in security provisioning ,Security Attacks and security issues possible in Adhoc and Sensors Networks

Course Code: BTCS718-18	Course Title: Quantum Computing	3L: 0T: 0P	Credits: 3

CO1: understand the quantum model of computation and the basic principles of quantum mechanics;
CO2: be familiar with basic quantum algorithms and their analysis;
CO3: be familiar with basic quantum protocols such as teleportation and super dense coding;
CO4: see how the quantum model relates to classical models of deterministic and probabilistic computation.