DEPARTMENT OF COMPUTER SCIENCE

Modibbo Adama University, Yola

FACULTY OF PHYSICAL SCIENCES

DEPARTMENTAL STUDENT'S HANDBOOK

2023 – 2024

MESSAGE: FROM THE VICE CHANCELLOR

I welcome you to the Modibbo Adama University, Yola (MAU Yola), formerly the Federal University of Technology, Yola. I congratulate you for selecting MAU Yola. In doing so, you have become part of a tradition of excellence that places MAU Yola in the spotlight locally, regionally, nationally, and internationally.

In fact, since its establishment in 1981, MAU Yola has continued to grow as a centre for teaching and research in Pure and Applied Sciences, Agriculture, Engineering, Management and Information Technology and related disciplines. Modibbo Adama University, Yola, prides itself in providing a calm university environment rich in experience and has continued attracting many applicants within Nigeria and neighbouring countries who annually seek admission into its academic programmes. You are, therefore, privileged to be selected to study in this young but potentially great university.

SIGNED

Prof. Abdullahi Liman Tukur
B.Sc. (Kano), M.Sc. (Maid.), Ph.D. (Jos)

MESSAGE: FROM THE DEAN, FACULTY OF PHYSICAL SCIENCES (FPS)

You are welcome to the Department of Computer Science. It is one of the departments in the Faculty of Physical Sciences. I am proud of the giant strides made by the Department of Computer Science in how the Department conducts its affairs on a new orientation and along progressive lines, while powering the University technologically to remain relevant at the cutting edge of research, learning and excellence.

The Departmental handbook is an important source of information for those desiring to know more about the Department of Computer Science and its programmes. I am pleased to note that the leadership of the Computer Science Department has shared its philosophy with me and has activities engaged in a systematic production of this handbook. The effort of the Department in this regard is timely. I, therefore, call upon all students to be hard working, disciplined and to abide by the rules and regulations of the University.

SIGNED

Professor Yusuf Dabari Mamman
B.Sc (Unimaid), M.Sc (ATBU), Ph.D (ATBU),

MESSAGE: FROM THE HEAD OF DEPARTMENT (HOD)

You are welcome to the Department of Computer Science. A Department in the Faculty of Physical Sciences that is home to some of the most cherished Alumni, who are intuitive, innovative and committed to powering businesses and economy, defence and security, communication, and research across multinational companies such as Total Nig., Huawei, Ericson, as well as research institutions such as Modibbo Adama University Yola, Abubakar Tafawa Balewa University (ATBU) Bauchi, Federal University Lokoja, University of Ilorin, as well as both governmental and non-governmental ministries, departments and agencies (MDAs).

I am thrilled and honoured to be appointed Head of Department (HOD) Computer Science. As of today, the Department of Computer Science has made an apparent impact on computing, with a clear commitment to excellence among its Academic and Non-Academic staff, students, and alumni.

I welcome you all to the Department of Computer Science as we work to advance the Computing Needs of Tomorrow (CNT).

SIGNED

Dr Etemi Joshua Garba
B.Sc., M.Sc. (St Petersburg, Russia), PhD (MAUTECH Yola),

1.1 HISTORY AND PHILOSOPHY

The Department of Computer Science was established in January 2012 from the old Department of Mathematics and Computer Science. The Head of Department (HOD) oversees the day-to-day running of the Department. The philosophy of the Department is to train and develop manpower that would be skilled in both qualitative and quantitative reasoning for providing solutions to computational problems and evolving challenges while powering defence, economy, and institutions at the cutting edge of research, learning and excellence.

Until 2015, the Department was running only the undergraduate and Doctorate programmes leading to the award of Bachelor of Technology (B.Tech) and Doctor of Philosophy (PhD) degrees in Computer Science respectively. In addition to the undergraduate and Doctorate Programmes, the Department has commenced postgraduate programmes in Computer Science, leading to the Award of Master of Technology (M.Tech.). Our undergraduate programme in Computer Science has been given full accreditation by the National University Commission (NUC) which is normally reviewed every five (5) years. The Department has nineteen (20) academic staff, five (5) non-academic staff, a postgraduate room, and laboratories for practical and research.

In addition to departmental courses, the Department of Computer Science presently offers six (6) courses to some Departments in the Faculty of Physical Sciences (FPS), Faculty of Agriculture and Agricultural Technology (FAAT), Faculty of Environmental Sciences (FES), Faculty of Engineering and Engineering Technology (FEET), Faculty of Technology and Science Education (FTSE), and Faculty of Management and Social Sciences (FMSS). ***Simply put, the Department of Computer Science powers all other schools technologically***.

The Department intends to expand the staff strength for both Academic and Non-academic staff. The plan to establish Computational Centre of Excellence is underway and is currently being deliberated.

The Department is presently in the Faculty of Physical Sciences of the Modibbo Adama University, Yola.

1.2 DEGREE AND OTHER PROGRAMMES

(a) Undergraduate Degree Programmes

The Department runs a four-year programme in Computer Science. Students are admitted into the programme through the University Matriculation Examination (UME) or Direct Entry (DE) and are trained to be awarded the Bachelor of Science (BSc) degree in Computer Science.

In addition, the Department is planning to develop specialization in areas such as Multimedia Technology, Data and Communication Networks, Human-Computer Interaction, Machine Learning and Data Science, Management Information Systems and Information Science, Cybersecurity and Forensic, Data Structure and Algorithms, and Information Communication Technology for Development (ICT4D).

(b) Postgraduate Programmes

(1) Master Degree in Computer Science (MSc) – The Department has developed 18 months Full-Time and minimum of 24 months Part-Time Master Degree curriculum centred on specialization such as Artificial Intelligence, Blockchain Technology, eCommerce, Multimedia Technology, Data and Communication

Networks, Human-Computer Interaction, Machine Learning and Data Science, Management Information Systems and Information Science, Cybersecurity and Forensic, Data Structure and Algorithms, Information Communication Technology for Development (ICT4D), and IT for entrepreneurship and Society. Students to be admitted into the programme must possess a First Degree in related field.

(2) Doctorate Degree (PhD) in Computer Science – The Department of Computer Science runs a 36 months Full-Time and 48 months Part-Time Doctorate Degree programme in Computer Science. Our Prospective PhD students are admitted into the Doctorate Study through meeting the minimum requirements for undertaking PhD Research in any areas of our research focus.

1.3 DEGREE AWARDED

(a) Students who enrol into undergraduate Computer Science Programme – 4 years for students admitted through UME and 3 years for students admitted through DE, are awarded Bachelor of Science (BSc) in Computer Science.

(b) Students who enrol on the Master Degree Programme in Computer Science - minimum of 18 months for Full-Time and minimum of 24 months for Part-Time, are awarded

Master of Technology (MSc) Degree in Computer Science respectively.

(c) Students who enrol on the Doctorate Degree programme – minimum of 36 months for Full-Time and 48 months for Part-Time, are awarded Doctor of Philosophy (PhD) in Computer Science respectively.

1.4 ADMISSION REQUIREMENTS

(a) UNDERGRADUATE

A minimum of five (5) credits at 'O' Level in relevant subjects which must include English Language and Mathematics for UME and a minimum point from UME scores as can be fixed by the University Admission Committee from time to time. Post JAMB screening is carried out for students seeking admission into the department as additional requirement by the University. Those applying through Direct Entry (DE) should possess at least a lower credit in their 'A' Level, Diploma Programmes, or HND programme in related and relevant fields. This is in addition to possession of five (5) credits at their 'O' Levels.

(b) POSTGRADUATE

Candidate applying for Masters Degree must possess a first degree in related field with at least Second

Lower Division. Candidate applying for Doctorate Degree must possess a Master Degree in related field with a minimum Cumulative Grade Average (CGPA) of at least 3.50.

1.5 GRADUATION REQUIREMENTS

Students are expected to meet certain requirements and must complete their studies within the residency period before they can be awarded the BSc (Hons) in Computer Science.

(a) UNDERGRADUATES

For a student to be awarded a BSc (Hons) in Computer Science, he/she must have passed all the courses he/she registered for and a CGPA of not less than 1.50. In addition, a student must complete his/her project work and mandatory Field Work and Industrial training – Students Industrial Work Experience Scheme (SIWES).

(b) POSTGRADUATE

(1) Masters

Candidates must pass all courses registered cand omplete and defend project work before being awarded the MSc Degree in Computer Science. The courses are for two semesters.

(2) Doctorate

Candidates will be awarded PhD in Computer Science after completing a dissertation as the University requires.

1.6 TIMETABLING

The University operates the course unit (semester) system. There are two semesters (First and Second Semesters) of 18 weeks in a session. The First Semester commences in October and ends in February. The Second Semester commences in April and ends in July.

A student registers at the beginning of each session for a minimum of 16 units and a Maximum of 24 units per semester. A course unit is defined as one hour of lecture and three hours of laboratory exercise involving computer programming and application. Under normal circumstances, a student may not take more than 6 units per day spread between 7.00am to 6.00pm.

1.7 REVISED STUDENTS PUNISHMENTS FOR EXAMINATION MISCONDUCT

The Senate deliberated extensively on the above-mentioned report and approved the examination regulations and sanctions on examination misconducts as follows:

EXAMINATION REGULATIONS

1. University examination shall be held during the semester in which the course ends and all candidates who are required to pass an examination in any subject or subjects shall sit for the course examination in the subject or subjects.
2. University examination shall be held at the place and time specified by the Examination Time-Table Committee. Examinations shall be held on all days of the week except Sundays and Public Holidays and where necessary there shall be three sessions a day and a candidate shall not be required to take more than two papers in one day.
3. Where a candidate fails to appear for examination, the case shall be reported to Senate appropriately.
4. Thirty (30) minutes to the commencement of the paper, the student shall be expected to be in the examination hall.

5. It shall be the duty of the invigilator to invite candidates into the examination hall while ensuring that no unauthorised materials are introduced into the examination hall.

6. A student may be admitted up to 45 minutes after the start of the examination, but he/she shall not be allowed extra time. If a student arrives later than 45 minutes after the start of the examination, an invigilator may, at his discretion, admit him if he or she is satisfied that the student had good reason for his or her lateness. The invigilator shall report the circumstance to the HOD who shall advise the School Board of examiners which shall decide whether to accept the student's paper or not.

7. A student may be permitted by any invigilator to leave the examination room during the course of the examination provided that:

   (a) he/she does not leave during the first hour or the last fifteen minutes of the examination.

   (b) during the period of his/her absence is under the surveillance of invigilator or Assistant invigilator.

   (c) he/she must hand over his/her script to the invigilator before leaving if he does not intend to return.

8. Before opening up the parcel containing question papers, the invigilator must hold up the parcel to assure candidates that the parcel has not been tampered with.
9. The invigilator must ensure that candidates sign both attendance slips and attendance sheets before the end of the paper.
10. The invigilator ensures that the students sign in and out.
11. The duty of the invigilator among others is to ensure proper conduct of the examination.
12. At the end of the examination, a candidate shall hand-in his script personally to the invigilator before leaving the examination hall.
13. Where, for any reason, a candidate must leave the examination hall before the conclusion of his/her paper, the Chief Invigilator shall ensure that the candidate is accompanied by one of the Invigilators.
14. A student shall bring his/her examination card and identity card to each examination and display it in a prominent position on his/her desk.

15. Speaking or conversing or possession of cell-phone (GSM), Ipods, PDS, Computers, sophisticated calculators Ipod, PDS comparenol are not allowed into examination hall.

If any student is suspected to have infringed any of the following and found complicit after due investigations, the Senate may, without prejudice to any other provision in the statute, apply any of the following penalties against the offender;

S/No	**Misconduct:** Any acts of omission or commission that negatively affect the smooth conduct of the Examination.	**Penalty**
1	75% attendance not satisfied: other Departmental, School and Senate requirements not complied with.	Disqualification from sitting for the examination or cancellation of the paper(s) if written.
2	Unruly behaviour, speaking or conversing and Failure to observe silence, e.g. changing sitting position without permission	Eviction from the Examination hall and cancellation of paper.
3	Fighting/Assaulting another student in the examination hall/room	Expulsion from the University
4	Smoking, eating, chewing and drinking (other than water) when the examination is in progress	Verbal caution by the Chief Invigilator or Written warning for persistent violation.
5	Acts of insubordination or insolence to the invigilator other than assault	Suspension for one academic session.
6	Assaulting an invigilator or any other authorized person in the examination Hall or premises.	Expulsion from the University

7	Writing before official commencement or after official stoppage of examination	Deduction of 10 marks. To be indicated on the booklet and signed by the Chief invigilator.
8a	Possession of cell-phone (GSM), iPods, PDS, Computers, sophisticated calculators, smart watches, earpiece and bluetooth or any other wireless device during examination.	Suspension for one academic session.
8b	Use of cell-phone (GSM), iPods, PDS, Computers, sophisticated calculators, smart watches, earpiece and bluetooth or any other wireless device during examination.	Suspension for two academic session.
9	Writing on question paper	Cancellation of paper
10	Submission of answer scripts without signing out of the examination	Cancellation of paper
11	Un-collaborated copying (giraffing)	Caution and change of seat
12	Collaborated copying; including assisting by writing on question paper and passing it to another student.	Suspension for one academic session and cancellation of paper for both candidates
13	Being caught with materials relevant to the course being examined.	Suspension for two academic sessions and cancellation of paper.
14	Being caught with materials not relevant to the course being examined	Written warning
15	Involvement in two previous examination misconduct/malpractices with penalties less than suspension	Suspension for two academic sessions.
16	Involvement in two previous examination misconduct/malpractice cases of any kind with penalties of suspension.	Expulsion from the University.

17	Involvement in two examination malpractices in a semester with penalties of suspension for both.	Expulsion from the University.
18	Involvement in two examination malpractices in a semester with penalties of suspension and the other less than suspension.	Suspension for two academic sessions.
19	Involvement in two examination malpractices in a semester with both penalties less than suspension.	Suspension for one academic session.
20	Exchanging answer scripts or question papers containing relevant jottings and materials during the examination	Suspension for two academic sessions for both candidates and cancellation of paper for both students
21	Impersonation: Writing examination for another candidate; exchange of examination numbers, or names on answer script, intentional use of someone else's examination number, hiring mercenary to write examination by candidate.	Expulsion from the University.
22	Smuggling of used answer booklets or part thereof in or out of examination hall.	Expulsion from the University.
23	Smuggling of unused answer booklets or part thereof in or out of examination hall.	Suspension for two academic sessions.
24	Sitting for an examination not eligible for and course not registered for.	Cancellation of the paper
25	Any attempt, successful or not, to remove submitted examination script or material;	Expulsion from the university.
26	Any attempt, successful or not, to replace submitted examination scripts with extraneous ones after the examination, either in part or in whole;	Expulsion from the University.
27	Any attempt, successful or not, to alter, add or delete any written materials in the submitted answer scripts after examination;	Expulsion from the University

28	Any attempt, successful or not, to destroy submitted examination scripts or materials by any method.	Expulsion from the University
29	Involvement in examination leakage	Expulsion from the University
30	Influencing the Internal or External Examiner involved in marking exam scripts by lobbying or other inducements.	Expulsion from the University
31	Refusal to surrender or destruction of incriminating evidence for malpractice.	Expulsion from the University.
32	Forging any document relevant to the examination, including I.D. card.	Expulsion from the University
33	Refusal to complete examination misconduct/ malpractice form First Information Report when required to do so without prejudice to the outcome of the investigation.	Suspension for two academic sessions.
34	Refusal to appear before any panel constituted to investigate Students examination matters after three (3) properly served notices.	Expulsion from the University.
35	Refusal of witness to fill F.I.R form	Suspension for one academic session.

****All these laws/regulations apply to both undergraduate and postgraduate students.**

Senate agreed that this takes effect when the minutes of the 181st regular meeting is adopted.

STANDARD FOUR-YEAR PROGRAMME FOR B.SC. DEGREE IN COMPUTER SCIENCE

(NEW CURRICULUM)

CURRICULUM FOR B.SC. DEGREE IN COMPUTER SCIENCE

1.0 Vision of the Department

The department's vision is to produce world-class computer scientists who are in tune with the latest technologies and can use their skills in finding solutions to real-world problems for the benefit of mankind.

2.0 Mission of the Programme

The mission of the B.Sc. Computer Science at ModibboAdama University Yola is to equip students and practitioners with the necessary skillsets that will allow them to solve problems in Computing and beyond with the overall goal of producing highly skilled manpower for national development.

3.0 Philosophy of the Programme

The B.Sc. degree programme is designed to provide students with the ability to develop logical and computational skills and to identify and solve computational problems.

4.0 Objectives

This curriculum is intended to provide Computer Science undergraduate students with a substantial body of theoretical, practical and entrepreneurial principles and practices that underpin an understanding of computational thinking and problem solving based on techniques for analysing, designing, simulating and modelling computational solutions to problems.

The Computer Science programme in Modibbo Adama University, Yola has been designed to accomplish the following specific objectives:

(1) To provide undergraduate students with adequate THEORETICAL knowledge of Computer Science and its related fields, such as Mathematics, Operations Research and Statistics.

(2) To expose undergraduate students to standardized contemporary PRACTICAL Programming/Software Engineering skills, techniques and tools.

(3) To empower the undergraduate students with practical knowledge of ENTREPRENEURIAL related areas of Computer Science – to make them (upon graduation) job creators through self-empowerment.

(4) To train graduates in Computer science who can cope with the computing demands of the industry and other sectors of the Nigerian economy.

(5) To train graduates with competence in computer and related courses that can pursue Postgraduate programmes in Computer science and related courses.

5.0 Learning Outcome

a) Regime of Subject Knowledge

Graduates of B.Sc. Computer Science programme are expected to develop cognitive skills necessary to solve computational problems.

b) Competencies and Skills

Graduates should be able to demonstrate practical skills required for solving real-world problems using computational theories, techniques and tools.

c) Behavioural Attitude

Graduates of B.Sc. Computer Science programme should be able to demonstrate general skills relating to logical reasoning, communication skills, teamwork, leadership and entrepreneurial skills.

6.0 Admission Requirements

In addition to the requirements for admission into degree programmes at the ModibboAdama University, Yola, candidates for admission into B.Sc. Computer Science degree programme must also fulfil one of the following:

a) Pass at credit level in at least five O-level subjects that must include English language, Mathematics, Physics and any two of

Further Mathematics, Biology, Chemistry, Information and Communication Technology, Geography or Economics.

b) Candidates for direct entry into 200 level must, in addition to satisfying condition (a) above, also obtain at least:

(i) Two A-level passes or equivalent, one of which must be Mathematics.

(ii) A Diploma in Computer Science at a credit level from a recognized institution.

7.0 Duration Of The Course

The duration of the course is:

(i) Four years for UTME students.

(ii) Three years for Direct entry students.

8.0 Attainment Levels

Graduates are expected to possess the capacity to apply acquired knowledge and skills to solve theoretical and practical problems in computing and other fields.

9.0 Graduation Requirement

Graduating Required Units for B.Sc. Computer Science Programme

Level	**100**	**200**	**300**	**400**	**Total**
Compulsory	24	34	18	34	**110**
Electives	3			24	**27**
SIWES			6		**6**
General Studies	10	6	2		**18**
TOTAL	**37**	40	**26**	58	**161**

10.0 COURSE OUTLINE

100 LEVEL

FIRST SEMESTER

Course code	Title	Status	Units L T P
Compulsory Courses			*15*
CSC 101	Introduction to Computer Science	C	3 30 15 0
CHM 101	General Chemistry I	C	3 (As provided by the Dept.)
MTH 101	Elementary Mathematics I	C	3 (As provided by the Dept.)
MTH 103	Elementary Mathematics III	C	2 (As provided by the Dept.)
PHY 101	General Physics I	C	3 (As provided by the Dept.)
PHY 107	General Physics Practical I	C	1 (As provided by the Dept.)
General Courses			*6*
GST 101	Communication in English I	G	2 (As provided by the Dept.)
GST 103	Nigeria Peoples and Culture	G	2 (As provided by the Dept.)
GST 105	Logic, Philosophy and Human Existence	G	2 (As provided by the Dept.)
Electives			
BIO 101	General Biology I	E	3 (As provided by the Dept.)
SEMESTER TOTAL			**24**

SECOND SEMESTER

Course code	Title	Status	Units L T P
Compulsory Courses			*13*
CSC 102	Introduction to Problem Solving	C	3 15 15 0
CSC 104	Introduction to Computer Systems	C	3 30 15 45
MTH 102	Elementary Mathematics II	C	3 (As provided by the Dept.)
PHY 102	General Physics II	C	3 (As provided by the Dept.)
PHY 108	General Physics Practical II	C	1 (As provided by the Dept.)
General Course		C	
GST 102	Communication in English II	G	2 (As provided by the Dept.)
GST 108	Use of Library, Study Skills and Information Technology	G	2
SEMESTER TOTAL			**17**

200 LEVEL

FIRST SEMESTER

Course code	Title	Status	Units	L	T	P
Compulsory Courses			*17*			
CSC 201	Computer programming I	C	3	30	15	45
CSC 205	Operating Systems I	C	2	15	15	0
CSC 207	Computer Hardware	C	3	30	15	45
MTH 205	Linear Algebra I	C	2			
MTH 201	Mathematical Methods I	C	3 (As provided by the Dept.)			
STA 203	Statistics for Physical Science and Engineers I	C	2 (As provided by the Dept.)			
OPR 201	Linear Programming I	C	2 (As provided by the Dept.)			
General Course			*4*			
GST 203	Peace Studies and Conflict Resolution	G	2 (As provided by the Dept.)			
GST 201	History and Philosophy of Science	G	2 (As provided by the Dept.)			
SEMESTER TOTAL			**21**			

SECOND SEMESTER

Course code	Title	Status	Units	L	T	P
Compulsory Courses			*18*			
CSC 202	Computer programming II	C	3	30	15	45
CSC 206	Operating Systems II	C	2	30	15	0
CSC 208	Fundamentals of Data Structures	C	3	45	15	0
CSC 214	Discrete Structures	C	2	45	15	0
MTH 272	Introduction to Numerical Analysis	C	3 (As provided by the Dept.)			
STA 204	Statistics for Physical Science and Engineers II	C	2 (As provided by the Dept.)			
PHY 202	Introduction to Electric Circuits and Electronics	C	3 (As provided by the Dept.)			
General Course			*2*			
GST 206	Introduction to Entrepreneurial Skills	G	2 (As provided by the Dept.)			
SEMESTER TOTAL			**20**			

300 LEVEL

FIRST SEMESTER

Course code	Title	Status	Units	L	T	P
Compulsory Courses			*18*			
CSC 303	Computer Architecture	C	3	30	15	0
CSC 307	Structured and Object-Oriented Programming Languages	C	3	15	0	45
CSC 311	System Analysis and Design	C	3	30	0	45
CSC 313	Organization of Programming Languages	C	3	45	0	45
CSC 315	Database Design and Management	C	3	15	0	45
CSC 317	Computational Science and Numerical Methods	C	3	30	15	0
General Course		C				
GST 301	Introduction to Entrepreneurial Studies	G	2(As provided by the Dept.)			
SEMESTER TOTAL			**20**			

SECOND SEMESTER

Course code	Title	Units
SWE 398	Students Industrial Work Experience Scheme	**6**

400 LEVEL

FIRST SEMESTER

Course code	Title	Status	Units	L	T	P
Compulsory Courses			*17*			
CSC 403	Software Engineering	C	3	15	15	45
CSC 405	Net-Centric Computing	C	3	15	15	45
CSC 409	Algorithms and Complexity Analysis	C	3	30	0	45
CSC 411	Compiler Construction	C	3	30	15	0
CSC 491	Scientific Research Reporting	C	3	15	15	0
CSC 497	Project I	C	2	0	0	90
SEMESTER TOTAL			17			

Electives:

Course Code	Course Title	Status	Units	L	T	P
CSC 415	Special Topics in Software Engineering	E	3	15	15	45
CSC 417	Queuing Systems Performance Evaluation	E	3	30	15	-
CSC 419	Computer System PerformanceEvaluation	E	3	30	15	-
CSC 421	Compiler Construction II	E	3	30	15	-
CSC 423	Project Management	E	3	15	15	45

SECOND SEMESTER

Course code	Title	Status	Units	L	T	P
Compulsory Courses			*17*			
CSC 402	Introduction to Artificial Intelligence and Expert Systems	C	3	30		150
CSC 404	Data Communication and Networks	C	3	15	15	0
CSC 408	Human-Computer Interface	C	2	30	15	0
CSC 410	Computer System Modelling and Simulation	C	3	15	15	0
CSC 412	Computer Graphics and Visualization	C	2	15	15	45
CSC 498	Project II	C	4	0	0	180
SEMESTER TOTAL			17			

Electives:

Course Code	Course Title	Status	Units	L	T	P
CSC 416	Formal Models of Computation	E	3	15	15	45
CSC 422	Special Topics in Computer Science	E	3	15	15	45
CSC 424	Distributed Computing System	E	3	15	15	45

11.0 Course Contents

CSC 101: Introduction to Computer Science (3 Units: LH 30, PH: 45)

Survey of computers and information processing and their roles in society. This course introduces a historical perspective of computing, hardware, software, information systems, and human resources and explores their integration and application in business and other segments of society. Students must complete lab assignments using the PC's operating system and several commonly used applications, such as word processors, spreadsheets, presentations, graphics and other applications. Internet and online resources, browsers and search engines.

CSC 102: Introduction to Problem Solving (3 Units: LH 30, PH 45)

Role of Algorithms in the problem-solving process, concepts and properties of Algorithms. Implementation strategies, Development of Flow Charts, Pseudo Codes. Program objects. Implementation of Algorithms in a Programming Language - Visual BASIC or JAVA or C/C++ or Python.

CSC 104: Introduction to Computer Systems (3 Units)

Computer structure, machine language; assembly language; addressing techniques, macros; File I/O; assembler segmentation and linkage, assembler construction; interpretive routine. Concept

of the Computer system. Definition of computer and computer-related concepts such as programme, computer software: Systems and application programmes; minicomputers, mainframes and supercomputer. Number system: Binary, Decimal, Hexadecimal. Binary arithmetic; Addition, subtraction, multiplication, division. Discussion of selected applications of personal computers: word processing, database management, spreadsheet, graphics, data analysis.

CSC 201: Computer Programming I (3 Units: LH 30, PH 45)
Introduction to problem solving methods and algorithm development, designing, coding, debugging and documenting programs using techniques of a good programming language style, programming language and programming algorithm development. The programming language to be used in teaching is JAVA or Python.

CSC 202: Computer Programming II (3 Units: L30, P45)
Principles of good programming, structured programming concepts, Debugging and testing, string processing, internal searching and sorting, recursion. Use a programming language different from that in CSC 201. The programming language to be used in teaching is JAVA or Python. **PREREQUISITE: CSC 201.**

CSC 205 Operating System I (3 Units: LH 30, PH 45)
Overview of O/S: Role & Purpose, Functionality Mechanisms to Support Client-server models, hand-held devices, Design Issues influences of Security, networking, multimedia, Windows. O/S Principles: Structuring methods, Abstraction, processes of resources, Concept of APIS Device organization interrupts.

CSC 206: Operating Systems II

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

CSC 207: Computer Hardware (3 Units: LH 30, PH 45)

Computer circuits; diode arrays, PIAs etc., Integrated circuits fabrication process. Use of MSI, LSI and VLSI IC' hardware Design. Primary and Secondary memories; core memory, etc. Magnetic devices; disks, tapes, video disks etc. Peripheral devices; printers, CRT's, keyboards, character recognition. Operational amplifiers; Analog-to- digital and Digital-to-analog converters.

CSC 208: Fundamentals of Data Structures (3 Units: LH 30, PH 45)

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. Data types and ADT: Data types Basic structure for data representation – Bits, bites, words, Data definition languages. Sequential and linked storage allocation, for linear lists, multilinked structures, string processing techniques, arrays, graphs, trees – implementation, traversal algorithms, sets and relations, searching and sorting algorithms mathematical properties, balanced, trees, heaps, hash tables. Laboratory Work: Use PYTHON, C/C++ or JAVA programming language. ***PREREQUISITE: CSC 201 &CSC 202***

CSC 214: Discrete Structures (3 Units: LH 45)

Basic Set Theory: Basic definitions, Relations, Equivalence Relations Partition, Ordered Sets. Boolean Algebra & Lattices, Logic, Graph theory: Directed and Undirected graphs, Graph Isomorphism, Basic Graph Theorems, Matrices; Integer and Real matrices, Boolean Matrices, Matrices med m, Path matrices. Adjacency Vectors/Matrices: Path adjacency matrix, Numerical & Boolean Adjacency matrices. Applications to counting, Discrete Probability Generating Functions. Logic, propositional logic, predicate logic, Mathematical Reasoning, Propositional Functions & Predicates, relations and functions in predicate logic, infinite induction, modular arithmetic, graph theory, checking proofs using a proof assistant, Boolean Algebra, Counting, Discrete Probability, Number Theory, Algorithms, functions, relations, propositional and first-order predicate logic, set theory, proofs and their construction, counting and elementary probability.

CSC 303: Computer Architecture and Organization (3 Units: LH 45)

Fundamental building blocks, logic expressive immunization, sum of product forms. Register transfer notation, Physical considerations. Data representation, and number bases, Fixed and Floating point systems, representation memory systems organization and architecture. 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, microprogrammed control, Asynchronous control, i/c control. Introduction to the methodology of faulty tolerant computing.**PREREQUISITE: CSC 104**

CSC 307: Structured and Object-Oriented Programming (3 Units: LH 45)

Structured Programming elements, structured design principles, abstraction modularity, stepwise refinement, structured design techniques. Teaching of a structured programming language etc. 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. Use PYTHON, C/C++ or JAVA programming language.

CSC 311: Systems Analysis and Design (3 Units: LH 30; PH 45)

System Concept; System Development Life Cycle. Analysis: Fact gathering Techniques, data flow diagrams, Process description data modelling. System Design: Structure Charts, form designs, security, automated Tools for design. Introduction; starting a project, determining system requirements: interview, questionnaire, record review, observation; strategies for determining systems requirements: data flow diagrams, data description, data dictionary, decision analysis; application development and computer-aided systems tools, developing the system proposal; designing the new system: output design, input design, file and database design, program design; system engineering and quality assurance; systems implementation, management of information system development. Vital steps in system analysis: Techniques of system analysis. General Systems. Considerations: Data capture; Data management; Data security; Communications systems maintenance, User involvement; Project handling and control. Laboratory Work: Use PYTHON, C/C++ or JAVA programming language.

CSC 313: Organization of Programming Languages (3 Units: LH 45)

Language definition structure. Data types and structures, Review of basic data types, including lists and trees, control structure and data flow, Run-time consideration, interpretative languages, lexical analysis and parsing. 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. **PREREQUISITE – CSC 201, 202, 303**.

CSC 315: Database Design and Management (3 Units: L H 30; P 45)

Information storage & retrieval, Information management applications, Information capture and representation, analysis & indexing, search, retrieval, information privacy; integrity, security; scalability, efficiency and effectiveness. Introduction to database systems: Components of database systems DBMS functions, Database architecture and data independence use of database query

language. Rational Databases: Mapping conceptual schema to relational Schema; Database Query Languages (SQL) Concept of Functional dependencies &Multi-Valued dependencies. Transaction processing; Distributed databases.

CSC 317: Computational Science and Numerical Methods (3 Units: LH 45)

Operations research, Numerical Computation, Graphical computation, Modelling and simulation, High-performance computation. Basic Definitions and Uses, Simulation Process, Some basic statistic Distributions Theory, Model and Simulation. Queues; Basic components, Kendal notation, Queuing rules, Little's Law, Queuing networks, Special/types of queues. Stochastic Processes; Discrete state and continuous state processes, Markov processes, Birth-Death Processes, Poisson Processes. Random Numbers; types of Random Number Exercises.

SWE398:- STUDENT'S INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES) (6 UNITS)

Practical work with an industry illustrating applications of some of the theories and techniques covered in the programme. A detailed report on the fieldwork experience is presented by the student on completion.

CSC 403: Software Engineering (4 Units: LH 45; PH 45)

Software Design: Software architecture, Design Patterns, O. O. Analysis and design, Design for re-use. Using APIS: API programming Class browsers and related tools, Component-based computing. Software tools and Environment: Requirements analysis and design modelling Tools, Testing tools, Tool integration mech.

CSC 405: Net-Centric Computing (3 Units: LH 45)

Distributed Computing, Mobile & Wireless computing, Network Security; Client/Server Computing (using the web), Building Web Applications. The Internet, TCP, Hypertext Transfer Protocol, Hypertext. Client-Server environment: browsers and web servers, uniform resource locators, web navigation, net information space searching. Internet service providers, types of internet connections, Web design: development, programming, hosting.Distributed Computing, Mobile & wireless computing, network security, client/server computing (using the web), and building web applications. Network programming in PYTHON. Laboratory Work: Use HTML, PYTHON, PHP and MYSQL programming languages.

CSC 409: Algorithms and Complexity Analysis (3 Units: LH 45)

Basic algorithmic analysis: Asymptotic analysis of Upper and average complexity bounds; standard Complexity Classes Time and space tradeoffs in algorithms analysis recursive algorithms. Algorithmic Strategies: Fundamental computing algorithms: Numerical algorithms, sequential and binary search algorithms; sorting algorithms, Binary Search tress, Hash tables, graphs & its representation. Basic algorithmic analysis: Asymptotic analysis of upper and average complexity bounds; standard complexity classes time and space trade-offs in algorithms analysis, recursive algorithms. Algorithmic Strategies: Fundamental computing algorithms: Numerical algorithms, sequential and binary search algorithms; sorting algorithms, Binary search trees, hash tables, graphs and its representation. Principles of good programming style, expression and documentation, structure programming concepts; debugging testing verifying code inspection, semantic analysis, string processing, data structures. Recursion; efficiency of algorithms design techniques. Laboratory Work: Use Flowchart, PASCAL, C/C++ or JAVA programming language. ***PREREQUISITE: CSC 307.***

CSC 411: Compiler Construction I (3 Units: LH 45)

Review of compiler assemblers and interpreters, structure and functional aspects of a typical compiler, syntax semantics and, functional relationship between lexical analysis, expression analysis and code generation. Use of a standard compiler (FORTRAN/COBOL/PL) as a working vehicle. Error detection and recovery. Grammars and Languages: the parsing problem. The scanner.

CSC 491: SCIENTIFIC RESEARCH REPORTING (3 Units)

Definition of Research Methodology. Research Paradigms in Computing and Information Systems. Research Planning and Management. Types of Research Methods. Scientific writing including abstracts; identifying research problems, research objectives and questions; Interpretation of technical literature (literature reviews); Selection of overall methodological approach; Selection of suitable data collection and analysis techniques; Interpretation and conclusion of the research; and Presentation of research findings.

CSC 497: Project I (2 Units)

Students should embark on work that will lead to substantial software development under the supervision of a member of staff. A seminar is to be given on the approved topic. Students at this level must attend departmental seminars.

CSC 498: Project II (4 Units)

An approved research project to be undertaken and supervised by a lecturer. At the end of the session, students submit a written report on the topic and defend the same before a Departmental evaluation board and later the external examiner.

CSC 401: Management Information System (3 Units)

Introduction to computer and application, hardware, software, data and data processing, information, decision making, information systems and information need hierarchy, information system and today's business, basic concepts of database management systems, internet, threats, impacts and security.

CSC 402: Artificial Intelligence and Expert Systems (3 Units: LH 45)

Introduction to artificial intelligence, understanding natural languages, knowledge representation, expert systems, pattern recognition, the language LISP. History of artificial intelligence. Philosophical questions: Definition of AI, Ethical issues in AI, Fundamental definitions of Optimal vs. human-like reasoning, Optimal vs. human-like behaviour. Modelling the world: the role of heuristics. Soft computing: Fuzzy sets and possibility theory, neural networks, genetic algorithm. Natural language understanding, knowledge representation, expert systems, pattern recognition. What are expert systems? Basic concepts for building expert systems; Architecture of expert systems; construction of expert systems, Tools for building expert systems reasoning about reasoning. Evaluation of expert systems; languages and tools knowledge engineering; the language LISP or PROLOG.

CSC 404: Computer Networks and Communication (3 Units: LH 30; PH 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 asynchronous). 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.

CSC 408: Human-Computer Interface (HCI) (2 Units: LH 30)

Foundations of HCI, Principles of GUI, GUI toolkits; Human-centred software evaluation and development; GUI design and programming.

CSC 410: Computer System Modelling and Simulation (3 Units)

Basic definitions and uses, simulation process, some basic statistic distributions theory, model and simulation, Queues: Basic components, Kendal notation, queuing rules, Little's Law, Queuing networks, Special/types of queues. Stochastic processes; Discrete state and continuous state processes, Markov processes, Birth-Death processes, poisson processes. Random numbers; types of random number exercises.The concepts and techniques used in modelling and simulation, methodology and a suitable simulation language; modelling generation of random variable, transformation of random numbers, parameter estimation design, experiment factorial design, optimization. Measurement techniques, simulation techniques; analytic techniques; work-load characteristics; performance evaluation in selection problems, performance evaluation in design problems; evaluation of programme performance.

CSC 412: Computer Graphics and Visualization (2 Units: LH 30; P 45)

Hardware aspect, plotters microfilm, plotters display, graphic tablets, light pens, other graphical input aids Facsimile and its problems Refresh display refresh huggers, changing images, light pen interaction. Two and three dimensional transformation, perspective clipping algorithms. Hidden line removal bolded surface removal. Warnock method/ algorithm, shading, data reduction for graphical input. Introduction to handwriting and character recognition. Curve synthesis and fitting. Contouring. Ring structures versus doubly linked lists. Hierarchical structures. Data structure: Organization for interactive graphics. 3D transformations: translation, scaling, rotation, rotation about an arbitrary axis, affine transformations, projections. Hidden surface removal, polygon culling, z-buffer algorithm, illumination model, surface-shading methods, texture mapping. Scanning images, capturing and compositing images.

CSC 415: Special Topics in Software Engineering (3 Units : LH 30; PH 45)

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 417: Queuing Systems (3 Units: LH 45)

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

CSC 419: Computer System Performance Evaluation (3 Units: LH 45)

Measurement techniques, simulation techniques; techniques, workload characterization, performance evaluation in selection problems, performance evaluation in design problems, evaluation of programme performance.

CSC 421: Compiler Construction II

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

CSC 423: Project Management (3 Units: LH 30; PH 45)

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

CSC 425: Distributed Computing Systems (3 Units: LH 30; P 45)

Introduction: Definitions, Motivation; Communication Mechanisms: Communication Protocols, RPC, RMI, Stream Oriented Communication; Synchronization: Global State, Election, Distributed Mutual Exclusion, Distributed Transactions; Naming: Generic Schemes, DNS, Naming and Localization; Replication and Coherence: Consistency Models And Protocols; Fault Tolerance: Group Communication, Two-And Three-Phase Commit, Checkpointing; Security: Access Control, Key Management, Cryptography; Distributed File Systems: NFS, Coda etc.

CSC 416: Formal Models of Computation (3 Units: LH 30; PH 45)

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

CSC 492: Special Topics in Computer Science (3Units: LH 30; P 45)

Special topics from any area of computer science are considered relevant at a given time. Topics are expected to change from year to year. Apart from seminars to be given by lecturers and guests, students are expected to do substantial readings on their own.

STANDARD FIVE-YEAR PROGRAMME FOR B.TECH. DEGREE IN COMPUTER SCIENCE

(OLD CURRICULUM)

2.1 B. TECH DEGREE PROGRAMME

(a) VISION OF THE DEPARTMENT

The vision of the department is to produce world class computer scientists that are in tune with the latest technologies and that can use their skills in finding solutions to real world problems for the benefit of mankind.

(b) PHILOSOPHY

The B. Tech degree programme is designed to provide students with the ability to develop logical & computational skills and identify & solve computational problems.

(c) OBJECTIVES

The Computer Science programme in Modibbo Adama University, Yola has been designed to accomplish the following:

(6) To provide the undergraduate students with adequate THEORETICAL knowledge of Computer Science and its related fields, such as Mathematics, Operations Research and Statistics.

(7) To expose undergraduate students to standardized contemporary PRACTICAL Programming/Software Engineering skills, techniques and tools.

(8) To empower the undergraduate students with practical knowledge of ENTREPRENEURIAL related areas of Computer Science – to make them (upon graduation) job creators through self-empowerment.

(9) To train graduates in Computer science who can cope with computing demands of the industry and other sectors of the Nigerian economy.

(10) To train graduates with competence in computer and related courses that can pursue Postgraduate programmes in Computer science and related courses.

(d) CAREER PROSPECTS

The following are some of career prospects for a graduate of computer science:

i. System Analyst/Designer
ii. Software Developer/Engineer
iii. Database Designer/Manager/Administrator
iv. Multimedia Technologist
v. Network Analyst/Designer
vi. Web and Internet Designer/Developer

(e) LEARNING OUTCOME

(1) Regime of Subject Knowledge

Graduates of B.Tech Computer Science programme are expected to develop cognitive skills necessary to solve computational problems.

(2) Competencies and Skills

Graduates should be able to demonstrate practical skills required for solving real world problems using computer.

(3) Behavioural Attitude

Graduates of B.Tech Computer Science programme should be able to demonstrate general skills relating to logical reasoning, communication skills, team work, leadership and entrepreneurial skills.

(f) ADMISSION REQUIREMENTS

In addition to the requirements for admission into degree programmes at the Modibbo Adama University of Technology

Yola, candidates for admission into B.Tech Computer Science degree programme must also fulfil one of the following:

(1) Pass at credit level in at least five O-level subjects that must include English Language, Mathematics, Physics and any two of Further Mathematics, Biology, Chemistry, Information and Communication Technology, Geography or Economics.

(2) Candidates for direct entry into 200 level must in addition to satisfying condition (a) above, also obtain at least:

- Two A-level passes or equivalent, one of which must be Mathematics.
- A Diploma in Computer Science at credit level from a recognized institution.

(g) DURATION OF THE COURSE

The duration of the course is:

(1) Five years for UTME students.

(2) Four years for Direct entry students.

(h) ATTAINMENT LEVELS

Graduates are expected to possess the capacity to apply acquired knowledge and skills to solve theoretical and practical problems in computing and other fields.

(i) GRADUATING REQUIRED UNITS FOR B.TECH. COMPUTER SCIENCE PROGRAMME

Level	**100**	**200**	**300**	**400**	**500**	**Total**
Compulsory	30	32	39	6	33	**143**
Electives					6	
SIWES				4		**4**
General Courses	10	6	2			**20**
TOTAL	**40**	**38**	**41**	**10**	**39**	**167**

COURSE OUTLINE

100 LEVEL

FIRST SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*15*			
MTH 101	Elementary Algebra	2	15	15	0
MTH 103	Elementary Vector Algebra	2	15	15	0
MTH 105	Trigonometric and Elementary Geometry	2	15	15	0
CSC 101	Introduction to Computing I	3	30	15	0
CSC 103	Computer Installation and Management	2	15	15	0
PHY 101	General Physics I	3 (As provided by the Dept.)			
PHY 107	General Physics Laboratory I	1 (As provided by the Dept.)			
General Courses		*6*			
GST 101	Communication in English I	2 (As provided by the Dept.)			
GST 103	Nigeria Peoples and Culture	2			
GST 105	Logic, Philosophy and Human Existence	2			
SEMESTER TOTAL		**21**			

SECOND SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*15*			
MTH 102	Elementary Calculus	3	30	15	0
MTH 104	Introductory Mechanics	2	15	15	0
CSC 102	Introduction to Computing II	2	15	15	0
CSC 104	Computer programming I	3	30	15	0
PHY 102	General Physics II	3(As provided by the Dept.)			
PHY 104	General Physics III	2(As provided by the Dept.)			
MTH 102	Elementary Calculus	3	30	15	0
General Courses		*4*			
GST 102	Communication in English II	2(As provided by the Dept.)			
GST 108	Use of Library, study Skills and Information Technology	2			
SEMESTER TOTAL		**21**			

200 LEVEL

FIRST SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*17*			
CSC 201	Computer programming II	3	30	15	0
CSC 203	Introduction to Computer Systems	2	15	15	0
CSC 205	Introduction to Information Systems	2	15	15	0
MTH 201	Linear Algebra I	2	15	15	0
MTH 211	Mathematics methods I	3	30	15	0
STA203	Statistics for Physical Science and Engineers I	2(As provided by the Dept.)			
OPR 201	Introduction to Operations Research I	3(As provided by the Dept.)			
General Courses		*4*			
GST 203	Peace Studies and Conflict Resolution	2(As provided by the Dept.)			
SEMESTER TOTAL		**21**			

SECOND SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*18*			
CSC 202	Introduction to File Processing	2	15	15	0
CSC 204	Operating Systems	3	30	15	0
MTH 202	Linear Algebra II	2	15	10	0
MTH 212	Elementary Differential Equations I	3	30	15	0
MTH 272	Introduction to Numerical Analysis	3	30	15	0
STA 204	Statistics for Physical Science and Engineers II	2 (As provided by the Dept.)			
OPR 202	Introduction to Operations Research II	3 (As provided by the Dept.)			
General Course		2			
GST 202	History and Philosophy of Science	2 (As provided by the Dept.)			
SEMESTER TOTAL		**20**			

300 LEVEL

FIRST SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*17*			
CSC 303	Computer Architecture	3	30	15	0
CSC 305	Data Structures and Algorithms	3	30	0	45
CSC 307	Structured and Object-Oriented Programming Languages I	2	15	0	45
CSC 311	System Analysis and Design	3			
MTH 307	Discrete Mathematics	3	30	15	0
MTH 371	Introduction to Scientific Computing I	3	15	15	45
Electives		2			
CSC 309	Compiler Construction	2	15	15	0
EEE 303	Circuit Theory I	2(As provided by the Dept.)			
EEE 305	Electronic Circuits I	2(As provided by the Dept.)			
EEE 307	Electronic Circuits Laboratory I	1 (As provided by the Dept.)			
GST 202	History and Philosophy of Science	2 (As provided by the Dept.)			
SEMESTER TOTAL		**19**			

SECOND SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*12*			
CSC 302	Introduction to Digital Design and Microprocessor	3	30	15	0
CSC 304	Introduction to Agent Based Systems	2	15	15	0
CSC 308	Database Design and Management	2	15	0	45
CSC 310	Automata Theory, Computability and Formal Language	3	30	15	0
CSC 314	Computer Graphics	2	15	15	0
General Course		*2*			
GST 322	Introduction to Peace and Conflict Resolution	2	15	15	0
Electives		*3*			

CSC 306	Organization of Programming Languages	3 30 0 45
EEE 304	Circuit Theory II	2(As provided by the Dept.)
EEE 310	Electronic circuits II	2(As provided by the Dept.)
EEE 312	Electronic circuits Laboratory II	1(As provided by the Dept.)
EEE 316	Control Theory I	2(As provided by the Dept.)
EEE 318	Communication Principle I	2(As provided by the Dept.)
EEE 320	Communication Principle Laboratory I	1(As provided by the Dept.)
SEMESTER TOTAL		**17**

400 LEVEL

FIRST SEMESTER

Course Code	Title	Units L T P
Compulsory Courses		*6*
CSC 497	Field work	6
CSC 401	Management Information Systems	3
SEMESTER TOTAL		**9**

SECOND SEMESTER

Course Code	Title	Units L T P
Compulsory Courses		*4*
SWW 499	Students Industrial Work Experience Scheme	4
SEMESTER TOTAL		**4**

500 LEVEL

FIRST SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*16*			
MTH 319	Introduction to Mathematical Modelling	3	30	15	0
CSC 501	Design and Analysis of Algorithms	3	30	0	45
CSC 503	Software Engineering	3	15	15	45
CSC 505	Design of Computer Networks	3	30	15	0
CSC 591	Scientific Research Reporting	2	15	15	0
CSC 597	Project I	2	0	30	0
General Course		*2*			
MGT 507	Entrepreneurial Development	2 (As provided by the Dept.)			

Electives		*2*			
CSC 507	Multimedia Technology	3	30	15	0
EEE 403	Circuit Theory III	2(As provided by the Dept.)			
EEE 405	Electronic Circuit III	2(As provided by the Dept.)			
EEE 407	Electronic Circuit Laboratory III	1(As provided by the Dept.)			
EEE 409	Control Theory II	2(As provided by the Dept.)			
EEE 411	Control Theory Laboratory	1(As provided by the Dept.)			
SEMESTER TOTAL		**20**			

SECOND SEMESTER

Course Code	Title	Units	L	T	P
Compulsory Courses		*17*			
CSC 502	Introduction to Artificial Intelligence and Expert Systems	3	30	15	0
CSC 504	Data Communication and Networks	2	15	15	0
CSC 506	Web And Internet Programming	3	15	15	45
CSC 508	Structured and Object-Oriented Programming Languages II	3	30	0	45
CSC 510	Computer System Modelling and Simulation	2	15	15	0
CSC 598	Project II	4	0	30	90
SEMESTER TOTAL		**20**			

COURSES DESCRIPTION

CSC 101: INTRODUCTION TO COMPUTING I (3 Units)

History of computers and computer programme. Comprehensive history of modern computer technology. Evolution of microcomputer systems. Concept of Computer system. Definition of computer and computer related concepts such as programme, computer software: Systems and application programmes; minicomputers, mainframes and super computer. Number system: Binary, Decimal, Hexadecimal. Binary arithmetic; Addition, subtraction,

multiplication, division. Discussion of selected application of personal computers: word processing, database management, spreadsheet, graphics, data analysis. Social impact of computers: positive impacts, negative impacts.

CSC 102: INTRODUCTION TO COMPUTING II (2 Units)

An introduction to computing with emphasis on the practical usage of the personal computers; concepts of computer hardware, software firmware. Definition of the following terms: bits, bytes, word, word length, data, information, records, fields, files, database. Data types and organization. Data coding; ASCII Problem solving process. Algorithms; flowcharting. Basic logic gates and their operation. Examples with elementary logic circuits. Introduction to a scripting programming language.

CSC 103: COMPUTER INSTALLATION AND MANAGEMENT (2 Units)

Basic electric current theory; maintenance tools, corrective maintenance, installation procedure. The role of the computer centre, general operating procedures; data preparation; the magnetic tape library, operations procedure, job processing procedure; security procedures; performance statistics.

CSC 104: COMPUTER PROGRAMMING I (3 Units)

Brief survey of programming paradigms – Procedural programming – Object-oriented programming, Functional programming – Declarative programming, non-algorithmic programming – Scripting languages. The effects of scale on programming methodology. Programming the computer in current version of any common programming language:

Declarative statements; Input and Output statements; Program compilation and execution; Control and conditional statements; Loops and iteration; Functions, routines and sub-programmes. Input/output; File processing; Port addressing. Program testing and debugging techniques. Practical examples in both scientific and commercial applications and introduction to Visual Basic.

CSC 201: COMPUTER PROGRAMMING II (3 Units)

Principles of good programming structured programming, concepts; Debugging and testing string processing, Internet searching and sorting, Data Structure, recursion. Use a programming Language (such as Pascal, C/C++, Java) different from that in CS104.

CSC 202: INTRODUCTION TO FILE PROCESSING (3 Units)

File processing environment: definition of record, file, blocking, compaction, database, sequential access; physical characteristics of sequential media; external sort/merge algorithms: file manipulation, techniques for updating, deleting and inserting record in sequential files; random access; physical characteristics of disk and other bulk storage devices; physical representation of data structure on storage devices; inverted and indexed sequential files; back up procedure, file recovery, higher level language, data management facilities. The use of high level language such as database.

CSC 203: INTRODUCTION TO COMPUTER SYSTEM (2 Units)

Computer structure, machine language; assembly language; addressing techniques, macros; File I/O; assembler segmentation and linkage, assembler construction; interpretive routine.

CSC 204: OPERATING SYSTEMS (3 Units)

Early systems, simple batch systems, multiprogrammed and batch systems, time-sharing systems, personal computer systems, parallel systems, distributed systems, real-time systems. Computer system structures: computer system operation, I/O structure, storage structure, storage hierarchy, hardware protection, general system architecture. Operating system structures: system components, operating system services, system calls, system programs, system structure, virtual machines, system design and implementation, system generation. Processes: process concept, process scheduling, operation on a process, co-operating processing, threads, interprocess communication. CPU scheduling: basic concepts, scheduling criteria, scheduling algorithms, multiple-processor scheduling, real-time scheduling, algorithm evaluation. Deadlocks: system models, deadlock characterization, methods of handling deadlocks, prevention, avoidance, detection, recovery, combined approach. Memory management: address space, swapping, contiguous allocation, paging, segmentation, paged segmentation. Virtual memory: demand paging, page replacement, page-replacement algorithms, frame allocation, thrashing. File systems: file concept, access method, directory structure, protection, file system structure, allocation methods, free space management, directory implementation, efficiency and performance, recovery.

CSC 205: INTRODUCTION TO INFORMATION SYSTEM

(2 Units)

History of information communication and information system, definition of basic concepts of IS. Component, structure, configuration and management of IS. The internet and internet based services, internet based application development. The world wide web (www) and website development: page design and development (MS Outlook). Fundamentals of HTTP based programming.

CSC 302: INTRODUCTION TO DIGITAL DESIGN AND MICROPROCESSORS (3 Units)

Introduction to type of circuits – combinational and sequential. Introduction to instruction format: OPCODE OPERAND. Binary representation: bits, nibbles, bytes: character representation: numeric, non-numeric, alphanumeric, EBCDIC, BCID, ASCII, and ANSII. Fundamental building blocks (logic gates, flip-flops, counters, registers, PLA/PAL). Design of combinatorial circuits with emphasis on application. Design of sequential circuits, synchronous and asynchronous. Design of simple CPU, peripheral devices (I/O), memory/storage devices. Stored-program concept. Combination logic; sequential logic microprocessors and microcomputers.

CSC 303: COMPUTER ARCHITECTURE (3Units)

Basic logic design. Organization and design of digital computing systems; description of current typical computing structure, processor-micro-architecture and pipelining Memory system; cache and virtual memory organizations, general characteristics of memory operation, (Technology – magnetic recording, semi conductor memory, charge, coupled devices, magnetic bubble); Memory addressing, memory hierarchy, virtual memory,

control System, Hardware control, micro programmed control, Asynchronous control, i/o control. CPU configuration and possible architecture software/hardware tradeoffs. Introduction to the methodology of fault-tolerant, computing. Introduction to SIMD, MIMD, VLIW, EPIC, Systolic architecture, Interconnection networks (hypercube, shuffle-exchange, mesh, crossbar). Superscalar architecture, Branch prediction, Pre-fetching, Speculative execution, multithreaded architecture, scalability, symmetric multiprocessors; and parallel computers. Study Architecture of an actual mini-computer. ***PREREQUISITE: CSC 203.***

CSC 304: INTRODUCTION TO AGENT BASED SYSTEM

(2 Units)

Introduction to agent based technology: Definition of agents, Successful applications and state-of-the-art agent based systems; Agent architectures: Simple reactive agents, reactive planners, layered architectures, Example architectures and applications. Agent theory, Commitments, Intentions, Decision-theoretic agents, Markov decision processes (MDP). Software agents, personal assistants, and information access, Collaborative agents, Information gathering agents, Believable agents (synthetic characters, modelling emotions in agents). Learning agents, Multi-agent systems, economically inspired multi-agent systems, Collaborating agents, Agent teams, Agent modelling, Multi-agent learning, introduction to robotic agents, mobile agents.

CSC 305: DATA STRUCTURES AND ALGORITHMS (3 Units)

Data types and ADT: Data types Basic structure for data representation – Bits, bites, word, Data definition languages. Sequential and linked storage allocation, for linear lists, for multilinked structures, for string processing techniques, arrays, graph, trees – implementation, traversal algorithms, sets and relations, searching and sorting algorithms mathematical properties, balanced, trees, heaps, hash tables. Efficient algorithms for sorting, searching and selection. Algorithm analysis: worst and average case analysis. Recurrences and asymptotic. Algorithm design techniques: divide-and-conquer, dynamic programming, greedy algorithms, amortized analysis. Primitive types, Arrays, Records, Strings and string processing, Data representation in memory, Static, stack and heap allocation, Runtime storage management, pointers and references, Linked structures, Implementation strategies for stacks, queues, and hash tables. Algorithm for fundamental graph problems such as depth-first search, connected components, topological sort, and shortest paths. Possible additional topics: network flow, string searching, parallel computation. Laboratory Work: Use PASCAL, C/C++ or JAVA programming language. ***PREREQUISITE: CSC 201 &CSC 202.***

CSC 306: ORGANIZATION OF PROGRAMMING LANGUAGES (3 Units)

Language definition structure; Data types and structures; Review of basic data types; including lists and trees; control structure and data flow; Run-time consideration, Interpretative language, lexical analysis and parsing. Language definition structure; Data types and structures;

Review of basic data types; including lists and trees; control structure and data flow; Run-time consideration, interpretive languages. Lexical analysis and parsing. Laboratory Work: Use PASCAL, C/C++ or JAVA programming language. PREREQUISITE: CSC 201 &CSC 202.

CSC 307: STRUCTURED AND OBJECT-ORIENTED PROGRAMMING LANGUAGES I (2 Units)

Operators: arithmetic, relational, assignment increment/decrement, bit-wise, pointer, conditional, Data types; Library functions; include files, constraints; streams functions, statements: break, case, default continuous, do, else, for, it, return, switch, typed, while. Laboratory Work: Use PASCAL, C/C++ or JAVA programming language. PREREQUISITE: CSC 201 &CSC 202.

CSC 308: DATABASE DESIGN AND MANAGEMENT (2 Units)

Database management systems; review of basic concepts; function and components of DEMS*. File design and access path; future directions in DMOS*. Relational Database Management Systems (RDBMS), Normalization, Denormalization, Structured Query Language (SQL), MS Access/ORACLE.

Laboratory Work: Use Oracle, MS Access, PASCAL, C/C++ or JAVA programming language.

CSC 309: COMPILER CONSTRUCTION (2 Units)

Review of compiler assemblers and interpreters; structure and functional aspects of a typical compiler, syntax, semantics and pragmatics; functional relationship between lexical analysis, syntax analysis, expression analysis and code generation. Internal form of course programme. Use of

a standard compiler (FORTRAN, COBOL or PL/1) as a working vehicle. Error detection and recovery. Grammars and Languages; The parsing problem. The scanner. Grammars and Languages; recognizers, Top-down and bottom-up, production language; Run-time storage organization. The use of display in run time storage organization. The use of display in run time storage allocation; LR grammars and analyzers; Construction of LR table; Organization of symbol tables; Allocation of storage to run variable; Code generation; Optimization; Translator writing systems. The use of tools in support of the translation process and the advantages thereof program libraries and separate compilation, Building syntax-directed tools.

CSC 310: AUTOMATA THEORY, COMPUTABILITY AND FORMAL LANGUAGE (3Units)

Logic set theory, functions and relation, induction, Boolean functions, switching functions, recurrence relations. Finite-state machines, Context-free grammars, Tractable and intractable problems, Incomputable functions, the halting problem, the halting problem, the post correspondence problem. Implications of incomputability, Deterministic finite automata (DFA), Non-deterministic finite automata (NFA), Equivalence of DFAs and NFAs, Regular Expression. The pumping lemma for regular expressions, Push-down automata (PDAs), relationship of PDAs and context-free grammars, Turing machines, Non-deterministic Turing machines, Sets and languages, Chomsky hierarchy, The Church-Turing thesis.

CSC 311/312: SYSTEM ANALYSIS AND DESIGN (3 Units)

Note (311 is for Computer Science; 312 is forLibrary/Mathematics)

Introduction; starting a project, determining system requirements: interview, questionnaire, record review, observation; strategies for determining systems requirements: data flow diagrams, data description, data dictionary, decision analysis; application development and computer aided systems tools, developing the system proposal; designing the new system: output design, input design, file and database design, program design; system engineering and quality assurance; systems implementation, management of information system development. Vital steps in system analysis: Techniques of system analysis. General Systems. Considerations: Data capture; Data management; Data security; Communications systems maintenance, User involvement; Project handling and control. ***Laboratory Work:*** Use PASCAL, C/C++ or JAVA programming language.

CSC 314: COMPUTER GRAPHICSC (2Units)

Physical and logical input devices, strokes devices, string devices, valuator devices, choice devices, interaction with mouse and keyboard, touch screen. Windows-to-viewport transformation, points and lines, line-drawing algorithms, parametric representation of vectors and curves, line-plane intersections, clipping algorithms, antialiasing lines, circle-generating algorithms, fill areas, character generation, attributes of output primitives. Translation, scaling, rotation. Matrix representations and homogeneous coordinates, composite transformation. Polygon surfaces, curved surfaces, sweep

representations, wire-frame models, surface models, solid models. 3D transformations: translation, scaling, rotation, rotation about an arbitrary axis, affine transformations, projections. Hidden surface removal, polygon culling, z-buffer algorithm, illumination model, surface-shading methods, texture mapping. Scanning images, capturing and compositing images. Basic layout for print, interface design on screen, page layout for WEB graphics, text and typography. Preparing images for WEB and developing a Web-based installation and presentation. Computer aided design, graphs, art and animation. Graphical User Interface (GUI), image processing, graphics software packages, colour models.

CSC 401: MANAGEMENT INFORMATION SYSTEM (2 Units)

Introduction to computer and application, hardware, software, data and data processing, information, decision making, information systems and information need hierarchy, information system and today's business, basic concepts of database management systems, internet, threats, impacts and security.

CSC 497: FIELD WORK (6 Units)

The course is aimed at enhancing a student's future career prospects. Each student goes to the field which must be a reputable computer based outfit interested in software, hardware or general IT as approved by the department. Supervisory staffs are attached to the students. The supervisory staffs in conjunction with the industry based supervisors assessed the students. Each student is expected to write a detailed daily report of their activities while on the field. This is presented and assessed at the end of the exercise.

SWW 499: STUDENT'S INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES) (4 UNITS)

Practical work with an industry illustrating applications of some of the theories and techniques covered in the programme. A detailed report on the field work experience is presented by the student on completion.

CSC 501: DESIGN AND ANALYSIS OF ALGORITHMS (3 Units)

Principles of good programming style, expression and documentation, structure programming concepts; debugging testing verifying code inspection, semantic analysis, string processing, data structures. Recursion; efficiency of algorithms design techniques. Laboratory Work: Use Flowchart, PASCAL, C/C++ or JAVA programming language. ***PREREQUISITE: CSC 307***

CSC 502: INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (3 Units)

History of artificial intelligence. Philosophical questions: Definition of AI, The Turing Test Searle's "Chinese room" thought experiment, Ethical issues in AI, Fundamental definitions Optimal vs. human-like reasoning, Optimal vs. human-like behaviour. Modelling the world: the role of heuristics. Soft computing: Fuzzy sets and possibility theory, neural networks, genetic algorithm. Introduction to robotics and AI planning. Developments in artificial intelligence, natural language understanding, knowledge representation, expert systems, pattern recognition. What are expert systems? Basic concepts for building expert system; Architecture of expert systems; construction of expert systems, Tools for building expert systems reasoning about reasoning. Evaluation of expert systems; languages and tools knowledge engineering; the language LISP or PROLOG.

CSC 503: SOFTWARE ENGINEERING (3 Units)

Role of software engineering and engineer. Software engineering paradigms. Software development process, software life cycle, software metrics and measurement. Requirement analysis and design. Object-oriented design. Software specifications: classification of specification, operational specifications, dataflow diagram, and state transition diagrams. Description specification: ER diagram, logic specification and algebraic specification. Computer aided software engineering: CASE tools – analysis tools, project management tools, configuration management tools, editors, linkers, code generators, debuggers, testing tools and user-interface management tools. Integrated CASE environments. CASE workbenches. Group project (Waterfall, etc.), OOD&A tools (UML): problem statement and project plan. Software requirements specification, software design. Test plan, project presentation, and project documentation. Use UML with PASCAL, C/C++ or JAVA programming language. ***PREREQUISITE: CSC 309***

CSC 504: DATA COMMUNICATION AND NETWORKS (2 Units)

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

CSC 505: DESIGN OF COMPUTER NETWORKS (3 Units)

Basic principles of designing and implementing both local area networks (LAN) and wide area networks (WANS): physical protocols – transmission media, analogue and digital communication techniques, communication interface design, data link protocols for both point-to-point and broadcast technologies, network protocol for routing, congestion control, internetworking and transport protocols for error-free end-to-end communications. Actual communication protocols such as RS-232, ISDN, Ethernet and TCP/IP will be used for illustration. Higher layer protocols for applications such as encryption, authentication, network management, client/server computing and multimedia communication.

CSC 506: WEB AND INTERNET PROGRAMMING (3 Units)

The Internet, TCP, Hypertext Transfer Protocol, Hypertext. Client-Server environment: browsers and web servers, uniform resource locators, web navigation, net information space searching. Internet service providers, types of internet connections, Web design, development, programming, hosting, network programming in JAVA/Pascal/C/C++. ***Laboratory Work:*** Use HTML, PASCAL, C/C++ or JAVA programming language.

CSC 507: MULTIMEDIA TECHNOLOGY (3 Units)

Audio, sound, text, hypertext, animation, graphics, photography, video/film, TV. Visual reality, multimedia programming and production. Laboratory Work: Use PASCAL, C/C++ or JAVA programming language.

CSC 508: STRUCTURED AND OBJECT-ORIENTED PROGRAMMING LANGUAGES II (3 Units)

The objective of the course is to teach the latest in programming technology and current program development environment. Topics to be covered include, but not limited to: Visual programming languages, Java Technology, etc. ***Laboratory Work:*** Use PASCAL, C/C++ or JAVA programming language. ***PREREQUISITE: CSC 309***

CSC 510: COMPUTER SYSTEM MODELLING AND SIMULATION (2 Units)

The concepts and techniques used in modelling and simulation, methodology and a suitable simulation language; modelling generation of random variable, transformation of random numbers, parameter estimation design, experiment factorial design, optimization. Measurement techniques, simulation techniques; analytic techniques; work-load characteristics; performance evaluation in selection problems, performance evaluation in design problems; evaluation of programme performance.

CSC 591: SCIENTIFIC RESEARCH REPORTING (2 Units)

Definition of Research Methodology. Research Paradigms in Computing and Information Systems. Research Planning and Management. Types of Research Methods. Scientific writing including abstracts; identifying research problems, research objectives and questions; Interpretation of technical literature (literature reviews); Selection of overall methodological approach; Selection of suitable data collection and analysis techniques; Interpretation and conclusion of the research; and presentation of research findings.

CSC 597: Project I (2 Units)

A seminar to be given on approved topic. Students at this level must attend departmental seminars.

CSC 598: Project II (4 Units)

An approved research project to be undertaken and supervised by a lecturer. At the end of the session, the student submits a written report on the topic and defend the same before a Departmental evaluation board and later the external examiner.

RESOURCE PERSONS

S/N	Name & SP No.	Qualifications & Dates Obtained	Rank	Area of Specialization
1.	Prof. G. M. Wajiga (SP 94)	PhD Comp. Sc. (ATBU, 2000); M.Sc. Operations Research (Aston, 1993); B.Sc. Maths (Zaria 1979).	Professor	Soft Computing
2.	Dr. E. J. Garba (SP 833)	PhD Comp. Sc.(MAUTECH Yola, 2012); M.Eng. Software Engineering ITMO University, Russia, 2004); B.Sc. Comp. Sc. ITMO University, Russia, 2002).	Associate Professor	Software Engineering and Multimedia Technology
3.	Dr. (Mrs.) A. S. Ahmadu (SP 303)	PhD Comp. Sc. (ATBU Bauchi, 2018); M.Sc. Comp.Sc. (ATBU Bauchi, 2003); B.Tech. Comp. Sc. (ATBU Bauchi, 1991);	Associate Professor	Data Mining
4.	Dr. Y. M. Malgwi (SP 1600)	PhD Comp. Sc. (Mautech Yola, 2019); M.Sc. Comp.Sc. (ADSU, Mubi, 2014); B.Tech. Comp. Sc. (FUTY, 2006)	Lecturer I	Machine Learning/Medical Informatics
5.	Dr. M. Muhammad (SP 1875)	PhD Comp. Networks & Tele. (Salford UK, 2018); M.Sc. Comp Networking (Greenwich, 2012); B.Tech. Comp. Sc. (FUTY, 2008)	Senior Lecturer	Wireless Sensor Networks

S/N	Name & SP No.	Qualifications & Dates Obtained	Rank	Area of Specialization
6.	Mr. D. I. Sajoh (SP1564)	M.Sc. Comp. Sc. Software Eng. (Leicester UK, 2012) B.Tech. Comp. Sc. (FUTY, 2008)	Lecturer I	Machine Learning
7.	Mr. K. J. Danjuma (SP 1254)	M.Sc. (Ibadan, 2015); B.Tech. Comp. Sc. (FUTY, 2009).	Lecturer I	Machine Learning
8.	Mr. N. R. Suleiman (SP 1596)	M.Sc. Comp.Sc. (Durham Univ UK,2013); B.Sc. Comp Sc. (AUN, 2011).	Lecturer II	Cloud Computing
9.	Mr. A. U. Atiku (SP 1495)	M.Sc. Advanced Comp. Sc. (Birmingham, 2017); B.Sc. Comp. Sc. (AUN, 2012).	Assistant Lecturer	Cyber Security & Software Engineering
10.	Mr. A. A. Kadams (SP 1802)	M.Sc. Software Eng. (Kingston UK, 2015); B.Tech. Comp. Sc. (FUTY, 2009)	Assistant Lecturer	Soft. Engineering
11.	Mr. M. A. Mahmud (SP 1832)	M.Sc. Computing (Leicester UK, 2019) B.Tech. Comp Sc. (Mautech, 2014)	Assistant Lecturer	Cloud Computing
12.	Mr. M. Usman (SP 1892)	M. M.Tech. Comp. Sc. (MAUTECH Yola, 2019); B.Sc. Comp. Sc. (GSU, 2015)	Assistant Lecturer	Artificial Intelligence
13.	Mrs. F. F. Agboola (SP 1886)	M.Tech. Comp. Sc. (MAUTECH Yola, 2019); B.Tech. (Ladoke Akintola Uni. Of Tech. 2014)	Assistant Lecturer	Artificial Intelligence

S/N	Name & SP No.	Qualifications & Dates Obtained	Rank	Area of Specialization
14.	Mr. U. A. Umar (SP 2350)	B.Sc. Software Engineering (AUN Yola, 2015). M.Sc. Software Systems and Internet Tech. (The University of Sheffield, UK, 2018).	Assistant Lecturer	Software Systems and Internet Tech.
15.	Mr. K. O. Oluborode (SP 2366)	B.Sc. Comp. Sc. (Joseph Ayo Babalola University, 2015) M.Tech Comp. Sc. (Fed. Uni. Of Tech., Akure, 2020)	Lecturer II	Machine Learning