DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

Curriculum for B.Sc. Degree in Computer Science

100 Level Harmattan Semester

Course Code	Course Title	Pre-requisite	Units	Status
CIT 111	Introduction to Information & Communication Technology		2	C
BIO 101	Basic Biology I	-	3	C
BIO 107	Experimental Biology I	-	1	C
CHM 101	General Chemistry I	-	3	C
CHM 107	Experimental Chemistry I	-	1	C
MTH 101	General Mathematics I	-	3	C
PHY 101	General Physics I	-	3	C
PHY 107	Experimental Physics I	-	1	C
GNS 101	Use of English	-	2	R
LIB 101	Use of Library	-	1	R
FRN 221	Basic French	-	2	R
	Total		**22**	

100 Level Rain Semester

Course Code	Course Title	Pre-requisite	Units	Status
CIT 112	Introduction to Computer Programming	-	2	C
BIO 102	Basic Biology II	-	3	C
BIO 108	Experimental Biology II	-	1	C
CHM 102	General Chemistry II	-	3	C
CHM 108	Experimental Chemistry II	-	1	C
MTH 102	General Mathematics II	-	3	C
PHY 102	General Physics II	-	3	C
PHY 108	Experimental Physics II	-	1	C
GNS 102	Use of English II	-	2	R
FRN 222	French for Specific Purposes	-	2	R
	Total		**21**	

200 Level Harmattan Semester

Course Code	Course Title	Pre-requisite	Units	Status
CIT 201	Structured Programming	-	3	C
CIT 203	Computer Architecture and Organization I	-	2	C
CIT 205	Computer Hardware	-	2	C
CIT 207	Introduction to Computer Networks	-	2	C
CIT 291	Computer Workshop Practice 1	-	1	C
STA 201	Statistics for Physical Science & Engineering	-	4	C
GNS 201	Nigerian Peoples and Culture	-	2	R
MTH 201	Mathematical Methods I	-	2	R
	Electives: One of the following			
CIT 209	Data Management I	-	2	E
MTH 203	Linear Algebra I	-	2	E
	Total		**20**	

200 Level Rain Semester

Course Code	Course Title	Pre-requisite	Units	Status
CIT 202	Low Level Language	-	3	C
CIT 204	Compiler Construction I	-	2	C
CIT 206	Principles of Operating System I	-	2	C
CIT 208	Fundamentals of Data Structures	-	3	C
CIT 292	Computer Workshop Practice II	-	1	C
PHY 206	Electric Circuits and Electronics	-	3	C
GNS 202	Osun Peoples and Culture	-	2	R
GNS 302	Introduction to Logic and Philosophy	-	2	R
	Electives: One of the following			
MTH 204	Linear Algebra II	-	2	E
CIT 210	Computational Science and Numerical Methods	-	3	E
	Total		**20/21**	

300 Level Harmattan Semester

Course Code	Course Title	Pre-requisite	Units	Status
CIT 301	Object Oriented Programming	-	3	C
CIT 303	Algorithms and Complexity Analysis	-	3	C
CIT 305	Principles of Operating System II	CIT 206	3	C
CIT 307	System Analysis and Design Methodologies	-	3	C
CIT 311	Computer Architecture and Organization II	CIT 203	2	C
CIT 391	Digital Computer Laboratory	-	1	C
GNS 301	Entrepreneurship Skill, Development and Practice	-	2	R
	Electives: One of the following			
CIT 309	Survey of Programming Languages	-	3	E
CIT 313	Operations Research	-	3	E
MTH 205	Sets, Logic and Algebra	MTH101	2	E
	Total		**19/20**	

300 Level Rain Semester

Course Code	Course Title	Units	Status
CIT 399	Industrial Attachment	16	C
	Total	**16**	

400 Level Harmattan Semester

Course Code	Course Title	Pre-requisite	Units	Status
CIT 401	Software Engineering	-	4	C
CIT 403	Artificial Intelligence	-	3	C
CIT 405	Net-Centric Computing	-	3	C
CIT 497	Research Methodology/Seminar	-	2	C
	Electives: Two of the following			
CIT 407	Digital Computer Networks and Communication	CIT 207	3	E
CIT 409	Computer Graphics and Visualisation	-	3	E
CIT 411	Information Technology Policy and Security	-	3	E
CIT 413	Special Topics in Information Technology	-	3	E
CIT 415	Distributed Computing System	-	3	E
CIT 417	Agent Based Systems	-	3	E

	Total		**18**	

400 Level Rain Semester

Course Code	Course Title	Pre-requisite	Units	Status
CIT 402	Data Management II	-	3	C
CIT 404	Human Computer Interface	-	2	C
CIT 406	Modeling and Simulation	-	3	C
CIT 499	Research Project	-	4	C
Electives: Two of the following				
CIT 408	Compiler Construction II	CIT 204	3	E
CIT 410	Project Management	-	3	E
CIT 412	Queuing Systems	-	3	E
CIT 414	Computer System Performance Evaluation	-	3	E
CIT 416	Formal Models of Computation	-	3	E

CIT 418	Computer Based Distance Learning	-	3	E
	Total		**18**	

COURSE DESCRIPTION

100 LEVEL COURSES

CIT 111-INTRODUCTION TO INFORMATION AND COMMNUNICATION TECHNOLOGY ***L 1 T 0 P 3 Units 2***

Definition of computer and computer related concepts; Comprehensive history of modern computer technology, Evolution of micro computer system; Concept of computer hardware, software and firmware; Identification of different parts of the computer and learn to get friendly with the machine (Finger positioning on the keyboard);; Social impact of computers (positive and negative impacts); familiarization with application packages (Microsoft Windows, Microsoft word, Excel etc).

CIT 112 INTRODUCTION TO COMPUTER PROGRAMMING ***L 1 T 0 P 3 Units 2***

Introduction; Programming concepts and properties , problem solving strategies/methods, Program implementation strategies, concepts and properties. Algorithm development, designing, coding, debugging and documenting programs programming steps, teaching of a structured effects, variables and constants, arithmetic operations, control structure, modularization (subroutine/subprogram), file management, solution of selected problems. A widely used programming language should be used in teaching the above. e.g. BASIC or FORTRAN 2003,

200 LEVEL COURSES

CIT 201 STRUCTURED PROGRAMMING ***L 2 T 0 P 3 Units 3***

Structured programming elements, structured design principles, abstraction modularity, step refinement, structured design techniques. Teaching of a structure programming language, Brief survey of programming paradigms – procedural programming, object oriented programming, non-algorithmic programming, functional and declarative programming; Problem solving phases, The Programming process; Data types; Input and Output; Control Structures; Functions, objects and classes; Design, testing debugging and documentation. Principles of good programming, structured programming concepts, Debugging and testing, string processing, internal searching and sorting, recursion. Use a programming language such as C-Language

CIT 202 LOW LEVEL LANGUAGES *L 2 T 0 P 3 Units 3*

Assembly language basics – Bits, Bytes, and Words, Numeric Data representation and representation of non-numeric data (character codes, graphical data), representation of records and arrays. Instruction Formats; Addressing System; CPU internal Structure; Registers, Memory, ALU, CU, Controls – Loops and Switches; Macro Instructions; Interrupts; File Structures; Storage Control; Relocation; Linking/Loading; Editing; Hardware System Programming using simple machine codes, Problem solving using Assembler/Machine coding. Intel Instruction Set, Address mode.

CIT 203 COMPUTER ARCHITECTURE AND ORGANIZATION I
L 2 T 0 P 3 Units 2

Basic Computer organization, Fundamental building blocks, logic expressive immunization sum of product forms. Register transfer notation, Physical considerations. Data representation such as numeric ,non numeric, alphanumeric EBCIDIC,BCD,ASCII, , and number bases, Fixed and Floating point systems representation, basic logic gates(J-K flip-flops), symbols, truth tables , Boolean algebra, theorems, switching function minimization memory systems organization and architecture.

CIT 204-COMPILERS CONSTRUCTION I *L 1 T 0 P 3 Units 2*

Definition; Basic concepts of compiler, Lexical and Syntax Analysis; Symbol table management-Code generation by tree walking; Optimization techniques; Compilation approaches-Single Pass, Multipass, Load and Go; Scanning; Table management, Workspace and dumping. A typical compiler; Simple Scanners and Parsers using C/C++ language.

CIT 205 COMPUTER HARDWARE *L 2 T 0 P 3 Units 2*

Electronic circuits; diode arrays PIAs etc. Integrated circuits fabrication process. Use of LSI and VLSI IC" hardware Design. Primary and Secondary memories: core memory, Magnetic devices; disks, tapes, video disks etc. Peripheral devices: printers, CRT's keyboard character recognition , Operational amplifiers: Analog to digital and Digital to analog converter Analog computers.

CIT 206-PRINCIPLES OF OPERATING SYSTEMS I *L 2 T 0 P 3 Units 2*

Overview of O/S: Definition, types, components of an Operating System; Role & Purpose, Functionality Mechanisms to Support Client –Server models, Management modules in O/S, Concurrency: State diagrams structures, interrupts; Dispatching and Context switching; Concurrent execution; Mutual exclusion problem and some solutions to Deadlock;

CIT 207-INTRODUCTION TO COMPUTER NETWORKS *L 1 T 0 P 2 Units 2*

History of computer Networks, principles of computer networks, definitions, computer network classification, Topologies; Network communication media: twisted pair, coaxial, and fibre optics cables, satellite, voice communication digital and radio communication; Introduction to LAN, WAN, MAN, Internet; Network Concepts; Front-end controllers; ISO-OSI models; network protocols, Cables, hubs, routers.

CIT 208-FUNDAMENTALS OF DATA STRUCTURES *L 2 T 0 P0 Units 3*

Basic structure for data representation – Data definition languages; Abstraction; Data types; Information; Records; Arrays; Strings and String processing; Linked list and Pointers, Nodes, Stack; heap allocation; Queues; Binary Trees; Directed graphs, Object

Oriented Paradigm; Sorting, Searching, Algorithm design techniques – divide-and conquer, dynamic programming, greedy algorithm, amortized analysis

CIT 209 -DATA MANAGEMENT I ***L 2 T 0 P 3 Units 2***

Introduction to data management, file management and job-control language application; Information storage and retrieval, Information management applications, Information capture representation, analysis & indexing, search, retrieval, information privacy: integrity, scalability, file recovery efficiency and effectiveness.

Introduction to database systems: Components of database systems DBMS functions, Database architecture and data independence, use of data query language, high level language data management facilities.

CIT 210-COMPUTATIONAL SCIENCE AND NUMERICAL METHODS

L 2 T 0 P 3 Units 3

Operations research, Numerical Computation, Graphical computation, Modeling and simulation, High performance computation.

CIT 291: COMPUTER WORKSHOP PRACTICE I ***L 0 T 0 P 3 Unit 1***

Introduction: The need for a PC building skill, The dos and don'ts in a computer laboratory and media units handling simple overview and identification of basic tools and computer hardware components in use. The chassis, Motherboard ,Floopy Disk Drive, Hard Disk Drive, CD-ROM , Keyboard, Mouse, Video Card, Processors, Monitor, Memory (RAM); Procedure for the setting up of a PC, setting up a typical maintenance workshop; Pulling a System apart , safety precautions Diagnosis of common Faults.Setting up a typical maintenance workshop, safety precautions, installation of cards, installation of IDE cables, Installation of LED wire, connecting power to the

motherboards , First time booting, Hard Disks installation ,series 2 diagnosis. FDISK tool.

CIT 292 COMPUTER WORKSHOP PRACTICE II ***L 0 T 0 P 3 Unit 1***

Setting up an operating system, creating partitions and logical drives, Active Partitions, Delete Partitions, Installing Windows 98, 2003, Vista, Troubleshooting, Regular preventive maintenance of whole system, Breakdown maintenance, Diagnostic Carts, System display, Power supply, Boot up, Hard drive, Serial port, Basic use of multi-meter, Basic computer network practicals – student is expected to be able to install any brand of Network Operating System to connect up to five systems using all standard networking equipment.

300 LEVEL COURSES

CIT 301-OBJECT ORIENTED PROGRAMMING ***L 2 T 0 P3 Units 3***

Basic OOP Concepts: Classes, Objects, inheritance, polymorphism, Data abstraction, Tool developing, compiling, interpreting and debugging, Java programs, Java syntax and objects operators, central flow constructs, objects and classes programming, Arrays, m exceptions, Applets and the Abstract, OLE, Persistence, Windows Toolkit, Laboratory exercise in an OOP Language, Basic of JAVA; Strings, Selection, Iteration; Classes and Objects, Control Statements, Object-Oriented Programming: Inheritance, Polymorphism, GUI Components, formatted output; Composition, Inheritance; Arrays; Vectors ; Graphics. Solving Selected Problems.

CIT 303-ALGORITHMS AND COMPLEXITY ANALYSIS ***L3 T 0 P0 Units 3***

Fundamental computing Algorithm- Numerical algorithm, sequential and binary search algorithm, sorting algorithm, Principles of good programming style, expression, and documentation; structured programming concepts; debugging, testing, verifying, code inspection; semantic analysis, string processing; data structures, recursion; efficiency of algorithms. Basic algorithmic analysis: Asymptotic analysis of Upper and average

complexity bounds; standard complexity classes, time and space trade off in algorithms analysis, recursive algorithms.

CSC 305-PRINCIPLES OF OPERATING SYSTEMS II *L 2 T 0 P15 Units 3*

Pre –requisite CIT 206

O/S Principles: Structuring methods abstraction, processing of recourses, Concept of APIS Device organization interrupts.

Queuing theory ; preemptive versus non-preemptive scheduling, Resource sharing and protection. File system : Management of secondary stores , A study of Linus operating system such as startup and shut down; system access, system file ,multitasking

CSC 307-SYSTEMS ANALYSIS AND DESIGN METHODOLOGIES

L 2 T1 P3 Units 3

System concept; System Development life cycle, system development steering committee Analysis: Fact gathering Techniques, System concepts examples of systems; System Development Life Cycle (SDLC), Analysis Fact gathering Techniques, Data delivery, Data flow diagrams, Process Description, Data Modeling; System Design, Structure charts, Form designs, Security, Automated tools for design: CASE; Implementation and Maintenance; Project Planning and Control. Case Study.

CSC 309-SURVEY OF PROGRAMMING LANGUAGES *L 2 T 0 P3 Units 3*

Overview of programming languages: History of programming languages, Brief survey of programming paradigms (Procedural languages, Object oriented languages, Functional languages, Declarative non-algorithmic languages, Scripting languages), the effects of scale on programming methodology; Language Description: Syntactic structure (Expression Notations, Abstract Syntax Tree, Lexical syntax, Grammars for

expressions, Variants of Grammar), Language Semantics (Informal semantics, Overview of formal semantics, Denotation semantics, Axiomatic semantics, Operationslsemantic); Declaration and types: The concept of types, Declaration models (binding, visibility, scope and lifetime), Overview of type-checking, Garbage collection; Abstraction mechanisms: Procedures, function, and iterations as abstractions mechanisms, Parameterization mechanism (reference vs. Value), Activation records and storage records, Type parameters and parameterized types, Modules in programming languages; object oriented language paradigm; Functional and logic language paradigms.

CIT 311-COMPUTER ARCHITECTURE AND ORGANIZATION II

L 2 T 0 P0 Units 2 **Pre-requisite: CIT 203**

Computer systems organization, CPU organization, memory organization, Memory system, general, characteristics of memory operation. (Technology-magnetic recording semi-conductor memory, coupled devices, magnetic bubble). Memory addressing, memory hierarchy, virtual memory control systems, I/O devices and their characteristics, organization and design of modern digital computing systems, logic circuitry Hardware control, micro programmed control. Asynchronous control i/c control. Introduction to the methodology of faulty tolerant computing. 45h (L); 30h (p).

CIT 313 - OPERATIONS RESEARCH ***L 2 T 0 P3 Units 3***

The objective of this course is to introduce students to the mathematical techniques used in Operations Research. These include; Decision trees, Forecasting models, Investment Appraisal, Inventory Control, Linear programming and networking analysis.

CIT 391: DIGITAL COMPUTER LABORATORY ***L 0 T 0 P3 Unit 1***

Basic Experiment in computer system design, component identification and assembly, Digital electronics, combinatorial and sequential circuits. Simple latch and clocked flip-flop, j-k flip-flops, Karnaugh maps, Synchronous counter, up-down counter

CIT 399 STUDENTS INDUSTRIAL WORK EXPERIENCE I

L 0 T 0 P66 Units 16

A course of computing practice undertaken in the industry. It is an exposure to industrial practice and standards in Information Technology through the attachment of students to locations in the computer industry as may be approved by the Head of Department. Students' activities are monitored and recorded by approved staff supervisors and a report is submitted by each student at the end of the period for assessment.

400 LEVEL COURSES

CIT 401-SOFTWARE ENGINEERING ***L 2 T 0 P3 Units 4***

Software Life Cycle; Process and Models; Planning and management; Metrics Risk Analysis; Quality Assurance; Software Design, Design pattern, Design for re-use, Testing and Object Orientation; Semantic Analysis; Efficiency of Algorithms. Large and medium scale Software development processes. Software tools and Environment: Requirements analysis and design modeling tools, testing tools, tool integration mechanism.

CIT 402-DATA MANAGEMENT II ***L 2 T 0 P3 Units 3***

Relational Databases: Mapping conceptual schema to relational schema; Database Query Languages (SQL) concept of functional dependencies & Multi valued dependencies. Transaction processing; Distributed databases. Steps in Systems

Analysis; Techniques of data capture; Data Management, Security, Communication; System Maintenance; User Driven System Design. Information System Structure, Analysis, Organization, Storage, Searching and Retrieval; Dictionary Construction and Lookup, Searching and Matching Procedure; Automatic Information Dissemination.

CIT 403-ARTIFICIAL INTELLIGENCE ***L 2 T 0 P3 Units 3***

Concepts of Artificial Intelligence; Design of an Intelligent Computer System; Man-Machine Orientation; Understanding Language, Learning, Reasoning, Problem Solving, Forward and Backward Chaining; Rule and Predicates.

CIT 404 HUMAN-COMPUTER INTERFACE ***L 1 T 0 P3 Units 2***

Foundations of Human Computer Interface, Principles of Graphic User Interface (GUI), GUI toolkits; Human-centered software evaluation and development, GUI design and programming.

CIT 405 NET-CENTRIC COMPUTING ***L 2 T 0 P 3 Units 3***

Distributed computing, Mobile & Wireless computing, Network security; Client/Server Computing (using the web), Building Web applications. Internet vs. Intranet; System development overview; Development Concept; Web application development cycle; Architectures and Environment; Markup Languages; Java Script, Java VRML, VB Script, Active-X, CGI, Database Connectivity; Web-authority tools; Scripting Languages; Client/Server technologies and infrastructures; Current issues and trends.

CIT 406-MODELING AND SIMULATION ***L 2 T 0 P3 Units 3***

Types of Models; Model development, verification and validation; Steps in a Simulation Study; Discrete and Continuous Probability distributions; Performance of queuing systems; Linear Congruential generation of random numbers; Other techniques. Use of a Simulation Programming Language or Simulation Package to solve a problem.

CIT 407-DIGITAL COMPUTER NETWORKS AND COMMUNICATION

Pre-requisite: CIT 207 ***L 2 T 0 P3 Units 3***

Introduction, Waves, Fourier analysis, measure of communication, channel characteristics, transmission media, noise and distortion, modulation and demodulation, multiplexing TDM, FDM and FCM. Parallel and serial transmission (synchronous vs asynchronous). Bus structures and loop systems, computer networks. Examples of design consideration; data switching principles; broadcast techniques; network structure for packet switching , protocols, description of network e.g. ARPANET, DSC etc.

CIT 408- COMPILER CONSTRUCTION II ***L 3 T 0 P0 Units 3***

Pre-requisite: CIT 204

Grammars and languages, recognizers, Top-down and bottom up language Run-time storage Organization. The use of display in run time storage Organization. The use of display in run time storage allocation. LR grammars and analysers. Construction of LR table. Organisation of symbol tablets. Allocation of storage to run-time variables. Code generation. Optimization/Translator with systems.

CIT 409-COMPUTER GRAPHICS AND VISUALIZATIO ***L 2 T 0 P3 Units 3***

Image representation, Scan conversion, Two-dimensional transformation, Two dimensional viewing and clipping, Three dimensional transformation, mathematics of projection, three dimensional viewing and clipping, Geometric representation, Hidden surface, color and shading models, Ray tracing, Characteristics of vectors, Industrial Applications, Display Rings; Display processors; Display Coordinates, Graphics Software Design; Typical Problem solving.

CIT 410-PROJECT MANAGEMENT ***L 2 T 1 P0 Units 3***

The integration of business and technical consideration in the design, implementation and management of information systems. Topics include: Information system planning

and development; business, management, executive and strategic information systems, including case studies of selected large-scale systems; end-user training and development; systems security, disaster planning and recovery. Practical examples of information systems in industry. Team management ,project management ,project Scheduling , software measurement and estimation techniques, Risk analysis software quality assurance, software configuration management, Project management tools.

CIT 411 INFORMATION TECHNOLOGY POLICY AND SECURITY

L 2 T 1 P0 Units 3

The need for a guided policy; Policy Issues; Comparative Study of International Policies; The Nigerian Situation; Case Studies, Sources of the law; criminal law, computer crime, definition of computer crime, application of existing criminal studies. Specific legislation concerning computer crime.

CIT 412-QUEUING SYSTEMS *L 3T 0 P0 Units 3*

Introduction; Birth-death queuing systems; Markovian queues, the queue M/GI bounds, inequalities and approximations.

CIT 413 - SPECIAL TOPICS IN INFORMATION TECHNOLOGY

L 2 T 0 P3 Units 3

A series of selected advanced topics in information Technology is given to give the students an in-depth knowledge of the current state of the art in Information Technology. Experienced practitioners in the field may also be invited to treat some of the topics. At the end of the course the student will be expected to submit a long essay as part of Continuous Assessment.

CIT 414 COMPUTER SYSTEMS PERFORMANCE EVALUATION

L 2 T 0 P3 Units 3

Measurement Techniques; Simulation Techniques, Analytical techniques; work-load characterization; performance evaluation in selection problems; performance evaluation in design problems; evaluation or programme performance.

CIT 415-DISTRIBUTED COMPUTING SYSTEMS ***L 2 T 0 P3 Units 3***

Introduction: Definitions, Motivation; Communication mechanisms: Communication protocols RPC, RMI, Stream oriented communication; synchronization; Global state, Election distributed mutual exclusion. Distributed transactions; Naming; Generic Schemes, DNS, Naming and Localization; Replication and coherence; Consistency Models and Protocols; Fault Tolerance; Group Communication. Two and Three phase commit. Check pointing, Security Access Control. Key Management, cryptography; Distributed File System; NFS, Coda etc.

CIT 416-FORMAL MODELS OF COMPUTATION ***L 2 T 0 P3 Units 3***

Automata theory: Roles of models in computation Finite state Automata, Push-down Automata, Formal Grammars, Parsing, Relative powers of formal models. Basic computability: Turing machines, Universal Turing Machines, Church's thesis, solvability and Decidability .

CIT 417 AGENT BASED SYSTEMS ***L 2 T 0 P3 Units 3***

Definition of agents, successful applications and state-of-the-art agent-based architecture: simple reactive agent, Agent theory, commitments, intentions, Decision theoretic agents, Markov Decision Processes (MDP), Software agents, personal assistant and information access, collaborative agents Information gathering agents, Believable agents, Learning agents, Multi-agent systems, Agent teams, Agent modeling, Introduction to Robotic agents, Mobile agent.

CIT 418 -COMPUTER BASED DISTANCE LEARNING ***L 2 T 0 P3 Units 3***

Definition and explanation of terms in distance learning, potential benefits of computer

based distance learning various methodologies such as use of Computer Aided Learning (CAL), Intelligent Computer Aided Learning (ICAL) Electronic learning, Collaborative learning, adaptive learning, Groupware, Courseware, Design and implementation issues, security issue in computer based learning.

CIT 497-RESEARCH METHODOLOGY/SEMINAR ***L 1T 1 P0 Units 2***

Definition and explanation of terms, Literature review, methodology, computing research resources, Research document and communication, Time management, managing your supervisor, research regulations and Ethics. Technical Writing and Reporting; Special topics in any area of computer science considered relevant at given time. ; Guest Lecturers from Industry can be invited. Simple guided seminar paper submitted and presented by the student will be graded.

CIT 499 RESEARCH PROJECT ***L 0 T 0 P 12 Units 4***

A functional guided research is carried out by the student based on the theoretical, conceptual and practical knowledge gained to solve selected problem, under the supervision of an academic staff and approved by the Head of Department. A bound project report is presented in an approved format for assessment by an external examiner. The student may also be subjected to an oral interview.