

**UNIVERSITY OF PORT HARCOURT  
FACULTY OF SCIENCE**



**DEPARTMENT OF PURE & INDUSTRIAL  
CHEMISTRY**

**HANDBOOK**

*FOR*

**UNDERGRADUATE STUDENTS**

**INDUSTRIAL CHEMISTRY PROGRAMME**

**2016/2017 SESSION**

## TABLE OF CONTENT

1.0	Preface	3
2.0	Academic Staff Members Photobook	4
3.0	Brief History of the Department	14
4.0	Heads of Department since Inception	15
5.0	Academic Members of Staff	15
6.0	Technical Members of Staff	16
7.0	Administrative Members of Staff	17
8.0	Vice Chancellors of University of Port Harcourt since Inception	18
9.0	University Governance	18
10.0	Departmental Board Composition	20
11.0	Summary of Statement of Academic Policies	20
12.0	University of Port Harcourt Policy on Plagiarism	24
13.0	B. Sc Industrial Chemistry Programme	25
14.0	Course Descriptions for Undergraduate (BSc) Programme	33
15.0	Project preparation format	69

## PREFACE

This Departmental handbook is the 25<sup>th</sup> Anniversary Edition volume and contains information on the background on the establishment of the establishment of the Department of Chemistry. It is also a reference book for all who are in any of the programmes of the Department of Pure & Industrial Chemistry. It is intended to provide the necessary information, orientation and guidance to the students, right from their induction to the completion of their programmes. It therefore encapsulates the four major segments of our programmes, namely, the Undergraduate (BSc programmes), Post-Graduate Diploma in Chemistry (PGDC Programme), Master of Science (MSc Programme) and Doctor of Philosophy (PhD Programme). It describes the nature of each academic programme we offer, including the duration, workload, admission requirements and the core courses of each programme. Equally highlighted is the orientation for project writing, use of the library, anti-plagiarism, student discipline and participation in lectures as well as the practical, which constitute the clinical aspects of the programme, including the roles of academic advisers.

The importance of this booklet to both staff and students of this Department cannot therefore be overemphasized. It therefore makes for compulsory reading for not only the students and staff of the Department, but also for the general public who may wish to know what the Department is doing.

The student industrial work experience scheme (SIWES) mandates the 300 level students to have an industrial work experience of at least six months. Consequently, the Department has transferred some courses to 300 level first semester and 400 level.

In some cases, course codes and unit were also changed without compromising the academic standards.

The contributions of past Heads of Department are highly appreciated.

Prof. Gloria U. Obuzor  
Head of Department

## ACADEMIC STAFF MEMBERS PHOTOBOOK



***Onyewuchi Akaranta, PhD***

***Professor of Polymer Chemistry;*** Trained in the areas of polymer science and technology and surface coatings. Research interest is conversion of industrial and agricultural wastes into raw materials for polymeric surface coating applications. He is an expert in paints and adhesives.



***John O. E. Otaigbe, PhD***

***Professor of Polymer Chemistry***

Research area includes leachability of plastics, surface coating agents, clay- and polymer-supported materials and transformation of waste materials to useful products



***Michael Horsfall Jnr, PhD***

***Professor of Analytical Environmental Chemistry***

Research span from analytical method development and validation to elemental speciation in environmental matrices. Research fellow to Loughborough University of Technology, UK; University of La Plata, Argentina; University of Aberdeen, Scotland and Vaal University of Technology, South Africa. IFS Research Grantee and consultant.



***Regina Enyidia Ogali, PhD***

***Professor of Organic Chemistry:***

Her research interest is in Organic, Medicinal and Pharmaceutical Chemistry. However, she is a subject expert in organic synthesis and spectroscopy.



***Leo Chigbu Osuji, PhD***

***Professor of Petroleum Chemistry***

An oil-fingerprinting expert, he has over eighty peer-reviewed articles published in some of the world's finest journals, including Nature and Science. He is presently a visiting scholar to the Nigerian Content Development and Monitoring Board (NCDMB), where he is Head of Research and Development.



***Gloria Ukalina Obuzor, PhD***

***Professor of Organic Chemistry***

Her research areas are in organic synthesis, organometallic compounds and phytochemistry where the rich fauna of Nigeria is explored for nutraceutical. She is an oenologist, has a propensity for product development and she is currently exploring the conversion of waste to wealth. Current HOD



***Ifedi P. Okoye, PhD***

***Petroleum Chemist;*** His research interests focus on Petrochemicals /Petroleum Chemistry with emphasis on catalysis, absorption dynamics and simulation.



***Kaine Okorosaye-Orubite, PhD***

***Inorganic/Industrial Chemist;*** Specializes in exploring the usefulness of inorganic compounds in waste materials for the benefit of the environment. Corrosion inhibitors for mild steel, copper and Zinc from *Nypa Fruticans Wurmb* , *Xanthosoma spp* (a sea weed), corn silk (corn hairs), Silver metal from photographic wastes using unripe plantain peels and investigation of heavy metals and their speciation in selected materials.



***Kenneth Osondu Monago, PhD***

***Process/Industrial Chemist;*** His research interest is application of fundamental thermodynamics to process industries, such areas as palm oil derivation and natural gas custody transfer, which are relevant to the country's economy. He current works involve the use of model intermolecular potential functions to construct theory-based equations of state with a view to predict accurate thermodynamic properties of pure of fluids and their mixtures.



***Abosede Olubunmi James, PhD***

***Corrosion Chemist;*** Her research interests is focused on specializing in developing eco-friendly corrosion inhibitors of metals in various industrial acidizing fluids for interested companies.



***Millicent Uzoamaka Ibezim-Ezeani, PhD***

***Physical Chemist;*** Her research studies are in the area of identification of kinetic, thermodynamic and equilibrium conditions which are conducive to producing optimum results in the elimination of metal ions from effluents with resins formulated from agro waste. Her subject lectures are in Physical and Colloidal Chemistry at both undergraduate and graduate levels.



**Industrial Chemist;** He has a degree in Applied Chemistry with research interest in Environmental chemistry. On Sabbatical with the Department

***Timi Jack Francis Tarawou, PhD***



**Analytical/Environmental Chemist;** His research interest is in the application of nature and knowledge to solve environmental problems. He is presently focusing on modeling the relationships between chemical compositions of matter and their physicochemical properties, for applications in Environmental Evaluation, Assessment and Investigation. A key research area is in “Source identification of Polycyclic Aromatic Hydrocarbons in Soils and Sediments”. On Sabbatical with the Department

***Azibaola Kesiye Inengite, PhD***



**Chemistry/Fuel & Energy Engineering;** He holds a PhD degree in Environmental Chemistry, MEng degree in fuel and Energy Engineering, PGDPE in petroleum engineering and BSc degree in Analytical Chemistry. He also attended advanced and short courses in the Department of Fuel and Energy, University of Leeds, United Kingdom. An adjunct lecturer

***Boma Samuel Kinigoma, PhD***





***Prebo Jackreece, PhD***

***Computation Methods;*** He holds a PhD degree in Mathematics and teaches chemical mathematics and computational methods in science.



***Eka B. Essien, PhD***

***Nutrition/Toxicologist;*** Her research is in the areas of general biochemistry and nutrition/toxicology in particular. Other studies have been focused on food and water contamination, relationship between consumption of certain foods and disease and also studies on the phytochemical properties of some plants.



***Ithesinachi Appolonia Kalagbor, PhD***

***Analytica/Organic Chemist;*** Her research is in the synthesis and extraction of molybdenum (VI) complexes in acid media. On Sabbatical with the Department



***Benjamin Achor Amadi, PhD***

***Nutrition/Toxicologist;*** His research interests focuses on traditional food assessment.



***Charles Ikenna Osu, PhD***

***Environmental Chemist/Ecotoxicologist;*** His research interests focuses on Environmental and Pollution Control studies such as water impact assessment, air quality impact assessment, assessment of sanitary landfill, septic remedy, soils and geology impact assessment, transport impact assessment, odour impact assessment, visual impact assessment and air pollution modelling.



***Uche John Chukwu, PhD***

***Analytical/Inorganic Chemist;*** His research interest is in coordination/complex chemistry with focus on solvent-solvent extraction of heavy metals using different ligands both for environmental and industrial clean up to synthesize, characterize and extract metal chelates using synthetic and agricultural wastes.



***Ozioma Achugasim, PhD***

***Organic Chemist;*** His current research interests centers on the isolation of bioactive natural products and the synthesis of bioactive Schiff bases and their complexes, modification of natural products/biopolymers for use as oilfield chemicals and the precipitation of waxes and asphaltenes in crude oil flow assurance.



***Mudiaga Chukunedum Onojake, PhD***

***Petroleum/Environmental Geochemist;*** A Research Associate (Environmental Chemist) at the Centre for Marine Pollution Monitoring and Sea Food Safety, University of Port Harcourt, Choba, Rivers State. His research interests include: Petroleum Geochemistry, Oil spillage, Marine and Environmental pollution and Water quality.



***Chidi Obi, PhD***

***Biophysical Chemist;*** His research interests include adsorption and biosorption of heavy metal ions and organic pollutants from aqueous solutions, characterization of clays and clay minerals and other biomaterials, utilization of heterogeneous catalyst in the production of biodiesel, corrosion and electrochemical studies, critical micelle concentration studies etc.



***Godson N. Iwuoha, PhD***

***Environmental chemist;*** His research interests centers on but not limited to Chemical toxicology, Environmental remediation and assessment profiling of impact environmental matrices.



***Mark Obinna Onyema, PhD***

***Petroleum/Environmental Chemist;*** His research interests is focused on Petroleum Geochemistry and Fingerprinting Studies. He is a member of the Petroleum and Environmental Geochemistry (PEG) Research unit and an oil-fingerprinting expert.



***Nnaemeka Chinedu Ngobiri, PhD***

***Industrial Inorganic Chemist;*** His research interest includes Materials and Corrosion Chemistry, Petroleum and Environmental Chemistry and Energy studies. He has research collaborations with Shell Petroleum Development Company of Nigeria; Chinese Academy of Sciences, and materials Science Research Laboratory, among others.



***Onuoha Orij, PhD***

***Polymer/Industrial Chemist;*** His research interest centers on Polymer and Analytical Chemistry.



***Temple N. Chikwe PhD***

***Petroleum Chemist;*** His research interest is focused on the Environmental impact of Petroleum Impurities, Effects of Adulteration on the quality assurance parameters of Petroleum products and Treatment of Petroleum Products.



***Ikodiya Orji, MSc***

***Industrial Organic Chemist;*** First degree in Industrial Chemistry and On-going Doctoral Degree in oilfield chemicals. Areas of research interest include synthesis of biologically active heterocyclic compounds, ion exchange resins for the removal of heavy metal contaminants in produced water, and esters as synthetic base fluids for the formulation of oil well drilling fluids.



***Pereware Adowei, PhD***

***Environmental Chemist;*** Her current research interest is Synthesis, Characterization and Application of Nipa Palm (*Nypa Fruiticans Wurmb*) Supported Nanocomposite Adsorbents for Remediation of Organic and Inorganic Contaminants in Aqueous Systems.



***Remy Ukachukwu Duru, MSc***

***Industrial Organic Chemist;*** Master's Degree in Polymer Chemistry with an on-going Doctoral Degree research in oilfields chemicals. His research interest is in Natural Product Chemistry and Oilfield Chemicals.



***Idongesit Ekpo, MSc***

***Industrial Organic Chemist;*** His research interest area is in Industrial Organic Chemistry with focus on Fuel Chemistry.



***Samson Anuchi, MSc***

***Analytical Chemist;*** His research Interests is focused on the Development and Application of Nanomaterials/Nanocomposites for the optimisation of oilfield chemicals (drilling fluids, corrosion inhibitors).



***Cynthia Onyekachi Victor-Oji, BSc***

***Petroleum/Industrial Chemist;*** Her current research interest centres on Organic Geochemical Studies of Nigerian Tar Sands to determine its hydrocarbon potential as a huge source of petrochemical feedstock.

### **Brief History of the Department**

The University of Port Harcourt was initially established as the University College of Port Harcourt. However, in 1977, the University was granted a full University status with the academic objectives: “To contribute to national development, self-reliance and unity through the achievement and propagation of knowledge and use such knowledge for service to the community and to humanity”. In order to achieve the above objectives, the University at that time was operating the ‘School’ system and Chemistry was under the then School of Chemical Sciences with Prof. A. C. I. Anusiem as the first Dean, which comprises of Applied Chemistry unit, Biochemistry unit and Pure Chemistry unit. Prof. Anusiem, as Dean of the then School of Chemical Sciences made great input in designing the Bachelor’s Degree programmes of the three units under the school.

In 1982/83 session, the School system was abolished and Faculties established in 1983/84 session. The Pure Chemistry and Applied Chemistry units metamorphosed into full-fledged Departments of Pure Chemistry and Applied Chemistry with separate Heads of Department. Prof. A. C. I. Anusiem was the HOD of the Applied Chemistry Department; Dr. Knox (an American) was the HOD of Pure Chemistry Department. The two Departments merged into a single Department of Pure & Applied Chemistry in 1984/85 session with the then Dr (Mrs) Ayebaemi I. Spiff (now Professor) as the HOD.

In the mid 1980s and early 1990s, the industrial sector of Port Harcourt increased tremendously and there was a great demand for highly trained Industrial Chemist for the chemical and allied industries. It is the realization of this fact that made the Department to review its undergraduate programme in 1992/93 session, leading to the change of its focus and name from the Department of Pure and Applied Chemistry to Department of Pure & Industrial Chemistry with Dr. N. C. Oforka (now Professor) as the HOD.



**A. HEADS OF DEPARTMENT SINCE INCEPTION**

S/N	NAME	DESIGNATION	FROM	TO
1.	ANUSIEM, A. C. I	HOD, Applied Chemistry	1982	1985
2.	Dr. KNOX (American)	HOD, Chemistry	1982	1985
3.	SPIFF, A. I	HOD, Pure & Applied Chemistry	1986	1988
4.	OJINNAKA, C. M	HOD, Pure & Applied Chemistry	1988	1990
5.	SHODE, F. O	HOD, Pure & Applied Chemistry	1990	1992
6.	OFORKA, N. C	HOD, Pure & Industrial Chemistry (Late)	1992	1994
7.	OMOLEYE	HOD, Pure & Industrial Chemistry	1994	1995
8.	OTAIGBE, J. O. E	HOD, Pure & Industrial Chemistry	1995	1997
9	MANILLA, P. N	HOD, Pure & Industrial Chemistry (Late)	1997	1999
10	AKARANTA, O	HOD, Pure & Industrial Chemistry	1999	2001
11	ABIA, A. A	HOD, Pure & Industrial Chemistry	2001	2003
12	OGALI, R.E	HOD, Pure & Industrial Chemistry	2003	2005
13	UZOUKWU, B. A	HOD, Pure & Industrial Chemistry (Late)	2005	2008
14	HORSFALL, M. Jnr	HOD, Pure & Industrial Chemistry	2008	2010
15.	NGOCHINDO, R. I	HOD, Pure & Industrial Chemistry	2010	2012
16.	OSUJI, L. C	HOD, Pure & Industrial Chemistry	2012	2014
	OBUZOR, G. U	HOD, Pure & Industrial Chemistry	May, 2014	July, 2014
17.	NGOCHINDO, R. I	HOD, Pure & Industrial Chemistry	2014	2016
18.	OBUZOR, G. U	HOD, Pure & Industrial Chemistry	2016	Date

**B. ACADEMIC MEMEBERS OF STAFF (INDUSTRIAL CHEMISTRY)**

S/No.	Name	Qualifications	Field of Specialization	Designation
1.	Akaranta, O	BS. (Nigeria) MSc (ABU), PhD (UPH)	Polymer Science & Technology/Surface Coating	Professor
2.	Otaigbe, J. O. E.	BSc (Lagos), PhD (UMIST)	Polymer Chemistry	Professor
3.	Horsfall, M. Jnr	BSc, MSc, PhD (UPH)	Analytical/ Environmental Chemistry	Professor
4.	Ogali, R. E.	BSc (Nigeria), MPhil, PhD (London)	Organic/Pharmaceutical Chemistry	Professor
5.	Osuji, L. C.	BSc (UPH), PGD Pet. Eng. MSc, PhD (Ibadán)	Petroleum Chemistry	Professor
6.	Obuzor, G. U. (Mrs)	BSc (Washington DC) MSc (UPH), PhD (UMIST)	Polymer/Organometallics	Professor
7.	Okoye, I. P	BSc (Benin), MSc, PhD (UMIST)	Petroleum Chemistry	Reader
8.	Orubite-Okorosaye, K	BSc (UNIBEN), MSc, PhD (UNIPORT)	Inorganic Chemistry	Senior Lecturer
9.	Monago, K. O.	BSc (Nigeria), Dip Chem. Engr. (Aston), MSc, PhD (London)	Applied Thermodynamics/Process Development	Senior Lecturer
10.	James, A. O.	BSc (OSU), MSc (Ibadan), PhD (UPH)	Inorganic/Corrosion Chemistry	Senior Lecturer

11.	Ibezim-Ezeani, M. U	BSc, MSc, PhD (UPH)	Physical Chemistry	Senior Lecturer
12.	Tarawou, T. J. F. K	BSc, MSc, PhD (UPH)	Applied Chemistry	Senior Lecturer (Sabbatical)
13.	Inengite, A. K.	BSc (RSUST), MSc (Conventry,UK), PhD (UPH)	Analytical/Environmental Chemist	Senior Lecturer (Sabbatical)
14.	Kinigoma, B.	BSc, MSc, PhD (UPH)	Industrial Chemistry/Fuel & Energy Engineering	Senior Lecturer (Adjunct)
15.	Jackreece, P	BSc, MSc, PhD (FUTO)	Computational Methods	Senior Lecturer
16.	Essien, E.B	BSc, MSc, PhD (UPH)	Nutrition/Toxicologist	Senior Lecturer
17.	Kalagbor, I. A	BSc,(UNN), MSc (UNN), PhD (UPH)	Analytical/Organic Chemistry	Senior lecturer
18.	Amadi, B. A	BSc, MSc, PhD (UPH)	Nutrition/Toxicologist	Senior lecturer
19.	Osu, C. I.	BSc (ABSU), MSc, PhD (UPH)	Environmental Chemistry	Senior Lecturer
20.	Achugasim, O.	BSc (Cal), MSc, PhD (UPH)	Organic Chemistry	Lecturer I
21.	Onojake, M.	BSc (DELSU), MSc (UPH), PhD (UPH)	Petroleum Chemistry	Lecturer 1
22.	Obi, C.	BSc (IMSU), MSc, PhD (UPH)	Physical Chemistry	Lecturer I
23.	Chukwu, U. J.	BSc (NAU), MSc, PhD (UPH)	Analytical/Inorganic Chemist	Lecturer I
24.	Iwuoha, G	BSc (IMSU), MSc (FUTO), PhD (UPH)	Environmental/Analytical Chemistry	Lecturer I
25.	Ngobiri, N.	BSc (ABSU), MSc ((FUTO), PhD (UPH)	Material Chemistry	Lecturer 1
26.	Onyema, D M,	BSc (IMSU), MSc, PhD (UPH)	Petroleum Chemistry	Lecturer 1
27.	Orij, O. G	BTech (FUTY), MSc (UPH), PhD (Ghana)	Polymer/Paint Chemistry	Lecturer I
28.	Chikwe, T. N	BSc, MSc, PhD (UPH)	Petroleum Chemistry	Lecturer II
29.	Orji, O.	BSc, MSc (UPH)	Industrial Chemistry/Oil-field Chemicals	Lecturer II
30.	Adowe, P	BSc (DELSU), PGDC, MSc, PhD (UPH)	Environmental Chemistry	Lecturer II
31.	Duru, U. R	BSc, MSc (UPH)	Polymer Chemistry/Oil-field Chemicals	Assistant Lecturer
32.	Ekpo, I.	BSc (Cal), PGDM, MSc (UPH)	Petroleum Chemistry	Assistant Lecturer
33.	Anuchi, S	BSc, MSc, (UPH), MSc (Aberdeen)	Analytical/Oil-field Chemicals	Assistant Lecturer
34.	Victor-Oji, C	BSc, (UPH)	Industrial/Process Chemistry	Assistant Lecturer

### C. TECHNICAL MEMBERS OF STAFF (INDUSTRIAL CHEMISTRY)

S/No	Name	Qualification	Field of Specialization	Designation
1.	Okorika, Z. G.	BSSG, HD, HND	Glass blower	Chief Technologist
2.	Okike, N. E	HD/IMT (Enugu), MNIST (Nigeria), B. Engr. (UPH)	Chemistry/Biochemistry Chemical Engineering	Chief Technologist
3.	Johnson, Y.O	HND (Lagos), ANIST (Nigeria)	Biochemistry	Chief Technologist

4.	Chukwulobe, U. C	HDIP NIST, HDP IST (LON), MSERT (LON), Part II Telecoms (LON)	Instrumentation, Physics/Electronics Telecommunications	Chief Technologist
5.	Namiesimagha, F L	ANIST (NIG), FD NIST (RSUST), PGD (RSUST)	Chemistry/Biochemistry Soil Science	Chief Technologist
6.	Okon, E. E.	FD (NIST) (UPH)	Chemistry/Biochemistry	Chief Technologist
7.	Ijente, P. E	FD (NIST) (UPH)	Chemistry/Biochemistry	Chief Technologist
8.	Okele, C	FD (NIST), (UPH)	Chemistry/Biochemistry	Principal Technologist
9.	Amacha, M	HND Fed Poly (Nekede)	Chemistry	Technologist II
10.	Onobum, J	HND Fed Poly (Bida)	Chemistry	Technologist II
11.	Ojenamah, U	HND (SLT), HND (NISLT), (UPH)	Chemistry/Biochemistry	Technologist I
12.	Uchendu, S. C	HND (SLT), PGD (Ind. Chemistry (FUTA)	Chemistry/Biochemistry	Technologist II
13.	Okor, M. C	HND (NIST), (UPH)	Chemistry/Biochemistry	Senior Laboratory Supervisor
14.	Azajiri, R	LAPC (NIST)	General Laboratory	Senior Laboratory Supervisor
15.	Nwogu, E.	SSCE	Senior Laboratory Supervisor	
16.	Eze, C. O.	SSCE	Senior Laboratory Supervisor	
17.	Mathias, C	SSC/APC	Senior Laboratory Supervisor	
18.	Nwakanma, J	SSC	Senior Laboratory Supervisor	
19.	Amadi, S. N	SSCE	Head, Laboratory Attendant	
20.	Agbaruoka, C. G	SSCE/GCE	Laboratory Assistant	
21.	Asiol, M	GCE	Laboratory Assistant	
22.	Semenibipi, I	SSCE	Laboratory Assistant	
23.	Amesi-Sunny, V	GCE	Laboratory Assistant	
24.	Ilili, N. T	SSCE	Laboratory Assistant	
25.	Onyekaonwu, B	SSCE	Laboratory Assistant	
26.	Eleonu, P	SSCE	Laboratory Assistant	
27.	Nwokoma, V	SSCE	Laboratory Assistant	
28.	Leera, M. P	SSCE	Head Laboratory Attendant	
29.	Ogbuka, R	SSCE	Laboratory Attendant	
30.	Ogwudire, I	SSCE	Laboratory Attendant	

**F. ADMINISTRATIVE MEMBERS OF STAFF (PURE & INDUSTRIAL CHEMISTRY)**

S/No	Name	Qualification	Designation
1.	Obodagu, E	FSLC, Pitman (Advanced Typewriting), NCE	Chief Secretarial Assistant
2.	Owhonoda, N. T	WASE, BSc	Admin. Officer
3.	Okoro, R. N	WASC, Dip (Computer), Adv. NABTEB	Confidential Secretary I
4.	Chukwu, R	SSCE	Clerical Assistant

5.	Enyindah, R	SSCE, Dip (Comp. Appreciation)	Computer operator
6.	Ogbaka, S. V	FSLC	Messenger/Cleaner
7.	Wordai, M	FSLC	Messenger/Cleaner

### **VICE CHANCELLORS OF UNIVERSITY OF PORT HARCOURT SINCE INCEPTION**

Professor D. U. Ekong,	As Principal, 1975 - 1977
Professor D. U. Ekong,	Vice-Chancellor, 1977 - 1982
Professor S. J. S. Cooney,	Vice-Chancellor, 1982 - 1989
Professor K. Harrison,	Vice-Chancellor, 1989 - 1993
Professor N. Gadzama,	Vice-Chancellor, 1993 - 1994 (Acting)
Professor N. T. Salau,	Vice-Chancellor, 1994 - 1995 (Acting)
Professor N. D. Briggs,	Vice-Chancellor, 1995 - 1996 (Acting)
Professor Theo. Vincent,	Vice-Chancellor, 1996 - 2000
Professor N. D. Briggs,	Vice-Chancellor, 2000 – 2005
Professor D M Baridam	Vice-Chancellor, 2005 – 2010
Professor. A. J. Ajiinka	Vice Chancellor, 2010 – 2015
Professor N. E. S. Lale	Vice Chancellor, 2015 - Date

### **UNIVERSITY GOVERNANCE**

The main administrative structure of the University (including the Visitor, the Chancellor, the Council, the Senate, the Congregation, the Convocation and its Principal Officers) is specified by the University of Port Harcourt Decree No. 84 of 29<sup>th</sup> September, 1987.

**THE COUNCIL:** The Council is the highest policy-making body of the University, which meets at least three times a year. The Council is the governing body of the University and has power under the University Decree, to manage and adjudicate on matters regarding the administration and finances of the University except those not otherwise provided by the University of Port Harcourt Decree of 1979. The Pro-Chancellor and Chairman of Council, the Vice-Chancellor and the outside members of Council are appointed by the Federal Government as specified by the University Decree. The representatives of the University on the Council are elected from the Senate and Congregation.

**THE SENATE:** The Senate is presided over by the Vice-Chancellor. Its membership includes all Deans of Faculties, Directors of Units, Heads of Departments, all Professors holding established chairs, the University Librarian and members of the

academic staff elected by the Faculties or those appointed by the Vice-Chancellor as specified in the University Act. It has the responsibility for all the University's academic work, receives and decides on recommendations and reports from the Boards of Faculties, and all other academic units.

**UNIVERSITY ADMINISTRATIVE STRUCTURE:** The structure of the University administration is listed as follows

1. The Registry, the Head of which is the Registrar who works under the Vice-Chancellor as the Chief Administrative Officer of the University, provides the Secretarial services for the Congregation, the Council and the Senate. The Registry handles all formal University correspondence on appointments, resignations, contracts, supplies, legal and property matters. The Registry is divided into the following sections:

(a) The Establishment Division deals with staff establishment matters. The Division also handles all matters relating to housing; it also deals with entry and work permits, passport and passages.

(b) The Academic Division deals with admissions as well as examinations and records, and all other matters relating to academic aspect of student's life.

(c) Registry staff provides the Provost/Deans with the administrative support and services needed at the College/Faculty levels.

2. The Bursary Department is responsible for the financial administration of the University. The Students Accounts Section deals with fees, scholarship payments, and other financial matters affecting students.

3. The Student Affairs Department deals with all matters relating to student welfare management in the University.

**ORGANISATION OF ACADEMIC WORK OF THE UNIVERSITY:** University academic work rests on the Faculties.

(a) Each Faculty is divided into departments as may be prescribed from time to time. Each Faculty has a Faculty Board that consists of all full time lecturers of all the departments in the faculty with the Dean of the Faculty as the Chairman. The Board is subject to provisions of the University Statute and regulates the teaching and conduct of examinations of all courses offered in the Faculty.

(b) The Faculty deals with any other matters assigned to it by Statute or by the Vice-Chancellor or by the Senate.

(c) It advises the Vice-Chancellor or the Senate on any matter referred to it by the Vice-Chancellor or the Senate.

#### **DEPARTMENTAL BOARD COMPOSITION**

- (i) Head of Department; Chairman
- (ii) All Professors of the Department
- (iii) All full-time lecturers of the Department
- (iv) Administrative Officer – Secretary

#### **SUMMARY OF STATEMENT OF ACADEMIC POLICIES**

**ACADEMIC OBJECTIVES:** The academic objectives of the University of Port Harcourt shall be TO CONTRIBUTE TO NATIONAL DEVELOPMENT, SELF-RELIANCE AND UNITY THROUGH THE ADVANCEMENT AND PROPAGATION OF KNOWLEDGE FOR SERVICE TO THE COMMUNITY AND TO HUMANITY. To this end, degree programmes are provided with the objective of producing individuals that are well grounded in contemporary culture, have sound knowledge of at least one branch of learning, and are intellectually and morally well equipped to make effective contribution to national development, self-reliance and unity.

Research facilities shall be provided for staff and students to undertake research relevant to the total development of Nigeria.

Continuing education programmes shall be provided for the benefit of persons in the various sectors of the economy and in the public service, with a view to increasing their efficiency and productivity through knowledge of new development relating to their work.

Programmes shall be provided to assist the local community to benefit from the facilities provided by the institution.

**DEGREE STRUCTURE:** The University shall run regular degree programmes of 4 years for its Bachelor's Degrees in the Humanities, Social Sciences, Science, Education, Management Science; 5 years in Engineering, and 4 and 6 years in Health Sciences. The basic entrance requirement is the West African School Certificate/General Certificate of Education/Senior Secondary Certificate with Credits in five subjects or equivalent qualifications. Details of Departmental requirements should be obtained from the Heads of Departments. There is no provision for *direct entry* admission into the 2<sup>nd</sup> year of the degree programme.

The degree programme shall have the following provisions:

General Studies courses, the purpose of which shall be to improve the basic intellectual and communications skills of the students and to promote a continuous awareness and understanding of contemporary society as well as the historical and cultural origins of the peoples of Nigeria.

Community Service Courses. These will be field projects directed towards service to the community and shall be an integral part of all degree programmes. The objective of the projects shall be to involve both staff and students in a practical way with some of the problems of society as well as with efforts to provide solution to them.

Courses in the student's major field of interest as well as in ancillary discipline, shall begin as a limited number of major courses in the first two years, and occupy most of the student's time in the third and fourth years.

#### **GENERAL REQUIREMENT FOR A DEGREE**

To obtain a degree in the University of Port Harcourt, a student must complete the approved programme of study in his/her department. Every student is urged to familiarize himself/herself with the specific requirements for a Bachelor's degree in his/her department.

Details of general University requirements that every student must meet to graduate in the University of Port Harcourt can be obtained from the College Secretary and Faculty Officers.

#### **REGISTRATION OF COURSES**

Every student is required to register for all courses during the stipulated time, which is usually at the beginning of the session. It is advisable that every student should liaise with the College Secretary/Faculty Officer of his/her faculty at the end of every session to ensure that the continuation requirement has been met.

#### **CHANGE OF PROGRAMME**

The University allows for change of programme of study, provided the student has completed at least the first year of study in the department or programme for which admission was originally given.

Guidelines for change of programme should be obtained from either the Head of Department or Faculty Officer.

### **INTER-UNIVERSITY TRANSFER**

A student from another University may seek transfer to any of the programmes of the University of Port Harcourt. Such applicants must write, enclosing relevant credentials and official transcripts to the respective Head of Department. Each application shall be treated on its own merit.

All applicants for inter-university transfer shall be required to be in good academic standing/conduct in their previous universities.

### **GRADING SYSTEM**

The following system of Grade Points shall be used for all Faculties;

<b>Mark/Score</b>	<b>Letter Grade</b>	<b>Grade Points</b>
70% and above	A	5.00
60 – 69	B	4.00
50 – 59	C	3.00
45 – 49	D	2.00
40 – 44	E	1.00
0 – 39	F	0.00

Students are required to sit for examinations in all registered courses. Any student who fails to sit for a course examination without satisfactory reasons will earn the grade of “F”. Students are required to have attended 75% of the course lectures to qualify to sit for the examination.

A student applying for a review of answer script shall be required to pay the prescribed fees to the Bursary Department before commencement of the review.

### **PROBATION**

Probation is a status granted to a student whose academic performance falls below an acceptable standard. A student whose Cumulative Grade Point Average is below 1.00 at the end of a particular year of study, earns a period of probation for one academic session.



### **WITHDRAWAL FROM PROGRAMME**

A student who fails to meet the continuation requirement at the end of a particular period of probation shall be required to withdraw from the programme. The continuation requirement is CGPA of 1.00 at the end of every academic year. Similarly, a student who, after the maximum length of time allowed for a degree programme, has not obtained a degree shall be asked to withdraw from the programme. The maximum length of time that a student shall be permitted to spend on a standard 4-year degree programme is 6 years.

### **TEMPORARY WITHDRAWAL**

A student may apply for temporary withdrawal from study for a period of 1 year, which shall be renewed up to a maximum of 2 years.

### **AUDITING OF COURSES**

A student may attend a course outside his prescribed programme. The course shall be recorded in his/her transcript only if he/she had registered the course with the approval of the Head of Department and Dean of his/her Faculty and has taken the prescribed examination. However, the course shall not be used in calculating the CGPA.

### **DEGREE CLASSIFICATION**

The degree shall be awarded with 1st, 2nd Upper, 2nd Lower, 3rd Class Honours degree. The Cumulative Grade Point Average for these classifications shall be:

<b>Class of Degree</b>	<b>Cumulative Grade Point Average</b>
1st Class	4.50 - 5.00
2nd Class Upper	3.50 - 4.49
2nd Class Lower	2.40 - 3.49
3rd Class	1.50 - 2.39

### **University of Port Harcourt Policy on Plagiarism**

Plagiarism is the "wrongful appropriation" and "stealing and publication" of another [author's](#) "language, thoughts, ideas, or expressions" and the representation of them as one's own [original work](#). Plagiarism is considered [academic dishonesty](#) and it is frowned at when identified in academia.

At its 413<sup>th</sup> Meeting [Extraordinary] held on Wednesday, 25<sup>th</sup> November, 2015, Senate made a pronouncement against proven cases of criminal plagiarism.

Senate **noted** that Plagiarism is Examination Malpractice, *any student in the school of graduate studies found guilty of examination malpractice of any sort should be expelled.*

This is because; plagiarism is a vice which negatively impacts on the advancement of both the institution and the individual.

Students of the Department of Pure & Industrial Chemistry and those taking courses with the Department are advised to refrain from any form of plagiarism ranging from, cheating in laboratory sessions, class tests, assignments, take home works, seminars, project, dissertation and thesis writing.

**B.Sc. INDUSTRIAL CHEMISTRY PROGRAMME****YEAR 1 (100 SERIES)****First Semester**

<b>Course Code</b>	<b>Course Title</b>	<b>Unit</b>
GES 100.1	Communication Skills in English	3
FSB 101.1	General Biology I	3
CHM 130.1	General Chemistry I	3
PHY 101.1	Mechanics and Properties of Matter	3
PHY 102.1	Laboratory Practice I	1
MTH 110.1	Algebra and Trigonometry	3
MTH 120.1	Calculus	3
GES 102.1	Introduction to Logic and Philosophy	2
Total		21

**Second Semester**

GES 103.2	Nigeria People and Culture	2
GES 101.2	Computer Appreciation and Application	2
CHM 131.2	General Chemistry II	3
CHM 132.2	Introduction to Principles of Organic Chemistry	3
FSB 102.2	General Biology II	3
PHY 112.2	Introduction to Electricity and Magnetism	3
PHY 103.2	Laboratory Practice II	1
Total		17
Total Credit Units for year one		38

**YEAR 2 (200 SERIES)****First Semester**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
CHM 235.1	Analytical Chemistry I	3
CHM 250.1	Inorganic Chemistry I	3
CHM 260.1	Organic Chemistry I	3
BCH 210.1	General Biochemistry I	3
BCH 214.1	General Biochemistry II	3
MTH 280.1	Introduction to Computer Programming	3
	Total	18

**Second Semester**

CHM 240.2	Physical Chemistry I	3
CHM 261.2	Organic Chemistry II	3
PHY 231.2	Modern Physics	2
ICH 270.2	Industrial Aspects of Chemistry	3
ICH 236.2	Process Calculations in Chemistry	3
MTH 224.2	Mathematical Methods	3
FSC 2C1.2	Community Service	2
	Total	18
	Total Credit Units for year two	36

**YEAR 3 (300 SERIES)****First Semester**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
CHM 335.1	Analytical Chemistry II	3
CHM 340.1	Physical Chemistry II	3
CHM 350.1	Inorganic Chemistry II	3
CHM 371.1	Process Chemistry I	2
CHM 365.1	Structure and Reactivity in Organic Chemistry	3
CHM 349.1	Chemical Kinetics	2
CHM 362.1	Applied Spectroscopy	2
ICH 374.1	Introduction to Polymer Chemistry	3
GES 300.1	Fundamentals of Entrepreneurship	2
	Total	23

**Second Semester**

ICH 375.2	Industrial Work Experience	9
	Total Credit Units for Year three	32

**YEAR 4 (400 SERIES)**

**First Semester**

Course Code	Course Title	Unit
CHM 436.1	Environmental Chemistry	2
CHM 435.1	Analytical Chemistry III	3
CHM 472.1	Applied Surface & Colloid Chemistry	2
ICH 476.1	Process Chemistry II	2
ICH 474.1	Polymer Technology	3
GES 400.1	Entrepreneurship Project	2
<i>Electives: Any Three Courses (6 Credits)</i>		
CHM 442.1	Electrochemistry	2
ICH 477.1	Mineral Processing I	2
ICH 478.1	Chemistry of Paints and Adhesives	2
ICH 480.1	Petroleum Chemistry	2
Total		20

**Second Semester**

ICH 400.2	Seminar	3
ICH 490.2	Research Project	6
ICH 471.2	Process Chemistry III	3
<i>Electives: Any Three Elective Courses (6) Credits</i>		
ICH 452.2	Alloy Chemistry	2
ICH 480.2	Petrochemicals	2
ICH 481.2	Corrosion Chemistry	2
ICH 482.2	Colour Chemistry	2
ICH 461.2	Organic Synthesis	2
CHM 462.2	Pharmaceutical Chemistry	2
ICM 471.2	Process Chemistry III	2
CHM 477.2	Mineral Processing/Metallurgy	2
Total		17
Total Credit Units for year four		37

Total Number of Credit Units for the Degree = 143

## **Course Descriptions for Undergraduate (BSc) Industrial Chemistry Programme**

### **YEAR ONE FIRST SEMESTER**

#### **CHM 130.1 General Chemistry I (3 Units)**

Basic principles of matter and energy from the chemist's point of view. A broadly based course suitable for students from various schools as well as those from the Faculty of Science. Topics to be covered will include matter and units of measurement, atomic theory and molecular structure, stoichiometry, the periodic classification of the elements, atomic structure, chemical bonding, thermo chemistry, properties of gases and gas laws, solids, liquids and solutions.

#### **FSB 101.1 General Biology 1 (3 units)**

Characteristics of life. Investigations in biology. The scientific substance of life; the unit of life (including methods of study). Activities of cells, the control of metabolic activities, cell division. Basic principles of inheritance. Genetics.

#### **GES 100.1 Communication Skills in English Language (3 units)**

The course seeks to develop in the students a well-informed attitude towards English Language, and to equip them with knowledge of English communications and study skill that will facilitate their work in the University. Lectures and tutorials will cover the use of the library, study methods, grammar, punctuation and mechanics, principles of effective writing, word use, reading and comprehension.

#### **MTH 110.1 Algebra and Trigonometry (3 units)**

Elementary notions of sets, subsets, union, intersection, complements, venn diagrams, real numbers integers, rationales and irrationals, mappings of a set. Real functions and their compositions, quadratic functions, cubic functions. Roots of quadratic and cubic functions. Partial functions. Equations with complex roots. Complex numbers. Geometric representation of complex numbers. Demutters. Series and sequences of angles, circular functions. Addition theorems. Double and half angles.

**MTH 120.1 Calculus (3 units)**

Function of a real variable, graphs, limits and ideas of continuity. The derivative as limit of rate of change, methods of integration. Definite integrals. Application to areas, volumes.

**PHY 101.1 Mechanics and Properties of Matters (3 units)**

Topics covered in this course will include the following: motion in one dimension and in a plane; Work and Energy; Conservation laws; Oscillation. Solid friction, rotational kinematics and rotational dynamics, equilibrium of rigid bodies, gravitation, Galilean invariance, surface tension, elasticity and viscosity.

**PHY 102.1 Laboratory Practice 1 (1 unit)**

The Course emphasizes experimental verifications and quantitative measures of physical laws. Treatment of measurement, errors and graphical analysis. The experiments include studies of mechanical systems, static and rotational dynamics of rigid bodies, viscosity, elasticity, surface tension and hydrostatics.

**GES 102.1 Introduction to Logic and Philosophy (2 units)**

A brief survey of the scope, notions, branches and problems of philosophy, symbol logic. Special symbols in symbolic logic. Conjunction affirmation, negation, disjunction, equivalence and conditional statements. Laws of thought. The method of deduction. Using rules of inference and biconditionals. Quantification theory.



## YEAR ONE SECOND SEMESTER

### **CHM 131.2 General Chemistry II (3 Units)**

Application of the principles of chemical and physical change to the study of the behaviour of matter and the interaction between matters. Course content includes chemical equilibrium, ionic equilibria, chemical thermodynamics, electrochemistry, chemical kinetics, acids and bases, the chemistry of the representative elements and their common compounds with emphasis on graduation of their properties, brief chemistry of the first series of transition elements, general principles of extraction of metals; introductory nuclear chemistry.

### **CHM 132.2 Introduction to Principles of Organic Chemistry (3 Units)**

A survey of carbon compounds including an overview of the common functional groups in aliphatic and benzenoid compounds. Introduction to reactants and reactions in Organic Chemistry.

### **FSB 102.1 General Biology II (3 units)**

A course of variety of organisms. Principles of classification of organisms. A study of selected animals and plant groups. Analysis of the flora and fauna of assigned habitats.

### **GES 103.2 Nigeria Peoples and Culture (2 units)**

A study of Nigeria history and culture in pre-colonial times. Nigerian perception of his world. Culture areas of Nigeria and their characteristics. Obligations of the citizens. Environmental sanitation.

### **GES 101.2 Computer Appreciation and Application (2 units)**

History of computers. Generalizations and classifications of computers. IPO model of a computer. Components of a computer system – hardware and software; soft ware application.

Programme language, organization of data. Data computer techniques. Introduction to computer networks. Use of the key boards as an input devise. DOS, Windows, Word processing, spread sheets. Application of computers in Medicine, Social Science, Humanities, Education and Management Sciences.

**PHY 103.2 Laboratory Physics II (1 unit)**

The experiments carried out in this course will cover areas discussed in PHY 112.2. These experiments include verification of the laws of current electricity, measurement of the electrical properties of conductors, direct current and alternate current, circuit properties, series and parallel resonant circuits, transformer characteristics and other electrical circuit problems.

**PHY 112.2 Introduction to Electricity and Magnetism (3 units)**

This is the introductory course on Electricity and Magnetism. Topics covered will include: The electric field, Gauss's Law, Electric Potential, capacitors and dielectric, current and resistance, electromotive force and circuits, the magnetic field, Ampere's Law, Faraday's Law of Induction.

## **YEAR TWO FIRST SEMESTER**

### **CHM 235.1 Analytical Chemistry I (3 units)**

Introduction to basic analytical chemistry. Concepts of qualitative and quantitative analysis. Sampling methods: representative, homogenous/heterogeneous. The theory of errors: types of errors instrumental and personal errors, sources and prevention, determinate and indeterminate errors. Statistical treatment of data: significant figure, mean, mode, accuracy, precision, standard deviation relative error, student t-tests, Q-test, F-test, confidence level correlation and regression analysis calibration curves. Gravimetric analysis, concept of ligands and chelation. Volumetric analysis: acidimetry and alkalimetry, acid-base indicators, primary standards, precipitation and redox titrations, applications of volumetric analysis, balancing of equations. Introduction to electroanalytical methods: electrogravimetry and coulometry.

### **CHM 250.1 Inorganic Chemistry I (3 units)**

The physical principles of Inorganic Chemistry are treated. Topics include chemistry of non-transition elements and alloy chemistry.

### **CHM 260.1 Organic Chemistry I (3 units)**

Fundamental theories and principles of chemical reactivity. Chemical reactions and synthesis of monofunctional compounds. Reaction and mechanism of common reactions, stereochemistry.

### **BCH 210.1 General Biochemistry I (3 Units)**

Acids, bases and buffers. Chemistry of amino acids, proteins and their derivatives. Methods of isolation and identification. Primary, Secondary, tertiary and quaternary structures of proteins. Determination and biochemical importance of the structures. Chemistry and structure of carbohydrates, their nomenclature and chirality. Vitamins and minerals. Enzymes.

### **BCH 214.1 General Biochemistry II (3 units)**

Structure and functions of cells and organelles: Eukaryotic and Prokaryotic cells. Transport processes (passive and active). Basic concepts of biochemical energetic. Chemistry, structure and functions of lipids. Chemistry structure and functions of nucleic acids. Viruses.

**MTH 280.1 Introduction to Computer Programming (3 Units)**

Historical details of computers. Principles of programming : Programming with FORTRAN language.

**YEAR TWO SECOND SEMESTER**

**CHM 240.2 Physical Chemistry I (3 units)**

Introduction to basic physical chemistry. The emphasis is on the properties of gases, the three laws of thermodynamics and the principles of chemical kinetics and electrochemical cells.

**CHM 261.2 Organic Chemistry II (3 units)**

Chemistry of difunctional compounds: Dienes, allenes, diols, diketones and dialdehydes, etc. Chemistry of aromatic compounds. Aromaticity and routes to polymer aromatic compounds.

**ICH 236.2 Process Calculations in Chemistry (3 units)**

Data reduction and special functions in chemistry. Units and dimensions, stoichiometric and composition relations. Material and energy balance calculations in chemical reactions and processes.

**ICH 270.2 Industrial Aspects of Chemistry (3 units)**

Overview of chemical processes and products with emphasis on the nature, origin and applications of the products of the chemical and allied industries.

**FSC 2CI.2 Community Service (1 unit)**

This course affords the students the opportunity to render selfless practical service to the immediate and neighbouring communities. The activities include grass cutting, flower planting, and any kind of manual work as approved by the Director of Community service and departmental representatives.

## YEAR THREE FIRST SEMESTER

### **CHM 335.1 Analytical Chemistry II (3 units)**

Introduction to electroanalytical methods: coulometry, conductometry, voltametry, polarography, amperometry and potentiometry; concepts and analytical applications in titrations; methods in electrophoresis. Complexometric titrations: concepts of ligands, EDTA titration, direct and indirect titrations, metal ion indicators. Introduction to spectroanalytical methods: uv-visible colorimetry, infra-red, atomic absorption and flame emission spectrometry. Beer-Lambert's law, methods of quantitative analysis involving this law.

### **CHM 340.1 Physical Chemistry II (3 units)**

Chemical thermodynamics including treatment of partial molar quantities and chemical potentials. Brief introduction to quantum mechanics; limitation mechanics and derivation/application. Physical significance. Atomic structure.

### **CHM 349.1 Chemical Kinetics (3 units)**

Theories of reaction rates, interpretation of kinetic data. Kinetics of reactions and surface reactions, experimental methods, mechanisms, chain reactions and fast gas phase reactions.

### **CHM 350.1 Inorganic Chemistry II (3 units)**

Detailed study of the chemistry of the transition (d-block) elements to highlight their industrial uses. Introduction to alloy chemistry and the chemistry of co-ordination compounds.

### **CHM 362.1 Applied Spectroscopy (2 units)**

Principles and applications of IR, UV, NMR and mass spectroscopy, the determination and elucidation of structures of organic compounds.

### **CHM 365.1 Structure and Reactivity in Organic Chemistry (3 units)**

Stereochemistry, kinetics and mechanism of organic reactions; reactive intermediates. Theory of organic chemistry.

### **ICH 371.1 Process Chemistry I (3 units)**

Heat generation and transfer in industrial chemical operations. Laboratory techniques contrasted with methods used in a large industrial scale.

**ICH 374.1 Introduction to Polymer Chemistry (3 units)**

The nature of macromolecules, Outline of sources of raw-materials for polymers. Polymerization processes and conditions. Kinetics of polymerization process. Copolymerization. Polymer reactions. Molecular weight determination. Analysis and testing of polymers. Concepts of thermoplastic and thermoset polymers, polymer utilization, functionality of monomers, structure-reactivity relationship, auto-acceleration and polymerization conditions.

**GES 300.1 Fundamental of Entrepreneurship (2 units)**

Principles of entrepreneurship. Leadership attributes of an entrepreneur. Entrepreneurship and the Nigerian economy; Feasibility studies; Managing an enterprise: Micro Financing: Intellectual property: Management information systems: Entrepreneurship health, etc.

**YEAR THREE SECOND SEMESTER****ICH 375.2 Industrial Work Experience****YEAR FOUR FIRST SEMESTER****CHM 435.1 Analytical Chemistry III**

Separation techniques: solvent extraction, liquid-liquid extraction, theoretical concepts and application in analysis. The different types of chromatography: paper, thin-layer, column, gas and high performance liquid (HPLC) chromatography. Concepts of theoretical plates, resolution Van Deemter equation; application in analysis. Spectral methods of analysis: Nuclear Magnetic Resonance NMR ( $^1\text{H}$  and  $^{13}\text{C}$ ), X-ray fluorescence technique. Mass spectrometry: instrumentation, fragmentation pattern, use of Baynon's table, cleavage patterns in alkanes, alkenes, aromatics, alcohols, carbonyls, etc. Radiochemical methods: concepts of radioactivity, nuclear stability and decay patterns, detectors, law of radioactivity, application in chemical and biological tracers, isotopic dilutions, nuclear activation techniques. Electron spin resonance spectrometry. Thermo-analytical techniques: factors affecting thermos-analytical results, types of thermos-analytical methods, thermometric titrations

**CHM 436.1 Environmental Chemistry**

The crucial link between chemical principles and natural environment will be stressed. Air and water pollutions: their characteristics and methods of control. Water chemistry

and water pollution, Water treatment methods. Soil and land pollution, Noise pollution and aspect of solid waste management

**CHM 442.1 Electrochemistry**

Equilibria in electrochemical cells, thermodynamics of electrochemical cells, solution electrolytes (activity, ionic strength, Debye-Huckel Theory), transport members, conductance and ionic equilibria, Fick's laws, electrodicts.

**ICH 472.1 Applied Surface and Colloid Chemistry**

The physical chemistry of surface and interfaces with emphasis on industrial applocations. The properties of colloid and micelles. Distillation processes. Industrial catalysis, phase diagram.

**ICH 474.1 Polymer Technology**

Structure and properties of bulk polymers: crystalline melting point (T<sub>m</sub>), glass transition temperature (T<sub>g</sub>), crystallization in polymers, crystallization. Plasticization and its effects on polymer properties. Polymer property requirements and utilization. Polymer processing: plastics-compression, injection, blow, extrusion and transfer moulding, Rubber and fiber processing, polymer additives.

**ICH 476.1 Process Chemistry II**

Vapour liquid equilibrium relations, single-stage distillation methods, graphics multistage calculations, fractional distillation, solvent extraction.

**ICH 477.1 Mineral Processing I**

Importance of mineral processing and metallurgy. Mineral concentration including chemical ore processing, Iron makings, steel making, foundry technology, fabrication techniques.

**ICH 477.2 Mineral Processing /Metallurgy**

Solidification of liquid metals. Heat treatment processes, metallography techniques. Metallurgical microscopes.

**ICH 478.1 Chemistry of Paints and Adhesives**

Surface coating terminologies, definitions/nomenclature. Constituents of paints, varnishes and lacquers. Binders (film formers) - convertible and non-convertible binders, pigments and extenders, solvents for surface coatings. Paint additives. Paint formulation and manufacture. Film properties and measurements. Classification of adhesives, choice of adhesives, theories of adhesion. Adhesive formulations and bonding techniques. Test methods and their significance.

**ICH 480.1 Petroleum Chemistry**

Physical and chemistry characteristics of crude oil, chemistry of petroleum refining catalytic cracking, alkylation, polymerization, etc. Current petroleum use, future of petroleum.

**GES 400.1 Entrepreneurship Project (2 Units)**

This course will involve application of the fundamentals of Entrepreneurship which will include planning, design, production, finishing, and marketing of the potential products/services. Each student or group of students is expected to initiate a project of his/her choice in conjunction with supervisors. Alternatively, the students can choose a project from a pool of projects compiled by the Faculty/Departments

**YEAR FOUR SECOND SEMESTER****CHM 400.2 Seminar Course**

CHM 400.2 is a course which provides an opportunity for the student to give an organized and logical oral presentation of technical information to peers and staff members. Those students who are performing undergraduate research are encouraged to present a topic related to their research project. Regardless of the topic chosen, you are reminded that this is a chemistry seminar and you should concentrate on the chemical nature of your subject.

*Grading:* Each staff member attending the seminar will receive a copy of the evaluation sheet to grade the student. The staff member will assign ratings to each of the items under content and presentation and arrive at an overall score. Your final grade will be a composite of these evaluation scores.

*Attendance:* Attendance at each seminar is mandatory. Your grade will be reduced by one-half letter grade per absence unless you are excused by the seminar instructor. Your attendance at other "outside" seminars may also be required.

**CHM 452. 2 Alloy Chemistry**

Basic principles of alloy chemistry, alloy preparation, types and phase changes in alloys importance of alloy additions to elements, phase diagrams of some industrial alloys and their uses.

**CHM 461.2 Organic Synthesis**

Philosophy and theory of organic synthesis. Functionalization and interconversion of functional groups. Formation of C-C, C=C, and C≡C bonds. Formation of C-heteroatom bonds. Ring formation, expansion and contraction. Asymmetric synthesis.



### **CHM 462.2 Pharmaceutical Chemistry**

Physicochemical properties in relation to biological activity. General drug metabolism. Medicinal chemistry of some selected classes of compounds, including their synthesis: steroids (including steroidal hormones) and vitamins. Analgesic (antipyretic and narcotic). Local anaesthetics. Chemotherapeutic agents, e.g. sulphonamides, penicillins, antimalarial and anthelmintics. Pharmaceutical analysis and quality control procedures.

### **ICH 471.2 Process Chemistry III**

Conservation of mass, energy and momentum in ideal reactors. Material in isothermal reactors for homogenous reactions. Conversion in single isothermal reactors. Multiple isothermal reactor system. Non isothermal reactors. Automata reactions. Industrial organic and inorganic materials, raw materials, technical and economic principles of processes and products routes. Flow diagrams.

### **ICH 480.2 Petrochemicals**

The chemistry of processes involved in the conversion of natural gas and petroleum hydrocarbon to industrial chemicals. Utilization of olefins for industrial chemicals. Chemicals from benzene, toluene and xylenes. Nylon intermediates.

### **ICH 481.2 Corrosion Chemistry**

Principles and theory of corrosion, kinetics and thermodynamics, aqueous, dry and bacterial corrosion. Their prevention.

### **ICH 482.2 Colour Chemistry**

The chemistry and theory of dyeing. Chemistry and application of reactive dyes. Preparation and dyeing of man-made fibres. Printing. Colour matters for food, drugs and cosmetics. Dyes used in paper industries and colour photograph.

### **CHM/ICH 490.2 Research Project**

Research is a vital part of University life and all of our undergraduate degrees have, as a vital component, a research project. Your research project is an opportunity to do a piece of original work in a particular area of chemistry. In our undergraduate research projects, students work independently within a research group or in an area of specialization of a staff member.

## **PROJECT PREPARATION FORMAT**

### **Table of Contents**

Title page	i
Declaration	ii
Certification	iii
Dedication	iv
Acknowledgement	v
Abstract	vii
Table of Contents	viii
Lists of Tables	xii
Lists of Figures	xv
List of Abbreviations, Acronyms and Symbols	xx
List of Appendices	xxiii

### **CHAPTER ONE: INTRODUCTION**

- 1.1 Background to the Study
- 1.2 Statement of the problem
- 1.3 Aim of the Study
  - 1.3.1 Specific Objectives
  - 1.3.2 Hypotheses in this Study
- 1.4 Significance of Study
- 1.5 Scope of Study
- 1.6 Justification of Study

### **CHAPTER: TWO LITERATURE REVIEW**

### **CHAPTER THREE: MATERIALS AND METHODS**

### **CHAPTER FOUR: RESULTS AND DISCUSSION**

### **CHAPTER FIVE: SUMMARY OF RESULTS, CONCLUSIONS, RECOMMENDATIONS AND CONTRIBUTION TO KNOWLEDGE**

- 5.1 Summary of Results
- 5.2 Conclusions
- 5.3 Recommendations
- 5.4 Contributions to Knowledge

### **REFERENCES**

### **APPENDICES**