ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

B.Sc. IT

(From Academic Session 2018-19 onwards)

3rd Semester

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B.Sc. IT 3rd Semester: Course Structure

Sl. No.	Sub-Code	Subject	Hours per Week			Credits
			L	T	P	C
Theory						
1	BSIT181301	Object Oriented Programming and Design	2	1	0	3
2	BSIT181302	Theoretical Foundation of Computer Science	2	1	0	3
3	BSIT181303	Mathematics-III	2	2	0	4
4	BSIT181304	Operating System	2	1	0	3
5	BSIT181305	Computer Graphics	2	1	0	3
Practical						
1	BSIT181311	C++ Lab	0	0	4	2
2	BSIT181315	Computer Graphics Lab	0	0	4	2
TOTAL			10	6	8	**20**
Total Contact Hours per week : 24						
Total Credits: 20						

Detailed Syllabus:

Course Code	Course Title	Hours per week L-T-P	Credit C
BSIT181301	**Object Oriented Programming and Design**	**2-1-0**	**3**

COURSE OBJECTIVES

To introduce with the concepts of object oriented programming with practical

MODULE 1: Introduction (10 Lectures)

History of the development of Object-Oriented Programming Language. Basic Concepts of OOP-Objects.

MODULE 2: Characters of Objects (25 Lectures)

Classes and Message Passing. Notions of abstraction, encapsulation/ information hiding and modularity Instantiation and initialization of objects.
Inheritance- Single, multilevel multiple and repeated. Run-time polymorphism. Aggregation.

Differences between conventional and Object-Oriented programming.
Advantages and disadvantages of OOP. Class libraries.

MODULE 3: Implementations of OOP (8 Lectures)

Language Features of C++: Operator Overloading, Templates, I/O streams. Overview of Java. Implementation of OOP in C++ / Java.

Books:

1. Object Oriented Analysis and Design 2/e - Booch - Pearson
2. Object oriented Modeling and design - Rumberg- Pearson
3. J2ME the compete reference - Keogh
4. C++ Programming Language - Stroustrup
5. C++ Programming - E. Balaguruswamy

Course Code	Course Title	Hours per week L-T-P	Credit C
BSIT181302	**Theoretical Foundation of Computer Science**	**2-1-0**	**3**

COURSE OBJECTIVES

Detailed concepts of Automata Theory.

MODULE 1: Introduction (2 lectures)

Languages: Alphabet, string, basic operations on languages; union, intersection, concatenation, Regular expressions, Kleene's closure.

MODULE 2: Automata Theory (12 lectures)

Automata Theory: Finite Automata, NFA and DFA, Acceptability of strings, Equivalence of NFA and DFA, Mealy and Moore machines, Minimization of Finite Automata.

MODULE 3: Formal Language (6 lectures)

Formal languages: Definition of a grammar, Language generated by a grammar, Chomsky classification of languages, Languages and Automata.

MODULE 4: Regular Grammar (12 lectures)

Regular sets and grammar: Finite automata and regular expressions, transition system for regular expressions, Pumping lemma..

MODULE 5: CFG (6 lectures)

Context free grammar and languages: Derivation trees, Ambiguity, Simplification, Normal forms-Chomsky Normal Form, Pumping lemma for context free languages.

MODULE 6: Turing Machine (5 lectures)

Turing machine: Turing machine model, Representations, Design of Turing machines, Turing machine and Type-0 grammars, Halting problem of Turing machine.

Reference Books:

1. K.L.P. Mishra, N. Chandrasekaran, Theory of Computer Science (Automata, Languages and Computation) , PHI
2. Hopcroft, J.D. Ullman, Introduction to Automata Theory, Language and Computation, Addison Wesley.

Course Code	Course Title	Hours per week L-T-P	Credit C
BSIT181303	**Mathematics-III**	**2-2-0**	**4**

COURSE OBJECTIVES

To introduce the basics of electronics and digital communication system including analysis.

MODULE 1: (12 Lectures)
Power series, radius of convergence, Power series methods for solutions of ordinary differential equations. Legendre's equations and Legendre's polynomial. Bessel equations and Bessel functions of first kind Orthogonal sets. Orthogonality of Bessel's functions and Legendre's polynomials.

MODULE 2: (15 Lectures)
Laplace transforms, Inverse transform, shifting on the s and t axes, convolutions, partial fractions, Fourier series, half range expansions. Approximation by trigonometric polynomial. Fourier integrals. Transform techniques in differential equations.

MODULE 3: (15 Lectures)
Topological Spaces: Definition and examples, Bases and Sub- bases, Weak topologies, Fuzzy sets and examples, Brief overview of crisp set; the notation of fuzziness; what, why and when to apply fuzzy set; operations on fuzzy sets; fuzzy numbers. Crisp relations, fuzzy relations, operations on fuzzy relations

MODULE 4: (20 Lectures)
General LPP, Formulation of LPP, Graphical Method, Limitation of Graphical Method, Solution of GLPP, Simplex Method, Some Definitions and Notations, Simplex Algorithm, Optimization Problems, Transportation.

Books:

1. Differential Equation by Frank Ayers, Mc. Graw Hill.
2. Advanced Differential Equation; M.D.Raisighania, S Chand Company.
3. Laplace and Fourier Transforms; M.D. Raisinghania. S. Chand and Company Ltd.
4. Laplace Transforms by Spiegel(Schaum Out Line Series), Mc Graw Hill India.
5. Mathematical Physics by Ghatak, Goyel et al , Mc. Millan.
6. Topology by J.R. Munkres, Pearson Education India
7. Fuzzy Set Theory and its application, by H. J. Zimarmen, Boston
8. Fuzzy Sets and Fuzzy Logic and application, by G. J. Klir, Bo Yuan, Prentice Hall
9. Linear Programming by Hardy.
10. Linear Programming and Theory of Game; P. M. Karak, New Central Book Agency(P) Ltd.

Course Code	Course Title	Hours per week L-T-P	Credit C
BSIT181304	**Operating System**	**2-1-0**	**3**

COURSE OBJECTIVES
To introduction to basic Operating System concepts.

MODULE 1: Fundamentals of OS (4 Lectures)

Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

MODULE 2: System Structure (5Lectures)

System Structure: Different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

MODULE 3: Process Management (6 Lectures)

Process Management: Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication. Threads: overview, benefits of threads, user and kernel threads.

MODULE 4: CPU Scheduling (7 Lectures)

CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, and priority), and algorithm evaluation, multi-processor scheduling.

MODULE 5: Synchronization (8 Lectures)

Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.
Deadlocks system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

MODULE 6: Storage Management (6 Lectures)

Storage Management: Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging. Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU).

MODULE 7: File Management (6 Lectures)

File Systems: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

MODULE 8: I/O Management (6 Lectures)

I/O Management: Blocking and non-blocking I/O, kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance. Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN), disk reliability, disk formatting, boot block, bad blocks.

MODULE 9: Security Management (4 Lectures)

Protection & Security: Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Reference Books:

1. Distributed Operating Systems — Tanenbaum
2. Cryptography and network security — Stallings
3. Operating Systems: Internals and Design Principles — Stallings

Course Code	Course Title	Hours per week L-T-P	Credit C
BSIT181305	**Computer Graphics**	**2-1-0**	**3**

Course objective:

MODULE 1: Introduction (6 Lectures)

Use of computer graphics, Classification of application, Typical graphic resolution, Coordinate systems, Aspect ratio correction, Image processing as picture analysis, Interactive graphics, Development of Hardware and Software, Conceptual framework of interactive graphics.

MODULE 2: Basic Algorithms (12 Lectures)

Points and Lines, Line Drawing algorithms, Circle Generating Algorithms Ellipse Generating Algorithms, Parallel Curve Algorithms, Attributes of Output primitives.
Hardcopy Technologies, Display Technologies, Raster scan display system, Video controller, Random scan display processor.

MODULE 3: Clipping and Filling (7 Lectures)

Clipping algorithm, Scan converting primitives and scan algorithm, Anti-aliasing, Special problems of text, Filling algorithm.

MODULE 4: 2d Transformations (10Lectures)

Basic transformations, Matrix representations and Homogeneous Coordinates, Composite transformations, other transformations, Raster methods for transformations. The Viewing Pipe-line, Viewing Coordinate reference frame, window-to-view port Coordinate transformation, 2- D Viewing functions, Clipping Operations.. Structure concepts, editing structure, basic modelling concepts, Hierarchical modelling with structures, Graphical user interfaces and interactive input methods.

MODULE 5: 3d Transformations (6 Lectures)

3-D Display methods, 3-D Graphics packages, Polygon surfaces, Curves lines and Surfaces, Spline representations, Bezier Curves and Surfaces, B-Spline Curves, Beta Splines, Methods 3-D Planar Geometric projection, Transformation, Rotation Scaling, Other Transformations, Composite Transformations, 3-D Transformation functions, Modelling and Co-ordinate transformations, 3-D viewing concepts.

MODULE 6: Solid Representation(5 Lectures)

Representing solid, Sweep representation, Boundary representation, Spatial partitioning representation, Constructive solid geometry, Octrees, BSP Trees, Fractal Geometry.

Computer Animation. Algorithms for visible line determination, Z-buffer algorithm, List priority algorithm. Scan-Iine algorithm, algorithm for Octrees, Curved surfaces, visible surface ray tracing.

MODULE 7: Lights (5 Lectures)

Achromatic light, chromatic light, colour Models for Raster Graphics, Reproducing Colors, Using Colour in Computer graphics. Rendering technique for line drawing& shaded images. Illumination models, Shading models for polygon, Surface details, Shadows, Transparency, Inter-object reflection.

Reference books

1. Fundamental of Digital Image Processing -Annadurai - Pearson
2. Digital Image Processing -Gonzalez - Pearson

Course Code	Course Title	Hours per week L-T-P	Credit C
BSIT181311	**C++ Lab**	**0-0-4**	**2**

List of Experiments:

1. C++-Program involving Simple Programs using control statements
2. C++-Program using Functions, Recursion, use of various Data Types
3. C++- Program implementing OOP.

Course Code	Course Title	Hours per week L-T-P	Credit C
BSIT181315	**Computer Graphics Lab**	**0-0-4**	**2**

Experiments:

1. Implementation of Graphics algorithms using C language.

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