

HAVILLA UNIVERSITY NDE, IKOM
CROSS RIVER STATE, NIGERIA

FACULTY OF COMPUTING AND SCIENCES
DEPARTMENT OF COMPUTER SCIENCES



B.Sc. SOFTWARE ENGINEERING
STUDENT HANDBOOK

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HAVILLA UNIVERSITY NDE, IKOM

Student Handbook

1.0 Preamble

The Student Handbook is the official statement of rules and regulations guiding student conduct in Havilla University. All items contained in this book are in effect at the date of publication in September 2021. All rules, regulations, and policies are subject to change through the appropriate faculties, departments, units, offices, and legislative bodies empowered by the University Senate, the Vice Chancellor, and the Board of Trustees of Havilla University. Any change in the items contained in the Student Handbook will be published in the appropriate departmental media. All students are responsible for acquainting themselves with the contents of the Student Handbook. If questions arise, do not hesitate to call the Dean, Student Affairs' Office for clarification and/or assistance.

1.1 Introduction to Havilla University

It has always been the dream and aspiration of the owners of Steadyflow International Limited to nurture, train and produce dedicated and committed young men and women who shall become the curators, architects and transformers of society. This dream has been inspired by the personal experiences of the owners and the impact education has made in their lives. It is also inspired by the need to give something back to society as recompense and recognition for the benefits and blessings that they have received from their communities, societies and Nigeria in general. The Chancellor of Havilla University has identified education as the single most important tool for the emancipation of the individual and for the transformation of society.

The intent of Steadyflow International, the Proprietor of Havilla University, has also manifested in its engagement in the betterment of the lives of the less-privileged in society. To further actualize the dream, the Proprietor established the Steadyflow Nursery and Primary School, Abuja in 2001, the Steadyflow International High School, Abuja in 2007 and the Steadyflow College of Education, Akparabong, Ikom in 2012. The good intentions of the Proprietor of Havilla University and the successes recorded in the provision of education at the nursery, primary, secondary, and

tertiary levels have fueled the drive that led to the establishment of Havilla University as a centre of academic excellence.

On November 6, 2021, the Unveiling Ceremony of Havilla University took place under the Chairmanship of Sen. Kanu Agabi, SAN, GCON, ably represented by Sen. Victor Ndoma-Egba, SAN. During the occasion, The Chairman, Board of Trustees, Prof. Florence Banku Obi, represented by the Deputy Vice-Chancellor (Administration) of University of Calabar, performed the Investiture ceremony of the Pioneer Vice Chancellor of Havilla University, Prof. Samuel Tita Wara. Also on that occasion, the Representative of the Chairman of the occasion laid a foundation stone for the Proposed, Sen. Kanu Agabi Faculty of Law.

Two others were duly honoured by the Chancellor of the University, the Administrative Block was renamed the Sen. Victor Ndoma-Egba Senate Building while the Female Hostel Complex was renamed, Prof. Florence Banku Obi Hall. The final event of the Unveiling Ceremony was the celebration of the retirement of Mrs. Blessing A. O. Tangban, a Board Member of the Proprietor, Director of Education at the Steadyflow Group of Schools and wife of the Chancellor. Mrs. Tangban who went on voluntary retirement from the Petroleum Equalization Fund Management Board after twenty years of service, launched her maiden book, “The Memoirs of an African Village Girl”. Proceeds from the Book Launch were used to establish a Foundation for the Education of the Indigent Child at Havilla University.

1.2 Vision

The vision of Havilla University is ‘to be a leading University recognized, nationally and internationally, for promoting innovations in teaching, research and public service through its academic programmes’.

1.3 Mission

The mission of the Havilla University is 'to transform the lives of its students and staff and empower them with knowledge, skills and values to enable them excel in their fields, achieve successes and transform their societies’.

1.4 Philosophy

The philosophy of the Havilla University is guided by a five-point agenda that focuses on the impact of the University on its staff and students and the world at large. These cardinal points are:

- i. **Knowledge creation** — this is rooted in the philosophy that knowledge is power. It holds the belief that learning illuminates the mind and also brightens the paths of human beings to progressive self-discovery, leading to innovative contribution to development. Knowing that ignorance is darkness and darkness leads to poverty of mind, Havilla University provides an atmosphere of academic liberty for in-depth discovery of mind and purpose;
- ii. **Student-centered** — this provides wide opportunities, resources and facilities to enhance students' learning in academic, moral and community activities. This way, an avenue that prepares young people to be intellectually sound, morally balanced and professionally proficient is instituted in Havilla University;
- iii. **Community-participatory** — this is to promote participatory management on the understanding that all stakeholders have contributory roles in the achievement of the goals and objectives of Havilla University;
- iv. **Balancing Stability and Change** — with relevance to the rapidly changing social and technological revolutions of the 21st Century, the Havilla University creates a balance in retaining positive values while it strives to reverse the depth of poverty and place relevance on the institution of entrepreneurial education, job creation and value re-orientation; and
- v. **Global Relevance** — this ensures that the learning, teaching and community services shall embrace international perspectives and the impact of globalization, while acting locally to meet societal needs. This is built on excellence on the academic and research programmes of Havilla University.

1.5 Objectives

The law establishing Havilla University has outlined its objectives aimed at meeting its vision and mission. The objectives of Havilla University are to:

- i. Encourage the advancement of learning and to hold out to all persons without distinction of race, creed, sex or political conviction the opportunity of acquiring a higher and liberal education;
- ii. Provide sources of instruction and other facilities for the pursuit of learning in all its branches, and to make those facilities available on proper terms to such persons as are equipped to benefit from them;
- iii. Encourage and promote scholarship and conduct research in all fields of learning and human endeavour;

- iv. Evolve academic programmes to suit the changing social and economic needs of society through continuous review of curricular and developments of new programmes through programme structural flexibility to respond to societal and technological changes;
- v. Create and expand access and opportunities for education, attract and retain quality students, researchers, and teachers, thereby assisting in developing human capital and mitigating the brain drain currently afflicting Nigeria;
- vi. Appreciate and stimulate interest in African and other regional cultural heritage and relating its activities to the social and economic needs of the people of Nigeria and the world;
- vii. Carry out basic and applied research leading to the domestication and application of new technology to the Nigerian context through collaborative linkages with other academic and research institutions in Africa and the rest of the world;
- viii. Establish a centre for entrepreneurial studies to stimulate job creation and innovative abilities in students from onset of their studies, in such a way that graduates shall be resourceful, self-reliant and job creators; and
- ix. Undertake other activities appropriate for teaching, research and community service as expected of a university of high standard.

Steadyflow International Limited**Proprietor****Board Of Trustees of Havilla University**

Prof. Florence B. Obi	Chairman
Hon. Jones A. O. Tangban	Member
Dr. Pius Tabi Tawo	Member
Barr. Christopher Agara	Member
Ms. Blessing Ayuk Tangban	Member
Barr. Tawo E. Tawo, SAN	Member
Pastor Olugbenga Olufisayo	Member
Dr. Antor Odu Ndep	Secretary

Hon. Jones Ayuk Ojong Tangban**Chancellor****Principal Officers**

Prof. Samuel Tita Wara	Vice Chancellor
TBD	Deputy Vice Chancellor (Academic)
TBD	Deputy Vice Chancellor (Administration)
TBD	Registrar
TBD	Librarian
TBD	Bursar

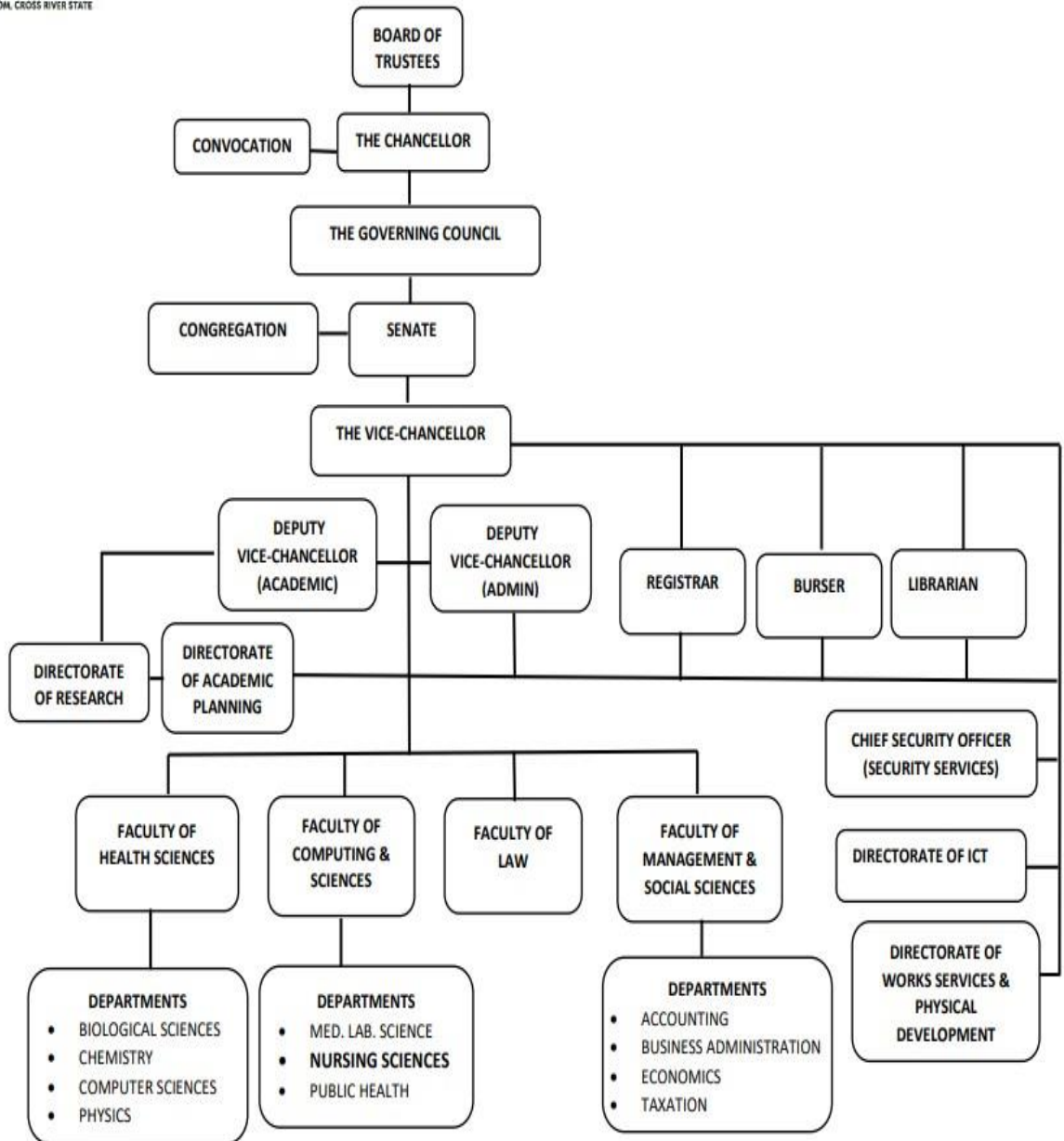
Other Officers

Dr. Antor Odu Ndep	Director of Academic Planning
Dr. Helen Uzezi Wara	Director of Admissions, Student Affairs & Establishment
TBD	Director of Physical Planning

ORGANOGRAM OF HAVILLA UNIVERSITY



INSTITUTIONAL ORGANOGRAM



List of current academic staff

NAME OF ACADEMIC STAFF	AREA OF SPECIALIZATION	DISCIPLINE	QUALIFICATION	RANK
Prof. Samuel T. Wara	Power & Energy Systems	Electrical Engineering	B. Eng., M.Eng., PhD, FIMC, CMC, CMS, FNSE, FRHD, FIET, FICA, FRHD, R.Eng (COREN)	Professor
Dr. Antor Ndep	Health Education & Communication	Public Health	B.Sc., MPH, DrPH	Senior Lecturer
Dr. Augustine Peter Silas	Socio-linguistics; syntax	Linguistics	B.A., M.A., PhD	Lecturer I
Dr. Benson Efeadi Eguzozie	French	International Relations	Dip (Journalism), B.A., M.A., PhD	Lecturer II
Dr. Helen U. Wara	International Relations and Human Resource Management	Business Administrations	B.Sc., MBA, M.Sc., PhD	Lecturer II
Dr. Barizomdu Tina Pii	Analytical & Environmental Chemistry	Chemistry	BSc., MSc., PhD	Lecturer II
Dr. Cecilia James Sunday	Human Genetics	Biology	BSc., MSc., PhD	Assistant Lecturer
Mr. Amechi E. Igharo	Macro-Economics	Economics	Dip. PA., B.Sc., M.Sc.	Assistant Lecturer
Mr. Raphael Asu Owan	Statistics	Mathematics & Statistics	Dip., HND, PGD, MSc.	Assistant Lecturer
Mr. Komomo Iwara	Information Technology	Computer Sciences	B.Sc., M.Sc.	Assistant Lecturer
Mr. Anthony Ibe	Geophysics	Physics	B.Sc., M.Sc.	Assistant Lecturer

2.0 General Admission Requirements

Admission into Havilla University is open to candidates with the requisite qualifications and subject to written and/or oral examination as the University may determine. All applicants for admission into the University must be at least 16 years of age. Admission into Havilla University is open to all irrespective of Religion, Ethnic Group, Gender, Creed, and Disability.

A general overview of the admission requirements are as follows:

- For admission to 100 Level (via UTME), candidates must: obtain five (5) credits at SSCE (or equivalent) in relevant subjects at not more than 2 sittings including credit passes in English and Mathematics; and attain acceptable points in UTME in relevant subjects.
- For admission by direct entry (200 Level), candidates must, in addition to having five (5) SSCE credits, obtain at least two (2) A' level (or its equivalent) passes in relevant subjects, or possess ND with credit passes, or possess a good first degree in another field as the case may be.
- Credit passes in English Language and Mathematics are compulsory for admission into all courses.
- Those who meet the requirements for admission shall be subjected to a screening interview to be conducted by the University.

Grading system

In evaluating the course work done by a student, a five-point grading system is adopted.

Percentage Mark	Letter Grade	Grade Point	Description
70% - 100%	A	5	Excellent
60% - 69%	B	4	Very Good
50% - 59%	C	3	Good
45% - 49%	D	2	Fair
40% - 44%	E	1	Pass
0% - 39%	F	0	Fail

Grade Point (GP)

Each grade has points attached to it. Since Havilla University runs a five point grading system, A is five points, B is four points, C is three points etc. see table above.

Credit Points (CP)

This is obtained by multiplying grade points obtained in each registered course by their respective credit units in a semester/session. If a student scored an A in Chemistry which is a 3-credit course, the Credit points obtained are $5 \times 3 = 15$.

Grade Point Average (GPA)

For each semester, the students' sum total credit points divided by total number of credit units from courses registered for that semester gives the Grade Point Average (GPA). The GPA is for one session only. By the end of the session, all Year One (100 Level) students normally get a GPA at the end of the first semester.

Cumulative Grade Point Average (CGPA)

This is the up-to-date mean of the grade point average (GPA) earned by the student in a programme of study. This is obtained by multiplying the GPA by the respective credit units for all the semesters, adding these and dividing the total sum by the total number of credit units for all courses registered by the student. For 100 Level students, CGPA can only be calculated by the end of the session (end of two semesters).

Note: 'NR' represents an incomplete result, and it is not use it for calculating CGPA.

How to Calculate GPA and CGPA

COURSE	CREDIT UNIT (X)	GRADE AND POINT (W)	SCORE GRADE	TOTAL CREDIT POINTS (XW)	GPA = $\frac{\sum XW}{\sum X}$
GSS 101	2	B = 4		8	
MTH 111	3	A = 5		15	
PHY 101	3	B = 4		12	65/18
BIO 101	3	C = 3		9	=3.61
CHM 101	3	A = 5		15	
PUH 101	2	D = 2		4	
GSS 131	2	E = 1		2	
TOTAL	$\sum X = 18$			$\sum XW = 65$	

CONDITIONS FOR PROBATION AND WITHDRAWAL

❖ Probation conditions

Probation is a status granted to any student whose academic performance fall below the acceptable standard. There are two conditions that could place a student on probation status:

- i. Any student whose GPA or CGPA is **below 1.50 (1.00 – 1.49) OR**
- ii. Any student who has **15 credit units** of failed courses irrespective of CGPA at the end of an academic year earns a period of Probation for one session.

Students who are on Probation are expected to take **only the failed probation courses**. At the end of the probation year, a student may continue in the programme of study provided his/her CGPA is up to 1.50 or more. Otherwise, the student will be advised to change programme or withdraw from the University.

❖ Withdrawal conditions

A student whose GPA or CGPA drops below 1.00 (i.e., 0.01 – 0.99) or has more than 15 credit units of failed courses irrespective of CGPA will be withdrawn from the University.

Expected Duration of the Programme

A student will not be allowed to exceed an additional 50 per cent of the duration of the programme if he fails to graduate within the minimum number of years.

- (a) UME -Four years.
- (b) Direct Entry -Three years

A student will not be allowed to exceed an additional 50% of the duration of the programme if he fails to graduate within the minimum number of years.

Title of Degrees to be Awarded

The title of the degree shall be Bachelor of Science “B.Sc”.

- ❖ Accounting; B. Sc (Accounting)
- ❖ Business Administration; B. Sc (Human Resource Management)

Graduation Requirements

The minimum number of credit units for the award of a degree is 120 units, including Department and Faculty requirements. A student shall therefore qualify for the award of a degree when he has met the conditions. The minimum credit load per semester is 15 credit units. For the purpose of calculating a student’s cumulative GPA(CGPA) in order to determine the class of Degree to be awarded, grades obtained in ALL the courses whether compulsory or optional and whether passed or failed will be included in the computation. Even when a student repeats the same course once

or more before passing it or substitutes another course for a failed optional course, grades scored at each and all attempts shall be included in the computation of the GPA. Pre - requisite courses must be taken and passed before a particular course at a higher level.

Classification of B.Sc. Degree

Below is the classification of degree results for graduation.

Cumulative Grade Point Average (CGPA)	Class of Degree
4.50 - 5.0	First Class (Hons)
3.50 - 4.49	Second Class (Hons) Upper Division
2.40 - 3.49	Second Class (Hons) Lower Division
1.50 - 2.39	Third Class (Hons)
0.99 - 1.49	Fail

**** Please note that there is no PASS class of degree**

DETAILED DESCRIPTION OF GENERAL STUDIES COURSES FIRST SEMESTER

s/n	Course Code	Course Title	Credit Units
100 LEVEL			
1	GST 111	Communications in English I	2
2	GST 121	Use of Library, Study Skills & Information Communication Technology (ICT)	2
3	GST 131	Nigerian Peoples & Culture	2
200 LEVEL			
1	GST 211	History & Philosophy of Science	2
300 LEVEL			
2	GST 311	Introduction to Entrepreneurial Skills	2

SECOND SEMESTER

s/n	Course Code	Course Title	Credit Units
100 LEVEL			
1	GST 112	Logic Philosophy & Human Existence	2
2	GST 122	Communication in English II	2

3	GST 132	Communication in French	2
200 LEVEL			
1	GST 212	Peace Studies & Conflict Resolution	2
2	GST 222	Introduction to Entrepreneurial Studies	2

Note that students must pass all GST courses in order to graduate.

GENERAL CODE OF CONDUCT

ACCOUNTABILITY

ACCOMMODATION

Havilla University is a fully residential institution. Students are not allowed to go out of campus at will. Should there be need for a student to go out of campus, appropriate permissions must be obtained which includes a verbal or written permission from the parent or guardian on record.

CLASS ATTENDANCE

All students must meet 70% attendance rate for any course in order to qualify for the end of Semester/sessional examinations.

COOKING IN THE HOSTEL

Students are not allowed to cook in the hostels. All students are expected to eat from the cafeteria. Any violation of this rule will result in expulsion.

CULTS/CONFRATERNITIES

Havilla University has zero tolerance for students with cult/confraternities affiliations. Any student that joins, organizes or encourages others to join such, or participates in cult-related activities within or outside the campus shall be expelled.

IKOM FIRE CRUSADE

All students are required to participate in Ikom Fire Crusade activities which involves feeding and clothing widows and orphans as well as health, spiritual growth and life skills seminars.

MEET THE CHANCELLOR

Every third Thursday of the Month from 5-7pm, there shall be a motivational session with the Chancellor with his family and friends.

RELIGIOUS ACTIVITIES

There shall be a mid-week service every Wednesday at 5:30pm at the University Worship Center (UWC).

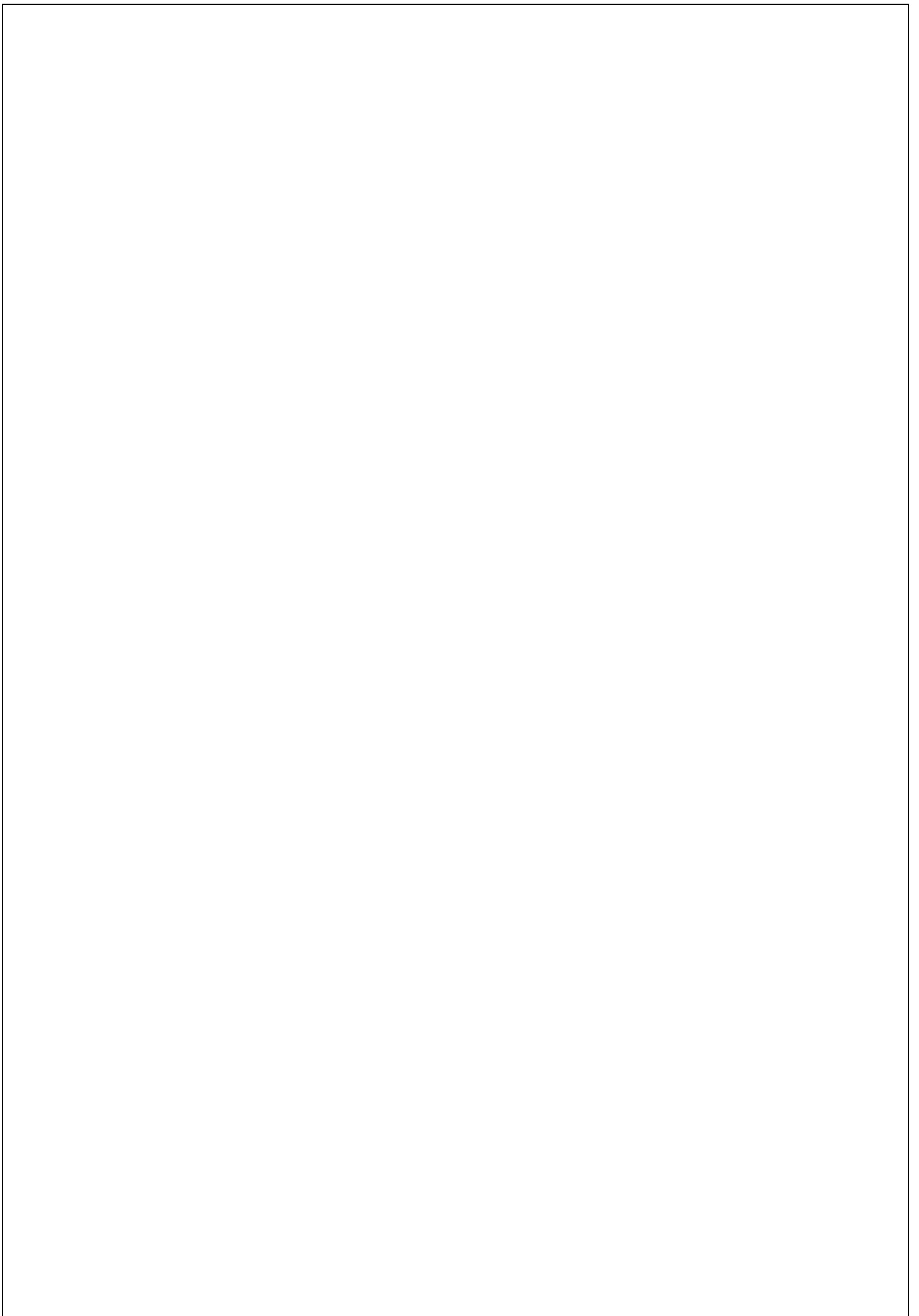
SPORTS

All students are to participate in sporting activities. It is our belief that everyone has some sporting ability. We intend to groom and raise champions who will compete favourably at all levels; local, national, international/Olympics.

DRESS CODE

All students are expected to dress modestly at all times on and off campus.

- Bump shorts and ultra-miniskirts are prohibited.
- All short dresses (above the knee length) must be worn over tights
- Tights must be worn with shirts or dresses that cover the buttocks
- Raggedy jeans are not allowed for both males and females
- Transparent shirts/blouses must be worn with the appropriate inner shirts
- Students must be clean shaven at all times.
- Male haircut must not be higher than one centimetre.
- For females, multi-coloured and ultra-long braids are nt allow



DEPARTMENT OF COMPUTER SCIENCES
(B.Sc. SOFTWARE ENGINEERING)

CURRICULUM FOR B.Sc. (Hons.) IN SOFTWARE ENGINEERING

100 LEVEL

FIRST SEMESTER

S/N	Course Code	Course Title	Status	Credit unit
1	GST 111	Communication in English I	C	2
2	GST 113	Nigerian Peoples and Culture	C	2
3	GST 112	Logic, Philosophy & Human Existence	C	2
4	BIO 101	General Biology I	C	3
5	BIO 107	Practical Biology I	C	1
6	CHM 101	General Chemistry I	C	3
7	SEN 101	Introduction to Computing and Application	C	3
8	MTH 101	Elementary mathematics I (Algebra)	C	3
9	PHY 101	General Physics I	C	3
10	PHY 107	Practical Physics I	C	1
Total credit unit				23

SECOND SEMESTER

S/N	Course Code	Course Title	Status	Credit unit
1	GST 122	Communication in English II	C	2
2	GST 104	Communication in French	C	2
3	GST 121	Use of Library, Study Skills & ICT	C	2
4	SEN 102	Principles of Programming I	C	3
5	CHM 102	General Chemistry II	C	3
6	SEN	Introduction to Web Technologies	C	3

	104			
7	MTH 102	Calculus and Trigonometry	C	3
8	PHY 102	General Physics II	C	3
9	PHY 108	Practical Physics II	C	1
		Total credit unit		22

**200 LEVEL
FIRST SEMESTER**

S/N	Course Code	Course Title	Status	Credit unit
1	GST 223	Introduction to Entrepreneurship	C	2
2	SEN 201	Introduction to software engineering	C	3
3	SEN 203	Discrete Structures	C	3
4	SEN 212	Software Engineering Process	C	2
5	SEN 205	Software Requirements and Design	C	3
6	SEN 207	Computer Architecture and Organization	C	3
7	SEN 209	Data structures and Algorithms	C	3
		2 Unit Electives	E	2
		Total credit unit		21

Electives

Note: Pick ONE course

S/N	Course Code	Course Title	Status	Total unit
1	GST 211	Environment and Sustainable Development	E	2
2	MTH 203	Linear Algebra	E	2

SECOND SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	GST 202	Peace Studies and Conflict Resolution	C	2
2	SEN 202	Principles of programming II	C	3
3	SEN 204	Logic and its Application in Computer science	C	2
4	SEN 206	Software Construction	C	2
5	SEN 208	Design and Analysis of Computer Algorithms	C	2
6	SEN 210	Principle of operating systems	C	2
7	PHY 201	Physics III	C	3
		4 unit electives	E	4
		Total credit unit		20

Electives

Note: Pick a total of 2 unit course

S/N	Course Code	Course Title	Status	Total unit
1	GST 206	Leadership Skills	E	2
2	MTH 205	Linear Algebra II	E	2

300 LEVEL

FIRST SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	ESP 311	Entrepreneurship Studies	C	2
2	SEN 301	Object-oriented analysis and design	C	3
3	SEN 303	Software testing and quality assurance	C	2
4	SEN 305	Web application development	C	3
5	SEN 307	Database systems	C	3
6	STA 343	Operation Research I	C	3
7	SEN 305	Concepts of programming languages	C	2
		2 Units Electives	E	2
		Total unit		25

SECOND SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	SEN 399	SIWES	C	6
		Total		6

400 LEVEL

FIRST SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	SEN 401	Software Configuration Management and Maintenance	C	2
2	SEN 403	Software engineering Project Management	C	2
3	SEN 405	Research Methodology	C	1
4	SEN 407	Software engineering professional practice	C	2
5	SEN 409	Software engineering security	C	2
		4 units electives	E	4
		Total unit		13

Electives

Note: Pick any two courses

S/N	Course Code	Course Title	Status	Total unit
1	SEN 411	AI and Expert systems	E	2
2	SEN 413	Engineering mobile applications	E	2
3	SEN 415	Embedded systems	E	2

SECOND SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	SEN 402	Net-Centric Computing	C	2
2	SEN 404	Human Computer Interaction	C	2
3	SEN 406	Open source software development and applications	C	2
4	SEN 408	Distributed, parallel and cloud computing	C	2
5	SEN 410	Software engineering security		
6	SEN 499	Research Project	C	6
		3 unit elective course	E	3
		Total unit		17

Electives

Note: Pick one course

S/N	Course Code	Course Title	Status	Total unit
1	SEN 412	Special topics in software engineering	E	3
2	SEN 414	Fault-Tolerant Computing	E	3
3	SEN 416	Game design and development	E	3
4	SEN 418	Modelling and computer simulation	E	3

DIRECT ENTRY PROGRAMMES FOR COMPUTER SCIENCES

University Required Courses for Direct Entry (DE) Students

200 LEVEL

FIRST SEMESTER

S/N	Course Code	Course Title	Status	Credit unit
1	GST 223	Introduction to Entrepreneurship	C	2
2	SEN 201	Introduction to software engineering	C	3
3	SEN 203	Discrete Structures	C	3
4	SEN 212	Software Engineering Process	C	2
5	SEN 205	Software Requirements and Design	C	3
6	SEN 207	Computer Architecture and Organization	C	3
7	SEN 209	Data structures and Algorithms	C	3
8	GST 111	Communication in English I	C	2
9	GST 113	Nigerian Peoples and Culture	C	2
10	GST 112	Use of Library, Study Skills & ICT	C	2
		Overall units		25

SECOND SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	GST 202	Peace Studies and Conflict Resolution	C	2
2	SEN	Principles of programming II	C	3

	202			
3	SEN 204	Logic and its Application in Computer science	C	2
4	SEN 206	Software Construction	C	2
5	SEN 208	Design and Analysis of Computer Algorithms	C	2
6	SEN 210	Principle of operating systems	C	2
7	PHY 201	Physics III	C	3
8	GST 122	Communication in English II	C	2
9	GST 104	Communication in French	C	2
10	GST 112	Logic, Philosophy and Human Existence	C	2
		Overall credit unit		22

300 LEVEL

FIRST SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	ESP 311	Entrepreneurship Studies	C	2
2	SEN 301	Object-oriented analysis and design	C	3
3	SEN 303	Software testing and quality assurance	C	2
4	SEN 305	Web application development	C	3
5	SEN 307	Database systems	C	3
6	STA 343	Operation Research I	C	3
7	SEN 305	Concepts of programming languages	C	2
		2 Units Electives	E	2
		Total unit		25

SECOND SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	SEN 399	SIWES	C	6
		Total		6

400 LEVEL

FIRST SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	SEN 401	Software Configuration Management and Maintenance	C	2
2	SEN 403	Software engineering Project Management	C	2
3	SEN 405	Research Methodology	C	1
4	SEN 407	Software engineering professional practice	C	2
5	SEN 409	Software engineering security	C	2
		4 units electives	E	4
		Total unit		13

Electives

Note: Pick any two courses

S/N	Course Code	Course Title	Status	Total unit
1	SEN 411	AI and Expert systems	E	2
2	SEN 413	Engineering mobile applications	E	2
3	SEN 415	Embedded systems	E	2

SECOND SEMESTER

S/N	Course Code	Course Title	Status	Total unit
1	SEN 402	Net-Centric Computing	C	2
2	SEN 404	Human Computer Interaction	C	2
3	SEN 406	Open source software development and applications	C	2
4	SEN 408	Distributed, parallel and cloud computing	C	2
5	SEN	Software engineering security		

	410			
6	SEN 499	Research Project	C	6
		3 unit elective course	E	3
		Total unit		17

Electives

Note: Pick one course

S/N	Course Code	Course Title	Status	Total unit
1	SEN 412	Special topics in software engineering	E	3
2	SEN 414	Fault-Tolerant Computing	E	3
3	SEN 416	Game design and development	E	3
4	SEN 418	Modelling and computer simulation	E	3

COURSE DESCRIPTION FOR B.SC. (HONS) IN COMPUTER SCIENCE

100 LEVEL

BIO 101: General Biology I

(3 Units)

Cell structure and organization, functions of cellular organelles, diversity, characteristics and classification of living things, general reproduction, interrelationship of organisms; heredity and evolution, elements of ecology and types of habitats.

BIO 102: General Biology I

(3 Units)

A generalized survey of the plant and animal kingdoms based mainly on the study of similarities and differences in the external features, ecological adaptation of these forms.

BIO 107: Practical Biology I

(1 Unit)

Laboratory experiments designed to illustrate the topics covered in BIO 101

CHM 101: General Chemistry I

(3 Units)

Atoms, molecules and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence Forces; Structure of solids. Chemical equations and stoichiometry. Chemical bonding and intermolecular forces. Kinetic theory of matter. Elementary thermochemistry. Rates of reaction. Equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions. Introduction to electrochemistry. Radioactivity.

CSC 101: Introduction to Computer Science

(3 Units)

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 will be required to 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 on-line resources, browsers and search engines.

CSC 102: Introduction to Problem Solving (3 Units)

Role of Algorithms in 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/JAVA/C/C++

MTH 101: Algebra (3 Units)

Real number system; Elementary Set Theory; Theory of Quadratic Equations; Polynomials; Partial Fractions; Real Sequences and Series; Mathematical Induction; Permutations and Combinations; The binomial theorem and its applications; Complex Numbers.

MTH 102: Calculus and Trigonometry (3 Units)

Circular measure; Trigonometric functions of angles of any magnitude; Compound angles; Inverse Trigonometric functions; Solution of trig. equations. Functions: Concepts and notation; Polynomial, Rational, Trigonometric and Exponential/ Logarithmic Functions; Functional Linear Equations; Concepts of Limits; The idea of continuity of functions; The derivative as limit of rate of change; Techniques of differentiation; Applications; Integration as an inverse of differentiation, Methods of integration, Definite integrals Application to areas, volumes.

MTH 104: Vectors, Geometry and Dynamics (3 Units)

Geometric representation of vectors in 1-3 dimensions, components, direction cosines, Addition, Scalar multiplication of vectors, scalar product, vector product and triple products; Application to Geometry; Two-dimensional co-ordinate geometry: Straight lines, circles, parabola, ellipse, hyperbola: Tangents and normals. Impact of two smooth spheres, and of a sphere on a smooth sphere.

PHY 101: General Physics I**(3 Units)**

Space and time, frame of references; Units and dimension; Vectors; Kinematics; Fundamental laws of Mechanics, statics and dynamics; Work, Energy and Power; Conservation laws; Universal gravitation; Rotational dynamics and angular momentum Molecular treatment of properties of matter; Elasticity: Hook's law, Young's, Shear, and Bulk moduli; Hydrostatics: Density, Pressure; Buoyancy: Archimedes'Principles; Hydrodynamics: streamline, turbulence, Bernoulli and continuity equations, Reynold's number, Viscosity: laminar flow, Poiseuille's law; Surface tension; Capillarity: Adhesion, cohesion, drops and bubbles. Temperature: the zeroth law of thermodynamics, heat: gas laws of thermodynamics, transfer, expansion, kinetic theory of gas; Waves: sound, applications.

PHY 102: General Physics II**(3 Units)**

Optics: Reflection at Plane, curved surfaces; Refraction through Plane surfaces; Thin Lenses; Optical instruments; Electrostatics; Conductors and Currents; Dielectrics; Magnetic fields and induction; Maxwell's equations; Electromagnetics oscillations and waves & its Applications; Semiconductors; Thermionic Emission; Electrons, Photons, and the Atom; Photoelectric effect; Atomic nucleus and Radioactivity; Compton effect; de-Broglie Hypothesis; Dual nature of Matter; Nuclear reactions: Fission and Fusion, Thermonuclear reaction; Uncertainty Principle.

PHY 107/108: Practical Physics I/II**(1 Unit Each)**

This introduction course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques will be employed. The experiment includes studies of metres, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc., covered in PHY 101 and PHY 102.

General Studies Courses for 100 Level**GST 111: Communication in English I****(2 Units)**

This course is designed to enable students acquire improved study skills and better communication skills in the use of English for general academic purposes at the university level. It focuses on students' study skills such as

listening skills, speaking skills, reading skills and writing skills. It also examines English grammar and usage, vocabulary development, etc. All these are needed to provide a smooth transition from secondary school to the university in terms of the language necessary for academic purposes.

GST 122: Communication in English II (2 Units)

This course focuses on the development of various aspects of writing skills (techniques and functions). It considers writing tasks that students require in the university. It will also focus on register, its factors and varieties.

GST 113: Nigerian Peoples and Culture (2 Units)

The course focuses on the study of Nigerian history, culture and arts in pre-colonial times. The Nigerian's perception of his world. Culture areas of Nigeria and their characteristics. Evolution of Nigeria as a political unit. Indigene/settler phenomenon. Concepts of trade. Economic self-reliance. Social justice. Individual and national development. Norms and values. Negative attitudes and conducts (cultism and related vices). Re-orientation of moral. Environmental problems.

GST 104: Communication in French (2 Units)

Introduction to French alphabets and numeracy for effective communication (written and oral). Conjugation and simple sentence construction based on communication approach. Sentence construction. Comprehension and reading of simple texts.

GST 121: Use of Library, Study Skills and ICT (2 Units)

Brief history of libraries. Library and education. University libraries and other types of Libraries. Study skills (reference services). Types of library materials, using library resources including e-learning, e-materials, etc. Understanding library catalogues (card, OPAC, etc) and classification. Copyright and its implications. Database resources. Bibliographic citations and referencing. Development of modern ICT. Hardware technology. Software technology. Input devices. Storage devices. Output devices. Communication and internet services. Word processing skills (typing, etc).

GST 112: Logic, Philosophy and Human Existence (2 Units)

The notion and meaning of Philosophy, A brief survey of the main branches of Philosophy. Symbolic logic. Special symbols in symbolic logic-conjunction, negation, affirmation, disjunction, equivalent and conditional statements, law of thought. The method of deduction using rules of inference and bi-conditionals. Qualification theory. Types of discourse, nature or arguments. Validity and soundness. Techniques for evaluating arguments. Distinction between inductive and deductive inferences; etc. (Illustrations will be taken from familiar texts, including literature materials, novels, law reports and

newspaper publications).

GST 108: Contemporary Health Issues

(2 Units)

Diet, exercise and health, nutritional deficiency diseases, malaria, other infections, hypertension, organ failure, air-borne diseases, sexually transmitted diseases, cancer and its prevention, sickle cell disease. HIV/AIDS: Introduction, epidemiology of HIV, natural history of HIV infection, transmission of predisposing factors to HIV, Impact of HIV/AIDS on the society, management of HIV infection, prevention of HIV. Drugs and Society: sources of drugs, classification of drugs, dosage forms and routes of drug administration, adverse drug reactions, drug abuse and misuse, rational drug use and irrational drug use. Human kinetics and health education: personal care and appearance, exercise and health, personality and relationship, health emotions, stress, mood modifiers, refusal to tobacco, alcohol and other psychoactive drugs.

200 LEVEL

CSC 201: Computer Programming I

(3 Units)

Introduction to problem solving methods and algorithm development, designing, coding, debugging and documenting programmes using techniques of a good programming language style, programming language and programming algorithm development. A widely used programming language should be used in teaching the above.

CSC 202: Computer Programming II

(3 units) 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. E.g. C-Language

CSC 204: Fundamentals of Data Structures

(3 Units) Primitive types,

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

CSC 205 Operating System I

(3 Units)

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 208: Discrete Structure (3 Units)

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 mod m, Path matrices. Adjacency Vectors/Matrices: Path adjacency matrix, Numerical & Boolean Adjacency matrices. Applications to counting, Discrete Probability Generating Functions,

CSC 212: Computer Hardware: (3 Units)

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 converter.

CSC 218 Foundations of Sequential Program: (3 Units) The relationships between H/L languages and the Computer Architecture that underlies their implementation: basic machine architecture, specification and translation of P/L Block Structured Languages, parameter passing mechanisms.

CSC 299: Industrial Training I (3 Units)

Require 3 months of Industrial Training. Students' experience will be documented and presented in a Seminar.

STA 203: Statistics for Physical Science and Engineering

(4 Units)

Scope for statistical methods in physical sciences and engineering. Measures of location, partition and dispersion. Elements of probability. Probability distribution: binomial Poission, geometric, hypergeometric, negative-binomial, normal Poission, geometric, hypergeometric, negative-binomial, normal.

Estimation (Point and interval) and tests of hypotheses concerning population means proportions and variances. Regression and correlation. Non- parametric tests. Contingency table analysis. Introduction to design of experiments. Analysis of variance.

MTH 201: MATHEMATICAL METHODS 1: (3 Units)

Real-valued functions of a real variable. Review of differentiation and integration and their applications. Mean value theorem. Taylor series. Real-valued functions of two or three variables. Partial derivatives chain rule, extrema, languages multipliers. Increments, differentials and linear approximations. Evaluation of line integrals. Multiple integrals. Pre-requisite -MTH 103.

PHY 201 GENERAL PHYSICS V: (Elementary Modern Physics) (3 Units)

Special Relativity; Defects in Newtonian Mechanics; the speed of light; the Lorenz transformation; transformation of velocities. Experimental basis of quantum theory: Black body radiation; electrons and quanta; Bohr's theory of atomic structure: De Broglie hypothesis the uncertainty principle; Schrödinger's equation and simple applications. (Pre-requisite – PHY 102).

PHY 202: Introduction to Electric Circuits and Electronics (3 Units)

Pre-requisite -PHY 102

D.C. Circuits; Kirchhoff's Laws, sources of emf and current, network analysis and circuit theorems. A.C. Circuits. Inductance, capacitance, the transformer, sinusoidal wave-forms rms and peak values, power, impedance and admittance series RLC circuit, Q factor, resonance, Network analysis and circuit theorems, filters. Electronics; semiconductors, the pn-junction, Amplification and the transistor; field effect transistors, bipolar transistors, Characteristics and equivalent circuits, amplifiers, feedback, oscillators; signal generators. There should be alternate week laboratory work.

General Studies Courses for 200 Level

GST 223: Introduction to Entrepreneurship (2 Units)

Profiles of business ventures in the various business sectors such as: Soap/Detergent, Tooth brush and Tooth paste making; Photography; Brick making; Rope making; Brewing; Glassware production/ Ceramic production, Paper production; Water treatment/conditioning/packaging; Food processing/preservation/packaging; Metal fabrication; Tanning industry;

Vegetable oil extraction; Farming; Fisheries/aquaculture; Plastic making; Refrigeration/Air-conditioning; Carving, Weaving; Bakery; Tailoring; Printing; Carpentry; Interior Decoration; Animal husbandry etc. Case Study Methodology applied to the development and administration of Cases that bring out key issues of business environment, start-up, pains and gains of growth of businesses, etc. with particular reference to Nigerian businesses. Experience sharing by business actors in the economy with students during Case presentations.

GST 202: Peace Studies and Conflict Resolution (2 Units)

Basic Concepts in peace studies and conflict resolution; Peace as vehicle of unity and development; Conflict issues; Types of conflict, e. g. Ethnic/religious/political/ economic conflicts; Root causes of conflicts and violence in Africa; Indigene/settler phenomenon; Peace – building; Management of conflict and security; Elements of peace studies and conflict resolution; Developing a culture of peace; Peace mediation and peace-keeping; Alternative Dispute Resolution (ADR). Dialogue/arbitration in conflict resolution; Role of international organizations in conflict resolution, e.g. ECOWAS, African Union, United Nations, etc.

GST 203/205: History and Philosophy of Science/ Environment and Sustainable Development (2 Units)

Man – his origin and nature; Man and his cosmic environment; Scientific methodology, Science and technology in the society and service of man. Renewable and non-renewable resources – man and his energy resources. Environmental effects of chemical plastics, Textiles, Wastes and other materials, Chemical and radiochemical hazards, Introduction to the various areas of science and technology. Elements of environmental studies, Great Nigerian Scientists.

GST 206: Leadership Skills (2 Units)

Transformation is a fundamental shift in the deep orientation of a person, organization or society such that the world is seen in new ways and new actions and results become possible that were impossible prior to the transformation. Transformation happens at the individual level but must be embedded in collective practices and norms for the transformation to be sustained. Leadership Development Programme (LDP) proposes novel approaches to teaching and learning, which emphasizes the practical involvement of participants.

It is interactive and involves exercises and actual implementation of breakthrough projects by teams that make difference in the lives of the target population. In this course, leadership concepts comprising of listening, conversation, emotional intelligence, breakthrough initiatives, gender and leadership, coaching and leadership, enrolment conversation and forming and leading teams will be taught.

GST 208: Foundation Course in Entrepreneurship (2 Units)

Essentials of feasibility study, writing a bankable business plan, Funding for business start-ups, Business skills for planning and implementation, Marketing skills for entrepreneurs, Developing the marketing concepts, Major survey research techniques, basic financial planning, Ethical consideration and Ethical dilemmas of entrepreneurs,

300 LEVEL

CSC 301: Structured Programming (3 Units)

Structured Programming elements, structured design principles, abstraction modularity, stepwise refinement, structured design techniques. Teaching of a structured programming language etc.

CSC 302: Object-Oriented Programming (3 Units)

Basic OOP Concepts: Classes, Objects, inheritance, polymorphism, Data Abstraction, Tools for developing, Compiling, interpreting and debugging, Java Programs, Java Syntax and data objects, operators. Central flow constructs, objects and classes programming, Arrays, methods. Exceptions, Applets and the Abstract, OLE, Persistence, Window Toolkit, Laboratory exercises in an OOP Language.

CSC 304: Data Management I (3 Units)

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.

CSC 305: Operating System II (3 Units)

Concurrency: States & State diagrams Structures, Dispatching and Context Switching; interrupts; Concurrent execution; Mutual exclusion problem and some solutions Deadlock; Models and mechanisms (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 310: Algorithms and Complexity Analysis (3 Units)

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 trees, Hash tables, graphs & its representation.

CSC 314: Computer Architecture I and Organization I (3 Units)

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.

CSC 315: Computer Architecture and Organization II (3 Units)

Memory system, general; characteristics of memory operation. (Technology-magnetic recording semi-conductor memory, coupled devices, magnetic bubble). Memory addressing, memory hierarchy, virtual memory control systems. Hardware control, micro programmed control, Asynchronous control, i/c control. Introduction to the methodology of faulty tolerant computing.

CSC 316: Compiler Construction I (3 Units)

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

CSC 321: Systems Analysis and Design (3 Units)

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.

CSC 332: Survey of Programming Languages (4 Units)

Overview of programming languages: History of programming languages, Brief survey of programming paradigms (Procedural languages, Object-oriented languages, Functional languages, Declarative – non-algorithmic languages, Scripting languages), the effects of scale on programming methodology; Language Description: Syntactic Structure (Expression notations, abstract Syntax Tree, Lexical Syntax, Grammars for Expressions, Variants of Grammars), Language Semantics (Informal semantics, Overview of formal semantics, Denotation semantics, Axiomatic semantics, Operational semantics); Declarations and types: The concept of types, Declaration models (binding, visibility, scope, and lifetime), Overview of type-checking, Garbage collection; Abstraction mechanisms: Procedures, function, and iterations as abstraction mechanisms, Parameterization mechanisms (reference vs. value), Activation records and storage management, Type parameters and parameterized types, Modules in programming languages; Object oriented language paradigm; Functional and logic language paradigms.

CSC 333: Computational Science and Numerical Methods (3 Units)

Operations research, Numerical Computation, Graphical computation, Modelling and simulation, High performance computation.

CSC 399: Industrial Training II**(3 Units)** Student's Industrial

work experience of 3 months' duration. Students' reports will be presented in a seminar.

General Studies Courses for 300 Level**ESP 311: Entrepreneurship Studies****(2 Units)**

Towards Nigeria's quest for accelerated economic growth, it is important that active and virile youth population is assisted to develop and convert their innovative ideas into business ventures. These skills can be acquired particularly by those so innately inclined. This underscores the need to actively promote and train students to be entrepreneurial within our educational system. The course aims at re-orientating students towards a job-creation mind-set rather than the fixed attitude of job-seeking. It will equip them with the skills required in establishing businesses or making them add value to existing systems, if employed in organizations. The main objective is to introduce students to concepts and opportunities available in entrepreneurship and innovation. It assumes no previous knowledge and takes students through the rudiments of entrepreneurship to selecting a desired business and starting it with a Feasibility Report.

GST 302: Enterprise Development I**(1 Unit)**

Family business and succession planning, Challenges of family business and sustainable family business model, Cultural issues and roles in family business, Succession management in family business, women in entrepreneurship, Developing Diversity Management Competency in SMEs, Owner Manager gender analysis study.

400 LEVEL**CSC 401: 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 languages, lexical analysis and parsing. Pre-requisite – CSC 201, 202, 304, 302.

CSC 403: Software Engineering**(4 Units)**

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 modelling Tools, Testing tools, Tool integration mech.

CSC 404: Data Management II**(3 Units)**

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

CSC 405 : Special Topics in Software Engineering**(3 Units)**

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

CSC 406: Queuing Systems: (3 Units)

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

CSC 407 : Special Topics in Software Engineering (3 Units)

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

CSC 408: Computer System Performance Evaluation (3 Units)

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

CSC 411: Artificial Intelligence (3 Units)

Introduction to artificial intelligence, understanding natural languages, knowledge representation, expert systems, pattern recognition, the language LISP.

CSC 416: Compiler Construction II (3 units)

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 421: Net-Centric Computing (3 Units)

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

CSC 422: Project Management**(3 Units)**

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

CSC 423: Computer Networks/Communication**(3 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, protocols, description of network e.g. ARPANET, etc.

CSC 432: Distributed Computing Systems**(3 Units)**

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.

CSC 433: Computer Graphics and Visualization**(2 Units)**

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 had writing and character recognition. Curve synthesis and fitting. Contouring. Ring structures versus doubly linked lists. Elerarchical structures. Data structure: Organization for intersotive graphics.

CSC 441: Human-Computer Interface (HCI)**(2 Units)**

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

CSC 452: Formal Models of Computation (3 Units)

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 482: Computer Simulations (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.

CSC 492: Special Topics in Computer Science (3 Units) Special topics from any area of computer science considered relevant at 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.

CSC 499: Project (6 Units)

Students should embark on work that will lead to substantial software development under the supervision of a member of staff