

400 LEVEL  
FIRST SEMESTER CURRICULUM

Course Code	Course Title	U	L	T	P
CSC 403	Object-Oriented Programming	3	1	-	2
CSC 405	Formal Methods & Software Development	3	2	-	1
CSC 407	Database System	3	1	-	2
CSC 443	Artificial Intelligence	3	2	-	1
CSC 447	Organization of Programming Language	3	2	-	1
CSC 491	Seminar I	1	1	-	-
	Electives	4	4	-	-
	Total	20	15	-	5

Electives

Course Code	Course Title	U	L	T	P
CSC 431	Logic Programming	2	1	-	1
CSC 435	Special Topics in Computer Science	2	-	-	2
CSC 437	Information and Communication Theory	2	2	-	-
CSC 439	Computer System Performance Evaluation	3	2	-	1
CSC 433	Computer Graphics	3	2	-	1
CSC 441	Queuing System	3	2	-	1
CSC 445	Special Topics in Software Engineering	3	2	-	1

400 LEVEL  
SECOND SEMESTER CURRICULUM

Course Code	Course Title	U	L	T	P
CSC 440	Human-Computer Interaction	2	2	-	-
CSC 442	Network Programming	3	2	-	1
CSC 444	Net-Centric Computing	3	2	-	1
CSC 446	Computer Networks & Data Communication	3	2	1	-
CSC 448	Entrepreneur for Computer Science	2	1	-	1
CSC 492	Seminar II	1	1	-	-
CSC 499	Project	4	-	-	4
	Electives	4	-	-	-
	Total	22	10	1	7

Electives

Course code	Course Title	U	L	T	P
CSC 412	Modeling and Simulation	3	2	-	1
CSC 416	Computer Security & Cryptography	2	2	-	-
CSC 418	Distributed Computing Systems	3	2	-	1
CSC 420	Statistical Computing & Data Mining	2	1	-	1
CSC 438	Project management	3	2	1	-
ELE 503	Digital Signal Processing	3	2	1	-

### **CSC 403: OBJECT-ORIENTED PROGRAMMING (3 Units)**

Basic OOP concepts: classes, objects, inheritance, polymorphism, data abstraction, tools for developing, compiling interpreting, and debugging, java programs, java syntax and data objects, operators. Central flow constructs, objects and classes programming, arrays, methods. Exceptions, applets and the abstract, OLE, persistence, window toolkit, laboratory exercises in an OOP language. **Pre-requisite: CSC 203 or 204**

### **CSC 405: FORMAL METHODS AND SOFTWARE DEVELOPMENT (3 Units)**

Topics from process improvement, Software re-engineering configuration management, formal specification, formal verification and validation, Software cost-estimation, Software architecture, Software patterns, Software re-use and open-source development. **Pre-requisite: CSC 311**

### **CSC 407: DATABASE SYSTEMS (3 Units)**

DBMS architecture and administration, centralized and client-server approaches, system catalog, and data dictionary, transaction management; concepts, characteristics, and processing, recovery techniques, concurrency control techniques: serializability, deadlock, locking schemes, time-stamp ordering, multi-version, and optimistic techniques, DB security, distributed databases, distributed DBMS, data fragmentation and replication, distributed transactions management, object-oriented databases, introducing to new emerging DB technologies and applications; Web DBs, multimedia DBs, data warehousing and data Mining.

Characteristics and advantages of the database management systems (DBMS), database concepts and architecture; data models, database schemes and instances, DBMS and the concept of program-data independence, database languages and interfaces, database models, relational data model and relational algebra, relational model constraints; domains, keys, and integrity constraints, the structured query language (SQL); data definition, queries, update, statements, and views in SQL, database design; functional dependencies, normal forms. Introduction to OO databases. Information storage and retrieval, information management applications, information capture and representation, analysis and indexing, search, retrieval, information privacy; integrity, security, scalability, efficiency and effectiveness.

### **CSC 443: ARTIFICIAL INTELLIGENCE (3 Units)**

Introduction to Artificial Intelligence, Understanding natural languages, Knowledge representation, Expert systems, Pattern recognition, The Language LISP, Machine Learning, Artificial Neural Network, Genetic Algorithm, Fuzzy Set Theory and Fuzzy Logic.

### **CSC 447: ORGANIZATION OF PROGRAMMING LANGUAGE (3 Units)**

Language definition structure, Data types and structures, Review of basic data types, including list and trees, control structure and data flow, Runtime consideration, interpretative languages, lexical analyses and parsing, evaluation of programming languages.

### **CSC 491 SEMINAR I (1 unit)**

Presentation of topics related to final year project.



**CSC 431: LOGIC PROGRAMMING (2 Units)**

Introduction to functional programming language, first order logic: terms, predicate, clauses, relations and algorithm. Robinson's substitution, property of substitution, occur problem. K-Clark theory, SLD, resolution (Selection rule-driven, Linear resolution for Definite clauses), property of SLD, infinite SLD tree, rules of Close World Assumption (CWA). Application programming with emphasis on PROLOG.

**CSC 435: SPECIAL TOPICS IN COMPUTER SCIENCE (2 Units)**

In depth study of selected topics will be taught in a seminar format. Research methods; choosing and evaluating references; collecting data; analyzing data; critical evaluation of research; report writing skills; presentation skills. Selected topics would be given to the students at the commencement of the semester.

**CSC 437: INFORMATION AND COMMUNICATION THEORY (2 Units)**

Historical background of information theory, the entropy function and its properties, joint and conditional entropy, discrete memory-less channels, models for communication systems, classification of channels, channel capacity, decoding schemes, the fundamental theorem and its weak converse, finite state channels, continuous channels, entry in the continuous case

**CSC 439: COMPUTER SYSTEM PERFORMANCE EVALUATION (3 Units)**

Measurement techniques, Simulation techniques, Techniques, Work load characterization, Performance evaluation in selection problems, Performance evaluation in design problems, Evaluation of program performance.

**CSC 441: QUEUING SYSTEMS (3 Units)**

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

**CSC 445 Special Topics in Software Engineering (3 Units)**

Topics from process improvement; software re-engineering configuration management; Formal specification, software cost – estimation, Software Architecture, Software patterns, Software Reuse and Open source development.

**CSC 440 Human-Computer Interaction (2 Units)**

Introduction to the field of Human-Computer Interaction (HCI) and an overview of software architectures used in modern graphical user interfaces. A variety of analysis and design methods are introduced (e.g. GOMS, heuristic evaluation, User-Centred Design and contextual design techniques). Interface implementation with the Java Swing toolkit. Evaluations of user interfaces according to usability and accessibility standards will be covered. Quality of design, user-centered approach to interface development is emphasized. Relevant of HCI is also central to recent technological developments such as hypertext, multimedia, virtual reality and the web. Psychological aspects of the individual user, universal design principles, and User Centered Design (UCD) models. Interactive system development lifecycle and its requirements, major themes and recent trends in HCI, interaction design models, participatory design, Information Architecture (IA), adaptive interfaces, measuring the User Experience (UX), social computing and online communities, mobile computing and issues surrounding the design for smaller screens, ubiquitous computing, Computer Mediated Communication (CMC) and Computer Supported Cooperative Work (CSCW).



**CSC 442: NETWORK PROGRAMMING (3 Units)**

Client server model and software design program interface to protocols. File Descriptor, Socket Descriptor, Datagram Socket, Data Encapsulation, System Burst (bind, connect, listen, accept, send/to, send/from). Remote call procedures, port addressing protocols. Implementing client-server using IP, TCP and UDP protocols. Distributed program generation

**CSC 444: NET-CENTRIC COMPUTING (2 Units)**

Advanced and modern concepts and technologies used in the development of electronic business applications. Component development and reuse, distributed object technologies, multi-tier applications, client-side versus server-side technologies, service-oriented architectures, enterprise application integration, data transformation, role of open-source technologies, and finally e-business application installation and deployment issues. Principles of distributed computing, the Internet as a huge computer system, distributed computing models: client-server model, multiple-server model, mobile agents model, and computer networks, TCP applications, IP layer applications, socket management, inter-process communication, UNIX case study, distributed object oriented architectures; design issues, applications in client-server computing, introduction to distributed file systems, name servers, mobile computing, modern trends in distributed computing.

**CSC 446: COMPUTER NETWORKS & DATA COMMUNICATION (3 Units)**

Introduction, waves, Fourier analysis, measurement of communication, channel characteristics, Transmission media, noise and distortion, modulation and demodulation, multiplexing, TDM FDM and FCM parallel and serial transmission (synchronous VS anal synchronous). Basic concepts of inter-active computing, un-interactive terminal devices protocol, direct links, communication channels, telecommunication links, simplex, duplex and hard duplex, multiplexer, concentration. Computer network structures and loop systems, computer network examples and design consideration, data switching principle broadcast techniques, network structure for packet switching, protocol, description of networks e.g. ARPANET, etc. Network Operating system for online processing scheduling algorithm, response time, reliability and security.

**CSC 448: ENTREPRENEUR FOR COMPUTER SCIENCE (2 UNITS)**

Meaning of Technopreneur. Classifications of entrepreneurs in IT. Characteristics of Information Technology Entrepreneur. Small, medium and Large IT Entrepreneur. Characteristics of entrepreneurship in IT and rewards. Management challenges in IT business. IT Business outlook in Nigeria. Comparative analysis of IT business between Third World Countries and Developed Countries. New ideas and opportunities identification, Competitive strategy for Technopreneurs, Intellectual property consideration. Value-based selling. Business plan design.

**CSC 412: MODELLING AND SIMULATION (3 Units)**

Foundations of model-based information systems management, basic concepts and techniques of simulation modeling, simulation as decision-support tool and a problem-solving approach. Emphasis will be on discrete-event simulation model development methodologies and implementation techniques. The concepts and techniques used in modeling and simulation, simulation methodology and suitable simulation language Modeling generation of random variables, transformation of random numbers; parameter estimation, design of experiment; factorial design, optimization. Distribution theory model and simulation. Kendal notation, Little's Law, Stochastic Processes, Queues and special types of queues, Discrete state and continuous state processes, Markov Processes, Poisson Processes.



## **CSC 416: COMPUTER SECURITY AND CRYPTOGRAPHY (2 Units)**

Fundamentals of computer and network security, systems and protocols for providing security services, access control, secure mail, internet protocol security, secured http, web security. Counter measures: cryptography (public and private key encryption), intrusion detection, firewalls, access control, counter cyber-terrorism. Number system, encryption, decryption, private and public key, divisibility and Euclidean algorithms, arithmetic of congruence and large prime numbers, hash function, RSA, DSA, Rabin, El-Gamal, Secure Socket layer algorithms. Security fundamentals, policies, procedures, and mechanisms. Identification, authentication models, access control models. Data models, concepts and mechanisms for software, hardware, operating system and database security. Basic cryptography (symmetric and asymmetric) and its applications. Security in computer networks and distributed systems. Attacks types and how to prevent them. Prevention and control of viruses and other rogue programs. In addition, the basics of physical security, incidence response, disaster recovery, business continuity, and forensics.

## **CSC 418: DISTRIBUTED COMPUTING SYSTEM (3 Units)**

Introduction, definition, motivation, communication mechanisms, distributed transactions, Naming, generic schemes, DNS, naming and localization, Replication and coherence, Consistency models and protocols, fault tolerance, Group protocols, RPC, RMI, Stream oriented communication, synchronization, global state, election, distributed mutual exclusion, communication, two and three phase commit, check pointing, security, access control, key management, cryptography, distributed file system NFS, coda e.t.c.

## **CSC 420: STATISTICAL COMPUTING & DATA MINING (2 Units)**

This course offers an introduction to data mining concepts and techniques. The goal is for the students to have a solid foundation in data mining that allows them to apply data mining techniques to real-world problems and to conduct research and development in new data mining methods. Topics include data mining concepts and techniques, data preparation, data mining algorithms and methods including association analysis, classification, cluster analysis, Online Analytical Processing (OLAP) and dimensionality modeling as well as emerging applications and trends in data mining. Students should be introduced to some software packages e.g R, WEKA, RapidMiner etc.

## **CSC 438: PROJECT MANAGEMENT (3 Units)**

Team Management, Project Scheduling, Software measurement and estimation techniques, Risk analysis, Software quality assurance, Software Configuration Management, Project Management tools

## **CSC 492: SEMINAR II (1 unit)**

Presentation of implementation and results' analysis of the final year project

## **CSC 499 PROJECT (4 Units)**

### **INDEPENDENT RESEARCH WORK IN COMPUTER SCIENCE**

Independent research work in Computer Science. Students will give a seminar presentation from introduction to implementation stage of their research work. Final bound report should be submitted at least two weeks before the final semester examination.