

HAVILLA UNIVERSITY NDE, IKOM
CROSS RIVER STATE, NIGERIA

FACULTY OF COMPUTING AND SCIENCES
DEPARTMENT OF INDUSTRIAL CHEMISTRY



B.Sc. INDUSTRIAL CHEMISTRY
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 TitaWara. 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 of the programme

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;

v. **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

iv. **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 TabiTawo	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 AyukOjong Tangban

Chancellor

Principal Officers

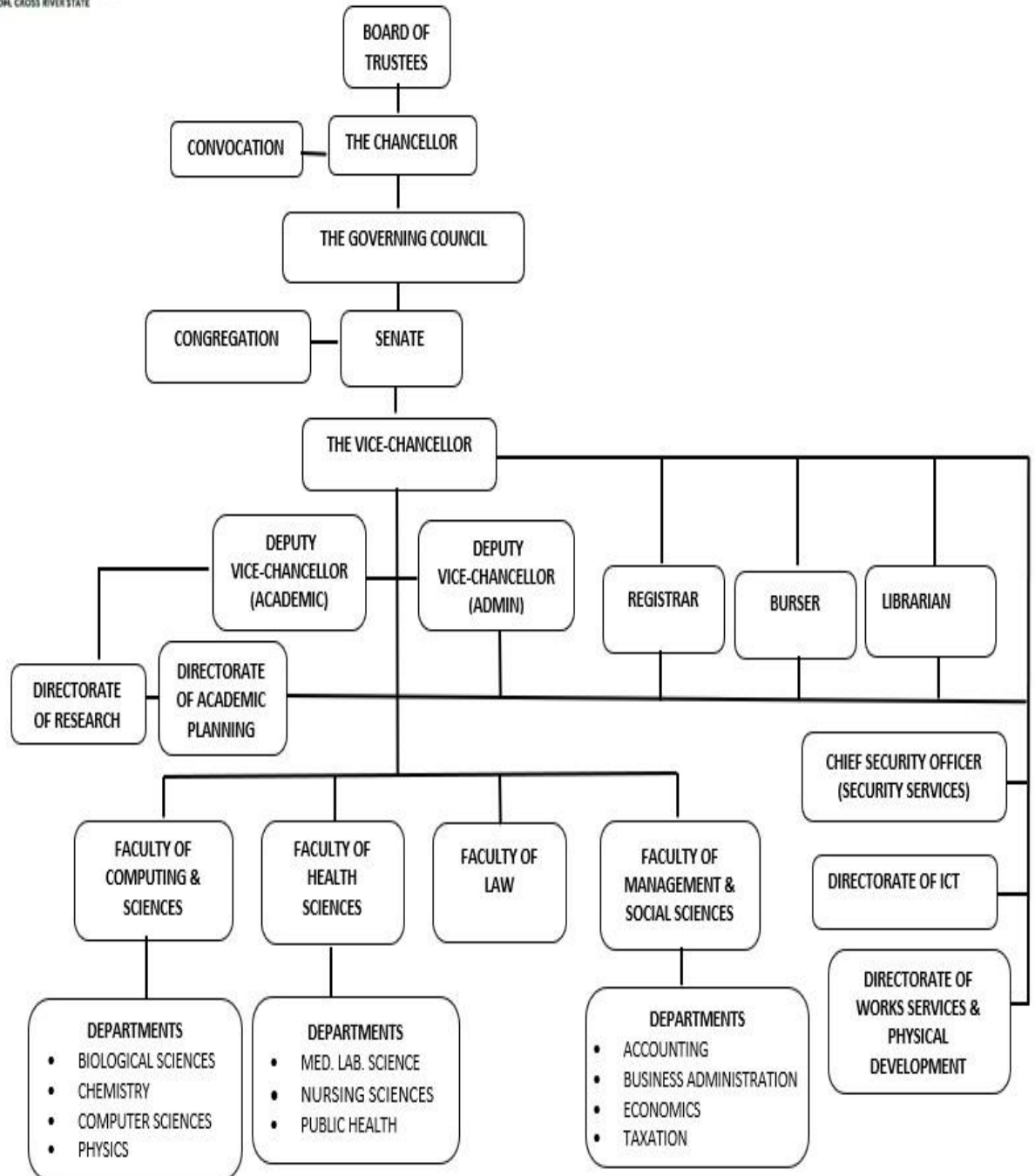
Prof. Samuel Tita Wara	Vice Chancellor
TBD	Deputy Vice Chancellor (Academic)
TBD	Deputy Vice Chancellor (Administration)
TBD	Registrar
TBD	Librarian
TBD	Bursar

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



1.6 List of Current academic staff

FAULTY OF COMPUTING AND SCIENCES					
DEPARTMENT OF BIOLOGY					
S/N	NAME OF ACADEMIC STAFF	DISCIPLINE	QUALIFICATION (specify)	RANK	POSITION
1	Cecilia James Sunday	Genetics & Biotechnology	PhD. MSc. BSc	Lecturer II	Lecturer
DEPARTMENT OF CHEMISTRY					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION	RANK	POSITION
1	Barizomdu Tina Pii	Analytical/Environmental Chemistry	PhD. MSc. BSc	Lecturer II	Lecturer
2	Uche Emmanuel Nwachi	Biochemistry/Medical Biochemistry	PhD. MSc. BSc	Lecturer I	Lecturer
DEPARTMENT OF COMPUTER SCIENCES					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION	RANK	POSITION
1	Iwara Kommomo	Computer Science	MSc., BSc.	Assistant Lecturer	Lecturer
2	Nsor Emmanuel Nsor	Computer Science	BSc.	Technologist I	Technologist
DEPARTMENT OF MATHEMATICS					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION	RANK	POSITION
1	Samuel Tita Wara	Electrical Electronics Engineering	Ph.D., MSc., BSc.	Professor	Lecturer
2	Raphael Owan Asu	Statistics	MSc. BSc.	Assistant Lecturer	Lecturer
DEPARTMENT OF PHYSICS					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION	RANK	POSITION
1	Samuel Tita Wara	Electrical Electronics Engineering	Ph.D. MSc. BSc.	Professor	Lecturer
2	Anthony Ibe Ekene	Physics	MSc	Assistant Lecturer	Lecturer
FACTY OF HEALTH SCIENCES					
DEPARTMENT OF MEDICAL LAB SCIENCE					
S/N					
1	Antor Ndep	Public Health	B.Sc., MPH, DrPH	Senior Lecturer	Lecturer
DEPARTMENT OF NURSING SCIENCES					
S/N					
1	Antor Ndep	Public Health	B.Sc., MPH, DrPH	Senior Lecturer	Lecturer
DEPARTMENT OF PUBLIC HEALTH					
1	Antor Ndep	Public Health	B.Sc., MPH, DrPH	Senior Lecturer	Lecturer
FACTY OF MANANGEMENT AND SOCIAL SCIENCES					
DEPARTMENT OF ACCOUNTING					
1	Mr. Kondo	Account Staff	MSC. BSc.	Account	Accountant

	Augustine Kondo			Officer 1	
DEPARTMENT OF BUSINESS ADMINISTRATION					
1	Antor Ndep	Public Health	B.Sc., MPH, DrPH	Senior Lecturer	Lecturer
2	Dr. Helen U. Wara	Business Administrations	B.Sc., MBA, M.Sc., PhD	Lecturer II	Lecturer
DEPARTMENT OF ECONOMICS					
1	Mr. Amechi E. Igharo	Economics	Dip. PA., B.Sc., M.Sc.	Assistant Lecturer	Lecturer
GENERAL STUDIES UNIT					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION	RANK	POSITION
1	Peter Augustine Silas	Linguistics	PhD., MSc. BSc	Lecturer II	Lecturer
2	Benson Efegadi Egugozie	French in International Relations	Ph.D., MSc., BSc.	Lecturer II	Lecturer
CORPERS					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION	RANK	POSITION
1	Efosa Prosper Osarumwense	Science Laboratory Technology (Physiology & Pharmacology)	BSc.		
2	Madonna Chinecherem Ezeoke	Parasitology & Entomocology	BSc.		
3	Kim Danladi	Buiding Technology	HND		
4	Mabel Ngwoke	Pure and Industrial chemistry	BSc.		
5	Morowooluwa Dami Omowonuola	Economics	BSc.		
6	Nnebedum Glory	Mechanical Engineering	BSc.		
7	Deborah Ayomide Babarinde	Biochemistry	BSc.		
8	Fidelis Ndubuisi Asu	Accounting	BSc.		
BURSARY					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION	RANK	POSITION
C	Mr. Kondo Augustine Kondo	Account Staff	MSC. BSc.	Account Officer 1	Accountant
SECURITY OFFICERS					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION (specify)	RANK	POSITION
1	Mr. Shagari Mohammed				Security officer
2	Mr. Donald Moses				
3	Mr. Kingsley				

	Nsing Akonjom				
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION (specify)	RANK	POSITION
1	Millicent Ajam		O'level		Cleaner
2	Mrs. Mary Ndoma		O'level		Cleaner
3	Maureen Ibangha Bassey		O'level		Cleaner
4	Alice Ukwudi Ibanye		O'level		Cleaner
VEGETATION CONTROL					
S/N	NAME OF STAFF	DISCIPLINE	QUALIFICATION (specify)	RANK	POSITION
1	Enyani Nsed Ekara				Gardener

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.

2.1 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

2.1.1 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.

2.1.2 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 $5 \times 3 = 15$.

2.1.3 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 semester only. By the end of the semester, all Year One (100 Level) students normally get a GPA.

2.1.4 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 for calculating CGPA.

2.1.5 How to Calculate GPA and CGPA

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

3.0 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.

4.0 GRADUATION REQUIREMENT

To graduate and for the award of any degree in Havilla University, the student must have completed and passed the prescribed courses and electives.

4.1 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**

4.2 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.

5.0 GENERAL CODE OF CONDUCT

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 75% 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 semester, a date shall be announced for a motivational session with the Chancellor.

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.

GENERAL DRESS CODE

- 1. Mondays & Tuesdays:** Western-style (Euro-American) office wear

2. **Wednesdays & Thursdays:** African-style Office wear
3. **Fridays:** HUNI Spirit (HUNI-branded T-shirts and cap)

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

- a. Bump shorts and ultra-miniskirts are prohibited.
- b. All short dresses (above the knee length) must be worn over tights
- c. Tights must be worn with shirts or dresses that cover the buttocks
- d. Raggedy jeans are not allowed for both males and females
- e. Transparent shirts/blouses must be worn with the appropriate inner wear
- f. Off-shoulder dresses/blouses are not acceptable
- g. Dresses/blouses that show cleavage are not acceptable except if worn with appropriate inner wear
- h. Students must be clean shaven at all times.
- i. Male haircut must not be higher than one centimetre.
- j. For females, multi-coloured and ultra-long braids are not allowed

6.0 DEPARTMENT OF INDUSTRIAL CHEMISTRY (B.Sc. INDUSTRIAL CHEMISTRY)

6.1 INTRODUCTION OF THE PROGRAMME

The Department of Industrial Chemistry was established in October 1960 as Department of Chemistry in the then Faculty of Science. In 1976, a degree in Industrial Chemistry was introduced. Industrial chemistry is part of applied chemistry that deals with the development, optimization and monitoring of fundamental chemical processes used in industry to produce chemicals and chemical products. The main area of research and teaching are on the catalyst and process development, mechanical and thermal unit of operations and process of chemical reaction engineering.

6.2 PHILOSOPHY

Chemistry is the index of industrial development everywhere in the world. The frontiers of chemistry are very large, ranging from one extreme of natural products to those synthesized by man. The giant strides made by man in the understanding and exploitation of nature, synthesis of new materials essential to the enhancement of the quality of life, and the surge in and sustenance of economic and technological progress have benefited immensely from chemistry and chemical technology. For economic sustenance and technological breakthrough, the undergraduate programme is designed to encompass an appreciation of the centrality of chemical sciences in the entire undergraduate curricula. It is also planned to arouse entrepreneurial spirits needed for self-employment and economic emancipation.

6.3 OBJECTIVE

The degree programme in Industrial Chemistry has the following objectives:

- (a) To stimulate in the students sustained interest and enthusiasm in chemistry and applications.
- (b) To provide students with a thorough grounding in principles and sound knowledge of scientific methods of the chemical sciences.
- (c) Arouse a sense of curiosity and enquiring mind, in order to encourage and develop creative thinking and research aptitudes.
- (d) Provide students with a broad and balanced base of chemical knowledge and practical skills.
- (e) Generate in students an awareness of the enormous resources in their immediate environment so as to enhance solution to the challenges of our time in a march towards nation building.

- (f) To educate and train chemists, particularly applied chemists, who can think fundamentally about their subject and who can acquire as graduates a meaningful picture of the chemical and allied industries.
- (g) Provide students with a solid base of chemical knowledge and skills that are required for postgraduate studies and research.
- (h) Inculcate in students' appropriate skills and abilities to manage and administer technological operations within the field of chemistry and allied areas.

It is intended that graduates of this programme will be able to adapt themselves to jobs which are problem solving or results oriented in the chemical, petrochemical, biochemical and allied technological field viz, food, environmental, textiles, polymer etc.

6.4 COURSE REQUIREMENT

In addition to the University's minimum entry requirements, the following conditions must be met:

(i) UTME CANDIDATES

Candidates seeking admission through UTME are required to obtain credit in Chemistry, English Language, Physics and Mathematics in the Senior Secondary School certificates or its equivalent prior to admission.

(ii) DIRECT ENTRY CANDIDATES

Direct entry Candidates must have passed Chemistry, Physics and Mathematics in G.C.E.

(Advanced Level) or HSC (Principal Level) or other equivalent examination.
examination.

JOB OPPORTUNITIES:

The successful graduates are equipped for higher studies and careers in teaching, research institutes, chemical laboratories, Ministries of Science and Technology, Education, Agriculture, Health, Industry, Environment and in such diverse industries as vegetable oils, soap and detergents, paints and varnishes, plastics, brewing, pharmaceuticals, sugar, paper and pulp, textiles, fertilizer, cement, ceramics, iron and steel, petroleum, coal, dyestuff, etc. Our graduates are also equipped for self-employment.

7.0 CURRICULUM FOR B.Sc.(Hons.) IN INDUSTRIAL CHEMISTRY

100 LEVEL

FIRST SEMESTER

Course Code	Course Title	Status	Units
HUN 102	The God Factor and 21 st century Challenges II	R	1
HUN 122	Security Education II	R	1
GST 111	Communications in English I	C	2
GST 121	Use of Library, Study Skills and Information Communication Technology (ICT)	C	2
GST 113	Nigerian Peoples & Culture	C	2
BIO 152	General Biology II	C	3
CHM 102	General Chemistry II	C	2
CHM 108	General Chemistry Practical II	C	1
MTH 102	General Mathematics II	C	2
PHY 102	General Physics II	C	2
PHY 108	General Physics Practical II	C	1
CHM 152	Introduction to Industrial Chemistry	C	3
CHM 122	Basic Principles of Organic Chemistry	C	2
CHM 112	Basic Principles of Physical Chemistry	C	2
ECO102	Basic Principles of Economics II	C	2
	TOTAL CREDIT UNITS		28

SECOND SEMESTER

Course Code	Course Title	Status	Units
HUN 102	The God Factor and 21 st Century Challenges II	R	1
HUN 122	Security Education II	R	1
GST 112	Logic Philosophy & Human Existence	C	2
GST 122	Communication in English II	C	2
GST 123	Communication in French	C	2
BIO 152	General Biology	C	3
CHM 102	General Chemistry II	C	2
CHM 108	General Chemistry Practical II	C	1
MTH 102	General mathematics II	C	2
PHY 102	General physics II	C	2
PHY 108	General physics practical II	C	1

CHM 152	Introduction to industrial chemistry	C	3
CHM 122	Basic Principles of Organic Chemistry	C	2
CHM 112	Basic principles of physical chemistry	C	2
ECO 102	Basic principles of economics IIC	C	2
	TOTAL CREDIT UNITS		28

200 LEVEL

FIRST SEMESTER

Course Code	Course Title	Status	Units
HUN 201		R	1
HUN 221		R	1
GST 211	Environment and Sustainable Development	C	2
CHM 213	Analytical Chemistry I	C	2
CHM 251	Process Science I	C	2
CHM 299	Industrial Attachment 1 (12 weeks)	C	2
CHM 201	General Inorganic Chemistry	C	2
CHM 211	General Physical Chemistry	C	2
CHM 273	Practical Organic Chemistry	C	2
CHM 221	Organic Chemistry I	C	2
MTH 207	Advanced Mathematics VII	C	2
PHY 251	Electromagnetism	C	2
COS 101	Introduction to computer Science	C	2
ECO 101	Principles of Economics I	C	2
	TOTAL CREDIT UNITS		26

SECOND SEMESTER

Course Code	Course Title	Status	Units
HUN 202		R	1
HUN 212		R	1
GST 222	Peace Studies & Conflict Resolution	C	2
GST 223	Introduction to Entrepreneurial Studies	C	2
GST 224	Leadership Skills	C	2
CHM 212	Inorganic Chemistry I	C	2
CHM 214	Structure and Bonding	C	2

CHM 252	Process Science II	C	3
STA 202	Statistics for Physical Sciences and Engineering	C	2
MTH 206	Advanced Mathematics VII	C	2
PHY 208	Electric Circuits and Electronics	C	3
	TOTAL CREDIT UNITS		20

300 LEVEL

FIRST SEMESTER

Course Code	Course Title	Status	Units
HUN 301		R	1
HUN 311		R	1
GST 311	Introduction to Entrepreneurial skills	C	2
CHM 321	Organic Chemistry II	C	2
CHM 301	Inorganic Chemistry II	C	2
CHM 317	Industrial Raw Materials Resource Inventory	C	2
CHM 319	Environmental Chemistry	C	2
CHM 355	Introductory Material Science	C	2
*CHM 399	Industrial Attachment II (12 Weeks)	C	3
CHM 383	Polymer Chemistry	C	2
COS 201	Computer Programming I	C	2
CHM 311	Physical Chemistry II	C	2
	TOTAL CREDIT UNITS		23

SECOND SEMESTER

Course code	Course code	Status	Units
HUN 302		R	1
HUN 312		R	1
CHM 302	Inorganic Chemistry II	C	2
CHM 314	Physical and structural chemistry III	C	2
CHM 312	Physical and structural chemistry II	C	2
CHM 316	Applied Spectroscopy	C	2
CHM 352	Management and Chemical Industry I	C	3
CHM 356	Colour and Textile Chemistry	C	2
CHM 358	Management and Chemical Industry	C	2

	II		
CHM 322	Organic Chemistry II	C	2
ECO 102	Principles of Economics	C	2
	TOTAL CREDITS		20

400 LEVEL

FIRST SEMESTER

Course Code	Course Title	Status	Units
HUN 401		R	1
HUN402		R	1
CHM 400	Seminar in Chemistry	C	3
CHM 405	Research Project	C	6
CHM 421	Advanced Organic Chemistry I	C	2
CHM 401	Advanced Inorganic Chemistry I	C	2
CHM 451	Advanced Industrial Chemistry	C	2
	TOTAL CREDIT UNITS		16

ELECTIVE COURSES (at least two courses)

Course Code	Course Title	Units
CHM 407	Electrochemistry	2
CHM 419	Organic Synthesis	2
CHM 457	Special Laboratory Methods	2
CHM 453	Chemistry of Industrial Processes	2
CHM 455	Macromolecular Chemistry II	2
CHM 483	Colour Chemistry & Technology I	2
CHM 485	Cement & Fertilizer Industry	2
CHM 489	Oils, Fats Detergents & Cholo-Alkali industries	2

SECOND SEMESTER

Course Code	Course Title	Status	Units
HUN 402		R	1
HUN 412		R	1
CHM 402	Advanced inorganic Chemistry	C	2
CHM 410	Analytical Chemistry II	C	2
CHM 422	Advanced Organic Chemistry	C	2
CHM 452	Advanced industrial chemistry II	C	3

CHM 454	Chemical Processes Technology	C	2
CHM 482	Colour Chemistry & Technology II	C	2
TOTAL CREDIT UNITS			15

DIRECT- ENTRY PROGRAMME FOR INDUSTRIAL CHEMISTRY

200 LEVEL

FIRST SEMESTER

Course Code	Course Title	Status	Units
HUN 101	The God Factor and 21 st century Challenges I	R	1
HUN 121	Security Education I	R	1
HUN 201		R	1
HUN 211		R	1
GST 111	Communications in English I	C	2
GST 121	Use of Library, Study Skills and Information Communication Technology (ICT)	C	2
GST 113	Nigerian Peoples & Culture	C	2
GST 211	Environment and Sustainable Development	C	2
CHM 221	Organic Chemistry I	C	2
CHM 213	Analytical Chemistry I	C	2
CHM 251	Process Science I	C	2
*CHM 299	Industrial Attachment I (12 Weeks)	C	3
CHM 201	General Inorganic Chemistry	C	2
CHM 211	General Physical Chemistry	C	2
CHM 273	Practical Organic Chemistry I	C	2
MTH 207	Advanced Mathematics VII	C	2
PHY 251	Electromagnetism	C	2
COS 101	Introduction to Computer Science	C	2
ECO 101	Principles of Economics I	C	2
TOTAL CREDIT UNITS			35

SECOND SEMESTER

Course	Course Title	Status	Units
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Code			
HUN 102	The God Factor and 21 st century Challenges II	R	1
HUN 122	Security Education II	R	1
HUN 202		R	1
HUN 212		R	1
GST 112	Logic Philosophy & Human Existence	C	2
GST 122	Communication in English II	C	2
GST 123	Communication in French	C	2
GST 222	Peace Studies & Conflict Resolution	C	2
GST 223	Introduction to Entrepreneurial Studies	C	2
GST 224	Leadership Skills	C	2
CHM 212	Inorganic Chemistry I	C	2
CHM 214	Structure and Bonding	C	2
CHM 252	Process Science II	C	3
PHY 208	Electric Circuits and Electronics	C	3
STA 202	Statistics for Physical Sciences and Engineering	C	2
MTH 206	Advanced Mathematics VII	C	2
	TOTAL CREDIT UNIT		28

300 LEVEL

FIRST SEMESTER

Course Code	Course Title	Status	Units
HUN 301		R	1
HUN 321		R	1
GST 311	Introduction to Entrepreneurial	C	2
CHM 311	Physical Chemistry II	C	2
CHM 321	Organic Chemistry II	C	2
CHM 301	Inorganic Chemistry II	C	2
CHM 317	Industrial Raw Materials Resource Inventory	C	2
CHM 319	Environmental Chemistry	C	2
CHM 355	Introductory Material Science	C	2
*CHM 399	Industrial Attachment II (12 Weeks)	C	3
CHM 383	Polymer Chemistry	C	2
COS 201	Computer Programming I	C	2

SECOND SEMESTER

Course Code	Course Title	Status	Units
HUN 302		R	1

HUN 312		R	1
CHM 302	Inorganic Chemistry II		
CHM 314	Atomic & Molecular Structure & Symmetry	C	2
CHM 312	Physical Chemistry II	C	2
CHM 316	Applied Spectroscopy	C	2
CHM 352	Management and Chemical Industry	C	3
CHM 356	Colour and Textile Chemistry	C	2
CHM 358	Management and Chemical Industry II	C	2
CHM 374	Applied Spectroscopy	C	2
ECO 102	Principles of Economics	C	2
	TOTAL CREDIT UNITS		19

400 LEVEL

FIRST SEMESTER

Course Code	Course Title	Status	Units
HUN 401		R	1
HUN 402		R	1
CHM 400	Seminar in Chemistry	C	2
CHM 405	Research Project	C	6
CHM 421	Advanced organic chemistry I	C	2
CHM 401	Advanced inorganic chemistry 1	C	2
CHM 451	Advanced industrial chemistry	C	2
	TOTAL CREDIT UNITS		16

ELECTIVE COURSES (at least two Courses)

Course Code	Course Title	Units
CHM 407	Electrochemistry	2
CHM 419	Organic Synthesis	2
CHM 457	Special Laboratory Methods	2
CHM 453	Chemistry of Industrial Processes	2
CHM 455	Macromolecular Chemistry II	2
CHM 483	Colour Chemistry & Technology I	2
CHM 485	Cement & Fertilizer Industry	2
CHM 489	Oils, Fats Detergents &Cholo-Alkali industries	2

SECOND SEMESTER

Course Code	Course Title	Status	Units
HUN 402		R	1

HUN 412		R	1
CHM 402	Advanced inorganic Chemistry	C	2
CHM 410	Analytical Chemistry II	C	2
CHM 422	Advanced Organic Chemistry	C	2
CHM 452	Advanced industrial chemistry II	C	3
CHM 454	Chemical Processes Technology	C	2
CHM 482	Colour Chemistry & Technology II	C	2
	TOTAL CREDIT UNITS		15

COURSE SYNOPSES

General Studies Courses

GST 111 Communication in English I

(2 Units)

Effective communication and writing in English Language skills; writing of essay, letters, speeches, public announcements, minutes of meetings and term papers; Reading and listening of Comprehension; sentence construction, outlines and paragraphs; collection and organization of materials; punctuation.

GST 112 Logic, Philosophy and Human Existence

(2 Units)

A brief survey of the main branches of Philosophy Symbolic; Local Special symbols in symbolic logic-conjunction; negation, affirmation, disjunction, equivalent and conditional statements law of tort; The method of deduction using rules of inference and bi-conditionals qualification theory; Types of Discourse; Nature of arguments, Validity and soundness; Techniques for evaluating arguments.

GST 113 Nigeria Peoples and Culture

(2 Units)

Nigerian history, culture and arts in pre-colonial times; 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 attitude and conducts (cultism and related vices); Re-orientation of moral and national values; Moral of obligations of citizens; Environmental problems.

GST 121 Use of Library, Study Skills & Information Communication Technology (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-material, etc.; understanding library catalogue and classification; Copyrights and its implication; Database resource, Bibliographic citations and referencing; Development of modern ICT; Hardware technology, Software technology, Input devices, Storage devices and Output devices; word processing skills.

GST 122 Communication in English II (2 Units)

Logical presentation of papers; phonetics; instruction on lexis; art of public speaking and oral communication; figures of speech; precise; report writing.

GST 123 Communication in French (2 Units)

Introduction to French; French Alphabets and Sounds – Writing and Pronunciation; French Syllabus –Writing and Pronunciation; French Words – Writing and Pronunciation; Phrases, Simple Sentences and Paragraphs; Conjunction, dialogue; Advance Study of Sentences.

GST 211 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, waste and other material; Chemical and radiochemical hazards; introduction to the various areas of science and technology; Elements of environmental studies.

GST 222 Peace and Conflict Resolution (2 Units)

Introduction to entrepreneurship and new venture creation; Entrepreneurship in theory and practice; Forms of business, Staffing, Marketing and new venture; determining capital requirements, raising capital; Financial planning and management; starting a new business, Feasibility studies; Innovation; legal Issues; Insurance and environmental consideration. Possible business opportunities in Nigeria.

GST 223 Introduction to Entrepreneurship (2 Units)

Introductory Entrepreneurial skills: Relevant Concepts: Enterprise, Entrepreneur, Entrepreneurship, Business, Innovation, Creativity, Enterprising and Entrepreneurial Attitude and Behaviour. History of Entrepreneurship in Nigeria. Rationale for Entrepreneurship, Creativity and Innovation for Entrepreneurs. Leadership and Entrepreneurial Skills for coping with challenge. Unit Operations and Time Management. Creativity and Innovation for Self-Employment in Nigeria. Overcoming Job Creation Challenges. Opportunities for Entrepreneurship, Forms of Businesses, Staffing, Marketing and the New Enterprise. Feasibility Studies and Starting a New Business. Determining Capital Requirement and Raising Capital. Financial Planning and Management. Legal Issues, Insurance and Environmental Considerations.

GST 224 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 311 Introduction to Entrepreneur Skills**(2 Units)**

The course is a continuation of GST 222 (Entrepreneur studies). Attention is given to Personal management, Financial Management, Machinery management, concept of marketing, salesmanship, available trade for entrepreneurs and decision making, students are expected to be exposed on some of the entrepreneurial skills.

Some of the ventures to be focused upon include the following: 1. Soap/Detergent, tooth brushes and tooth paste making 2. Photography 3. Brick, Nails, screws making 4. Dyeing/textile blocks paste making 5. Rope making 6. Plumbing 7. Vulcanizing 8. Food process/packaging/preservation 9. Production of Chemical and allied products.

CHM 101: General Chemistry I**(2 Units)**

Atoms, molecules and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shape: 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 and introduction to electrochemistry. Radioactivity.

CHM 171: Basic Practical Chemistry**(2 Units)**

The theory and practice of simple volumetric and quantitative analysis, redox reactions, acid-base titration and gravimetric analysis. Qualitative analysis.

CHM 102: General Chemistry II**(2 Units)**

Historical survey of the development and importance of Organic Chemistry. Fullerenes as fourth allotrope of carbon, uses in nanotubes, nanostructure, nanochemistry.

Electronic theory in organic chemistry. Isolation and purification of organic compounds. Determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry. Nomenclature and functional group classes of organic compounds. Introductory reaction mechanism and kinetics. Stereochemistry. The chemistry of alkanes, alkenes, alkynes, alcohols, ethers, amines, alkyl halides, nitriles, aldehydes, ketones, carboxylic acids and derivatives.

CHM 108: General Chemistry Practical II (1 Unit)

Continuation of CHM 107. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

CHM 211: Physical Chemistry I (2 Units)

Kinetic theory of gases; Behaviour of real gases; the laws of thermodynamics; entropy and free energy; reactions and phase equilibria; reaction rates; rate laws; mechanism and theories of elementary processes; photochemical reactions basic electrochemistry.

CHM 221: Organic Chemistry (2 Units)

Pre-requisite – CHM 102

Chemistry of aromatic compounds. Structures of simple sugars, starch and cellulose, peptides and proteins. Chemistry of bi-functional compounds. Energetics, kinetics and the investigation of reaction mechanisms. Mechanisms of substitution, elimination, addition and rearrangement reactions. Stereochemistry. Examples of various named organic reactions e.g. Grignard reaction, Aldol and related reactions. Simple alicyclic carbon compounds and their synthesis.

CHM 201: Inorganic Chemistry I (2 Units)

Pre-requisite – CHM 101

Chemistry of First row transition metals. Introduction to coordination chemistry including elementary treatment of crystal field theory. Comparative Chemistry of the following elements: (a) Ga, In, Ti, (b) Ge, Sn, Pb, (c) As, Sb, Bi (d) Se, Te, Po.

Elementary introduction to organometallic chemistry. Role of metals in biochemical systems. Concepts of hard and soft acids and bases. Oxidation and reduction reactions.

CHM 213: Analytical Chemistry I (2 Units)

Theory of Errors; and statistical treatment of data: Theory of sampling. Chemical methods of analysis including volumetric, gravimetric and physiochemical methods, Optical methods of analysis; separation methods.

CHM 214: Structure and Bonding (2 Units)

Pre-requisite –CHM 101 and 102

Idea of quantum states, orbitals, shape; and energy. Simple valence theory, electron

repulsion theory, atomic spectra. Methods of determining molecular shape, bond lengths and angles. The structure and chemistry of some representative main group element compounds.

CHM 251: Process Science I

(2 Units)

Pre-requisite: CHM 152:

Commercial process, problems of scale and cost. Process flow sheet and stoichiometry. Handling of fluids; conservation laws and dimensional analysis applied to a moving fluid. Process heat transfer, mechanisms of heat transfer coefficients in batch and continuous processes. Use of mean temperature difference. Change of phase correlation of heat transfer data. Distillation differential, batch, fractional and continuous fractional distillation; number of stages; effects of operating variables.

CHM 252: Process Science II

(2 Units)

Pre-requisite: CHM 251:

Mass transfer processes; single phase and inter-phase, mass transfer drying as a heat-mass transfer process. Extraction and Absorption; solvent extraction in mixer settlers and columns; number of ideal stages; number of stages in gas absorption by HTU method; gas film and liquid film rate determining steps. Solid-liquid separation by filtration and sedimentation. Stoichiometry for systems involving recycles.

CHM 299: Industrial Attachment I (12 Weeks)

(3 Units)

Students should be attached to some industrial organizations for 12 Weeks at the 200 Level preferably during the long vacation for real-time relevant industrial experience. Students to be assessed based on seminar presentations, their reports and assessment by supervisors. This is only applicable in institutions that run a 4-year industrial chemistry programme.

CHM 301: Physical Chemistry II

(2 Units)

Pre-requisite –CHM 201

A review of Gibbs Function. Chemical thermodynamics. Introduction to statistical thermodynamics. Ideal solutions and non-Ideal solutions. Properties of electrolytes. Colligative Properties.

CHM 302: Inorganic Chemistry II

(2 Units)

Pre-requisite –CHM 212

The Noble gases. Hydrogen. Electronic structure and general properties and comparative study of Group IA and group IIA elements. Chemistry of Boron; Carbon and Silicon; Nitrogen and Phosphorus; Oxygen and Sulphur. The halogens. Transition elements. Separation of metals. Introduction to co-ordination chemistry.

Introductory organometallic chemistry. Ligand and Crystal field theories. Introduction to radiochemistry. Radioactivity and the periodic table. Role of metals in living systems.

CHM 321: Organic Chemistry II (2 Units)

Pre –requisite –CHM 221

Aromatic and Alicyclic chemistry. Survey of representative polycyclic compounds. Heterocyclic Chemistry (3,4,5 and 6-membered ring of O, N, S heterocyclic compounds). Reactive intermediates – carbocations, carbanions, carbenes, nitrenes etc. Selected rearrangement reactions e.g. Beckmann, Baeyer-Villiger etc to illustrate various reaction mechanisms and types.

CHM 383: Polymer Chemistry (2 Units)

The nature of Polymer nomenclature. Outline of sources of raw materials for polymers; Polymerization process, condensation polymerization in details. Solubility and solution properties of polymers. Structure and properties of polymers. Electrical conducting organic wires, smart/sim cards, flat screen televisions.

Polymerization mechanisms; detailed treatment of addition processes. Stereospecific reactions, copolymerization reactions. Phase systems for reactions. Industrially important thermoplastic and thermosetting polymers: Polyurethanes. Rubber elasticity. Mechanical properties of polymers. Analysis and testing of polymers. Degradation of polymers.

CHM 312: Separation Methods and Analysis (2 Units)

Intermediate theory and laboratory techniques in analytical and physical chemistry. Advanced data analysis methods and goodness-of-fit criteria Spectroscopic methods and instrumentation. Separation methods: ion exchange, gas, paper, liquid and column chromatography; electrophoresis. Atomic and molecular absorption, emission and fluorescence spectrophotometry. Electroanalytical techniques. Quantitative analysis. X-ray methods. Refractometry, Interferometry, Polarimetry, Polarography & Calorimetry.

CHM 316: Applied Spectroscopy (2 Units)

Principles and applications of UV, IR, NMR and Mass spectroscopy in the determination and elucidation of structures of organic compounds. Brief mention of hyphenated systems: GC-MS, LC-MS and LC-NMR and NMR in medicine.

CHM 317: Industrial Raw Materials Resource Inventory (1 Unit)

Survey of Nigeria's industries and their raw material requirements. Mineral chemistry. Fossils and their uses. Plant and animal products. Nuclear, Solar, aerodynamic/wind and hydrodynamic sources of energy. Potentials and applications of locally available raw materials as industrial feedstock.

CHM 319: Environmental Chemistry (2 Units)

Concepts of elementary cycles. Characteristics of the atmosphere. Sources, types and effects of environmental pollution. Waste water treatment. Composition of

domestic/industrial wastes and waste management. Water chemistry and analysis. Chemical and physical instrumentation in Environmental Sciences. Introduction to Environmental Impact Assessment. Green Chemistry: 12 principles of Modern and unusual methods of pollution analysis. Biodegradable macromolecules including detergents.

CHM 352: Management and Chemical Industry I (2 Units)

Management Process and Methods: The nature of management and the role with the chemical industry: management theory. Managerial association and specialization. Line and staff structure: functions and relationship. The manager's role. Organizational structure and management structure. Authority and organization. Corporate policy and organizational constraints on management process. The decision process, managerial techniques and supportive information system.

Managerial Economics: Risk and uncertainty in decision making. The theory of production, Cost and Demand analyses and sales forecasting. Pricing. Investment decision: product diversifications. Theory of business behaviour.

CHM 355: Introductory Material Science (2 Units)

Classification and properties of industrial materials. Type of bonding and its influence on both structure and properties of materials. Manufacture and properties of solid solutions(alloys). Structure of crystalline materials, coordination number, Crystallography. Stress-strain relationship in materials, elastic and inelastic regions, mechanical, thermal and electrical properties of materials. Crystal growth and imperfections (defects). Material transformation-deformation, strengthening, electroplating and corrosion.

CHM 356: Colour and Textile Chemistry (2 Units)

Classification of dyes and textile fibres. Natural regenerated and synthetic fibres. Physical and structural properties of fibres. Preparatory processes: Singeing, desizing, scouring, bleaching, mercerization and optical brightening. Colour and constitution. Theory of dyeing. Dyeing preparation, structure, and application of dyes. After treatments and quality control: Colour fastness.

CHM 358: Management and Chemical Industry II (2 Units)

An introduction to the anatomy of management; Industrial Relation; Public Relations; Industrial Psychology; Organizational Design: Management of Personnel. An introduction to the production functions; planning for productivity. General Problem solving processes and creative thinking. Analytical methods of investigation.

CHM 399: Industrial Attachment II (12 Weeks) (3 Units)

Students should be attached to some industrial organizations for additional 12 Weeks at the 300 Level preferably during the long vacation for more real-time relevant industrial experience. Students to be assessed based on seminar presentations, their reports and assessment by supervisors. This only applies to institutions that operate a

4-year industrial chemistry programme.

CHM 400: Seminar in Chemistry

(2 Units)

Restricted Special topics to be covered include the following:

(1) Mining and Metallurgy: Mineral Processing: performance and separation crystal structures. Metal solidification and heat treatment. Phase transformation and microstructure. Fabrication and uses of materials. **(2) Ceramics and Glasses:** The crystal structure of ceramic materials including silicates, crystallization of glass formation, glass forming materials. Forming process of glass and ceramic. Chemotherapeutic agents. **(3) Chemistry of Paints and Adhesives:** Classification of paints in terms of use and constitution. The manufacturing process and principles of formulation. The paints and their physical properties. Composition and classification of adhesives.

Physical properties, formulation and application of paints and adhesives. **(4) Cement Chemistry:** Classification of cements, cement raw materials and process of manufacture. Structure of cements. Physical and chemical properties cement. Cement production processes. **(5) Leather Chemistry:** Chemistry of animal skin. Theory of tanning. Pretanning processes. Vegetable tanning process. Materials, their properties and chemistry. Synthetic tanning materials: Chrome and other tonnages. Leather/Tanning.

(6) Chemistry of Brewing: Bio-organic chemistry of malting and mashing. Chemistry Of hop constituents, wort boiling and hop extraction. Techniques in the brewing process. Fermentation. Additive

CHM 405 Research Project

(6 Units)

Research projects into selected topics in industrial chemistry. Students will be expected to carry out literature survey on chosen topics, perform experiments and produce reports. Students will be subjected to both seminar and oral examinations on their projects.

CHM 407: Electrochemistry

(2 Units)

Chemical Equilibria: Ionic equilibria, Conductance, theory and measurement, interpretation of data for strong and weak electrolytes, Conductance and transport processes. Thermodynamics and galvanic cells. Standard electrode potentials. Practical electrode. Molecular forces in solids and liquids: Dipole moments. Interaction potentials and forces. Reversible galvanic cells, measurement of E.M.F. Electrode potentials and the electrochemical series. Standard state and the Nernst equation. Applications of e.m.f. measurements (excluding thermodynamic relationships). Potentiometric titration including measurement of pH. Redox reactions. The electrical double layer and its applications. use of isotopes in reaction mechanism and analysis.

CHM 415: Polymer Technology

(2 Units)

Large scale industrial polymerization processes. Polymer characterization, criteria for polymer solubility, chain conformation, thermodynamics and phase equilibrium.

CHM 419 Organic Synthesis**(2 Units)**

General methods of isolation, separation, purification and structural determination of natural products. Classifications and biogenesis. Chemistry of terpenoids, steroids, alkaloids, antibiotics, flavonoids. Prostaglandins and chlorophylls. Other natural products of pharmaceutical importance. Cholesteryl benzoate, liquid crystals and digital displays in computer screens, etc.

CHM 422 Physical Organic Chemistry**(2 Units)****Pre-requisite: CHM 322**

Stepwise and concerted reaction mechanism. Kinetic studies, non-kinetic studies, Nucleophilic displacement reactions. The mechanisms of SN1, SN2 processes. The effects of structure, environment, nature of the nucleophile, solvation factors, added salt etc on the course and rates of reactions, stereochemical concepts. Ester hydrolysis – unimolecular and bimolecular processes. Linear free energy relationships. The Hammett equation; determination of constituent and reaction constants; significance and Use of the signs and symbols to + ρ / ρ^+ / ρ^- / ρ^0 application to evaluation of mechanistic pathways.

CHM 401 Advanced Inorganic Chemistry**(2 Units)****Pre-requisites: CHM 201, CHM 301**

Classification of organometallic compounds. Preparation, structure and reactions including abnormal science of organometallic compounds. Synthetic utility of organometallics. Introduction to organometallic compounds of the transition elements. Classification of ligands, electron rule, bonding, preparation of organic transition metal compounds. Reaction and structures of organometallic compounds of transition elements. The organic chemistry of ferrocene and related compounds. The role of organometallic compounds in some catalytic reaction.

CHM 457 Special Laboratory Methods**(2 Units)**

Selected advanced chemistry laboratory exercises to enhance students' knowledge and manipulative skills in modern laboratory techniques and methods – viz. Ozonolysis, hydrogenation, hydroboration – oxidation, functional groups protection and de-protection, high vacuum distillation and other separation methods. Advanced qualitative organic and inorganic analysis.

CHM 451 Advanced Industrial chemistry**(2 Units)****Pre-requisite: CHM 251 & CHM 351**

Overview of chemical processes and products with emphasis on the nature, origin and application of the products of the chemical and allied industries. Raw materials; availability, location, energy, primary chemical products: Industrial reactions, chemical plant, process costing Consumer and Secondary products: main uses of primary products. Legal aspects; Factory Acts. Etc. Case studies based on industries and/or chemical networks e.g. Industries: Oil, fertilizer, plastics, Detergents etc, chemical networks; Alkali, Chlorine, Fluorine, Coal/Oil etc.

CHM 452 Advanced industrial chemistry II**(3 Units)****Pre-requisite: CHM 352**

Mixing and agitation; liquid-liquid, solid-liquid and gas-liquid systems. Scale up. Residence distribution functions for continuous flow systems. Correlation of heat transfer data. Use of effectiveness number of transfer units applied to heat exchangers. Solvent extraction with partially mixable liquids, selection of suitable extracting agents. Column height and cross section in gas washing. Multi-component vapour-liquid equilibria, bubble points and dew points; key components partial material balances. The approximate design of Multi-component distillation columns. Minimum reflux ratio, minimum number of theoretical stages; feed point location. Rigorous simulation procedure; multi-component composition profiles. Small refinery configurations. Optimization. Case studies covering fluid mechanics, heat and mass transfer processes. Linear Programming. The need for process control. Types of control; open loop, feed forward, feed-back, cascade feedback and adaptive control. Primary elements, final elements. Nature of offset; one, two and three term algorithms. Response to disturbances. Controller optimization. Control of systems with non-linear response characteristics. Direct digital control. Programmed control regimes.

CHM 455: Macromolecular Chemistry II**(2 Units)**

Polymerization processes; mechanism and kinetics of free radical, ionic and stereo-specific polymerization. Additions of polymerization in bulk, solution, suspension and emulsion. Ring opening poly condensation processes. Gelation theory. Copolymerization: Addition copolymerization, reactivity ratios, the copolymer-equation. Prediction of reactivity ratios. Degradation of polymers: by thermal, oxidative, photochemical and chemical

CHM 459 Photochemistry**(2 Units)**

Energy levels. Absorption and emission of light. Interaction of radiation with matter. Spin conservation rules. Electronic excitation: Excitation of atoms in the phase, Excitation of diatomic molecules, polyatomic molecules, complex polyatomic molecules and other complexes. Selection rules, deactivation routes, energy transfer, simple reactions of stable singlet and triplet states. Reactions of species produced photochemically. Sensitization and quenching. Conventional photolysis procedure. Flash photolysis. Photosynthesis, Chemiluminescence, vision and the photographic process.

Appendix I

RULES AND REGULATIONS GUIDING STUDENT CONDUCT DURING EXAMINATIONS

1. The following qualifies students to enter the examination hall;
 - a. Student name is on the list provided by the course lecturer
 - b. The student is properly and neatly dressed using the school dress code for the day of the week.
 - c. The student is wearing his/her HUNI identity card with the picture part prominently displayed in front.
 - d. The men are clean-shaven with low cut hair
 - e. The women's hair is neatly done
 - i. No extensions longer than the shoulder-length
 - ii. No odd-coloured extensions (only dark brown and black are acceptable)
2. Students must enter the examination hall with only pens, pencils, a mathematical set, and a calculator.
3. No student will be allowed into the hall with extraneous materials
 - i. Paper strips with written information regardless of whether the information is related to the course or not.
 - ii. Telephones
 - iii. Earpieces
 - iv. Writings on any part of their bodies
4. Examination starts and ends at the exact time listed on the timetable.
 - a. Tardiness is not allowed: Students must be at the examination hall 30 minutes before the start time listed on the timetable.
 - b. Any student who comes late, up to 30 minutes after the examination starts, **may** be allowed -+into the hall but will **not** be given extra time.
5. During the examination;
 - a. No communication between the students is allowed.
 - b. Students should ensure that they sign the attendance register. That is proof that you were indeed in the examination hall. Students should ensure that they fill in all information required in the attendance sheet (Matric number, course code, course name, script number, date, signature, etc).
 - c. No student shall be given an extra sheet unless the invigilator examines the answer booklet and confirms that it has been completely used.
 - d. All rough work must be done on the answer booklet! The student should just draw a single straight line across to cancel. Tipex or 'white out' fluid is **NOT** allowed.
 - e. Students are not allowed to talk to or request 'help' with the questions or

answers from the invigilators or supervisors during the examination.

- f. Students are not allowed to leave the examination hall unless it's an emergency
 - i. If a student must leave the examination hall, he/she shall be accompanied by an invigilator or someone assigned by the examination supervisors.
- g. Students should be aware that the Chief Examiner and/or the Supervisors shall come into the hall unannounced at any time during the examination.
6. At the end of the examination, the student should ensure that his/her script is collected by the invigilator.
7. The student is prohibited from carrying out, aiding, and abetting direct or indirect leakage of examination questions.
8. It is illegal for a student to ask a course lecturer to change marks to improve his/her course grades or for someone else.
9. No student should allow or aid another student to substitute freshly prepared answer scripts for those used during an examination.
10. No student should Initiate or request the correction of an approved result/grade based on false claims.

Appendix II

THE EXAMINATION BOARD

1. Chief Examiner is the Vice-Chancellor
2. Examination Supervisors:
 - a. Dr. Antor Odu Ndep
 - b. Dr. Helen Uzezi Wara
3. Examination Officers:
 - a. Mr. Anthony Ibe (Computing & Sciences)
 - b. Mr. Amaechi Igharo (Management & Social Sciences)
4. Examination Secretariate is Dr. Ndep's office at the Academic Block (labeled HOD Public Health)

ORGANIZATION AND CONDUCT OF EXAMINATIONS

11. The following qualifies students to enter the examination hall
 - a. Student name is on the list provided by the course lecturer
 - b. The student is properly and neatly dressed using the school dress code for the day of the week.

- c. The student is wearing his/her HUNI identity card with the picture part prominently displayed in front.
 - d. The men are clean-shaven with low cut hair
 - e. The women's hair is neatly done
 - i. No extensions longer than the shoulder-length
 - ii. No odd-coloured extensions (only dark brown and black are acceptable)
12. Students must enter the examination hall with only pens, pencils, a mathematical set, and a calculator.
- a. No student will be allowed into the hall with extraneous materials
 - i. Paper strips with written information regardless of whether the information is related to the course or not.
 - ii. Telephones
 - iii. Earpieces
 - iv. Writings on any part of their bodies
13. Examination starts and ends at the exact time listed on the timetable.
- a. Tardiness is not allowed: Students must be at the examination hall 30 minutes before the start time listed on the timetable.
 - b. Any student who comes late, up to 30 minutes after the examination starts, may be allowed into the hall but will not be given extra time.
14. During the examination;
- a. No communication between the students is allowed.
 - b. Students should ensure that they sign the attendance register. That is proof that you were indeed in the examination hall. Students should ensure that they fill in all information required in the attendance sheet
 - c. No student shall be given an extra sheet unless the invigilator examines the answer booklet and confirms that it has been completely used.
 - d. Students are not allowed to talk to or request for 'help' by the invigilators or supervisors during the examination.
 - e. Invigilator is prohibited from allowing a student to substitute freshly prepared answer scripts with those he/she used in the examination hall.
 - f. Students are not allowed to leave the examination hall unless it's an emergency
 - i. If they must leave the examination hall, they shall be accompanied by an invigilator or someone assigned by the examination supervisors.
 - g. The Chief Examiner and/or the Supervisors shall come into the hall unannounced at any time during the examination.
15. At the end of the examination;
- a. The invigilators and examination officer must ensure that the number of scripts tallies with the number of students who wrote the examination.

- b. The scripts, attendance register, and question paper must be neatly placed into an envelope.
 - c. The Examination officer takes the envelope to the secretariate
 - d. The course lecturer is given the envelope in the presence of the examination supervisors.
16. The course lecturer is prohibited from;
- a. Carrying out, aiding, and abetting direct or indirect leakage of examination questions to students.
 - b. Helping students to answer questions during an examination.
 - c. Changing marks to pass or victimize a student.
 - d. Allowing or aiding a student to substitute freshly prepared answer scripts for those used during an examination.
 - e. Initiating or requesting correction of an approved result/grade based on false claims.
 - f. Withholding or destroying a script or grade to enable a student to qualify for a (special) supplementary examination.

