FEDERAL UNIVERSITY OF KASHERE

FACULTY OF SCIENCE

Department of Mathematics and Computer Science

B.Sc. Computer Science Programme

UNDERGRADUATE STUDENTS' HANDBOOK
2021-2023

FORWARD

I am delighted to put in the second edition of the *Students' Handbook* of the Department of Mathematics and Computer Science. I am equally happy to welcome our dear students, fresh and returning to our department. There are many reasons why Computer Science is worth study, none surpassed that of its applications areas in real-life situations.

The objective of the publication of this Handbook is to disseminate information to students in the department on the history of the programmes offered in the department, its organizational structure, philosophy, mission, vision, aim and objectives, admission requirements, workload per level, grading system, graduation requirements, results computation as well as its course structures (Curricula).

Students are therefore strongly advised to read this Handbook carefully so that they will be conversant with the dos and don't of the department and other relevant information that will lead to their itch free study and also achieve their study objectives. There may be other rules and academic regulations of specific nature not covered by this Handbook. Such rules are important as those contained in the *University Student Handbook*, 2013.

I wish to add that any comment for improvement of this Handbook will always be welcomed.

I also wish you God's blessing and protection throughout your study period in this department and the University at large.

Prof. P. B. Zirra
Head of Department

(A) LIST OF STAFF, QUALIFICATION, RANK AND STATUS

Commented [p2]:

S/N	Name of Staff	Rank/Designation	Status	Qualification, dates obtained and specialization, membership of professional association
1	*Prof. P. B. Zirra (HOD)*	*Professor*	*F/T*	*NCE Math/Phy (Hong,1987); B. Tech. Comp. Sc. (ATBU,1994); MBA Finance (Unimaid, 2001); M.Tech. Comp. Sc. (ATBU, 2006); Diploma Theology (KBC,2010);PhD Comp. Sc. (MAUTECH, 2012).* *CPN, NCS, TRCN, ITSSP, NIM.*
2	*Prof. G.M. Wajiga*	*Professor*	*S*	*B.Sc. Maths (Zaria,1979); M.Sc. OR (Aston, 1983);PhD Comp. Sc. (ATBU, 2000).* *NCS,MAN,ORS(UK)*
3	*Prof. M..I. Bello*	*Professor*	*S*	*B.Sc. Maths (Unimaid, 1990); M.Sc. Maths (ATBU 1994); PhD. Maths (ATBU 2003).* *MAN, NMS.*
4	*Prof. M. N. Haggai*	*Professor*	*S*	*B.Sc. Maths (Unimaid, 1989); M.Sc. Maths (ATBU 1994); PhD. Maths (ATBU 2006).*

				MAN, NMS.
5	*Dr. J. Abah*	*Reader*	*S*	B.Tech. Comp.Sc. (ATBU, 2005), MSc Comp. Sc. (BUK, 2011), PhD Comp. Sc. (FUTM, 2016) IEEE, MAN, CPN, NCS
6	*Dr B. Y. Baha*	*Reader*	*S*	*B.Tech. CS (ATBU, 2000); M.Sc. CS (ABU, 2008);PhD. CS (MAUTech.,2012)* *CPN, NCS, AITP*
7	*Dr A. Y. Gital*	*Reader*	*S*	PhD CS (UTM, 2015), MSC. CS (ATBU, 2010), BTech. CS (ATBU, 2003) ACM, NCS, CPN, IEEE, IAENG
8	*Dr. I. Asabe*	*Senior Lecturer*	*F/T*	*B.Sc. Statistics (Unimaid, 2004); M.Sc. Statistics (ABU 2010); PhD. (BHU, 2016).*
9	*Dr. Joel John Taura*	*Senior Lecturer*	*F/T*	*B.Sc. Maths (ABU,2000);PGDE (Gashua,2007);M.Sc. Maths (ABU, 2011). PhD. Maths (ABU,2016)*
10	*Dr. J. A. Kwanamu*	*Senior Lecturer*	*F/T*	*B.Sc. Maths (MAUTECH, 1995); M.Sc.. Maths (MAUTECH 2006); PhD. Maths (MAUTECH, 2016).*
11	*Dr. E. J. Garba*	*Senior Lecturer*	*F/T*	*PhD CS (MAUTech,2012), MSc CS (PSIPMO Uni,*

				2004), BSc. CS (PSIPMO, Uni, 2002) *NSC, CPN, IEEE*
12	*Dr M. A. Mahdi*	*Senior Lecturer*	*F/T*	*PhD Comp. Info. Sys. (UTM, 2016)* *MSc. Info. Tech. (UTM, 2012)* *B. Eng. E/lec (BUK, 2006)* *NCS, ISMI, CPN*
13	*Dr. A.M. Mabu*	*Senior Lecturer*	*F/T*	*PhD CS (SHAUTS, India, 2018)* *MSC. CS (BUK, 2015)* *BSc. CS (BUK, 2007)* *ND Stat (FPD, 1998)*
14	*Dr. M. Mohammed*	*Senior Lecturer*	*F/T*	*PhD Comp. Tel. Network (2018)* *MSc Computer Networking (Uni of Greenwich, 2012)* *BTech CS (MAUTech, 2009)* *IEEE*
15	*Dr. B. Modi*	*Senior Lecturer*	*S*	*PhD CS (Uni of Kent, 2015), MSc. CS BUK, 2009), BTech. CS (ATBU, 2003), ND Stat. (Kaduna Poly., 1991)*
16	*Dr A.U Abdullahi*	*Senior Lectuer*	*F/T*	*BSc. C S (ATBU, 2003),* *MSc. CS (BUK, 2011)* *PhD Info Tech. (UTPM, 2018)* *FNCS,, CPN, TRCN*
17	*Dr. S.S. Jauro*	*Senior Lecturer*	*F/T*	*PhD CS (SHUATS India, 2020), MSc. CS (BUK, 2015), BSc. CS. (BUK, 2008)*

18	*Dr. A.U. Terang*	*Lecturer I*	*F/T*	*NCE(Coll., of Edu., Hong, 1993); B.Sc. Maths (ADSU,2008); M.Sc. Maths (ADSU, 2013). PhD Maths(MAUTEC, 2019)*
19	*Dr. Y.M. Malgwi*	*Lecturer I*	*F/T*	*PhD Comp. Sc. (Mautech. 2019), MSc. Comp. Sc. (ADSU, 2014),B.Tech. Comp. Sc. (FUT, 2006) NCE, (1995), ND Comp. Sc. (FPM, 1999) NCS, TRCN*
20	*Dr. S.Y. Enoch*	*Senior Lecturer*	*F/T*	*B.Sc. Comp. Sci. (ADSU, 2007); M.Sc. Comp. Sc. (UI, 2011); P.hD. Comp. Sc.(UC New Zealand, 2018). IEEE, ACM, NCS, SDIWC,NIM*
21	*Dr. M.L. Jibrin*	*Lecturer I*	*F/T*	*B.Sc. Comp. Sc. (UOP, 2010) MBA (UOW, 2011) M.Sc. Comp. Sci. (BUK, 2015), PhD. Comp. Sci. (MAUTECH, 2019)*
22	*Dr. M.K. Ahmed*	*Lecturer I*	*F/T*	*PhD CS (MAUTECH, 2019), MSc CS (UDU, 2016), BSc. CS (GSU, 2010)*
23	*Dr. M.A. Usman*	*Lecturer I*	*F/T*	*PhD Cs (USM, 2020) MSc. CS (ADSU, 2014) BSc. CS (ATBU, 2005) IEEE, MIAENG, NCS, TRCN*
24	*Y. Atomsa*	*Lecturer I*	F/T	*B.Sc. Comp. Sci. (ADSU, 2006), M.Sc.*

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				Comp. Sci. (Uni. Hong Kong, 2011)
25	Dr. O. David	Lecturer II	F/T	B.Sc. Maths (UNAD,2007); M.Sc. Maths (UniAbuja, 2013). PhD. Maths (FUTMinna,2017) Publication - 18
26	*A. Nuraini*	*Lecturer II*	*F/T*	*B. Tech. Comp. Sc. (ATBU, 2010) MSc. Software Engr.(UTHM,2015)* *Publication: 6*
27	A. M. Umar	Lecturer II	F/T	NCE. Maths/Geo (2001); B.Sc. Maths (BUK, 2010). M.Sc. Maths (BUK,2017) Publication – 2
28	*M.B. Jibrin*	*Assistant Lecturer*	*F/T*	*B.Sc. Comp. Sc. (KSU 2008) MSc. Comp. Sci. (Uni.Ilorin, 2018)* *Publications: 9*
29	Dr. A. Auwal	Assistant Lecturer	F/T	B.Sc. Maths (Unijos,2011); M.Sc. Maths (Unimaid, 2007), PhD Maths (UPM,2020)
30	*A.J. Ibrahim*	*Assistant Lecturer*	*F/T*	*B.Tech. Software Engr.(UTM, 2013) MSc. Comp. Sci. (UTM, 2015)*
31	*U.A. Jauro*	*Assistant Lecturer*	*F/T*	*B.Sc. Info. Tech (MU 2012) M.Sc. Info. Tech (MU 2013).*
32	*N.A. Muhammad*	*Assistant Lecturer*	*F/T*	*BSc. Comp. Sci. (ABU, 2014) MSc. Comp. Sci. (India, 2019)*

33	*D.O. Silas*	*Assistant Lecturer*	*F/T*	*BSc. Comp. Sci. (FUT, Minna, 2013),MSc. Comp. Sci. (ABU, 2017)*
34	A.D. Azi	*Assistant Lecturer*		B.Tec. Maths(FUTY,2012) MSc. Maths (FUTY,2018)
35	A. Bernard	*Assistant Lecturer*	F/T	B.Sc Maths (BSU,2006) MSc Maths (NSU,2010)
36	U. Umar	*GA*	*F/T*	*BSc. Comp Sc. (BUK, 2013)*
37	S.Y. Danjuma	*GA*	*F/T*	*BSc. Comp Sc. (Bingham uni, 2016)*
38	U.I. Ismail	*GA*	*F/T*	*BSc. Comp Sc. (GSU, 2015)*
39	Z.D. Babantakko	*GA*	*F/T*	*BSc. CS (2015)*
40	S.M. Shehu	*GA*	*F/T*	*BSc. Comp Sc. (SUM, 2015)*
41	A. Umar	*GA*	*F/T*	*BSc. Comp Sc. (NIMS Uni India, 2015)*
42	M.B.A Aisha	*GA*	*F/T*	*BSc. Comp Sc (2013)*
43	B.M. Ali	*GA*	*F/T*	*BSc. Maths (FUK, 2016)*
44	H.J. Ankale	*GA*	*F/T*	*BSc. Maths (ATBU, 2017)*
	H.S. Abdullah	*GA*	*F/T*	*BTech. Maths (ATBU, 2015)*
	A.S. Joseph	*GA*	*F/T*	*BSc. Maths (FUK, 2015)*
	S.S. Kada	*GA*	*F/T*	*BSc. Maths (GSU, 2016)*
	A.S. Yayangida	*GA*	*F/T*	*BSc. Maths (FUD, 2016)*

(B) LABORATORY STAFF

i. Computer Laboratory I

Name	***Rank/Designation Date of First Appointment***	***Qualifications, Dates Obtained Membership of Professional Association***
Aliyu abdullahi	*Data Processing Officer, 2019*	*HND CS (2016), ND CS (2013)*
Adamu Mohammed Mangadu	*Lab Computer Assistant,, 2012*	*Advance Cert. (2012),* *ND CS (2005)*

ii. Computer Laboratory II

Name	***Rank/Designation Date of First Appointment***	***Qualifications, Dates Obtained Membership of Professional Association***
Yakubu Abubakar Maidu	System Analyst II, 2019	B.Tech. CS (2013)
Ibrahim Abubakar	*Senior Science Lab. Assistant I, 2018*	*OND Computer Operation, 2010*

iii. Computer Laboratory III

Name	***Rank/Designation Date of First Appointment***	***Qualifications, Dates Obtained Membership of Professional Association***
Fada Maikano	System Analyst II, 2019	B.Sc. CS (2018)
Ahmed Abubakar	*Senior Computer Operator, 2019*	*Internal Adavance Diploma in Computing (2007)* *Diploma Diploma in Computing (2007)*

iv. Computer Hardware Maintennce Laboratory

Name	***Rank/Designation Date of First Appointment***	***Qualifications, Dates Obtained Membership of Professional Association***
Abdullahi Yerima Abubakar	*Senior system Analst, 2018*	*B,Eng (Computer Engeering)*
Bashir Abubakar	*Senior Computer Techncians, 2015*	*Diploma in Computer Studies, 2005, Cert in Computer Studies, 2004*

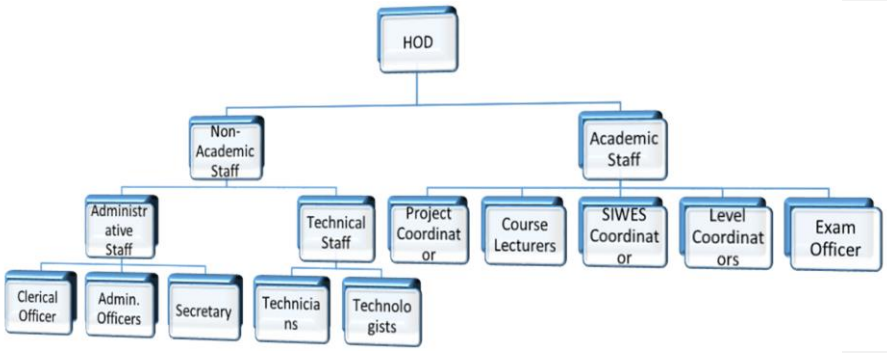
(C) **ADMINISTRATIVE NON-TEACHING STAFF**

Name of Staff	***Rank/Designation Salary Scale and Date of First Appointment***	***Qualification and Dates Obtained***	***Post Qualificatin Work Experience***	***Remarks***
Caroline Idajor Samuel	*Senior Confidential Secretary, 2018*	*HND Secretarial Studies, (2010), ND Secretarial Studies*	*FUK, 2015to Date*	*Departmental Secretary*

Abdulrahman Tijjani	*Administrative Officer,* *CONTISS 8, 28/8/2017*	*B.A.(Ed) Islamic Studies (2012)*	FUK, 2017 to Date	AO incharge of general administration
Theophilus Albert	*Administrative Assistant,* *CONTISS 7/2, 20/5/2019*	*B.Sc. Sociology & Anthropology (2014)*	*FUK, 2019 to Date*	AO in charge of student matters
Nuhu Muhammad Abubakar	*Administrative Assistant,* *CONTISS 7/2, 24/5/2019*	*B.A.(Ed) Islamic Studies (2015)*	*FUK, 2019 to Date*	AO incharge of senior staff matters
Dauda Abubakar	*Administrative Assistant,* *CONTISS 7/3, 16/1/2018*	*B.Sc. Business Administration (2011)*	*FUK, 2018 to Date*	AO incharge of junior staff matters
Sule A. Uba	*Clerical Officer,CONTISS 3/3, 5/7/2016*	*Basic Cert. ICT (2016)* *SSCE (2014)*	*FUK, 2016 to Date*	*Inchage of file and memo movement*

ORGANIZATIONAL STRUCTURE OF THE DEPARTMENT

The Department is headed by the Head of Department (HOD) who assigns duty and responsibilities to staff. The departmental activities are guided by the regulations approved by the University Senate and supervised by the Dean of School. The Organization Structure is shown in the Figure below. The Department uses a committee system with the Departmental board as its highest decision-making body after the committees. The HOD chairs all the meetings of the Departmental Board while the secretary who is appointed from the members of academic staff takes the minute, prepares, and circulates it in readiness for the next meeting. He/she is assisted by an other staff.



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1.0 HISTORICAL BACKGROUND OF THE DEPARTMENT

Bachelor of Science (B.Sc.) in Computer Science was started in the Department of Mathematics and Computer Science in August 2012. The Department of Mathematics and Computer Science is one of the departments in the Faculty of Science established in August 2012 with four (4) academic staff and seventeen (17) students at the takeoff side. Since then, the Department enjoys a very solid backing and support of the Vice-Chancellor and the University Management, currently, the Department has a total of thirty five academic staff on permanent and pensionable status excluding Graduate Assistants and those on study fellowship, six administrative staff, and three Technologists.

The Departments has computer laboratories, lecture rooms, lecture theaters and staff offices.

Currently, the Department offers Bachelor of Science (B.Sc.) degree programmes in Computer Science, Mathematics and Statistics with a total enrollment of five hundred and fifty five (555) students.

The pioneer Acting Head of Department was Mr. Yusuf Enoch Simon an Assistant Lecturer who served from 2012 to 2014. Dr. P.B. Zirra a Senior Lecturer succeeded him from 2014 to 2018. Between 2018 and 2020, Dr. Asabe Ibrahim a Senior Lecturer became the third Head of Department. Professor P.B. Zirra took over again from Dr. Asabe Ibrahin as Head of Department on 1st November, 2020 till date.

2.0 VISION

To reinforce, extend, and diversify our strengths in interdisciplinary innovation and collaboration while striving to become recognized for addressing critical, scientifically important problems through education and research in Computer Science.

3.0 MISSION

The Computer Science Programme of Mathematics and Computer Science Department strives for excellence in creating, applying and imparting knowledge in Computer Science and Engineering through comprehensive educational programs, research in collaboration with industry and government, dissemination through scholarly publications, and service to professional societies, the communities and the world at large.

4.0 PHILOSOPHY

The Computer Science Programme is particularly designed to produce quality graduates who are practically oriented so as to provide the much needed solutions to problems in any field of Education, Science, Engineering, Business, Banking, Healthcare, Agriculture etc.

5.0 AIM AND OBJECTIVES

The aim of this programme is to produce high quality Computer Science graduates with a range of knowledge and skills to be able to impact positively and provide solutions to problems in various fields of Human endeavour locally and internationally. The specific objectives are:

i. To provide a broad and balanced foundation in Computer Science knowledge and practical skills.
ii. To prepare students for further graduate studies in the field of Computer Science.
iii. To reinforce, extend, and diversify students' strengths in interdisciplinary innovation and collaboration.
iv. To produce graduates with the ability and expertise to conduct and lead research in all aspects of Computer Science which will be in turn beneficial to the economic, social and scientific needs of human beings.
v. To provide quality undergraduate and graduate education in both the theoretical and practical aspects of Engineering, Electronics, Information theory, Logic, human behaviour and train students to effectively apply this education to solve real-world problems thus amplifying their potential for lifelong high-quality careers.
vi. To develop and offer dynamic programs in Computer Science that will prepare students to be self-reliant and job creators.
vii. To produce Computer Science graduates that will compete favourably with their contemporaries in the labour market and the worlds at large.

6.0 COURSE ASSESSMENT

Each course is assessed by a continuous assessment which includes assignments, tests, practical and end of semester examination.

(a) The practically based courses are assessed according to the following distribution:
- Practical: 20%
- Assignment and Test: 20%
- End of Semester Examination: 60%
- Total Weighting for the course: 100%

(b) The non- practically based courses are assessed according to the following distribution:
- Assignment and Continuous Assessment Test: 40%
- End of Semester Examination: 60%
- Total Weighting for the course: 100%

Commented [3]: is this the NUC standard today?

7.0 ADMISSION / ENTRY REQUIREMENT

a) U.T.M.E. Applicants: Five ordinary level passes at credit level in English, Mathematics, Physics and any other two relevant science subjects from ICT/Computer Studies, Chemistry and Biology/Agricultural Science, Geography and Further Mathematics in not more than two (2) sittings. In addition, applicants are expected to sit for the relevant U.T.M.E. subjects (Mathematics, Physics and any one of

Biology/Agricultural Science, Chemistry and Geography) obtain the minimum cut off points as may be specified from time to time by the Joint Admission and Matriculation Board (JAMB).

b) **Direct Entry (D.E.) Applicants**: The D.E. applicants are expected to have the following:

i. Five ordinary level passes at credit level in English**,** Mathematics, Physics and any other two relevant science subjects from ICT/Computer Studies, Chemistry and Biology/Agricultural Science, Geography and Further Mathematics in not more than two (2) sittings.
ii. National Diploma/NCE (not professional) in Computer Science with Upper Credit or I.J.M.B. in relevant subjects (Mathematics and Physics as core and any other one from Chemistry, Biology or Geography) with a minimum of ten (10) points.

8.0 GRADING SYSTEM

Students' academic work shall be graded at the end of every semester using the following letter grades

Letter	Grade	Marking Scale (%)	Grade Points
A	70 –100	Excellent	5 Points
B	60 – 69	Very Good	4 Points
C	50 – 59	Good	3 Points
D	45 – 49	Average	2 Points
E	40 – 44	Pass	1 Point
F	0 – 39	Fail	0 Point

9.0 EXAMINATION

Course Credit System: The department has adopted the Course Credit System in computing results of students' performance. It is a quantitative system of organization of the curriculum in which the subject areas are split into examinable unit courses that are assigned weights or Credit Units (e.g. 1 Unit, 2 Units, 3 Units, etc) and for which credits are earned after passing them. The course (Core, general and elective) are arranged in progressive order of difficulty or in levels of academic progress e.g. Level 1 or 100 Level or Year 1 donated as 1201, 1301, 1402, etc; Level 2 or 200 Level or Year 2 designated as 2301, 2301, 2202, etc. the first digit represents the level, the second digit represents the credit unit, the third and fourth digits represent the serialization of the course.

Credit: Is generally a 'Value' used to measure a students workload in terms of learning time required to complete course units, resulting in learning outcomes. The number of credits awarded to a learner is determined by Credit Value or Credit Points assigned to a particular course.

Course: A course is essentially a constituent of a 'Program' and may be conceived of as a composite of several learning topics taken from a certain knowledge domain, at a certain level. A 'Course' in simple terms corresponds to the word 'subject' used in many Universities.

Core Courses: These are compulsory courses that each student must register for and pass before graduating.

General Courses: These are compulsory Courses offered by all students at a particular level and must pass them before graduating.

Elective Courses: These are optional (not compulsory) courses designed for the student to make up the minimum credit units for registration.

Credit Unit (CU): This is a measure of the 'Workload' of a learner and is an index of student-teacher contact hours per week per semester e.g. 1 credit unit means one hour of lecture or tutorial etc per week per semester.

Grade Point (GP): The grade point derives from the actual percentage, raw score for a given course; the raw score is converted into a letter grade and hence the grade point. Each grade, except 'Inc' and 'Pnd' is assigned a Grade Point as follows:

Raw score	70-100	60-69	50-49	45-49	40-44	0-39
Letter Grade	A	B	C	D	E	F
Grade Point	5	4	3	2	1	0

Credit Point (CP): The credit point is the product of the credit units of the course and the grade point. For example, if a student obtains a C in a 2 credit unit course then his/her credit point is *2 x 3 = 6.*

Total Credit Unit Registered (TCUR): This represents the total number of credit units registered by a student in any given semester.

Total Credit Unit Earned (TCUE): This represents the number of credit units for which a student has sat for in examination and passed in a semester.

Weight Grade Point (WGP): The sum of Grades Points of courses offered in a semester (i.e.$WGP = \sum GP$).

Grade Point Average (GPA): Performance in any semester is reported in Grade Point Average. This is the average of weighted grade points earned in the courses offered in

a semester. The grade point average is obtained in each semester by summing the grade point of courses offered in the semester and then divide it by the total number of credit units registered for the semester.

$$GPA = \frac{Weighted\ Grade\ Point\ (WGP)}{Sum\ of\ Credit\ units\ Registered\ (CUR)}$$

Suppose a 100-Level student in Computer Science has the following results for a session.

FIRST SEMESTER

Course	MTH1201	MTH1203	MTH1205	CSC1201	STA 1201	GST 1201
Credit Units (CU)	2	2	2	2	2	2
Raw Score	50	60	70	45	38	40
Grade	C	B	A	D	F	E
GP	3	4	5	2	0	1
GPxCU	6	8	10	4	0	2

$$GPA = \frac{Weighted\ Grade\ Point\ (WGP)}{Sum\ of\ Credit\ units\ Registered\ (CUR)} = \frac{(6+8+10+4+0+2)}{12} = \frac{30}{12} = 2.5$$

Cumulative Grade Point Average (CGPA): This is the up to date average of the grade points earned by the student in a program of study. It is an indication of the student's overall performance at any point in the training program. To compute the CGPA, the total weighted grade points gained in the semesters attended is divided by the total number of credit units for all courses registered by the students.

i.e. **CGPA** $= \frac{Total\ Weighted\ Grade\ Points\ Earned\ for\ the\ session}{Total\ Credit\ Units\ Registered\ for\ the\ session} = \frac{TWGP}{TCUR} = \frac{WGP_1 + WGP_2}{CUR_1 + CUR_2}$

Where WGP_1 and WGP_2 are weighted grade points Earned for first and second semesters, CUR_1 and CUR_2 are credit units registered for first and second semesters respectively. This calculation is carried out up to the final year from which the final CGPAs will determine the class of degree.

Since the minimum pass mark of a course is 40% corresponding to a GP of 1.00, the minimum CGPA of 1.00 is required for graduation. An example of how the above

mentioned terms are used in calculating CGPA is given in tables below for a 100 Level Computer Science as an illustration.

Computation of CGPA (example)

- **a.** Total Credit Units Registered (TCUR)
- **b.** Total Credit Units Earned (TCUE)
- **c.** Total Weight Grade Point (TWGP)

SECOND SEMESTER						
Course	MTH1202	MTH1204	MTH1206	STA1202	GST1202	GST1204
Credit Units (CU)	2	2	2	2	2	2
Raw Score	55	60	63	45	56	60
Grade	C	B	B	D	C	B
GP	3	4	4	2	3	4
GPxCU	6	8	8	4	6	8

$GPA = \frac{(6+8+8+4+6+8)}{12} = \frac{40}{12} = 3.33$

$The\ CGPA = \frac{WGP_1 + WGP_2}{CUR_1 + CUR_2} = \frac{(6+8+10+4+0+2)+(6+8+8+4+6+8)}{12 \quad + \quad 12} = \frac{30+40}{12+12} = \frac{70}{24} = 2.92$

Cumulative

TCUR	**TCUE**	**TWGP**	**CGPA**
12+12=24	10+12=22	30+40=70	70/24=2.92

Therefore the CGPA for that level = 2.92

Instructions to Candidates on Examination

a) A candidate must arrive at the examination Hall 30 minutes before the commencement of the examination.

b) A candidate who arrives late for any examination shall not be allowed extra time.

c) No candidate shall remove a question paper from the examination room without the consent of the Chief Invigilator.

d) In case a candidate has to leave the examination room temporarily he/she shall be accompanied by an invigilator or security personnel.

e) No candidate shall be allowed to enter an examination room later than 30 minutes after the start of an examination session. However any candidate who seeks entry into the examination room after the first 30 minutes may be allowed to do so by the Chief Invigilator but such cases shall be reported in writing to the Examination Committee.

f) No candidate is allowed to leave the examination Hall 30 minutes to the end of the examination.

g) No candidate shall take into an examination room or have in his/her possession during an examination any book or paper, printed or written documents, whether relevant to the examination or not, unless specifically authorized to do so. An invigilator has authority to confiscate any such documents or items.

i) A candidate shall not directly or indirectly;

   i. Give assistance to any candidate.
   ii. Accept any assistance from any other candidate during the examination.

j) A candidate shall not remove from an examination room any papers used or unused, except the question paper and such books or papers, if any, as he/she was authorized by the invigilator to take into the examination room. The invigilator will indicate occasions when question papers may not be taken out of the examination room.

k) A candidate shall not be allowed during an examination to communicate in any way with any other candidate, nor shall he/she leave his/her seat except with the consent of an invigilator. Should the candidate act in such a way as to disturb or inconvenience other candidates he/she shall be warned and if he/she persists he/she may, at the directive of the chief invigilator, be expelled from that examination room.

l) A candidate shall comply with all instructions to candidates set out on the examination answer booklet or other examination materials supplied to him/her, and shall comply with directives given by the invigilator.

m) A candidate shall not write on any paper other than the answer booklet of the examination except when indicated. All rough work must be done in the answer

booklet and crossed out neatly. Supplementary answer sheets, even if they contain only rough work, must be tied inside the main answer booklets and handed in.

n) When leaving the examination room, a candidate shall not leave his/her written work on the desk but he/she shall hand it over to the invigilator. Candidates are responsible for the proper return of their written work.

o) Smoking, chewing and eating shall not be permitted in examination rooms during examination sessions.

p) Any candidate involved in examination misconduct must complete the misconduct form or write a statement as demanded by the invigilator stating clearly his/her level of involvement. Such a report should be signed by the candidate and dated.

q) Candidates who have been requested by an invigilator to change their seats must comply with the directive.

r) All candidates must ensure that they have signed in and out on the Attendance list when their scripts are submitted to the invigilator at the end of each examination.

10.0 STUDENT ACADEMIC WORKLOAD

All full-time students shall take a minimum of 15 credit units and a maximum of 24 credit units per semester. A student may apply to take less or more than the limit through the Faculty Board for Senate's consideration if threaten by residency.

11.0 ACADEMIC PROBATION

A student shall be placed on Academic Probation if he/she fails to maintain a minimum CGPA of 1.00 at the end of the session. The probationary status of a student shall be reversed if the student maintains a CGPA of at least 1.00 in any subsequent semester after the first year.

The responsibility to reverse the probationary status rests with the student.

A preliminary notice of poor academic standing shall be given to a student in writing by the University.

Commented [4]: Have we being issuing this to the affected students?

12.0 TEACHING AND LEARNING

We use a wide range of teaching methods to suit the content and aims of each course unit:

a. **Fieldwork**: Students undertake directed work and independent research projects to develop observation, experimental design and data collection skills.
b. **Tutorials**: regular sessions with an advisor and small group of students to develop oral and written communication, team working and problem-solving skills whilst exploring topics related to their degree discipline.
c. **Lectures**: delivered to audiences ranging from 20 to 500 students using technology such as powerpoint.
d. **E-learning**: our virtual learning environment provides learning resources on demand (discussion boards, quizzes) to enhance and support lecture based units.
e. **Practical**: undertake modern experimental techniques to develop laboratory, experimental design, and data analysis skills.
f. **Seminars**: examine and debate topical areas of research to develop the students' critical thinking and communication skills.
g. **Projects**: carry out an independent research project which could solve real life problems.

13.0 WITHDRAWAL FOR ACADEMIC FAILURE (WAF)

A student shall be required to withdraw for academic failure if he/she at the end of any session fails to maintain a CGPA of at least 1.00. However, this rule shall not apply to the first year students.

However, a student in his/her final year of study who fails to make a minimum CGPA of 1.00 may be allowed to register for courses in the final year. Such students who fail to make a minimum CGPA of 1.00 in the concession year shall be asked to withdraw from the University.

Commented [5]: is it withdrawal of university or course?

14.0 DURATION OF PROGRAMME

Expected duration for UTME candidates shall be four years, while that of DE shall be three years.

15.0 RESIDENCY PERIOD

The residency period for a UTME candidate to graduate is six years, while it is four and half years for DE candidates.

Commented [6]: is it five years or 4.5 years?

16.0 GRADUATION REQUIREMENTS FOR BACHELOR'S DEGREE

In order to qualify for the Bachelor's Degree in Computer Science of this Department, students must attain:

i. A passing grade in supervised Student Industrial Work Experience Scheme, (SIWES) where applicable;

ii. A minimum of CGPA of 1.00;

iii A minimum of 156 TCU and 112 TCU including SIWES for UTME and DE admission respectively. A transfer student must earn a minimum of 112 units and

Commented [7]: and what???

iv. A passing grade is required in all compulsory courses. A student may take some Elective courses to meet graduation requirements.

17.0 FINAL CLASSIFICATION OF DEGREE

For the purpose of final classification of degree, a student should have achieved the following CGPA at the end of his/her study.

CGPA		CLASS OF DEGREE
4.50 – 5.00	-	First Class
3.50 – 4.49	-	Second Class (upper Division)
2.40 – 3-49	-	Second Class (Lower Division)
1.50 – 2.39	-	Third Class
1.00 – 1.49	-	Pass

18.0 PROGRAMME STRUCTURE

18.1 Structure:

The duration for B.Sc. Computer science programme is four academic sessions and every academic session comprises two semesters. At 300L, a student is required to go for a six(6) months Student Industrial Work Experience Scheme (SIWES) after finishing the first semester courses. At the end of the SIWES, a student has to write, present and defend a technical report on what he/she learnt in the industry. A student with more than 10 cumulative units backload (carry over and dropped courses) is not eligible to proceed to SIWES. At 400 Level, each student undertakes a one year project in any field of interest besides the normal stipulated courses. A report on the project will also be presented and defended by the student.

18.2 SUMMARY OF CREDIT LOAD DISTRIBUTION BY SEMESTER AND LEVEL

LEVEL	SEMESTER		TOTAL CREDIT
	FIRST	SECOND	
100	24	20	44
200	23	22	45
300	24	6	30
400	17	20	37
TOTAL	U.T.M.E		156
	D.E		112

19.0 COURSE CODING/NUMBERING/DESCRIPTION

Each course offered in Computer Science has as its prefix the letters CSC which indicates a Computer Science Course. The letters CSC are followed by a four digit numbers; the first digit indicates the level to which the course belongs, the second digit, is the credit unit(s) and the last two digits indicates the serialization of the course in any given semester – an odd number indicates a first semester course whereas an even number indicates a second semester course.

19.1 Courses in curriculum on a semester –by-semester basis

100 LEVEL First semester

Code	Course Title	CU	P/req	L	T	P
MTH1301	General Mathematics I: Algebra and Trigonometry	3		3	1	
MTH1303	General Mathematics III: Vectors, Geometry and Dynamics	3		3	1	
CSC1301	Introduction to Computer Science	3		3	1	3
CSC 1203	IT Essentials: PC Hardware & Software	2		2	1	2
STA 1301	Introductory Statistics	3		**3**	**1**	

PHY 1311	Gen. Physics I (Mechanics, Thermal Physics and Waves)	3				
PHY 1171	General Physics Laboratory I	1				
CHM 1301	General Chemistry I	3				
GST 1201	Communication in English I	2				
GST 1105	Introduction to Service – Learning I	1				
Total		24				

Second semester

Code	Course Title	CU	P/req	L	T	P
CSC 1302	Introduction to Problem Solving	3		3	1	3
MTH1302	General Mathematics II: Calculus	3		3	1	
STA 1304	Statistical Inference	3		3	1	
PHY 1322	Gen. Physics II (Electricity, Magnetism and Modern Phy.)	3				
PHY 1172	General Physics Laboratory II	1				
GST 1202	Communication in English II	2				
GST 1204	Use of library, studies skills and ICT	2				
GST 1106	Introduction to Service – Learning II	1				
Total		**18**				

200 LEVEL First semester

- Core courses

Code	Course Title	CU	Prerequisite	L	T	P
CSC 2301	Computer Programming I: Java	3	CSC 1301, CSC 1302	3	1	3
CSC 2303	Data Management I	3		3	1	3
CSC 2305	Operating System I	3		3	1	3
CSC2207	Computer Hardware	2	CSC 1203	2	1	2
CSC 2309	Discrete Structure	3			1	
MTH 2301	Mathematical Methods I	3				
MTH 2205	Linear Algebra I	2				
GST 2201	Nigerian People and Culture	2				
GST 2203	Entrepreneurship and Innovation I	2				
Total		**23**				

Second semester Core courses

Code	Course Title	CU	Prerequisite	L	T	P
CSC 2302	Computer Programming II: C++	3	CSC 1302	3	1	3
CSC 2304	Fundamentals of Data Structures	3	CSC 1302	3	1	3
CSC 2306	Foundation of Sequential Programming	3		3	1	3
CSC 2308	Internet Technology	3		3	1	3
MTH 2308	Introduction to Numerical Analysis I	3				
PHY 2342	Electric circuit and electronics	3				

GST 2202	Logic, Philosophy and Human Existence	2				
GST 2208	Peace Studies and Conflict Resolution	2				
	Total	**22**				

300 LEVEL First semester Core courses

Code	**Course Title**	**U**	**Prerequisite**	**L**	**T**	**P**
CSC 3301	Structured Programming	3	CSC 2301, CSC 2302	3	1	3
CSC 3303	Algorithm and Complexity Analysis	3	CSC 2304	3	1	3
CSC 3305	Data Management II	3	CSC 2303	3	1	3
CSC 3307	System Analysis and Design	3		3	1	3
CSC 3109	Survey of Computing in IT Industries	1				
CSC3315	Object Oriented Programming	3	CSC 2301, CSC 2302	3	1	3
CSC 3317	Computational Science and Numerical Methods	3		3	1	3
CSC 3319	Operating System II	3	CSC 2305	3	1	3
GST 3201	Enterprise Business Creation and Growth II	2				

Total	**24**				

Second semester

Code	Course Title	U	Prerequisite
CSC 3699	Students Industrial Work Experience Scheme (SIWES)	6	
Total		**6**	

400 LEVEL First semester

- **Core courses**

Code	Course Title	U	Prerequisite	L	T	P
CSC 4301	Software Engineering	3	CSC 3307	3	1	3
CSC 4303	Net-Centric Computing	3	CSC 2308	3	1	3
CSC 4305	Computer Architecture and Organization	3	CSC 1203, CSC 2207	3	1	3
CSC 4307	Compiler Construction	3		3	1	3
CSC 4309	Computer Networks and Communications	3		3	1	3

CSC 4211	Research Methods in Computing Sciences	2		2	1	2
Total		**17**				

Second semester

- **Core courses**

Code	Course Title	U	Prerequisite	L	T	P
CSC 4202	Human Computer Interface	2		2	1	2
CSC 4204	Formal Methods and Software Developments	2		2	1	2
CSC 4406	Survey and Organization of Programming Languages	4	CSC 3315, CSC 3301	4	1	3
CSC 4308	Artificial Intelligence	3		3	1	3
CSC 4699	Project	6				
Total		**17**				

- **Elective courses:** A minimum of 3 credit units from the following:

CSC 4310 Project Management 3 Units
MTH 4318 Operations Research 3 Units
CSC 4314 Optimization Techniques 3 Units
CSC 4315 Computer System performance 3 Units
CSC 4316 Computer Graphics and Visualization 3 Units
CSC 4317 Distributed Computing system 3 Units
CSC 4319 Formal models of computation 3 Units
CSC 4318 Computer Simulation 3 Units
CSC 4220 Computer Security and Privacy 2 Units

CSC 4318: Computer Simulations (3 Units)

Status - elective

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 process, Poisson Processes. Random Numbers; types of Random Number Exercises.

CSC 4319: Formal Models of Computation (3 Units)

Status - elective

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 4220: Computer Security and Privacy(2 Units)

Status - elective

Introduction to Computer Security and privacy issues in various aspects of computing: meaning, comparing security with privacy; types of threats and attacks; methods of defense. Program Security: secure program; nonmalicious program errors; malicious code; control against program threats. Operating System security: methods of protection; access control, user authentication, Network Security, Database Security and privacy. Physical security, economic security, legal and ethical issues.

CSC 4699: Project (6 Units)

Pre – requisite - CSC 4311

Status - Core

Students should embark on work that will lead to substantial software development under the supervision of a member of staff in the field of Computer Science. It will spread over both semesters.

COURSE DESCRIPTIONS

CSC 1301: Introduction to Computer Science: (3 Units)

Status - Core

Overview of the discipline of computer Science; General Structure of a computer system; Historical development of Computer system; Generation of Computer systems; Computer

Operations, Internal structure of computer Hardware, Characteristics of computer, micro computer technology, computer number system, computer arithmetic, computer data representation schemes, low and high languages, source and object programs, translators, storage, manipulations and retrieval of data. Internet and its facilities, basic file processing concepts. Introduction to Program development, flow charts and algorithms using BASIC fundamentals.

CSC 1302: Introduction to Problem Solving: (3 Units)

Prerequisite – CSC 1301

Status - Core

Problem solving strategies, Role of algorithms in problem solving process, implementations strategies, concepts and properties of algorithms. Program: Development; Flowcharts and algorithms; Program Objects. Operators, expression and assignment, conditional statement, Boolean expression, scope of identifier, lifetime of variable, Arrays. Students are expected to translate their algorithm, pseudocode, flowchart to VB language. Laboratory exercise using Visual Basic

CSC 1203: IT Essentials: PC Hardware and Software

Status - Core

Overview of information technology, Character User interface (with reference to MSDOS), Computer Installation, requirements, computer assembly step – by – step, basis of preventive maintenance and troubleshooting, operating system capabilities, identification and description of main components of laptops and portable devices and their basic maintenance. Basic preventive maintenance of printers and scanners. Fundamentals of networks: definition, types, technologies and importance. Replacement or upgrading personal computer components.

CSC 2301: Computer programming I: Java (3 Units)

Prerequisite – CSC 1301, CSC 1302

Status - Core

Algorithm development, designing, coding, debugging and documentation programmes using techniques of a good programming language style, programming language and programming algorithm development.Creating, compiling and executing program, Anatomy of Application Program: comments, reserved words, modifiers, statements, blocks, classes, methods etc Primitive data types and operations, Control Statement, Methods, objects and classes. Arrays and vectors, String manipulations, creating user interface. Laboratory exercise using programming language (Java) to implement a variety of programs.

CSC 2303: Data Management I (3 units)

Status - Core

Introduction to DBMS Technology, Information storage & retrieval, Information management applications, Information capture and representation, analysis and indexing, search, retrieval, information privacy; integrity, security; scalability, efficiency and effectiveness. File processing.

Introduction to database systems: Components of database systems, DBMS functions, Database architecture and data independence, Entity Relational Model – concept and practice, interpretation and representation of case scenarios using ER tools. Use of database query language – forms and standard, DDL, DML and DCL command. Laboratory exercise using Structured Query Language.

CSC 2305: Operating System I (3 Units)

Status - Core

Overview of O/S: Definition, Role and Purpose, Types of operating Systems; real time (single – user/multi user), timesharing, functionality mechanisms to support Client – Server models, hand-held devices, concurrent programming batch versus time sharing, multi processing systems; the supervisor, resources allocation and deallocation, interrupt and interrupt handling,

memory organization, virtual memory & virtual machine, remote job entry, Design Issues influences of security, networking, multimedia, Windows. CPU Scheduling, Process Management, O/S Principles: Structuring methods Abstraction, Concepts of APIS device organization interrupts. Laboratory exercise using a microcomputer operating system, e.g. Windows, Linux

CSC 2207: Computer Hardware: (2 Units)

Status - Core

Computer circuits; diode arrays, PLAs, 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 converter.Analog Computers: channels and interrupts.

CSC 2302: Computer Programming II using C++ (3 Units)

Prerequisite – CSC 2301

Status - Core

Principles of good programming, structured programming concept, Introduction: History of C and C++. Basic structure of a C++ program: Generic form , Header files, Define constants, Main, Local variables, Basic input/output statements, Simple program. Variables, data types, and expressions. Program control, Arrays: One dimensional arrays, Multi dimensional arrays, String manipulation functions, Pointers. Debugging and testing, string processing, internal searching and sorting, recursion.Creating user interface and Object Linking and Embedded (OLE). Laboratory exercise using C++ programming language to implement a variety of programs.

CSC 2304: Fundamentals of data Structures (3 Units)

Pre – requisite – CSC 2301, CSC 2302

Status - Core

Data Structure and representation, Basic data types. Relations between algorithm and data structure, linear data structure, Arrays, linear linked list, stacks and heap allocation, queues, tree structures, non-linear data structure applications. Graph, binary trees, transversal algorithm, multi-linked structure.Dynamic storage allocation and storage management. Searching and sorting algorithms. Symbols tables and hashing.Higher level language data-handling facilities.Implementation Strategies for stack, queues, trees. Run time Storage management; Pointers and References.Records Strings and String processing, Data representation in memory.

CSC 2309: Discrete Structure: (3 Units)

Basic set Theory: Basic definitions, Relations, Equivalence Relations Partition, Ordered Sets. Boolean Algebra & lattices, Logic, Graph Theory, Matrices; Integer and Real and matrices, Boolean Matrices, Path matrices. Adjacency matrices. Application to counting, Discrete probability Generating functions.

CSC 2306: Foundations of Sequential Program: (3 Units)

Pre – requisite – CSC 2301

Status - Core

The relationship between High-level languages and the Computer Architecture that underlies their implementation; fundamentals of compilation of computer programs to machine-executable code.The functional components of computer (CPU, memory, I/O) and their interactions.Representation of data in a computer; its manipulation at the machine-language level and in high-level languages.Assembly language and the manipulation of an assembler.Overall structure of a compiler and the functions of its components.Purpose and functions of linkers and loaders.Specification and recognition of regular languages and their use in lexical analysis; lexical analysis tools.Specification and parsing of context-free language; parsing tools.Semantic analysis and code generation for procedural languages.

CSC 2308: Internet Technology: (3 Units)

Status – Core

Prerequisite - CSC 2301, **CSC 1301**, **CSC 2303**.

WWW: Definition, history and fundamental concepts. HTML: Document structure, images, maps, table, frames and forms. HTTP, TCP/IP, URL's server technology. JavaScript: Syntax, DOM, Form processing, common tasks. Style sheets: fundamentals CSS formatting, CSS positioning and standard. DHTML: Dynamic techniques, proprietary techniques. Web design and usability: principle of navigation, usability, style grids and standard. Multimedia: Audio, animation, multimedia server and protocol technology. Web programming-Introduction to PHP – SQL – Connecting Databases using ODBC – files – forms – images – Imap object.Web development tools: Editors, site management tools. Laboratory exercise and group project on web development to meet the needs of the society (service learning).

CSC 2312: Theory of Computation: (3 Units)

Status - elective

Finite Automata, Turning machine, Recursively enumerable sets, Halting problem, computation and Decidable. Predicate logic validity problem, Deduction, Herbands procedure, Robinson's resolution rule. Program verification; formal semantics.Chomsky hierarchy, regular, context sensitive and unrestricted grammars, characterization closure properties, algorithms and limitations.Models of computation, universal machines.Unsolvable problems, Church's thesis, Digital arguments.Reductibility, complexity classes.

CSC 3301: Structured Programming: (3 Units)

Prerequisite – CSC 2301, CSC 2302

Status - Core

Structured Programming elements, structured design principles, abstraction modularity, stepwise refinement, structured design techniques. Teaching of a structured programming language, e.g. C++/JAVA.Laboratory exercises using the programming language.

CSC 3305: Data Management II: (3 Units)

Pre-requisite – CSC 2303

Status - Core

Relational Databases, Mapping conceptual schema to relational Schema; Database Query languages (SQL), Normalization, concept of functional dependencies & multi – valued dependencies.Transaction processing; Concurrency Control, Distributed databases.create Database, select database, create tables, drop tables, insert records, update records, delete records, WHERE clause, Like clause, sorting data. Laboratory exercise.

CSC 3303: Algorithms and Complexity Analysis: (3 Units)

Pre-requisite – CSC 2306

Status - Core

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, Binary Search trees, Hash tables, graphs & its representation.

CSC 3307: Systems Analysis and Design: (3 Units)

Status - Core

System Concept; System Development Life Cycle, project identification and selection; system requirements analysis and feasibility study.

Analysis: Fact gathering Techniques, data flow diagrams, Process description, data modelling.

System Design: Structured charts, form designs, Security, automated Tools for design. Analysis techniques and tools e.g. Jackson System Development (JSD) techniques etc. HIPO Charts. Business system design; procurement, site preparation, system installation, system testing, system conversion; system project, report writing and presentation; system documentation; post installation evaluation; compilation of a real life systems analysis team project to provide experience in applying the principles and techniques presented above.

CSC 3109: Survey of Computing in IT Industries: (1 Units)

Status - Core

Students will be introduced to computing practices in industries through visitations to selected IT sections of governmental and non-governmental organisations. There will be no end of semester examinations for this course but students are to write and defend reports after the visitation, which shall be used for the semester assessment and grading.

CSC 3315: Object – Oriented Programming (3 Units)

Pre-requisite: CSC 2301, CSC 2302

Status - Core

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 handling, Applets and the Abstract, File input and output, Connection to database from java, Persistence, Window Toolkit, Laboratory exercise in an OOP language(Java). Students are to develop programs (e.g. student records, staff payroll, supermarket inventory system, etc) using the concept of OOP and Database connectivity.

CSC 3317: Computational Science and Numerical Methods: (3 Units)

Status - Core

An introduction to Scientific Computing using Matlab/Octave covering the fundamental programming concepts (data types, abstraction, control structures, I/O, modules) and demonstrating the use of Matlab/Octave to solve scientific computing problems from a variety of disciplines including physics, chemistry, biology, computer science, and mathematics. Topics to be covered include plotting, curve fitting, image processing, optimization, integration, differentiation, statistical analysis, ODE solving, and simulation.

CSC 3319: Operating System II: (3 Units)

Pre-requisite – CSC 2305

Status - Core

Concurrency: States and State diagram Structures, Dispatching and context switching; interrupts; Concurrent execution; mutual exclusion problem and some solution Deadlock; Models and mechanisms (Semaphores, monitors etc.). Producer – consumer Problems & Synchronization, P & V operations, resource protection. Multiprocessor issues. Scheduling & dispatching, Memory Management: Overlays, Swapping and Partitions, Paging and Segmentation Placement & replacement policies, working sets and Trashing, caching.

CSC 3699: Students Industrial Work Experience Scheme: (6 Units)

Pre-requisite – CSC 3109

Status - Core

Students are to undergo a six (6) months industrial training in IT related firms. A technical report which will be defended by the students in form of a seminar shall be submitted at the end of the exercise. A student with more than 10 cumulative units backload (carry over and dropped courses) is not eligible to proceed on industrial training.

CSC 4301: Software Engineering: (3 Units)

Pre-requisite – CSC 3307

Status - Core

Introduction, organization of software projects: project models, software project life cycle, Software Design: Software architecture, Design patterns, O.O. analysis & 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 modelingTools, Testing Tools, Tool integration mechanisms, Use of CASE tools - UML and UML extension.

CSC 4303: Net-Centric Computing: (3 Units)

Pre-requisite – CSC 2308

Status - Core

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

CSC 4305: Computer Architecture and Organization (3 Units)

Pre-requisite – CSC 1207

Status - Core

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

CSC 4307: Compiler Construction: (3 Units)

Pre-requisite – CSC 3307

Status - Core

Review of compilers, assemblers and interpreters, structure and functional aspects of a typical compiler, syntax semantics and pragmatics, functional relationship between lexical analysis, expression analysis and code generation. Internal form of course programme. Error detection and recovery. Grammars and languages: the parsing problem. The scanner. Grammar and language recognizers, Top down and bottom-up, L-R grammars and analysers, construction of LR table, organization of symbol tables. Code generation and optimization. Use of a standard compiler as a working vehicle. Laboratory exercises leading to the production of major parts of a compiler for an actual programming language.

CSC 4309: Computer Networks and Communication: (3 Units)

Status – Core

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).TCP/IP modelBus 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 4211: Research Methods in Computer Science: (2 Units)

Status - Core

Introduction and overview of the research in computing, the nature of Computer science research, what makes good research in computing science,searching for information on www and libraries, information gathering, Reading and understanding research paper, reviewing Research literatures, Technical writing, referencing, bibliographies, Presentation skills, written and oral, Choosing or proposing a project, Project planning, tools and techniques for planning, Project conduct, time management, risk management, team working, Commercial and economic considerations in IT research and IT industry.Review of legal, ethical, social and professional (LSEP) issues including data protection and standards.

CSC 4202: Human Computer Interface (HCI) (2 Units)

Status - Core

Foundations of HCI, Why is HCI needed? Human information processing and human error models of the user and interaction, Principles of GUI, GUI toolkits; Human centered software evaluation and development; GUI design, guidelines, standards, metrics and programming. Usability issues and the world wide web.

CSC 4304: Formal Methods and Software Developments (3 Units)

Pre –requisite – CSC 4301

Status - Core

Paradigms of software development traditional and automation-based software engineering processes. Cases tools and programming support environments. Specification and prototype: formal specification versus prototype; specification methods (SADT, HOOD, VDM, Z,..), Abstract data types: algebraic specification; semantic, completion and consistency, object oriented system.

CSC 4406: Survey and Organization of Programming Languages: (3 Units)

Pre-requisite – CSC 2301, CSC 2302, CSC 3301

Status - Core

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 Trees, Lexical Syntax, Grammars for Expressions, Variant of Grammars), Language Semantics (Information semantics, Overview of formal semantics, Denotational semantics, Axiomatic semantics, Operational semantic); 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.

Organization of programming Language: 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.

CSC 4308: Artificial Intelligence: (3 Units)

Status - Core

Introduction to Artificial Intelligence, Search control, Games trees, understanding natural languages, knowledge representation, expert systems, pattern recognition. Laboratory Exercise in AI language e.g. LISP/Prolog.

CSC 4310: Project Management: (3 Units)

Status - elective

Team Management, project scheduling, Software measurement and estimation techniques, risk analysis, Software quality assurance, Software Configuration Management, Project Management tools.

MTH 4318: Operations Research: (3 Units)

Status - elective

Phases of operations Research study. Classification of operations research models, linear; Dynamic and integer programming.Decision Theory. Inventory Models, Critical Path Analysis and project Controls.

CSC 4315: Computer System Performance: (3 Units)

Status - elective

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

CSC 3318: Computer Graphics and Visualization: (3 Units)

Status – elective

Hardware aspect, plotters microfilm, plotters display, graphics 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. Warmock's method, 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 interceptive graphics.

CSC 4317: Distributed Computing Systems: (3 Units)

Status - elective

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