



UNIVERSITY OF ILORIN, ILORIN, NIGERIA

DEPARTMENT OF COMPUTER SCIENCE,

**FACULTY OF COMMUNICATION AND
INFORMATION SCIENCES**

HANDBOOK FOR

**BACHELOR OF SCIENCE (COMPUTER SCIENCE)
UNDERGRADUATE PROGRAMME**

February, 2019



NATIONAL ANTHEM

Arise O Compatriots
Nigeria's call obey
To serve Our Father Land
With love and strength and faith,
The Labour of our Heroes past,
Shall never be in vain
To serve with Hearths and Might
One nation bound in freedom,
Peace and Unity.

THE UNILORIN ANTHEM

(The Alma Mater)

Music by Lavinia L. Odejimi

Words by: Lavinia L. Odejimi and Abraham T. J. Adavi

In Love, peace and harmony,
We shall build the tower of wisdom;
Unilorin! Hear the clarion call,
In Unity we grow
Committed to the seat of our learnings,
Our hearts from vanities.
Standing firm in wisdom, in knowledge and in truth,
We honour your virtues;
Unilorin, you stand in strength and pride,
Learning, winning, building, praying,
Showing the way for all who yearn;
Making a future for the ones who follow,
Rising high we must never turn.
Unilorin, Unilorin, your torch has guided us
Upwards and onwards,
Unilorin, Unilorin our Alma Mater,
We sing!



COURSE CONTENTS

100 Level Courses

HARMATTAN SEMESTER				RAIN SEMESTER			
COURSE CODE	COURSE TITLE	CR	STATUS	COURSE CODE	COURSE TITLE	CR	STATUS
CSC 111	Introduction to Computer Science I	2	C	CSC 112	Introduction to Computer Science II	2	C
GNS 111	Use of English I	2	R	CSC 114	Computer Appreciation I	2	E
ICS 101	Information Communication and Society	2	R	GNS 112	Use of English II	2	R
MAT 111	Elementary Set Theory and Numbers	3	R	ICS 106	Information literacy for the digital age	2	R
MAT 113	Elementary Vectors Geometry and Mechanics	3	R	MAT 112	Elementary Differential and Integral Calculus	3	R
PHY 115	Mechanics and Properties of Matter I	2	R	MAT 114	Elementary Algebra and Trigonometry	3	R
PHY 101	Practical Physics I	1	R	PHY 102	Electricity and Magnetism I	3	R
PBL 101	Cell Biology	3	R	PHY 102	Practical Physics II	1	R
STA 121	Introduction to Probability	2	R	STA 124	Introduction to Probability Distribution	2	R
STA 131	Introduction to Statistical Inference	2	R	TCS 112	Telecommunication and Networks I	2	R
TCS 111	Introduction to Telecommunication	2	R				
Total No. of Credits for C and R Courses	24						
				Total No. of Credits for C and R Courses		20	

Note: There are three categories of courses to be registered and taken by the students:

1. C- Compulsory
2. R- Required
3. E- Elective

Handbook for Bachelor of Science (Computer Science Programme)



200 Level Courses

HARMATTAN SEMESTER				RAIN SEMESTER					
COURSE CODE	COURSE TITLE	CR	STATUS	COURSE CODE	COURSE TITLE	CR	STATUS		
CSC 231	Computer Programming I (Structured Programming)	2	C	CSC 212	Computer Programming II	3	C		
CSC 233	Object Oriented Programming	2	C	CSC 214	Introduction to File Processing	2	C		
CSC 217	Computer Programming I (Fortran)	2	E	CSC 226	Computer Appreciation III	2	E		
CSC 219	Computer Appreciation II	2	E	CSC 228	Tools for Scientific Computing	2	E		
CSC 227	Intro. To Computer Science (For Management Science)	2	E	CSC 216	Assembly Language	2	C		
CSC 229	Numerical Computer I	2	E	CSC 218	Computer Programming III (Scientific)	3	E		
MAT 201	Mathematical Methods I	3	R	CSC 230	Computer Architecture I	3	C		
MAT 211	Elementary Differential Equation	3	R	CSC 222	Database Design and Management I	3	C		
MAT 213	Linear Algebra I	2	R	CSC 224	Internet Technology I	2	C		
STA 203	Statistics for Physical Science and Engineering I	2	R	GNS 212	Introduction to Social Science, Art and Education	2	R		
STA 221	Probability Distribution I	3	R	MAT 206	Linear Algebra II	2	R		
GNS 211	Philosophy, Logic and Nigerian Culture	2	R	MAT 208	Real Analysis I	2	E		
MAC 251	Basic Statistics for Communication and Information Sciences	2	R	STA 222	Probability Distribution II	3	E		
Total No. of Credits for C and R Courses		21		PHY 252	Electricity and Magnetism II	2	R		
				GSE 202	Introduction to Entrepreneurship Skills (Theory)	2	R		
				Total No. of Credits for C and R	23				

NOTE

Elective courses are optional for Computer Science Students at this level.

Handbook for Bachelor of Science (Computer Science Programme)

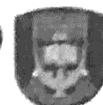


300 Level Courses

HARMATTAN SEMESTER				RAIN SEMESTER			
COURSE CODE	COURSE TITLE	CR	STATUS	COURSE CODE	COURSE TITLE	CR	STATUS
CSC321	Introduction to Digital Design and Microprocessors	3	C	CSC340	Industrial Attachment	6	C
CSC325	System programming	2	C	GNS312	Digital Skill Acquisition	1	R
CSC333	Operating System	3	C	CSC334	Theory of Computation	2	E
CSC317	Data Structure & Algorithms	3	C	CSC336	Operations Research	2	E
CSC319	Internet Technology II	2	E	CSC338	Computer System Performance evaluation	2	E
CSC311	Automata Theory, Computability and Formal Language	2	C				
CSC337	Numerical Computation II	2	E				
CSC327	Logic Programming	2	C				
CSC329	Functional Programming	2	E				
CSC331	Academic Writing	1	C				
PHY357	Electronics I	2	E				
GSE301	Graduate Self Employment	2	R				
GNS311	History and Philosophy of Science	2	R				
TCS205	Multimedia Networking	3	E				
MAT309	Discrete Mathematics	3	E				
MAT318	Mathematical Methods II	3	E				
Total No. of Credits for C and R Courses		20				Total No. of Credits for C and R Courses	
						7	

NOTE

Elective courses are optional for Computer Science Students at this level.



400 Level Courses

HARMATTAN SEMESTER				RAIN SEMESTER			
COURSE CODE	COURSE TITLE	CR	STATUS	COURSE CODE	COURSE TITLE	CR	STATUS
CSC 421	Algoithm Design and Analysis	3	C	CSC 420	Software Engineering	3	C
CSC 423	Programming Verification and Development	2	C	CSC 422	Data Communication & Information Theory	2	C
CSC 425	Data Mining and Data Warehousing	2	C	CSC 426	Parallel Computing	2	C
CSC 427	Computer Networking	2	C	CSC 428	Distributed Computing	2	E
CSC 429	Human Computer Interaction	2	C	CSC 430	Fuzzy Logic and Fuzzy Control System	2	E
CSC 431	Seminar	2	C	CSC 432	Modeling & Simulation	2	E
CSC 433	Neural Networks	2	E	CSC 434	Expert Systems	2	E
CSC 445	Introduction to Cryptography	2	E				
CSC 447	Image Processing	2	E	CSC 436	Computer Installation Management	2	E
CSC 441	Database design and Management II	2	E	CSC 438	Visual Programming Languages	2	C
CSC 443	Bio-Informatics	2	E	CSC 444	Queueing System	2	E
TCS 301	Wireless System	2	E	CSC 442	Cybernetics	2	E
TCS 305	Telecommunication System Lab	2	E	CSC 446	Computer Graphics	2	C
TCS 311	Networking Certification I	2	E	CSC 448	Artificial Intelligence	2	C
TCS 411	Wireless Telecommunication Networking	3	E	CSC 450	Organisation of Programming Languages	2	C
MAT 425	Numerical Analysis II	3	E	CSC 452	Mobile and Cloud Computing	2	C
CSC 499	Project	6	C	CSC 454	Compiler Construction	3	C
Total No. of Credits for C and R Courses		19		TCS 312	Networking Certification II	2	E
				Total No. of Credits for C and R Courses		20	

NOTE

Minimum of 4 credit units of elective courses must be taken before graduation. The Computer Science students are encouraged to pass one Professional Examination before graduation. They are also advised to present the Certificate of such Examination to the Department for official record. Such Professional Certificates could be in Oracle, CISCO, JAVA, MSCE, etc.



DETAILS OF UNDERGRADUATE COURSES

100 Level

CSC 111 Introduction to Computer Science I 2 Credits

Overview of the discipline of Computer Science; Historical development of computer systems (Analogue and Digital Computers); Characteristics of a digital computer. Basic components (Such as the Control Unit, Registers and their types, ALU, Memory, I/O systems, the system bus); Number System; Data Representation schemes; Boolean Algebra; Karnaugh Map; Basic Logic Gates and some simple Combinatorial Logic circuits.
15h (T), 45h (P); C.

CSC 112 Introduction to Computer Science II 2 Credits

Problem solving techniques. Algorithm: pseudo-code and flowcharting. Programming languages: types and orientations. Language translation: Compiler and Interpreter. BASIC programming language: constants, variables, arithmetic & logical expression. Control statements: selection and iterative, jump elementary data structure, list and tables, functions and subroutines.

15h (T), 45h (P); C.

CSC 114 Computer Appreciation I 2 Credits

Operating Systems: Windows and DOS. Application packages: Document (MS-Word) Processing, Spreadsheets (MS-Excel) and Presentations (MS- PowerPoint).

15h (T), 45h (P); E (For students other than Computer Science students)



200 Level

CSC 231 Computer Programming I 2 Credits
History and Fundamentals of C. Standard Inputs/Outputs. Control structures. Composite Data Types: Enumeration, Array, Structure, Union, String and Pointer. Function and Macros: graphs library, interrupt, Preprocessing directives, File Processing. Exception handling: C and Database, Assembly language code in C.

15h (T), 45h (P); C

CSC 212 Computer Programming II 3 Credits
History and Fundamentals of C++. C versus C++. Standard Inputs/Outputs. Insertion and Extraction Operators. Control structures: Array, Structure and Union, String and Pointer. Overloading operators. Object Oriented Design Technique. Class and Object: Class and Composition. Data Member and Member Functions. Aggregation and inheritance: friendship, Polymorphism; Class Iterators.

30h (T), 45h (P); C

CSC 233 Object Oriented Programming (Using Java) 2 Credits

Basic concepts of OOP: Data Abstraction, Data Hiding and Encapsulation, Inheritance and Polymorphism. Class, Object and Methods. Relationship between Classes and Class Hierarchy. Abstract Class. Class Libraries. Object Oriented Design Approach/Object Modeling. Identification of Class: Class Attributes and Methods in Problem Statements.

15h (T), 45h (P); C

CSC 214 Introduction to File Processing 2 Credits

Introduction to Data Management Files. Job Control language application. Input/Output system Architecture. Logical file



Organizations. Mapping logical organization onto Physical Storage. Backup procedure and file recovery. Data management facilities.

30h(T); C

CSC 216 Assembly Language

2 Credits

Data representation. CPU and Memory Organization. Simple instructions: Branching with JMP and JR (relative jump). Loops in assembly. Subroutines in assembly. Interfacing with C and C++, and processing arrays in Assembly Language. Low level bit manipulation. Intel math chip and floating-point operations.

15h (T), 45h (P); C

CSC 217 Computer Programming I

2 Credits

History of FORTRAN programming language. Elements of FORTRAN: constants, variables and arithmetic expression. Statements: Control structure: sequential, selective, iterative and jump. Linear and multi-dimensional arrays. Subroutines with files. Writing program in FORTRAN: finding roots of an equation, computing area under a curve, matrix multiplication, solving simple system of linear equations.

15h(T), 45h (P); E. Pr: CSC 112 (For Sciences and Engineering)

CSC 218 Computer Programming II

3 Credits

Derived types: Pointers, dynamic structure, recursion and object-oriented concepts. Abstraction, encapsulation and information hiding. Inheritance and polymorphism and their implementation in FORTRAN.

30h(T); 45h (P); E. Pr: CSC 217 (For Sciences and Engineering)

CSC 219 Computer Appreciation II

2 Credits

Basic concepts of networks. Internet and World Wide Web (www). TCP/IP Internet Services: E-Mail, Fax Messages, Voice



Mail, Websites, Video Conferencing, Intranet, Extranet, Internet Service Provider, HTML and Internet Security.

15h (T), 45h (P); E

CSC 230 Computer Architecture 3 Credits

Introduction to Computer Architecture. The Von Neumann Machine, System bus, Instructions and Registers. Data Representation: Revision of Number Systems, Unsigned and Signed representation - two's Complement, Floating Point Numbers. Addition Implementation (Ripple Carry Adder). Instruction Format. Revision of Basic Logic Devices. CISC and RISC architectures. Memory System: general characteristics of memory operation, Technology- magnetic recording, semiconductor memory, charge couple devices and Magnetic bubble. Memory addressing. Memory hierarchy. Virtual Memory control systems. Optical memory devices. Hardware control: Micro programmed control, Asynchronous control and I/O controls. Introduction to methodology of fault-tolerant computing.

30h (T), 45h (P); C

CSC 222 Database Design and Management 3 Credits

File management systems, Database and Database Management System, Data models: network, hierarchical and relational models, Entity-relationship model. Database design: functional dependencies, decomposition, normalization. Query languages: SQL, Relational algebra and calculus. Query processing and optimization. Study of some Standard database System i.e. Access and Oracle. MYSQL, SQL SERVER Elements of transact-query: Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL).

30h (T), 45h (P); C



CSC 224 Internet Technology I **2 Credits**
History of XML, HTML, DHTML. Scripting language and E-commerce. Basics of XHTML, CSS, Java Scripts, and Dynamic HTML. Brief discussion of 'wysiwyg' (HTML editors including Macromedia Dreamweavers).

15h (T), 45h (P); C

CSC 226 Computer Appreciation III **2 Credits**
Introduction to Database Management. Relational data model. MS access. Query Languages. SQL, Query by Example. Microsoft Publisher. Statistical Packages.

15h (T), 45h (P); E

CSC 227 Introduction to Computer Science for Management and Social Sciences **2 Credits**

Data and information. Basic component of a computer. Classification of computers. Range and scope of computer applications. Social and economic implications of the use of computers. (Not for Computer Science students)

30h (T); R

CSC 228 Tools for Scientific Computing **2 Credits**

Introduction to Scientific computing. Applications of computing for fundamental science investigation. Epistemological advances of computational sciences. Evolution of scientific computing applications for modeling and simulation. Role of human-machine interactions in scientific investigation. Scientific computing and the transformation of information to knowledge. Scientific computing in pattern recognition and forensic science, scientific data analysis. MATLAB: Introduction to MATLAB as a tool for scientific computing, MATLAB optimization toolbox, curve fitting toolbox, partial differential equation toolbox and statistics toolbox.

15h (T), 45h (P); E



CSC 229 Numerical Computation I 2 Credits

Number systems and Errors. Number representation, floating point arithmetic, loss of significance and Error propagation. Interpolation by polynomial. Difference table.

Numerical differentiation and Integration. Solving system of equation, matrix and vector norms, matrix decomposition. Gaussian elimination approach and iterative scheme, Eigen value computation. Curve fitting, (least square rational function approximations.

30h (T); E

300 Level

CSC 311 Automata Theory, Computability and Formal Language 2 Credits

Alphabets and languages. Finite and non-finite automata. Regular expressions. Grammar and their classification. Parsing, pushdown automata. Kleene's theorem. Pumping theorem and Minsky's theorem. Turing machines. Chomsky hierarch. Complexity theory.

30h (T); C. Pr: CSC 231 or CSC 212

CSC 333 Operating Systems 3 Credits

Introduction: History and types, overview of hardware fundamentals. Concepts: processes, thread and deadlock, memory management, virtual memory, I/O and File Systems. Shell Programs. Systems calls. Processes and Threads: Process states, implementation, Thread-User-level, thread packages. Inter-process communication: Mutual Exclusion, Critical Regions, Semaphores, Monitors. Scheduling, Deadlocks, Memory Management: Multiprogramming, Swapping, Virtual memory, Paging, Segmentation. I/O: Device Controllers, Direct Memory Access, Interrupt Handlers, Device Drivers, Disks, Clocks. GUIs.



Power Managements. File Systems, Security and Protection Issues.

45h (T); C

CSC 317 Data Structure and Algorithm 3 Credits
Basic Data types and their associated operations. Composite Data type: array, record, string and their implementations, string matching algorithms. Definition of Abstract data types (ADT). Concept, implementation and application of stack, queue, list, tree, set, bags, dictionary, hash table and hashing. Graphs and some graph algorithms. 339

30h (T), 45h (P); C. Pr: CSC 231 or 212 or 233

CSC 319 Internet Technology II 2 Credits
Website Design: Practices and pitfalls. Overview of web/client servers. Server-side technologies including PHP. Usability issues in designing web pages.
15h (T), 45h (P); E. Pr: CSC 224

**CSC 321 Introduction to Digital Design and Microprocessors
3 Credits**

Number Systems and Arithmetic: Base Conversions, Codes, BCD, Gray, ASCII and parity. Boolean Algebra: logic equation minimization and circuit implementation. DE-Morgan's Theorem. Basic logic gates: Sum of Product and Product of Sum. Karnaugh Map and circuit simplification. Multiplexers, De-Multiplexers, encoders and decoders. Basic SR Flip-flops.

30h (T), 45h (P); C

CSC 337 Numerical Computation II 2 Credits
Numerical solution of Ordinary Differential Equation: Initial Value Boundary problem (Taylors series, Euler Runger-Kult and multi-step approaches) and Boundary Value problem (shooting methods and finite difference approaches). Introduction to



Numerical solution of Partial Differential Equation (ellipse periodic and hyperbolic types).

30h (T); E. Pr: CSC 229

CSC 325 System Programming

2 Credits

Basic function of an Assembler. Features of an Assemblers: instruction format, addressing modes, program relocation, literal, symbol defining statements, control section and program linking. Study of some standard assembler (i.e MASM assembler). Loader and Linker: their functions, features and design. Some standard linkers in market, Macro processors.

15h (T), 45h (P); C. Pr: CSC 216

CSC 327 Logic Programming

2 Credits

Prolog language concepts and programming. Data object, matching, list representation and list operators, arithmetic expression, backtracking and its control. Input/output and some other built-in procedure. Horn clause logic and foundation.

15h (T), 45h (P); C. Pr: CSC 231

CSC 329 Functional Programming

2 Credits

Introduction to programming paradigms. Functional programming languages. Expression, functions, higher order functions recursion, list, reduction model, strictness, type systems, program synthesis and transformation.

15h (T), 45h (P); E. Pr: CSC 231

CSC 331 Academic writing

1 Credit

Understudying Academic writing, choosing research topic, statement of problem, research gap, literature review, referencing style (in-text citation and listing i.e. APA, IEEE).

15h (T); C



CSC 340 Industrial Attachment

6 Credits

Exposure of students to practical application and use of computer in solving problems within the work environment. Student should submit and defend report after completion of the industrial attachment.

540h (P); C

CSC 334 Theory of Computation

2 Credits

Decidability, decidable languages, halting problem, reducibility, recursion theorem, complexity theory and Lambda calculus. Applications to string matching, parsing and problem solving.

30h (T); E. Pr: CSC 321

CSC 336 Operations Research

2 Credits

Linear programming. Sensitivity analysis and duality. Simplex method. Transportation. Assignment. Inventory, replacement and maintenance problems. Network model. Integer and dynamic programming. Markov chain and game theory.

30h (T); E

CSC 338 Computer System Performance Evaluation

2

Credits

Measurement techniques, Simulation techniques and Analytical techniques. Work-load characterization. Performance evaluation in selection problems. Performance evaluation in design problem. Evaluation of program performance.

30h (T); E



400 Level

CSC 420 Software Engineering 3 Credits

Software and software engineering, Software life cycle, Process models, Project planning, Project scheduling and tracking, requirement analysis. Software design principles, implementation, integration, testing, maintenance, quality assurance and software metric. CASE tools, UML, Object oriented paradigm, object-oriented analysis, design and programming. Software management. Formal methods - Z and Raise specification languages etc.

30h (T), 45h (P); C

CSC 421 Algorithm Design & Analysis 3 Credits

Analysis of algorithms (time and storage requirements), worst, average, best cases analysis, amortization and potential methods. Various techniques for algorithms design. Divide and Conquer, greedy method, dynamic programming, recursion, basic space–searching techniques and use of invariant. NP-hard and NP-complete problems. Cook’s theorem. Back tracking, pattern matching and string/text algorithm. Numerical approximation algorithm

30h (T), 45h (P); C. Pr: CSC 317

CSC 422 Data Communication and Information Theory 2 Credits

Introduction. Waves, Fourier analysis and measure of communication. Channel characteristics, transmission media, noise and distortion, modulation and demodulations. Multiplexing: TDM, FDM and FCM. Parallel and serial transmission (synchronous vs. Asynchronous). Bus structures and loop systems. Error detection and correction. Communication protocols. Element of Information theory.

15h (T), 45h (P); C



CSC 423 Programming Verification and Development 2 Credits

Simultaneous development and verification of correct programs. Program state, state predicate and program specification. Establishing program correctness, axioms/deduction rules for proofs of program correctness, predicate transformer, formal logic and program semantics. Actual examples of program development.

30h (T); C; Pr: CSC 311

CSC 425 Data Mining and Data Warehousing 2 Credits

Definitions of Data warehouse and Data mining. Application areas, pit-falls in data mining. Data warehouse architectures. Dimensional modeling. Multidimensional aggregation queries and view materialization. Data mining algorithms: association rule, classification and prediction, clustering, scalable algorithms and flexible predictive modeling. Web mining. Text and data clustering. Automated recommender systems and pattern discovery algorithms.

30h (T); C.

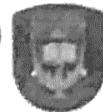
CSC 426 Parallel Computing 2 Credits

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.

15h (T), 45h (P); C. Pr: CSC 317

CSC 427 Computer Networking 2 Credits

Definition of Data communication/Network, OSI Model. LAN technologies: security and applications. LAN Topology and Media: media-access methods, protocols (Ethernet, token rings, FDDI, ATM) and transmission methods. LAN devices: WLAN technologies, WAN technologies, switching methods. WAN



devices. Introduction to internetworking, overview of Internetworking devices, Internetworking design models and routing.

30h (T); C. Pr: CSC 231

CSC 428 Distributed Computing

2 Credits

Characterization of Distributed systems, system models, distributed objects and remote method invocation. Component-based development: using UML for component-based design. JavaBeans and Enterprise Java Beans case study. Distributed transactions: introduction, flat & nested distributed transactions, concurrency. Service-oriented architectures: characteristics of SOAs, introduction to web services, J2EE based web services study.

15h (T), 45h (P); E

CSC 429 Human Computer Interaction

2 Credits

HCI Paradigms. History and definition of concepts. Usability Principles. User-centered design. Task/Data and requirement analysis. Goms cognitive model and other key HCI methods. Prototyping and Evaluation.

30h (T); C.

CSC 430 Fuzzy Logic and Fuzzy Control System

2 Credits

Classical Sets and Fuzzy sets. Classical relations. Membership Functions. Fuzzy arithmetic; Numbers, Vectors and the Extension principle. Classical Logic and Fuzzy Logic, Fuzzy ruled based Systems, Fuzzy Classification and Fuzzy Control Systems.

15h(T), 45h (P); E. Pr: MAT 201, 211, 213

CSC 431 Seminar

2 Credits

Student is expected to give seminar on some selected topics (of industrial value).



30h (T); C

CSC 432 Modeling and Simulation

2 Credits

Modeling (basic concept and techniques). Simulation methodology and simulation language. Random number and its generation. Monte-Carlo simulation. Simulation languages and process. Parameter estimation design of experiment. Factorial design optimization. Statistical distribution functions. Examples of simulation queuing and inventory systems.

15h(T), 45h (P); E. Pr: CSC 317

CSC 433 Neural Networks

2 Credits

Basic Architectures of Neural Networks and Neural Computing. Central Nervous System. Anatomy and Physiology of the brain- Sensation, perception and cognition, Learning and Memory. Information Content of Neural signals. Spike Generation Processes. Stochastically in Neural Codes. Principal components analysis, Neural Operators that encode, analyze and represent image structure. Face recognition. Invariants and object representation.

15h(T), 45h (P); E.

CSC 434 Expert Systems

2 Credits

Meaning of Expert System. Basic concept for building Expert system and architectures of expert systems. Constructing of Expert systems. Tools for building Expert system. Evaluation of expert systems. Languages and tools. Knowledge engineering. Study of some expert systems (like MYCIN, HEARSAY, HORSES).

15h (T), 45h (P); E. Pr: CSC 327

CSC 436 Computer Installation Management

2 Credits

Role of computer unit in organizations. Computer hardware installation. Computer software installation. Configuration



management, computer security management and computer performance management.

15h (T), 45h (P); E

CSC 438 Visual Programming

2 Credits

Introduction to VB, VB IDE, VB Forms (SDI and MDI). Intrinsic Controls (textbox, Command Button, Label, Checkbox, etc and their property Setting). Coding: Identifier, Variable, Constant and Operators. User Defined Procedures and Functions. Event Procedures, string and control structures. Array and control array. ActiveX Control. Class. VB advance programming. Windows API. File Processing. OLE. VB and Database. Data Control and Data Bound Control.

15h (T), 45h (P); C

CSC 441 Database Design and Management II

2 Credits

Overview of Query languages: SQL, query by example, relational algebra, relational calculus. Query processing and optimization. Elements of transact-query: Data Definition language (DDL), Data Manipulation Language (DML), Data Control language (DCL) and data types. Working with tables and views, querying multiple tables, optimizing access to data using indexes, enforcing data integrity and User Defined Functions (UDF). (Using SQL Server, MySQL or Oracle).

15h (T); 30h (P); E. PR: CSC 222.

CSC 442 Cybernetics

2 Credits

Systems theory. Control Systems: structures and properties and feedback control loop. Control objectives: specifications in time, frequency and complex domain, reference tracking and steady-state error. Control Systems properties (stability, gain and phase management, etc) and analysis. Basic Controllers PID (lead, lag and alike). Root locus and frequency loop-shaping. Limits of control software for control design. Digital signal processing.



Image as signal, Image formation & Processing. Data transfer media. Distributed Systems.

15h (T), 45h (P); E

CSC 443 Bioinformatics

2 Credits

Algorithms on strings, Sequences, Pattern matching, Text processing, Genetic engineering, Pattern Discovery, Bio computing, sequence alignment, BLAST, FASTA, Structural alignment, Multiple alignment. Computational phylogenetics. Tree building and Tree evaluation. Sequence analysis: Restriction sites, finding genes, Predicting Protein structure. Micro arrays. Whole genome analysis. Computing with DNA Dynamic Programming, HMM, Bayesian Statistics.

15h (T), 45h (P); E

CSC 444 Queuing System

2 Credits

Introduction. Birth-Death queuing systems. Markovian queues. The queue M/GL. Bounds. Inequalities and approximations.

30h (T); E

CSC 445 Introduction to cryptography

2 Credits

History and overview of cryptography. Basic symmetric-key encryption: stream ciphers, block ciphers using DES, 3DES and AES. Pseudo random permutation. Pseudo random functions. Message integrity: definition and application, collision and resistant hashing, authenticated encryption. Public key cryptography. Arithmetic modulo primes. Cryptography using arithmetic modulo primes. Public key encryption. Arithmetic modulo composites. Digital signatures: definition and application, signature schemes, password-based key exchange, identification protocols. Practical applications of cryptography using any programming language.

30h (T); E



CSC 446 Computer Graphics

2 Credits

Computer Graphics application areas. Hardware support: input, storage and output devices (including graphic plotter, light pen etc). Geometry generation: line, conics, polygon and character generation etc. Transformation and magnification: scaling, translation, rotation. Viewing (projections and their types). Windowing and clipping. Representing courses and surfaces: parametric curves, cubic and B-Splines etc. Hidden surfaces. Painter's algorithm. Object hierarchy and PHIGS: solid modeling, Achromatic and colored light, illumination and shading. Raster graphic architecture.

15h (T), 45h (P); C

CSC 447 Image Processing

2 Credits

Introduction to Digital Language. Data types. Characteristics of grey-level digital language. Discrete sampling model. Quantization. Noise processes and image attributes. Segmentation (threshold and thresholding algorithm performance evaluation and ROC analysis, connected components labeling). Region growing and region adjacency graph (RAG). Split and merge algorithm image transformation: gray level transformation, histogram, equalization, geometric transformation, affix transformation etc. Morphological operation: image filtering (fourier description, linear & non-linear filtering operations, image convolution, separable convolution sub-sampling and interpolation as convolution operation). E-feature characterization, e-edge & corves detection.

15h (T), 45h (P); E

CSC 448 Artificial Intelligence

2 Credits

Definition of Artificial Intelligence (AI). Nature and goals of AI. Application areas. Characteristics of AI problems. Basic problem-solving techniques: State-space searching and Game playing techniques. Knowledge representation using first-order logic:



Proposition, Predicate, Interface rules, Clausal forms, resolution and unification. Knowledge representation using Logic. Handling uncertainty. Intelligence Agents. Prolog Language. Planning, Machine learning, Nature and goals of Neural computing. Perception. The Hopfield Model, Self Organizing Nets. Natural Language understanding.

15h (T), 45h (P); C

CSC 450 Organization of Programming Language 2 Credits

Language definition structure. Data types and structures. Review of basic types, including lists and tree. Control structures and flow. Run-time consideration, interpretative languages, lexical analysis and parsing.

15h (T); 45h (P); C. Pr: CSC 231 or CSC 212

CSC 452 Mobile and Cloud Computing 2 Credits

Introduction and History. Technologies for Wireless Communication. Data in Wireless Cellular Systems. Data in Wireless LAN. Wireless LANs, IEEE 802.11, Personal Area Network, Bluetooth. High-Speed Wireless Networks; HiperLan. Wireless Application Protocols: Mobile IP, WAP, SMS, Bluetooth. Wireless Markup Language (WML): J2ME, wireless toolkit (MIDlets, MDIP, CLDC etc.) Mobile Applications. Ad-Hoc Networks.

15h (T), 45h (P); C. Pr: CSC 233

CSC 454 Compiler Construction 3 Credits

Introduction. Basic concepts (Grammars, classes of grammars, context-free grammars) and data structures. Lexical Analysis: Tokens, regular expressions, Finite Automata. Lexical analyzer generators. Predictive Parsing: recursive descent, LL(1) and grammar parsing. FIRST and FOLLOW sets. Error handling. LR Parsing (LR grammars and error recovery). Syntax-Directed Translation: Semantic actions, abstract parse trees, visitors,



symbol tables, type-checking. Run-time Storage: Activation records, stack frames, parameter passing, frames in MiniJava. Intermediate Forms: IR trees, translation to trees, declarations, The MIPS R2000 architecture and instruction set. SPIM Code Generation Part I: Target machine, canonical trees, blocks and traces, instruction selection, tree tiling, maximal munch. Code Generation Part II.

30h (T), 45h (P); C

CSC 499 Project

6 Credits

Each student under the guidance of an approved supervisor is required to conduct research in an area approved by the Department, culminating in the submission of a project.

270h (P); C

SUMMARY

100 LEVEL

Compulsory Courses:

CSC 111 (2), CSC 112 (2)

= 4 Credits

Required Courses:

GNS 111(2), ICS 101(2), MAT 111(3), MAT 113(3), PHY 115(2)
PHY 191(1), PBL 101(3), STA 121(2), STA 131(2), TCS 101(2)
GNS 112(2), ICS 102(2), MAT 112(3), MAT 114(3), PHY 152(3)
PHY 192(1), STA 124(2), TCS 102(2) **= 40 Credits**

Elective Courses:

CSC 114(2)

= 2 Credits

Handbook for Bachelor of Science (Computer Science Programme)



(Optional for Computer Science students)

Total = 44 Credits

200 LEVEL

Compulsory Courses:

CSC 231(2), CSC 233(2), CSC 212(3), CSC 214(2), CSC 216(2),
CSC 230(3), CSC 222(3), CSC 224(2) = **19 Credits**

Required Courses:

MAT 201(3), MAT 211(3), MAT 213(2), STA 203(2), STA 221(3),
GNS 211(2), MAC 251(2), GNS 212(2), MAT 206(2), PHY
252(2), GSE 202(2) = **25 Credits**

Elective Courses:

CSC 217(2), CSC 219(2), CSC 227(2), CSC 229(2), CSC 226(2),
CSC 228(2), CSC 218(3), MAT 208(2), STA 222(3)
= **20 Credits**

(Optional for Computer Science students)

For Direct Entry Students only: GNS 111 (2), GNS 112 (2)
= **4 Credits**

Total = 44 Credits for UTME Students

48 Credits for DE Students



300 LEVEL

Compulsory Courses:

CSC 321(3), CSC 325(2), CSC 333(3), CSC 317(3), CSC 311(2),
CSC 327(2), CSC 331(1), CSC 340(6) = 22 Credits

Required Courses:

GNS 311(2), GNS 312(1), GSE 301 (2) = 5 Credits

Electives Courses:

CSC 319(2), CSC 323(2), CSC 329(2), PHY 357(2), TCS 205(3),
MAT 309(3), MAT 318(3), CSC 334(2), CSC 336(2), CSC 338(2)
= 23 Credits

(Optional for Computer Science students)

Total = 27 Credits

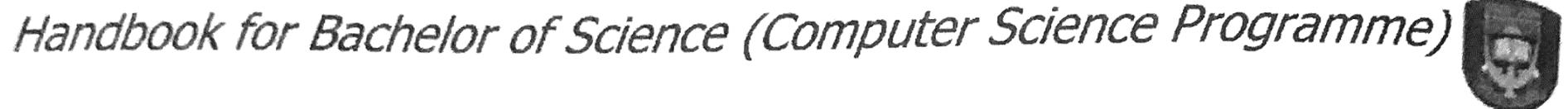
400 LEVEL

Compulsory Courses:

CSC 421(3), CSC 423(2), CSC 425(2), CSC 427(2), CSC 429(2),
CSC 431(2), CSC 420(3), CSC 422(2), CSC 426(2), CSC 438(2),
CSC 446(2), CSC 448(2), CSC 450(2), CSC 452(2), CSC 454(3),
CSC 499(6) = 39 Credits

Elective Courses:

CSC 433(2), CSC 445(2), CSC 447(2), CSC 441(2), CSC 443(2),
TCS 301(2), TCS 305(2), TCS 311(2), TCS 411(3), MAT 425(3),



Handbook for Bachelor of Science (Computer Science Programme)

CSC 428(2), CSC 430(2), CSC 432(2), CSC 434(2), CSC 436(2),
CSC 444(2), CSC 442(2), TCS 312(2) = **38 Credits**

(Optional for Computer Science students)

Total = 41 Credits

Note: The Minimum number of credits load per semester is **15** while the Maximum number is **24**.