NATIONAL OPEN UNIVERSITY OF NIGERIA

Detailed Programme Proposal

for

B. Sc Information Technology

in the

Faculty of Computing

1.0 Name of the Programme: B.ScInformation Technology
Programme Code: 5202

2.0 Entry Requirements

To be admitted for the B.Sc Information Technology programme, a candidate is expected to:

i. Have at least credit level passes in five (5) subjects at the Senior Secondary Certificate or its equivalent NECO, GCE 'O' level, NABTEB or TC II 'O' level examinations. The credit level passes must include English language, Mathematics and Physics to form the core subjects and any other two (2) credit level passes from Chemistry, Biology/Agric, Further Mathematics and Computer Studies taken from a maximum of two (2) sittings.

ii. A minimum of a credit pass in Computing-related courses at the University/ A minimum of Lower Credit pass at the National Diploma (ND) or NCE (with a merit pass in Mathematics) for consideration for entry into the 200 level of the programme in addition to (i) above.

iii. Have two (2) A-level passes (graded A – E) at the GCE Advanced level in relevant subjects (Mathematics and Physics) for consideration for entry into the 200 level of the programme in addition to (i) above.

iv. A minimum of a pass in BSc/Upper/lower credit in HND from any **Other Science Technology and Engineering-related fields** as shown below, for consideration for entry into the 200 level of the programme in addition to (i) above.

v. Upper/lower credit in HND from any computing-related fields as shown below, for consideration for entry into the 300 level of the programme in addition to (i) above.

Note:

Computing-related fields

Computing-related fields from recognized institutions include Computer Science, Data Management, Information Technology, Mathematics, Maths and Statistics, Statistics, Computer Engineering, Electrical/Electronic Engineering, Electrical Engineering, Cybersecurity, Artificial Intelligence, Data Science, Software Engineering, Communication Technology, Physics with Mathematics, System Engineering, Computer with Mathematics

3.0 Aims and Objectives

The B.Sc Information Technology programme is designed to equip the undergraduate students with the basic requirements for serving in a professional capacity in most areas of computing as well as well as develop knowledge in the theory of applied mathematics. The degree programme would explore all the basic rudimentary or foundation

knowledge of Information technology not known to most of today's information users. It is also expected to equip students with the tools for computational techniques and thinking, as they would be exposed to the fundamentals of computing processes and principles.

3.1 Aim

The B.Sc. Information Technology Programme is aimed at taking you through the fundamental of the science of Information Technology and the latest technologies that make Information Technology an all-round catalyst in the design of any new market driven communication devices.

3.2 Objectives

After completing this programme, the grandaunts are expected to:

- Be able to interact with various communication devices characterizing today's workplace.
- Be able to design communication networks suitable for various organizations.
- Also be able to manage data transmission procedures and security parameters and controls
- Be able to administer various topologies for effective communication networks.

4. Programme Structure and Degree Rules

4.1 **Outline of Course Structure**: The B. Sc, honours, Information Technology programme is structured in 8 semesters as shown below. However, a 6-semester structure can be attempted if the entry level is at the 200-year level.

REGISTRABLE COURSES FOR B. SC. INFORMSTION TECHNOLOGY (with brief historical background)

BSc INFORMATION TECHNOLOGY

100 Level

Course Code	Course Title	Unit	Status
1st Semester			
GST101	Use of English and Communication Skills I	2	C
GST103	Computer Fundamentals	2	C

GST107	The Study Guide for the Distance Learner	2	C
CIT143	Introduction to Data Organization and Management	2	C
BIO101	General Biology I	2	C
CHM101	Introductory Inorganic Chemistry	2	C
MTH101	Elementary Mathematics I	3	C
MTH103	Elementary Mathematics III	3	C
CIT191	Computer Laboratory I	1	C
PHY101	Elementary Mechanics, Heat and Properties of Matter	2	C
CHM191	Introductory Practical Chemistry I	1	C
PHY191	Introductory Practical Physics I	1	C
BIO191	General Practical Biology I	1	c
	Total Credit Units - Compulsory	**24**	
	Total Credit Units - Elective	**0**	
	Total Credit Units	**24**	

2nd Semester

GST102	Use of English and Communication Skills II	2	C
GST104	Use of Library	2	C
MTH102	Elementary Mathematics II	3	C
CIT108	Introduction to Problem Solving	3	C
CIT104	Introduction to Computer Science	2	C
MTH102	Elementary Mathematics II	2	C
PHY102	Electricity, Magnetism and Modern Physics	3	C
STT102	Introductory Statistics	2	E
	Total Credit Units – Compulsory	**17**	
	Total Credit Units	**19**	

200 Level

Course Code	**Course Title**	**Unit**	**Status**
1st Semester			
GST201	Nigerian Peoples and Cultures	2	C
GST203	Introduction to Philosophy and Logic	2	C
CIT211	Introduction to Operating Systems	3	C
CIT215	Introduction to Programming Languages	3	C

CIT237	Programming & Algorithms	3	C
MTH211	Introduction to Set Theory and Abstract Algebra	3	E
MTH213	Numerical Analysis I	3	E
MTH281	Mathematical Methods I	3	E
	Total Credit Units – Compulsory	**13**	
	Total Credit Units - Elective	**9**	
	Total Credit Units ***N/B: Students are expected to offer at least one elective course per semester.*** **Maximum credit units allowed per semester is 25**	**22**	
2nd Semester			
GST202	Fundamentals of Peace Studies and Conflict Resolution	2	C
GST204	Entrepreneurship and Innovation	2	C
CIT208	Information Systems	2	C
CIT212	Systems Analysis and Design	3	C
CIT236	Analog and Digital Electronics	3	C
CIT292	Computer Laboratory II	2	C
MTH212	Linear Algebra II	3	E
MTH232	Elementary Differential Equations	3	E
MTH282	Mathematical Methods II	3	E
PHY208	Network Analysis and Devices	3	E
	Total Credit Units - Compulsory	**14**	
	Total Credit Units - Elective	**12**	
	Total Credit Units ***N/B: Students are expected to offer at least one elective course per semester.*** **Maximum credit units allowed per semester is 25**	**21**	

300 Level

Course Code	Course Titles	Units	Status
1st Semester			

CIT303	Principles of Communication Technology	3	C
CIT305	Networking and Communication Technology	3	C
CIT309	Computer Architecture	3	C
CIT315	Operating System II	3	C
CIT353	Introduction to Human Computer Interaction	2	C
CIT216	Fundamental of Data Structures	3	E
CIT371	Introduction to Computer Graphics and Animation	3	E
CIT389	Industrial Training/SIWES	6	C
	Total Credit Units - Compulsory		20
	Total Credit Units - Elective		3
	Total Credit Units ***N/B: Students are expected to offer at least one elective course per semester.*** **Maximum credit units allowed per semester is 25**		23

2nd Semester

GST302	Business Creation and Growth	2	C
CIT342	Formal Languages & Automata theory	3	C
CIT344	Introduction to Computer Design	3	C
CIT314	Computer Architecture II	3	C
CIT302	Data Mining and Data Warehousing	3	C
CIT364	Management Information Systems (MIS)	2	C
CIT332	Survey of Programming Languages	3	E
	Total Credit Units - Compulsory	**15**	
	Total Credit Units - Elective	**3**	
	Total Credit Units **Maximum credit units allowed per semester is 25**	**21**	

400 Level

Course	Course Titles	Units	Status

Code			
1st Semester			
CIT403	Seminar on Emerging Technologies	3	C
CIT411	Microcomputers & Microprocessors	2	C
CIT415	Introduction to E-commerce	3	E
CIT427	Database Systems & Management	3	C
CIT423	Computer Networks and Communication	3	C
CIT421	Net-Centric Computing	3	C
CIT463	Introduction to Multimedia Technology	3	C
	Total Credit Units - Compulsory	**16**	
	Total Credit Units - Elective	**5**	
	Total Credit Units ***N/B: Students are expected to offer at least one elective course per semester.*** **Maximum credit units allowed per semester is 25**	**20**	
2nd Semester			
CIT425	Operations Research	3	C
CIT474	Introduction to Expert Systems	2	C
CIT478	Artificial intelligence	2	E
CIT484	Website Design & Programming	3	E
CIT410	Introduction to Cyber-Security	2	E
CIT499	Project	6	C
	Total Credit Units - Compulsory	**16**	
	Total Credit Units - Elective	**3**	
	Total Credit Units **Maximum credit units allowed per semester is 25**	**21**	

3.2 **Course Content Specification:** For graduation with a B.Sc. (Hons.) in Information Technology, the students must have passed all compulsory courses, a minimum of **130** credit units of core courses for an 8-semester structure and **91** credit units of core courses for a 6-semester structure.

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BIO101: GENERAL BIOLOGY I (2 UNITS)

Characteristics of living things; cell as the basic unit of living things, cell structure, organization, cellular organelles, tissues, organs and systems.

Classification of living things, general reproduction and concept of inter-relationships of organism. Heredity and evolution. Elements of ecology (introduction) and habitats.

BIO191 GENERAL BIOLOGY PRACTICAL I (1 UNIT)

What practical work in biology involves. Laboratory organization. Handling common laboratory equipment. Microscopic handling and maintenance. Making microscopic measurements. Procuring animal materials for practicals. Killing, preserving and maintaining animal materials. Procuring plant materials. External features of plants (differences and similarities). Preparation of temporary slides. Preparation of stains and reagents. Techniques for microbial culture and grain staining. Setting up demonstration for physiological processes in plants. Setting up apparatus for demonstrating physiological processes in animals. Preparation required for dissection.

CHM101: INTRODUCTORY INORGANIC CHEMISTRY (2 UNITS)

Hypothesis, theory and law with appropriate illustrations, Nature of matter – 3 states of matter, Atomic structure, electronic energy levels and orbital. Periodic classification of elements and its relationship to their electronic configurations, Chemical bonding, Survey of properties and trends in groups I, II, IV, VI and transition metal,

CHM191: INTRODUCTORY PRACTICAL CHEMISTRY I (1 UNIT)

Practical based of CHM 101 and CHM 103: Cations and anions – identification, Acid-base titrations, Redox reactions and determinations

GST101: USE OF ENGLISH AND COMMUNICATION SKILLS I (2 UNITS)

Listening enabling skills, listening and comprehending comprehension, note taking and information retrieval. Including data, figures, diagrams and charts. Listening for main idea, interpretation and critical evaluation. Effective reading. skimming and scanning. Reading and comprehension at various speed levels. Vocabulary development in various academic contexts. Reading diverse texts in narratives and expository. Reading and comprehension passages with tables, scientific texts. Reading for interpretation and critical evaluation.

GST102: USE OF ENGLISH AND COMMUNICATION SKILLS II (2 UNITS)

Writing paragraphs: Topic sentence and coherence. Development of paragraphs: illustration, Description, cause and effect including definitions. Formal letters;

essential parts and stylistic forms, complaints and requests; jobs, ordering goods, letters to government and other organizations. Writing reports; reporting event, experiments. Writing summaries: techniques of summarizing letters and sounds in English, vowels and consonants. Interviews, seminar presentation, public speech making, articles, concord and sentences including tenses. Gerund, participles, active, passive and the infinitive. Modal auxiliaries.

GST104: USE OF LIBRARY (2 Units)

Identifying sources of Information, concept of library and library services, history of libraries. ICT use in the library, Copyright, Plagiarism and bibliographic Citation & referencing, functions and services of research libraries.

GST103: COMPUTER FUNDAMENTALS

Introduction to Computer, basic concepts, classifications of computers, historical views of computer. Threats to computer system, Computer Hardware and Software. Overview of computer programming languages. Detailed discussion of Computer Applications in various field.

GST107: THE STUDY GUIDE FOR THE DISTANCE LEARNER. (2 UNITS)

Getting started: How to use the book, why read about skills, getting yourself organised ; what is studying all about, reading and note taking; Introduction, reactions to reading, your reading strategy, memory, taking notes, conclusion. Other ways of studying: Introduction, learning in groups, talks and lectures, learning from TV and radio broadcasts, other study media. Working with numbers; Getting to know numbers, describing the world, describing with the tables, describing with diagrams and graphs; What is good writing? The Importance of writing, what does an essay look like, what is a good essay? Conclusion. How to write essays: Introduction, the craft of writing, the advantages of treating essay writing as a craft, making your essay flow, making a convincing case, the experience of writing. Preparing for examination.

MTH101 ELEMENTARY MATHEMATIC I: (3 Units)
(ALGEBRA AND TRIGONOMETRY)

Elementary set theory, subsets, union, intersection, complements, venn diagrams. Real numbers; integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers; algebra of complex numbers; the Argand Diagram. Re Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formalae.

MTH102 ELEMENTARY MATHEMATICS III: (3 UNITS) CALCULUS:

Function of a real variable, graphs, limits and idea of continuity. The derivative as limit of rate of change, Techniques of differentiation, Extreme curve sketching. Integration as an inverse of differentiation, Methods of integration, Definite integrals; Application to areas and volumes

MTH103 ELEMENTARY MATHEMATICS III: (3 Units) PRE-REQUISITE - MTH 101
(VECTORS, GEOMETRY AND DYNAMICS)

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition and Scalar multiplication of vectors and linear independence. The Scalar and vector products of two vectors. Differentiation and integration of vectors with respect to a scalar variable. Two-dimensional co-ordinate geometry. Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normal.

STT102 INTRODUCTORY STATISTICS (2UNITS)

Measures of Central Tendency and dispersion, (grouped and ungrouped); mean: - arithmetic and geometric, harmonic, median, mode quartiles, deciles, modes, relative and absolute dispersion, sample space and events as sets. Finite probability space properties of probability. Statistical independence and conditional probability. Tree diagram. Bayes theorem. Discrete and continuous random variables. Expectation, independent Bernoulli trials. Binomial Poisson and Normal distributions. Normal approximation to binomial and Poisson distribution, Hyper geometric.

PHY101: Elementary Mechanics, Heat and Properties of Matter (3 UNITS)

Space and Time: Physical quantities: Units and dimensions of physical quantities; Kinematics: Uniform velocity motion, uniformly accelerated motion; Dynamics: Newton's laws of motion; Impulse and Linear Momentum, Linear Collision, Newton's universal law of gravitation; Work, energy and power; Conservation laws; Concept of mechanical equilibrium; Centre of mass and centre of gravity; Moment of a force; Rotational kinematics and dynamics: Torque; Moment of Inertia; angular momentum; Total mechanical energy. Simple harmonic motion

Heat and temperature, work and heat, Quantity of heat: heat capacities, latent heat; Thermal expansion of solids, liquids and gases; Gas laws, heat transfer; Laws of thermodynamics: Isothermal and Adiabatic changes, Carnot cycle; Application kinetic theory of gases; van der Waals gas.

Classification of matter into (solids, liquids and gases, forces between atoms and molecules, molecular theory of matter, Elasticity, plasticity, Hook's Law, Young's Shear and bulk Moduli) Crystalline and non-crystalline materials, Hydrostatics: pressure, buoyancy, Archimedes' principle; Hydro-dynamics-streamlines, Bernouli and Continuity equations, turbulence, Reynold's number, Viscosity, laminar flow, Poiseuille's equation; Surface tension, adhesion, cohesion, capillary, drops and bubbles.

PHY102: ELECTRICITY, MAGNETISM AND MODERN PHYSICS (3 UNITS)

Electrostatics: Coulomb's law, Gauss's law, potential and capacitance, dielectrics, production and measurement of static electricity. Current: Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters; D.C. circuits: sources of emf and currents, Kirchhoff's laws; Electrochemistry; The Earth's magnetic field; Magnetic fields and induction, Faraday's and Lenz's laws; Force on a current-carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators. A.C. Theory. Atomic structure; Production and properties of X-rays; Radioactivity; Photoelectric emission.

PHY191: INTRODUCTORY PRACTICAL PHYSICS I (1 UNIT)

Graphs, Measurement, Error Analysis, Determination of Acceleration due to Gravity by Means of Simple Pendulum, Determination of force constant of a spiral spring,

Determination of effective mass of a spiral spring and the constant, Determination of surface tension of water, Determination of specific latent heat of fusion of ice, Determination of the co-efficient of limiting static friction between two surfaces, Determination of the co-efficient of static friction on two surfaces using an inclined plane, Determination of Relative Density of kerosene using the specific Gravity Bottle, Determination of the Relative Density of a Granular substance not soluble in water using the specific gravity bottle.

CIT191 Computer Laboratory I (1 Unit)

The lectures will cover the concepts of Computer Hardware, Networking and Computer Programming. The course aims to assist you in gaining practical understanding of the diverse contexts of Computer Hardware Networking and Computer Programming. This course requires you to gain some practical experience on how to configure a computer network and also write simple computer programs.

CIT 104: Introduction to Computer science (2 units)

What is Computer, Types of Computer, History of Digital Computer, Element of a Computer : Hardware and Software. How to work with a computer. Operating System Windows Files word processing, copying a text, saving, Changes to a document and Formatting, spelling checker and introduction to Printing a document. Spread sheet, Entering and correcting data. Using Formula, Numeric Formats Creating Charts. Types of Charts Power Points and presentation. Networking, Internet and E-mail. Reading and responding to an E-mail message.

CIT108: Introduction to Problem Solving (3 Units)

Problem solving strategies, Role of algorithm in problem solving process, implementations strategies, concepts and properties of algorithm.

CIT211: Introduction to Operating System (3 units)

Definition of an operating system; Types of operating systems; and real time (single-user/multi-user), timesharing; Examples of operating systems; DOS, CP/M, UNIT/ZENITH,/LINUX, MS/9798/2000, etc. Components of an operating system; Supervisor, memory manager, I/O handlers, file system, etc. Operating system interface with the hardware; interrupts, i/o channel, multiplexer, registers, status words. Operating system interface with other systems software; linkers, translators, libraries, etc. storage organization and protection.

CIT215: Introduction to Programming(3 units)

FORTRAN programming language; Comparison of various versions of the language. Programming exercises using FORTRAN with emphasis on scientific application problems. Elements of Pascal language. Exercises in Pascal Programme structures and programming concepts; Structured design principles; abstraction, modularity, stepwise refinement, structured design techniques teaching of a structured programming language, e.g. PASCAL/JAVA, C^{++}.

CIT 237: Programming and Algorithms(3 units)

The programme development process, programme design, coding, and testing principles of good programming styles; Programme verification techniques; Programme documentations and maintenance; Programme design tools, e.g. flowcharts, pseudocodes, etc. Illustration of the various concepts with practical programming problems of manageable complexity e.g. Knight's tour or 8-queens, life game problems, etc. Algorithms and data structures; Divide-and-conquer algorithms; Stacks, queues, trees. A treatment of popular sorting and searching algorithms; performance analysis of algorithms. Worst-, best- and average-case performance of the algorithms. Recursion, Hill-climbing techniques.

MTH 211: Introduction to Set theory and Abstract Algebra (3 units)

Set: Binary operations, mapping, equivalence relations integers: Fundamental theorem of arithmetic, congruence equations, Euler's function (n) Group Theory: Definition and examples of groups. Subgroups, coset decomposition, Lagrange's theorem. Cyclic groups. Homomorphism, isomorphism. Odd and even permutations, Cayley's theorem. Rings: Definition and examples of rings. Commutative rings. Integral domain. Order, well-ordering principles. Mathematical induction.

MTH213: NUMERICAL ANALYSIS I (3UNITS) PRE-REQUISITE - MTH 102

Interpolation: Lagrange's and Hermite interpolation formulae, divided differences and difference schemes. Interpolation formulas by use of divided differences. Approximation: Least-square polynomial approximation, Chebychev polynomials continued fraction and rational fraction orthogonal polynomials.

Numerical Integration: Newton's-cotes formulae, Gaussian Quadrature. Solution of Equations: Graffe's method (iterative method) Matrices and Related Topics: Definitions, Eigenvalue and Eigenvectors, Algebraic Eigenvalue problems-power method, Jacobi method.

Systems of linear Equations: Gauss elimination, Gauss-Jordan method. Jacobi iterative method, Gauss-field iterative method.

CIT216: Fundamentals of Data Structures: (3 Units)

Primitive types, Arrays, Records Strings and String processing, Data representation in memory, Stack and Heap allocation, Queues, TREES. Implementation Strategies for stack, queues, trees. Run time Storage management; Pointers and References, linked structures.

GST202: Fundamentals of Peace Studies and Conflict Resolution (2 Units)

Basic Concepts in peace studies and conflict resolution, peace as a vehicle of unity and development, Conflict issues, Types of conflicts, e.g. Ethnic/religious/political/economic conflicts, Root causes of conflicts and violence in Africa, Indigene/settler phenomenon, Peace – building, Management of conflict and security. Elements of peace studies and conflict resolution, Developing a culture of

peace, Peace mediation and peace-keeping, Alternative Dispute Resolution (ADR), Dialogue/arbitration in conflict resolution, Role of international organizations in conflict resolution, e.g. ECOWAS, African Union, United Nations, etc.

GST204: Entrepreneurship and Innovation I (2 Units)

Development Entrepreneurship/Intrapreneurship: An Overview of the Definitions of Entrepreneurship and Intrapreneurship; Concepts and Theories of Entrepreneurship The Entrepreneurship Culture; Brief Biographical Studies of Prominent Nigerian Entrepreneurs; Barrier to Entrepreneurial Practice. The Nigerian Entrepreneurial Environment: The Business External Environment; Identifying Business Opportunities and Threats; Strategies for exploring opportunities in the Environment; Approaches to addressing environmental barriers. Creativity and Intellectual Rights: Intellectual Properties and its Dimensions; Copyright Laws in Nigeria; Strategies for Protection of Intellectual Property (original ideas, concepts, products, etc.). Technological Entrepreneurship: The Interface between Technology Development and Entrepreneurship; Technological Development and Entrepreneurial Opportunities; Technological Environment and Business; New Technology and Entrepreneurship Opportunities. Management and Innovation: The Concept, Nature and Types of Innovation; Innovation Theory of Entrepreneurship; Financing Innovation and New Ventures; Change Management; Technical Change and Management of Innovation.

Family Business and Succession Planning: The Concept of Family Business Contents; The Cultural Contexts of Family Business; Roles and Relationship in Family Business; Ownership Transfer and Succession in Family Business. Women Entrepreneurship: The Concept of Women Entrepreneurship; Role orientation and Women Entrepreneurial Aspirations; Contributions of Women to National Socio-Economic and Human Development; Barriers to Women Entrepreneurial Practice.

Social Entrepreneurship: The Concept of Social Entrepreneurship; Social Entrepreneurship and Value Creation; The Roles of Non-governmental Organizations in Social Entrepreneurship; Social Entrepreneurship and Funding Opportunities; Social Entrepreneurship Enhancement Factors. Business Opportunity Evaluation: Sources of Business Opportunities in Nigeria; The difference between Ideas and Opportunities; Scanning Business Opportunities in Nigeria; Environment and New Venture Idea Generation.

GST201: Nigerian Peoples and Culture (2 Units)

Study of Nigerian history, culture and arts in pre-colonial times, Nigerian's perception of his world, Culture areas of Nigeria and their characteristics, Evolution of Nigeria as a political unit, Indigene/settler phenomenon, Concepts of trade, Economics of self-reliance, Social justice, Individual and national development, Norms and values, Negative attributes and conducts (cultism and related vices), Re-orientation of moral and national values, Moral obligations of citizens, Environmental problems.

GST203: Introduction to Philosophy and Logic (2 Units)

An Overview of Philosophy: Definition and Scope of Philosophy; Methods of Philosophy; Branches of Philosophy; Philosophy and other Disciplines Contents; The Usefulness of Philosophy; Sources of Knowledge and Criteria for Knowing. History and Development of Philosophy: The Ancient Age of Philosophy; Medieval and Renaissance Age of Philosophy; Modern Period of Philosophy; Philosophical

Movements in The Contemporary Period; The Idea of African Philosophy. Logic: Definition and Scope of Logic; Logic's Vocabulary I; Logic's Vocabulary II; Valid, Invalid, Deductive and Inductive Arguments; Language and Its Functions. Fallacies and Definitions: Fallacies (Part One); Fallacies (Part Two); Definitions (Part One); Definitions (Part Two); Categorical Propositions Contents. Argument Forms and Law of Thought: Argument Forms; Laws of Thought.

MTH 281: Mathematical Methods I (3 units)

Sequences and Series: Limits, continuity, Differentiability, implicit functions, sequences. Series, test for convergence sequences and series of functions. Calculus: partial differentiation, total derivatives, implicitly functions, change of variables. Taylor's theorem and maxima and minima functions, of two variables. Langrangian multiplier. Numerical Methods: Introduction to iterative methods, Newton's method applied to finding roots. Trapezium and Sipsons rules of integration.

CIT 208: Information systems(2 units)

Introduction & Basic SQL Project Introduction. Advanced SQL. Conceptual Modelling and Schema Design. Database Programming,JDBC, Regular Expressions. Functional Dependencies E2: Functional Dependency&Relational Algebra. Relational Algebra. Introduction to XML. XML and XQuery. Web Services. Transactions. Recovery. Database Heterogeneity.

CIT212: Systems Analysis& Design (3 units)

General systems concepts: Systems project team organisation; Overview of systems development process; Project identification and selection; system requirements analysis and feasibility study; fact finding techniques; Systems design; Analysis techniques and tools e.g. Jackson System Development (JSD) techniques etc. Data flow diagrams, HIPO charts. Business system design; procurement, site preparation, system installation, system testing, system conversions; system project, report writing, and presentation; system documentation; post installation evaluation; compilation of a real-life system analysis team project to provideexperience in applying the principles and techniques presented above

CIT 236: Analog and Digital Electronics (3units)

Biploar Junction Transistors: Common Emitter biasin, load lines; Small signal Amplifiers: Transistor Hybrid parameters, Analysis of a single stage transistor amplifier small signal operation, Field Effect Transistors, Introduction to feedback, Operational Amplifiers, DC power supplies, Voltage regulators, Heat sinks, Boolean Algebra, Logic gates, Karnaugh Maps

CIT 292: Computer Laboratory II (2 units)

Basic logic Operations. Combinational logic, Karnaugh maps, Simple latch and clocked flip flop, J-k flip-flops, Binary addition, Synchronous counters, up and down counters.

MTH 212: Linear Algebra II (3 units)

Vector spaces. Linear independence. Basis, change of basis and dimension. Linear equations and matrices. Linear maps. The diagonal, permutation, triangular matrices. Elementary matrix. The inverse of a matrix. Rank and nullity. Determinants. Adjoint, cofactors, inverse matrix. Determinantial rank. Crammer's rule. Canonical forms, similar matrices, Eigen values and vectors, quadratic forms.

MTH 232: Elementary Differential Equation (3 units)

Introduction, equation of first order and first degree, separable equations, homogeneous equations, exact equations, linear equations, Bernoulli's and Riccati equations. Applications to mechanics and electricity. Orthogonal and oblique trajectories. Second order equations with constant coefficients.

MTH 282: Mathematical Methods II (3 units)

Vector Theory: Vector and scalar field functions. Grad, div, curl, directional derivatives. Orthogonal curvilinear coordinates.

Complex Numbers: The algebra and geometry of complex numbers; d'Moivre's theorem. Elementary transcendental functions. The n^{th} root of unity and of a general complex number.

PHY 208: NETWORK ANALYSIS AND DEVICES (2 UNITS)
PREREQUISITE:PHY102

Circuit analysis: circuit elements, Kirchhoff's laws, complex impedances, current-voltage source transformations, circuit theorems; ac and dc circuits: resonant circuits, impedance matching, theory of passive filters, attenuators; Electron devices: vacuum tubes, semiconductor materials, p-n junction diodes, transistors.

CIT303: Principles of Communication Technology(3 units)

Drives and Sensors: Functionality, calculation, and operational behavior of motors; Functionality and choice of sensors; Drive design and regulation;Decentralized drive systems. Communication and Networks: Functionality and integration of automation components (bus systems, automation devices, communication modules, process control systems);Networked automation technology; Service and monitoring systems, Human Machine Interface; Planning and the basic principles of project planning with *Profinet* / industrial Ethernet-based networks. Safety Engineering in Automation Technology: Project planning for an error-proof automation system; Error-proof communication and programming; Remote diagnostics, elimination of errors, and remote maintenance. Automated

Systems: Integral development methodology in automation; Economic development (planning, budgeting); Application examples.

GST302: Entrepreneurship Studies II (Business Creation and Growth) (2 Units)

Concept of Business and New Value Creation: Business Planning Process; Start-up Decision – What Motivate people to begin new businesses; Opportunity Search and Identification; Legal Issues at Start-up; & Feasibility Analysis of New Ventures and New Venture Financing. Theories of Growth: An Overview: Concepts and Reasons of Growth; Challenges of Growth; Strategies for Growth (External Growth Strategies Franchising, Buy-In and Buy-Out); Mergers and Acquisition; Sources of Funds: Internal Sources and External Sources; Formal and Informal Sources; Efficiency in the use of Resources. Marketing: Concept of Marketing: Small and Big Business Marketing; Marketing Mix; Modern Marketing Tools. Ethics and Social Responsibility: The Importance of Ethics in Business; Ethical Behaviour and Practices in Nigeria; Community Development Projects/Walfare. New Opportunities for Expansion: E-Commerce; E-Business; E-Trade. Managing Transition: From Start up to Growth: Personal Disciplines; Learning; Decision Making; Control.

CIT 305: Networking and Communication Technology (3 units)

Introduction; Constructing data links, Deploying physical media; Practical network protocols; Capitalizing on Ethernet; Harnessing Wi-Fi for user mobility; Building internetworks using TCP/IP and routers; Utilizing telecommunication circuits; Implementing security best practices; Creating enterprise networks; Planning and selection. Protocols, technologies, standards, and applications of datacommunications and computer networks for both LANs and WANs. Foundation and background of Advanced WAN and LAN classes. Signal transmission analysis, modulation concepts, modems, multiplexers, digital technologies, transmission impairments, and various transmission media will be extensively discussed. Network protocols based on the OSI Reference Model, TCP/IP protocol suite, and IEEE 802 standards. Network technologies: ISDN, DSL, SONET, packet switching networks, LAN technologies, Internet and TCP/IP, and ATM

CIT315 Operating Systems II (3 Units)

Concurrency: States & State diagrams Structures, Dispatching and Context Switching; interrupts; Concurrent execution; Mutual exclusion problem and some solutions Deadlock; Models and mechanisms (Semaphones, monitors etc.) Producer – Consumer Problems & Synchronization. Multiprocessor issues. Scheduling &Despatching Memory Management: Overlays, Swapping and Partitions, Paging & Segmentations Placement & replacement policies, working sets and Trashing, Caching

CIT 309: Computer Architecture (3 units)

Introduction, basic computer organization; Instruction formats, instruction sets and their design; ALU design: Adders, subtracters, logic operations; Boolean Algebra; Karnaugh Maps; Datapath design; Control design: Hardwired control, microprogrammed control; More on arithmetic: Multiplication, division, floating point arithmetic; RISC machines; Pipelining; Memory systems and error detection and error correction coding; Caches; Memory; I/O and Storage; Multiple Issue; Dynamic Scheduling; Data-Level Parallelism and Vectors; Shared-Memory; Multiprocessors; Multithreading

CIT 371: Introduction to Computer Graphics & Animations (3 units)

Mathematics of 3-Ds and projections; graphical data structures; characteristics, and types of display memories; graphics hardware including digital plotters and display devices; graphics, software;

CIT302: Data Mining and Data Warehousing (3 units)

Data Mining; Definition relationship to warehousing Classification of data mining approaches to data mining problems application of data mining , commercial tools of data mining, knowledge discovery, Architecture of Data warehousing Data marts, Data warehousing lifecycle, data modelling Building of data warehouse, OLAP, MOLAP, ROLAP Data warehouse and views. Future open issue for data warehouse.

CIT332: Survey of Programming Languages (3 Units)

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 Grammars), Language Semantics (Informal semantics, Overview of formal semantics, Denotation semantics, Axiomatic semantics, Operational semantics); Declarations 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 abstraction mechanisms, Parameterization mechanisms (reference vs. value), Activation records and storage management, Type parameters and parameterized types, Modules in programming languages; Object oriented language paradigm; Functional and logic language paradigms.

CIT 342: Formal Languages and Automata Theory (3 units)

Introduction to language structures; languages and their representations; Grammars; formal notations, types, Chomsky's language hierarchy; sentence generation and recognition; derivations; Ambiguity and syntax and finite state automata; context-free grammars; simplification of context-free grammars; Chomsky, Greibach Normal Forms Push-Down automata, LR(K), grammars, Recursive languages; semantics. Lab. exercises.

CIT 344: Introduction to Computer Design(3 units)

Introduction tonumbers and codes. Combinational logic design and applications: adders, decoders, multiplexers, etc. Sequential logic design and applications: registers, flip-flops, etc., and general finite state machines. Memory devices: read-only memory (ROM), random access memory (RAM). Introduction to microprocessors: arithmetic logic unit (ALU), basic CPU architecture, addressing modes and program execution. Assembly language programming: programs for simple tasks; branching, loops, and subroutines.

CIT 389: Industrial Training (6 units)

Required 6 months of Industrial Training Students experiences will be documented and presented in a Seminar and submitted as a Tutor Marked Assignment. An example of a report is a report of a case study of a Cyber Cafe.

CIT353: Introduction to Human Computer Interaction (2 Units)

Survey of human-computer interaction concepts, theories and practice. Basic components of human-computer interaction. Interdisciplinary underpinnings. Informed and critical evaluation of computer-based technology. User-oriented perspective rather than system-oriented, with two thrusts: human (cognitive, social) and technological (input/output, interaction styles devices). Design guidelines, evaluation methods participatory design, communication between users and system developers. Topics include: System interaction design

patterns, User Interface Design Criteria and User Interface Design and Programming tools, Multimedia and HCI.

CIT364 Management Information Systems (2 units)

Introduction to MIS, Types of MIS, Levels of Management, Overview of Information Technology, Technologies for Information System, Internets, Modes of Information Communication, Information Representation-, Information Storage Media, Information Security.

CIT314: Computer Architecture and Organization II (3 Units)

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. Hardware control, micro programmed control, Asynchronous control, i/c control. Introduction to the methodology of faulty tolerant computing.

CIT 403: Emerging Technologies (3 units)

Learners are to carry out researches and write Term papers on the Current/Emerging technologies in Information and Communication Technology

CIT411: Microcomputers and Microprocessors (2 units)

Review of basic concepts in digital electronic; Microprocessors; functions, operations and architecture; comparison of current microprocessors; multi-chip and single chip; i/o organization; assembler language; comparison of instruction sets; address modes, stack operation; subroutines. i/o data transfer; bus control; daisy chaining, handshaking etc; Interrupt structures; programmed transfer, DMA microcomputer systems; types of microprocessors; uses of microprocessors, microcomputer design for specific applications; microcomputer networking; interfacing microcomputer real-time control; laboratory exercises using an assembly language

CIT 415: Introduction to E-Commerce (3 units)

Introduction of basic concepts and definitions; Techniques and methodologies for for developing and managing Web-sites for e-Commerce. Topics include: Introducing pre-requisite skills, understanding Electronic business and electronic commerce, Techniques and methodology for site development, Developing and enhancing a Product Catalogue, Managing a Shopping Cart, Processing orders, Completing the Purchasing process and Tracking Shoppers Information.

CIT427: Database Systems & Management (3 units)

Basic concept of data bases, history of DBMS types of database, specific problems of data independence, data reliability, integrity, etc, data, data management, data base generation, raw data, data definitions, data structure,

storage structure data base logical and physical organization, interrogation, data model, network, hierarchical relational, security, policies, privacy quality and integrity protection mechanism.

CIT 463: Introduction to Multimedia Technology(3 units)

Introduction: What is multimedia, Multimedia systems, Quality of service, Synchronization & orchestration, Standards, Convergence, Value chain. Hardware: Multimedia computers, Video and graphics, Audio, Telephone, video conference, and networks, CD and DVD, USB and FireWire, Processors, Video for Windows, DirectX, and ActiveMovie. Software: Browser based software architecture, Distributed software, Servers, Network, Terminals. Audio and Video: Digital audio; Psycho acoustics, Digital presentation of sound, Digital images, JPEG, Video signal, Camera sensors, Colors, Color television, Equipment, Compression systems, Basics of video compression, Methods, Algorithms. Interchange Formats: Application areas, Requirements, Track and object model, Real-time transfer, Different transfer formats, Comparison. Authoring Tools: Production process, Tools, Barriers, Development areas. Communications: QoS, ATM, QoS implementations, Integrated Services, Differentiated Services. Multicast: Group control, Routing, Real-time transfer and control protocols, Resource reservation, Session control, MBone. Video Conference: Standards, Products, Internet telephony, CTI (Computer Telephony Integration). Access Networks: Cable television, Digital subscriber lines, UMTS, Digital television.

CIT 425: Operations Research (3 units)

Simple theories of queues, stochastic processes and random numbers, definition and uses of simulation; discrete simulation models, design of simulation experiments; simulation langs, detailed study of a chosen simulation language; applications; Lab. exercises. The nature of operation research; allocation problems; inventory problems; Replacement; maintenance and reliability problems. Dynamic programming; sequencing and co-ordination.

CIT421: Net-Centric Computing (3 Units)

Distributed Computing, Mobile & Wireless computing, Network Security; Client/Server Computing (using the web), Building Web Applications.

Introduction to Parallel Systems. Parallel Programming Models. Message Passing Programming. Dependence Analysis, Open MP Programming, Evaluation of Programs, Optimizations for Scalar Architectures and Models for Parallel Computing. Distributed systems: Characterization of Distributed systems, system models, distributed objects and remote method invocation. Component-based development: using UML for component-based design. Distributed transactions: introduction, flat & nested distributed transactions, concurrency. Service-oriented architectures: characteristics of SOAs, Hadoop and Spark. Mobile and cloud computing: Technologies for Wireless Communication. Wireless Cellular Systems. Overview of Wireless LANs, IEEE 802.11, Personal Area Network, Bluetooth. High-Speed Wireless Networks; HiperLan. Wireless Application Protocols: Mobile IP, WAP,

SMS, Bluetooth. Frameworks for mobile application development (e.g Ionic, React Native, Xamarin, Adobe PhoneGap, J2ME). Cloud computing: introduction to cloud computing, technologies, infrastructure, and architecture. Cloud computing development models (public, private, community and hybrid cloud), service models (SaaS, PaaS, IaaS).

CIT474: Introduction to Expert Systems (2 units)

Study of different classes of expert systems, e.g. Rule Based: MYCIN or PROSPECTOR, Blackboard; HEARSAY or CRYSLIS, Expert System shells e.g. Rule Based: e.g. P-MYCIN, EXPERT. S.I. Frame Based e.g. KEE, KL-ONE Merit and Demerits of natural language interface for expert systems. Extensive independent study of recent development in the field and the submission of a group proposal for the application of Expert System in different areas.

CIT478: Artificial Intelligence (2 units)

Basic AI issues attention, Search, Control, Game trees, knowledge representation, Application of AI techniques in natural language, scene analysis, expert systems, KBCS robot planning. Lab. exercises in AI lang. e.g., LISP/Prolog.

CIT410 Introduction to Cyber-Security

Cyber Security Fundamentals: Cyber Security Fundamentals, Benefits, Cyber space and Cyber-Law; Cyber Crimes Classification and Types of Cyber Crimes; Scope of Cybercrimes. Cyber Threat Management: Firewalls; Virtual Private Networks (VPN); Security Control Management; Hardware and Software Prevention. Computer Forensics and Digital Investigation: Computer Forensics; Network, Disk, Malware and Database Forensics; Email, Memory and Mobile Forensics; Malware Analysis. Introduction to Cyber Law and Ethics: Concept of Cyber Law; The INDIA cyber-Acts; The International Laws; Cyber Ethics.

CIT484: Website Design & Programming (2 units)

What is HTML; Basic Tags of HTML; HTML Tag TITLE Tag Body Tag Formatting of Text, Headers, Formatting Tags, Pre-Tag FONT TAG Special Characters Working with Images META Tag; Links: Anchor Tag, Lists; unordered lists ordered lists, definition lists, tables : TABLE, TR and TD Tags Cell spacing and cell padding colspan and Rowspan Frames: Frameset frame Tag, NOFRAMES Tag Forms: FORM and INPUT Tag,; Text Box Radio Button, checkbox. Select tag and pull down. Lists hidden submit and Reset. Some special Tags: COLGROUP, THREAD, TBODY, TFOOT, blank self, parent top, IFRAME LABEL TEXTAREA. INTRODUCTION TO Java Script: Java script variables and data types. Statement and operators, control structures object based programming message box in JavaScript, Javascript with HTML forms

CIT499: Project (6 units)

Individual or Group projects of approved topics related to the current research interests in the department.

CIT435: Statistical Database System (2 units)

Fundamentals of Database Systems: Databases and Database Users, Database System Concepts and Architecture, Data Modelling Using the Entity-RelationshipModel.The Statistical database system, Statistical Database Concepts, Statistical Data Analysis, Mining and Decision Tree Computer Security and Statistical DatabasesApplication of Statistical Database System SPEA SMART Airport Statistical Data ManagementSystem (SMART STAT)

CIT423: Computer Networks/Communications (Units) (L 30: P 45)

Introduction, wares, 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 analynchronous). Bus structures and loop systems, computer network Examples and design consideration, data switching principles broadcast techniques, network structure for packet switching, protocols, description of network e.g. ARPANET, etc.