Course – Bachelor of Science in Information Technology (BSc-IT)

Course Duration: 3 years.

PROGRAM OBJECTIVE:

With the growing use of Computers and Information Technology in our day to day life, it is necessary that we have the trained man power to manufacture, maintain and use the Computers as well as write the software required for the effective and efficient use of the computers and IT. If we try to understand one of the most common features that have enabled the businesses to become successful is that they all have evolved to become information enabled business. Role played by computer application is that of a driver rather than an enabler. I.T. is used from Simple Office Automation to Decision Support, Re-Engineering and Organization Transformation. A new genre of manpower / managers is required to harness the awesome capabilities of Information Technology and to tap the potential of this tool to its maximum. This course, Bachelor of Computer Application , is designed and introduced by Gauhati University in 2006 to bridge this gap and produce employable graduate in Information technology which will enable the industry to grow and he graduates to become successful in the field of computer application . Students who choose BCA program , develop the ability to think critically, logically, analytically and to use and apply current technical concepts and practices in the core development of solutions in the form of Information technology .The knowledge and skills gained with a degree in Computer Science prepare graduates for a broad range of jobs in education, research, government sector, business sector and industry.

The program covers the various essential concepts in Computer Science.

- The course lays a structured foundation of Computer fundamentals, Numerical methods, Data structure, and Algorithm and Complexity analysis, Software Engineering.
- Programming Concepts in various languages(C, C++, Java, Visual Basic etc.)
- The program covers the concept of Computer Networking, System Programming and Administration, Operating System, Digital Image Processing, Embedded systems, Computer Architecture, Microprocessor,
- It also provides detail knowledge PHP programming, Numerical methods, Combinatorial optimization, Computer Graphics and Database management system.

- An exceptionally broad range of topics covering current trends and technologies in computer science: Programming in Python, Cyber Security, Data mining, R-Programming, Data Sciences, Artificial Intelligence and Android Programming.
- Also, to carry out the hand on sessions in Computer lab using various Programming languages and tools to have a deep conceptual understanding of the topics to widen the horizon of students self-experience.

COURSE OUTCOME:

FIRST SEMESTER	
PAPER CODE	COURSE OUTCOME
HC-1016 Computer fundamentals and programming	Upon completion of this course, students will acquire knowledge about: a) Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. b) Demonstrate an understanding of computer programming language concepts. c) To be able to develop C programs on Linux platform. d) Ability to design and develop Computer programs, analyses, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. e) Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. f) Student must be able to define union and enumeration user defined data types. g) Develop confidence for self-education and ability for life-long learning needed for Computer language.
HC-1026 Mathematics - I	Upon completion of course: a) Learn fundamental concepts of set theory, operation on sets, venn diagrams, statement problems, laws, duality, partitioning of a set. b) Understand the concept of graph theory and how to make various types of graphs. c) Understand the concept of relation and types of relations, graph of relations, properties of relations and matrix representation. d) Understand logic operations, truth tables, arguments and laws of logic, mathematical system and propositions over universe. e) Principle of mathematical induction, recursion, recurrence relations, binomial theorem.
ENG-AE-1014	Upon completion of course: a) Acquire knowledge about the various principles of communication, understand its various stages and the role of audience and purpose, deal with the barriers that affect communication in a professional set up. b) Understand the different channels that are functional at the work place.

	c) Learn the importance of verbal and non-verbal communication in the professional world along with its uses. d) Learning the uses and application of RP to improve pronunciation. e) Understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds, Importance of syntax for cultivating effective language skills. Understanding the need of skill developed.
HG-1016	Upon completion of this course the student will be able to : a) Indicate the names and functions of hardware ports and the parts of the motherboard. b) Identify the names and distinguishing features of different kinds of input and output devices. c) Describe how the CPU processes data and instructions and controls the operation of all other devices. d) Identify the names, distinguishing features, and units for measuring different kinds of memory and storage devices. e) Search your personal computer for the various hardware components it contains.

SECOND SEMESTER

HC-2016 Data structures and algorithm	Upon completion of this course the student will be able to : a) Designs and analyses simple algorithms. b) Defines the meaning of iterative and recursive algorithms. c) Calculates the running time of iterative algorithms. d) Uses Big 'O' notation to express algorithmic running time. e) Describes and analyses elementary sorting algorithms such as Selection sort, Bubble sort, Insertion sort, and Shell sort. f) Understands and restates the fundamentals of basic data structures. g) Understands and explains the concept of Abstract Data Types (ADT) – separation of definitions of data types from implementations. h) Discusses basic ADTs such as stacks, queues, and trees i) Discusses recursion and tree traversal algorithms. j) Develops skills in implementations and applications of data structures. k) Implements basic algorithms for sorting and searching. l) Implements basic data structures such as stacks, queues and trees. m) Applies algorithms and data structures in various real-life software problems.
HC-2026 Digital Logic	Upon completion of the course: a) Able to perform the conversion among different number systems b) Familiar with basic logic gates -- AND, OR & NOT, XOR, XNOR; Independently or work in team to build simple logic circuits c) Understand Boolean algebra and basic properties of Boolean algebra d) Able to simplify simple Boolean functions by using the basic Boolean properties.

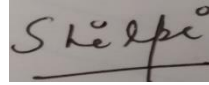|	
	e) 3. Able to design simple combinational logics using basic gates. Able to optimize simple logic using Karnaugh maps, understand "don't care". f) 4. Familiar with basic sequential logic components: SR Latch, D Flip-Flop and their usage and able to analyse sequential logic circuits. g) 5. Understand finite state machines (FSM) concept and work in team to do sequence circuit design based FSM and state table using D-FFs. h) 6. Familiar with basic combinational and sequential components used in the typical data path designs: Register, Adders, Shifters i) Comparators; Counters, Multiplier, Arithmetic-Logic Units (ALUs), RAM.
ENV-AE-2014	Upon completion of the course: a) Measure environmental variables and interpret results. b) Evaluate local, regional and global environmental topics related to resource use and management c) Propose solutions to environmental problems related to resource use and management d) . Interpret the results of scientific studies of environmental problems. e) Describe threats to global biodiversity, their implications and potential solutions.
HG-2016 Programming in C++	Upon completion of the course: The course is designed for to providing knowledge of C & C++. Students will be able to develop logics which will help them to create programs, applications. After the completion of this course, the students will be able to develop applications in C & C++.
THIRD SEMESTER	
HC-3016 Computer Organization	Upon completion of the course: a) Understand the theory and architecture of central processing unit. b) Analyse some of the design issues in terms of speed, technology, cost, performance. Design a simple CPU with applying the theory concepts. c) Use appropriate tools to design verify and test the CPU architecture. d) Learn the concepts of parallel processing, pipelining and interprocessor communication. e) Understand the architecture and functionality of central processing unit. f) Exemplify in a better way the I/O and memory organization. g) Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
HC- 3026 Operating System	Upon completion of course: a) Identify the role of Operating System. b) To understand the design of control unit. c) Understanding CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms. d) Solve Deadlock Detection Problems.

	e) Describe the role of paging, segmentation and virtual memory in operating systems. Description of protection and security and also the Comparison of UNIX and Windows based OS. f) Defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms.
HC-3036 Database Management System	Upon Completion of the course: a) Describe fundamental elements of RDBMS. b) Explain the basic concepts of relational data model, relational database design, relational algebra and database language SQL. c) Design E-R diagram to represent simple database applications scenarios. d) Criticize a database and improve the design by normalization. e) Basic of Database protection & Distributed databases
SE-3014 UNIX/LINUX Programming	Upon Completion of the course: a) Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system. b) Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers. c) Understand basics of various OS related concepts, from programmer's point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc. d) Develop applications where several processes need to communicate with each other to complete a task. e) Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories. f) Write programs which employs advanced concepts like multithreading. g) Write useful programs for networking purposes
FOURTH SEMESTER	
HC-4016 Programming in JAVA	Upon completion of the course: a) Understand the concept of OOPs as well as the purpose and usage principles of Inheritance, polymorphism, encapsulation etc. b) Understand the basic concepts of classes and objects. c) Understand JVM Concept , Data types and Operators, Strings d) Understand Internet Programming Using Java Applets & Graphic Programming & Make use of array, constructors, Inheritance, Packages and Interfaces. e) Understand the concept of Exceptional Handling/Event Handling & Java I/O Handling
HC-4026 Software Engineering	Upon completion of the course: a) Understand the process to be followed in SDLC. b) Define formulate and analyze a problem. c) Apply design and testing principles to software project development & Design Methodologies. d) Apply the project management and analysis principles to software project development.

	e) Knowledge about software development life cycle and problem articulation
HC-4036 Data Communication and Computer Networks	Upon Completion of the course: a) Understanding network models. b) Understand different network technologies. c) Understand the effects of using different networking topologies. d) Be updated with different advanced network technologies that can be used t connect different networks. e) Be familiar with various hardware and software that can help protect the network, layers of OSI model and their functionality.
SE-4024 PHP Programming	Upon Completion of the course: a) List the major elements of the PHP & MySQL work and explain why PHP is good for web development b) Learn how to take a static website and turn it into a dynamic website run from a database using PHP and MySQL. c) Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application. d) Learn how databases work and how to design one, as well as how to use php MyAdmin to work with MySQL. e) Learn different ways of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data. Connect to SQL Server and other data sources.
HG-4026 Information Security and Cyber laws	Upon Completion of the course: a) To introduce Information Security Concepts, Principles of Security, Policy Framework, Role based Security in an organization, Components and Balancing Information Security Approaches to information Security Implementation, Security Systems Development Life Cycle. b) To clear the concepts of Security Threats and Vulnerabilities, Desktop Security, PGP and S/MIME, Web Security, Web authentication, Database Security, Firewalls. c) To learn the techniques of Security Management and Laws, Access Control , Intrusion Detection Systems and Intrusion Prevention Systems, Security Procedures and Guidelines, Business Ethics and Best Practices, Security Assurance, Security Laws, IPR, International Security Standards, Security Audit. d) To make students aware of Cryptography: Concepts and Techniques, Symmetric and Asymmetric Key Cryptography, Steganography, e) Symmetric Key Ciphers-DES, AES (Structure and Analysis), RSA Algorithm and its Analysis. Digital Signatures. 5. Use the concepts of Authentication Protocols
FIFTH SEMESTER	

HC-5016 Compiler Design	Upon completion of this course: a) Explain the concepts and different phases of compilation with compile time error handling. b) Represent language tokens using regular expressions, context free grammar and finite automata and design lexical analyzer for a language. c) Compare top down with bottom up parsers, and develop appropriate parser to produce parse tree representation of the input. d) Generate intermediate code for statements in high level language. e) Design syntax directed translation schemes for a given context free grammar. f) Apply optimization techniques to intermediate code and generate machine code for high level language program.
HC-5026 Web Technology	Upon completion of this course: a) Fundamentals of how the Internet and the Web function b) A basic understanding of graphic production with a specific stress on creating graphics for the Web c) General grounding introduction to more advanced topics such as programming and scripting d) Analyse a web page and identify its elements and attributes. e) Create web pages using XHTML and Cascading Style Sheets. f) Build dynamic web pages using JavaScript (Client side programming). g) Create XML documents and Schema.
HE-5026 Object oriented Analysis and Design	Upon completion of this course: a) The importance of modeling in the software development life cycle b) The UML notation and symbols c) The object-oriented approach to analyzing and designing systems and software solutions d) How to Employ the UML notation to create effective and efficient system designs
HE-5046 Project Work	Upon completion of this course: a) Able to do some innovative work with applying the knowledge gained from various courses undergone in the earlier years. b) Able to exhibit both analytical and synthetically skills. c) Able to know the complete project life cycle and the project time estimation & its management. d) Able to gain knowledge of various simulation tools. e) Able to culture working in a team.
SIXTH SEMESTER	
HC-6016 System Administration LINUX	Upon completion of this course: a) Demonstrate an understanding of the principles, practices and goals of system administration. b) Demonstrate an understanding of system components, the advantages of Unix-like and Windows-like OS

	c) Major networking models, network addressing and naming systems, network services. Demonstrate an understanding of the major approaches to computer management in the network environment. d) Demonstrate an understanding of the features of the Windows 2003 Server Operating System. 5 e) Perform the installation of Windows 2003 OS and configure the server environment. f) Demonstrate an understanding of Active Directory and its key features. g) Perform user accounts management and implement security groups. h) Perform configuration, management, and troubleshooting of folders, files, and printing resources. i) Perform network services installation and management. j) Use server and network monitoring software tools. k) Describe the elements of an effective troubleshooting methodology and use a variety of software and hardware tools to diagnose problems. l) Demonstrate an understanding of network backup and recovery strategies and how to protect a network from viruses.
HC-6026 Computer Graphics	Upon completion of the course: a) Understand the foundations of Computer graphics. b) Understand the concept of Geometric mathematical and algorithmic concepts necessary for programming computer graphics. c) Understand the comprehension of window clipping and view port object representation in relation to images displayed on screen. d) Understand the concepts of geometric and composite transformations on objects. Understand the concepts of shading, surface Elimination on the objects.
HE-6016 Microprocessor	Upon completion of the course: a) Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance. b) Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller. c) Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements. d) Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller. e) Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices. f) Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.
HE-6026 Data Mining and Warehousing	Upon completion of the course: a) Basics of data ware house and Mining b) Various Transaction Processing Systems

	c) Data ware house Implementation / Design / Technical considerations d) Concept of Artificial Intelligence, Multidimensional data models & association correlation algorithms e) Various prediction techniques and clustering algorithms.

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