

**FEDERAL UNIVERSITY OYE-EKITI,**

**EKITI STATE, NIGERIA**



**FACULTY OF SCIENCE**

**DEPARTMENT OF INDUSTRIAL CHEMISTRY**

**UNDERGRADUATE ACADEMIC PROSPECTUS**

**2017 – 2020**

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## **Forward**

This is the second edition of students' handbook of the Department of Industrial Chemistry, Faculty of Science, Federal University, Oye – Ekiti. This handbook contains information on the curriculum for the degree programme of the Department in line with minimum National University Commission (NUC) academic standards. The philosophy, objectives and admission requirements of the programme in the Department are clearly stated. The course guidelines in the course system with the description of the various courses are well specified. The handbook also contains list of academic, non-academic and technical staff of the Department.

The primary aim of this Departmental handbook is to guide both the students and staff of the Department on the academic programme available in the Department. It is hope that students would find the information contained in it a useful guide throughout the duration of their studentship in the Department. It is therefore highly recommended for students and various course advisers who will find the handbook very useful in the discharge of their responsibilities of teaching and guide the students throughout their course of study. It is also recommended for other people who may wish to obtain first hand information on the undergraduate degree programme available in the Department.

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# **ABOUT THE DEPARTMENT**

## **1.0. Name of Programme**

Bachelor of Science (B. Sc) in Industrial Chemistry

## **History of the Programme**

The Department of Industrial Chemistry is one of the seven (7) departments established in the Faculty of Science of the University at inception in September 2011. Academic activity commenced in July, 2012 in the 2011/2012 academic session with fifteen (15) students who were admitted through UTME and Post-UTME conducted by the university. The academic programme is designed in line with Nigerian University Commission (NUC) specifications. It is structured with an aim to produce undergraduate and postgraduate students that will serve as specialists in Food Chemistry, Environmental Chemistry, and Polymer Chemistry; this is in addition to General Chemistry (Inorganic, Organic, and Physical Chemistry).

Presently, the department has twenty seven (27) staff members out of which twelve (12) are academics, ten (10) are laboratory staff while five (5) are administrative officers. Meanwhile, the student population stands at eighty five (85) with thirty two (32) students in 100 level, twenty one (21) at 200level, Fourteen (14) students at 300 level, and eighteen (18) students at 400 level.

## **2.0. Philosophy, Aims and Objectives of the Degree Programme**

### **2.1 Philosophy**

The frontiers of chemistry are very large, ranging from one extreme of natural products to those synthesized by man. The undergraduate programme curriculum, which is to run as a 4-year programme, is



designed to encompass an appreciation of the centrality of chemical sciences. It is designed to equip students for employment in virtually all types of industries. Consequently a lot emphasis will be placed on practical work and industrial training during the course of the programme. The programme is also planned to arouse entrepreneurial spirits needed for self-employment and economic emancipation.

## **2.2 Aims**

The aim is to provide its students with broad-based knowledge of modern theoretical and practical chemistry that will arouse entrepreneurial spirits needed for self-employment and economic emancipation. 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 fields e.g; food, environmental, textiles, polymer etc.

## **2.3 Objective**

The specific objectives of the Industrial Chemistry Programme are as follows:

- a. To provide students with a thorough grounding in principles and sound knowledge of scientific methods of the chemical sciences.
- b. Arouse a sense of curiosity and enquiring mind, in order to encourage and develop creative thinking and research aptitudes.
- c. Generate in students an awareness of the enormous resources in their immediate environment so as to enhance solutions to the challenges of our time in a march towards nation building.
- d. 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 industry.

- e. Inculcate in students appropriate skills and abilities to manage and administer technological operations within the field of chemistry and allied areas;
- f. Prepare students for professional participation in chemical industries.

### **3.0. Philosophy, Aims and Objectives of the programme**

The undergraduate programmes of the department is to provide broad training in Industrial Chemistry that leads to necessary skill acquisition for the graduates to function as professionals Chemists in industries, research laboratories and in the larger society

The aim is to provide its students with a broad – based knowledge of modern theoretical and practical chemistry with some emphasis on the following areas of applied chemistry; Polymer and Petrol Chemistry, Macromolecular Chemistry. Textile and Dye chemistry, Food, wood paper and pulp Chemistry

The objectives of the programme are to equip the graduates

- With an understanding of the fundamental principles of chemistry and applied chemistry.
- With using interdisciplinary orientations and approach to solving life challenging problems.
- To undertake general supervisory and managerial functions in chemical and allied industries
- To collect samples and carry out chemical analysis on them
- With ability to organise, supervise production and quality control units of chemical and allied industries
- In developing research in some areas of chemistry.

## **4.0. Entry Requirements**

Applicants seeking admission to study Industrial Chemistry must satisfy the following requirements;

### **4.1. UTME entry requirements**

Students seeking admission through UME must have

- (i) Five (5) credits at least in two sittings in Chemistry, Mathematics, Physics, English Language and any other any science subject in SSCE/NECO examination.
- (ii) Pass the UME examination in relevant courses; Chemistry, English Language, Biology or Agricultural Science/Physics/Mathematics.

### **4.2. Direct entry requirements**

Students seeking admission through direct entry must posses:

- (i) Pass with satisfactory grades at ‘ A ‘ levels examination i.e a minimum of 6.0 points aggregate including a minimum of ‘C’ grade in Chemistry and satisfactory grades in mathematics, Physics / Biology. Such candidate may be exempted from equivalent courses in the programme. He or She must also satisfy (i) above
- (ii) A minimum of Upper Credit (in OND Science Technology) from a recognized Polytechnic

## **5.0. Admission and registration**

### **5.1. Admission**

Admission to the department is mainly through University Tertiary Matriculation Examination (U.T.M.E) and through direct entry. The student must satisfy the conditions stipulated in 4.0 above.

## **5.2. Registration of courses**

Registration for a course shall normally be within the first two weeks of resumption in a semester. Late registration shall only be allowed after payment of the late registration fee and shall come up within two weeks following the normal registration period. Any student who fails to register up to the end of the late registration period shall be deemed to have unilaterally withdrawn from the University for that session. Registration for a course shall mean simultaneous registration for the course and its examination.

## **5.3. Dropping of courses**

A student may drop a course or add a course provided he/she completes the prescribed form within four weeks of the commencement of lectures in the course and obtains the approval of his/her Head of Department.

## **6.0. Instructional methods and Assessment**

### **6.1. Language of instruction**

The language of instruction is English Language.

### **6.2. Teaching methods**

The teaching methods to be adopted in the department include Lectures, Oral Communication and Assignments.

### **6.3. Mode of assessment**

Final grades in courses shall comprise continuous assessment and end-of course examinations in the theory, practical, laboratory, oral examination, seminars, SIWES, and others as otherwise specified.

## Continuous Assessment

Students' achievement shall be based on continuous assessment of the course and final examinations. For continuous assessment, there shall normally be three tests/assignments. The students shall be periodically informed of his/her standing in the course. The final examination for each course shall normally be at the end of the semester in which the course is offered. Such final examination will normally comprise a theory paper, a practical/oral examination. The course grade will be made up of the student's score in the continuous assessment as well as the end- of course examination. The continuous assessment shall carry a maximum mark of 40% unless otherwise specified.

### 6.4. Research project

As part of requirements for awarded a Bachelor of Science (B.Sc) Degree in Industrial Chemistry, the student must have submitted a research project carried out in the department, supervised by an academic staff of the department and certified as adequate during a defence seminar by the department board of examiner.

### 6.5. Grading of Courses

The grading system used in the University is presented below:

<b>Percentage Score (%)</b>	<b>Grade</b>	<b>Grade Point</b>
70-100	A	5
60-69	B	4
50-59	C	3
45-49	D	2
0-44	F	0

The following terminologies and abbreviations are commonly used in the computation of results:

**Total Load Units (TLU)** is the total number of course units carried by a student in a particular semester. It is the summation of the load units on all courses carried during the semester. For example, a student who is taking 6 courses of 3 units each has TLU of 18 for that semester.

**Cumulative Load Units (CLU)** is the summation of Total Load Units overall the semesters from the beginning to date. A student who is prone to repeating courses will finish( if he/she does not drop out) with a higher CLU than his/her non repeating colleagues, and will most likely require a longer time to complete the requirements for the award of degree.

**Total Credit Point (TCP)** is the sum of the products of course units and rating in each course, for the entire semester or period. E.g consider a student who took five courses of 3 units each. Suppose the grade he/she obtained in the five courses were A, B, C, D and E. The TCP of this student is obtained as  $(3 \times 5.00) + (3 \times 4.00) + (3 \times 3.0) + (3 \times 2.0) + (3 \times 1.0) = 15.00 + 12.00 + 9.00 + 6.00 + 3.0 = 45.00$

**Cumulative Credit Point (CCP)** is the summation of Total Credit Points over all the semesters from the beginning to date.

**Grade Point Average (GPA)** is the Total Credit Points (TCP) divided by the Total Load Units (TLU). E.g., considers the student's score referred to above. His/her TCP is 45.0 and his/her TLU is 15. His/her GPA is therefore  $45/15 = 3.00$ . The highest possible GPA that can be earned is 5.00 and i.e. when a student has earned a grade of "A" in every course during the semester. The lowest GPA obtainable is 0.00.

**Cumulative Grade Point Average (CGPA)** is not the summation of GPA's for the semester. Rather, it is the summation of TCP for all semesters to date, divided by the summation of TLU for the said semesters. In effect,  $CGPA = CCP/CLU$

## **6.6. Collation of marks**

There shall be a Departmental Board to consider all examination results before they are presented to the Faculty Board.

Processing of examination results shall be the responsibility of each Head of Department. Processed results must be taken to the Faculty Board of Examiners for consideration.

The master marks sheets or results must be signed by the Chief Examiner/Head of the Department.

The Faculty Board shall take measures to ensure the correctness of all results presented to it for consideration and ratification before presentation to Senate.

### **Release of Examination Result**

The results of each semester examination shall be signed and by the Dean forwarded to the relevant Senate Committee not later than 24 hours after the meeting of the Faculty's Board and shall remain provisional until approved by Senate.

After Senate approval, the result shall be forwarded to the Registrar who shall cause results to be released to students.

All the results of a session shall be released before the commencement of a new session.

## **6.7. Examination malpractices**

A student, who is involved in University examination malpractice or violates examination regulations, shall be referred to the disciplinary committee which will recommend appropriate disciplinary action.

The following procedures shall apply in handling all suspected cases of examination malpractice in the University as stipulated in the University student's handbook [**Ref. Students' Handbook of Information, (see section 23.2.0)**] as stated below.

23.2.1 The attention of any other invigilator present should be drawn to the suspicious circumstance(s), if an invigilator suspects that a candidate has committed an examination malpractice offence, if another student suspects that there is misconduct he/she should alert the invigilator(s).

23.2.2 The invigilator(s) should approach the suspected candidate and inform him or her of the suspicion, and give the candidate an opportunity to make a written statement.

23.2.3 The Invigilator(s) should withdraw the candidate's script and issue a fresh script for him/her to continue the examination. If any unauthorized material is discovered it should be confiscated by the invigilator(s) and tendered in the evidence against the candidate.

23.2.4 Within twenty-four hours the invigilator(s) should make a written report to the Chief Examiner, who is the Head of the Department.

23.2.5 Written account of the incident by the invigilator(s), suspect's script, any unauthorized materials by the Invigilator(s), the Chief Examiner and other candidates (if appropriate in evidence) and the students statement must be submitted under confidential cover to the Registrar who shall forward it to the Central Student Disciplinary Committee within twenty-four (24) hours at the end of the course examination.

23.2.6 If however, during the marking, moderating or collating of examination materials, an Examiner or any member of staff suspects that malpractice has taken place, the Examiner or member of staff must confer with the Chief Examiner (Head of Department). As soon as a prima facie case has been established, the Examiner or member of staff must submit written reports with the student's script and other



corroborating evidence to the Dean of Faculty through the Chief Examiner (Head of Department) within seventy-two (72) hours. The student so affected must be informed immediately of the allegation and made to submit a written statement.

23.2.7 The suspect will be invited to appear before, and be heard by the Examination Misconduct Committee.

23.2.8 The decision of the Examination misconduct Committee as approved by Senate shall be conveyed to the candidate.

23.2.9 All cases of examination malpractice must be disposed off within the shortest possible time but not longer than six (6) months.

23.2.10 All materials confiscated from students in proven cases of malpractice shall be kept by the University until punishment has been served.

## **EXAMINATION OFFENCES AND PUNISHMENTS**

Examination offences and punishments are highlighted below as stated in Section 23.8 of the University Student's Handbook

### **23.8.1 Misconduct before Examination**

<b>S/N</b>	<b>OFFENCES</b>	<b>PENALTY</b>
1	Involvement in and bearing responsibility for examination question leakage	Expulsion from the University
2	Participating in or benefiting from question leakage.	Expulsion from the University
3	Attempting to participate in or benefit from examination question leakage	Suspension for two (2) semesters.
4	Coming into the examination hall after thirty (30) minutes of the commencement of an examination.	The candidate should not be allowed into the examination hall and he/she should be scored 0 (F) in the course examined.

### **23.8.2 Misconduct during Examination**

<b>S/N</b>	<b>OFFENCES</b>	<b>PENALTY</b>
5	Sitting for an examination for which a candidate did not register for or is not qualified to sit for.	The result of the candidate in the course should be nullified. He/She should be score 0 (F) and be issued a letter of warning.
6	Representing/standing in for another in the course of an examination.	The candidates representing and the represented should be expelled from the University.
7	Conniving with another candidate/student/person to represent/stand in for	Expulsion from the University.

	another in an examination.	
8	Destroying, effacing, mutilating, swallowing of potentially incriminating material(s) relating to a course during the course of an examination.	Expulsion from the University.
9	Displaying of inappropriate or anti-social behaviour (e.g. smoking, singing, cat calls etc) capable of causing delay and/or disruption of an examination process	Suspension for one (1) semester.
10	Displaying of inappropriate or anti-social behaviour leading to disruption and suspension of an examination.	Suspension for two (2) semesters.
11	Giving, or receiving, or in any way benefiting from information relating to a course in an examination through electronic, personal dress material, part of the body in any manner or form whatsoever.	Suspension for two (2) semesters.
12	Leaving the examination hall without the permission of the invigilator	Letter of warning. In addition, the candidate should be scored 0 (F) in the course examined.
13	Leaving the examination hall with examination material before the end of the examination without the permission of the invigilator.	Suspension for two (2) semesters.
14	Substitution or exchanging the answer script given to a candidate in whatever manner or form, during the examination.	Expulsion of all the students involved from the University.
15	Exhibiting insulting, rude, impolite behaviour to another student during	Letter of warning.

	course of an examination.	
16	Exhibiting insulting, rude, impolite behaviour to a staff during the course of an examination.	Suspension for two (2) semesters.
17	Physical assault or battery on staff during the course of an examination.	Expulsion from the University.
18	Physical assault on another student during the course of an examination.	Suspension for two (2) semesters.
19	Talking to or communicating with another candidate without due permission during the course of an examination.	Suspension for two (2) semesters.
20	Bringing in unauthorized material(s) into the examination hall by a candidate.	Suspension for two (1) semesters. The candidate should also be scored 0 (F) in the course.
21	Bringing in unauthorized material(s) into the examination hall by a candidate with proven evidence of using material(s) or any part therefore.	Suspension for two (2) semesters. The candidate should also be scored 0 (F) in the course.
22	Failure by a candidate to submit his/her answer script after taking part in an examination.	Suspension for two (2) academic semesters. In addition, the candidate should be scored 0 (F) in the course.
23	Giving/receiving irregular assistance, cheating or aiding and abetting by a candidate/student in an examination.	Suspend for two (2) semesters.
24	Refusal to sign the Attendance Register.	Letter of Warning

### **23.8.3 Misconduct after Examination**

<b>S/N</b>	<b>OFFENCES</b>	<b>PENALTY</b>
25	Involvement in an attempt to substitute or change or remove or effect changes in Examination script(s), record sheet(s), attendance register or any examination relate material/document.	Expulsion from the University.
26	Exertion of influence with a view to obtaining undue advantage in the grading of scripts or award of marks by an internal or external examiner.	Expulsion from the University.

### **6.8. Absence from examination**

Any student absent from a course examination without approval of the Head of Department during or at the end of the semester will receive a grade of 0(F). Permission may be granted only on substantiated or on compassionate grounds as recommended by the Faculty Board and by Senate.

### **6.9. Graduation requirements:**

For the purpose of final classification of degree, a student should have achieved the following CGPA at the end of 145 units.

#### **CGPA**

4.50 – 5.00  
3.50 – 4.49  
2.40 – 3.49  
1.50 – 2.39

#### **Class of Degree**

First Class  
Second Class (Upper Division)  
Second Class (Lower Division)  
Third Class

## 7.0. Quality Assurance

To maintain high quality, the course materials shall be of high standard. Continuous assessment shall be given priority of place as well as mid-semester test. Examination questions and marking schemes shall be subjected to external moderation.

## 8.0. Programme Structure

To be awarded a Bachelor of Science (B.Sc) Degree in Industrial Chemistry, the student must pass a minimum Credit of 151 credit Units, distributed as follows:

a.	Compulsory Courses (including Project/Dissertation) -	129 Credit Units
b.	General Studies Courses -	18 Credit Units
c.	Elective Courses -	6 Credit Units
	TOTAL	= 153 Credit Units

## 8.1. Duration of programme

The period for the completion of the programme is a minimum of eight (8) semesters and a maximum of twelve (12) semesters through UTME; and a minimum of six (6) semesters and a maximum of ten (10) semesters through Direct Entry for a full-time degree.

## 8.2. Summary of courses

Level	Semester	General courses		Compulsory courses		Electives		Total	
		No. of courses	No. of credit units	No. of courses	No. of credit units	No. of courses	No. of credit units	No. of courses	No. of credit unit
100	1 <sup>st</sup>	3	5	8	17	0	0	11	22
100	2 <sup>nd</sup>	3	5	9	18	0	0	12	23
200	3 <sup>rd</sup>	2	3	8	19	0	0	10	22
200	4 <sup>th</sup>	2	3	7	14	0	0	9	17
300	5 <sup>th</sup>	0	0	11	17	1	2	11	21
300	6 <sup>th</sup>	0	0	7	14	1	2	8	16
400	7 <sup>th</sup>	0	0	6	15	1	2	7	17
400	8 <sup>th</sup>	0	0	5	13	1	2	6	15
<b>TOTAL</b>		<b>10</b>	<b>16</b>	<b>60</b>	<b>125</b>	<b>4</b>	<b>8</b>	<b>74</b>	<b>153</b>

### 8.3. Course structure by semester

#### 100 Level First Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
GST 101	Communication in English I	C	Nil	2	0	0	2	General Studies Unit
GST 103	Use of Library and ICT	C	Nil	2	0	0	2	General Studies Unit
GST 105	Introduction to Entrepreneurial Skills I	C	Nil	1	0	0	1	General Studies Unit
CHM 101	General Chemistry I	C	Nil	2	0	1	3	Chemistry
CHM 107	Practical Chemistry I	C	Nil	0	1	0	1	Chemistry
PHY 101	General Physics I	C	Nil	2	0	1	3	Physics
PHY 107	Practical Physics I	C	Nil	0	1	0	1	Physics
BIO 101	Introductory Biology I	C	Nil	2	0	1	3	Mircobiology
BIO 107	Practical Biology I	C	Nil	0	1	0	1	Mircobiology
MTH 101	Elementary Mathematics I	C	Nil	3	0	0	3	Mathematics
CSC 101	Introduction to Computer Science I	C	Nil	2	0	0	2	Computer
	<b>TOTAL</b>						<b>22</b>	



## 100 Level Second Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
GST 102	Communication in English II	C	Nil	2	0	0	2	General Studies Unit
GST 106	Evaluating Opportunities & Business Concepts	C	Nil	1	0	0	1	General Studies Unit
*GST 108	Government, Society & Economy	C	Nil	2	0	0	2	General Studies Unit
*GST 110	African Culture & Civilisation	C	Nil	2	0	0	2	General Studies Unit
CHM 102	General Chemistry II	C	Nil	2	0	1	3	Chemistry
CHM 108	Practical Chemistry II	C	Nil	0	1	0	1	Chemistry
CHM 110	Industrial Drawing	C		0	1	0	1	
PHY 102	General Physics II	C	Nil	2	0	1	3	Physics
PHY 108	Practical Physics II	C	Nil	0	1	0	1	Physics
BIO 102	Introductory Biology II	C	Nil	2	0	1	3	Microbiology
BIO 108	Practical Biology II	C	Nil	0	1	0	1	Microbiology
MTH 102	Elementary Mathematics II	C	Nil	2	0	1	3	Mathematics
CSC 102	Introduction to Computer Science I	C		2	0	0	2	Computer
	<b>TOTAL</b>						<b>23</b>	

## 200 Level First Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
GST 203	Feasibility Plan & Investment Decision	C	Nil	1	0	0	1	General Studies Unit
GST 205	Introduction to Philosophy, Logic and Human Existence	C	Nil	2	0	0	2	General Studies Unit
CHM 201	Inorganic Chemistry I	C	Nil	2	0	0	2	Chemistry
CHM 203	Physical Chemistry I	C	CHM 101	3	0	0	3	Chemistry
CHM 207	Experimental Inorganic/ Physical Chemistry	C		0	1	0	1	Chemistry
CHM 205	Basic Protein and Enzyme Chemistry	C	Nil	2	0	0	2	Chemistry
MTH 201	Mathematical Method I	R	MTH 101	2	0	1	3	Mathematics
CSC 201	Structured programming	C	Nil	2	0	0	2	Computer
PHY 201	Elem. Modern Physics	C		2	0	1	3	Physics
PHY 205	Thermal Physics	c		2	0	1	3	
	Total Credit Units (Compulsory)						<b>22</b>	
	Total Credit Units (Elective)						<b>0</b>	
	Total Credit Units						<b>22</b>	

## 200 Level Second Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
GST 202	Peace studies and Conflict Resolution	C	Nil	2	0	0	2	General Studies Unit
GST 204	Resource management and Organisation Behaviour	C	Nil	1	0	0	1	General Studies Unit
CHM 202	Quality Control and Industrial Safety	R		2	0	0	2	Chemistry
CHM 204	Organic Chemistry I	C	CHM 102	2	0	0	2	Chemistry
CHM 206	Analytical Chemistry	C	Nil	2	0	0	2	Chemistry
CHM 208	Expt. Organic Chemistry	C	Nil	0	1	0	1	Chemistry
CHM 212	Experimental Analytical Chemistry	R	Nil	0	1	0	1	Chemistry
CSC 208	Computer Programming			3	0	0	3	Computer
MTH 232	Statistics for Physical Sciences and Engineering			3	0	0	3	Mathematics
	Total Credit Units (Compulsory)						<b>18</b>	
	Total Credit Units (Elective)						<b>0</b>	
	Total Credit Units						<b>18</b>	

### 300 Level First Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
CHM 307	Industrial Management & Chemical Industry I	C	Nil	2	0	0	2	Chemistry
CHM 301	Inorganic Chemistry II	C	CH M 201	2	0	0	2	Chemistry
CHM 303	Chemical Literature	C	Nil	1	0	0	1	Chemistry
CHM 305	Physical Chemistry II	C	CH M 203	2	0	0	2	Chemistry
CHM 309	Natural Product Chemistry	C	CH M 204	2	0	0	2	Chemistry
CHM 311	Petroleum Chemistry	C	Nil	2	0	0	2	Chemistry
CHM 313	Polymer Chemistry	R	Nil	2	0	0	2	Chemistry
CHM 315	Glass Blowing Practical	R	Nil	1	0	0	1	Chemistry
CHM 317	Applied Spectroscopy	C	Nil	2	0	0	2	Chemistry
CHM 323	Industrial Chemistry Practical	C	Nil	0	1	0	1	Chemistry
EPS 301	Entrepreneurial Studies II	C	Nil	0	2	0	2	Chemistry
	Electives	E		2	0	0	2	
	Total Credit Units (Compulsory)						<b>19</b>	
	Total Credit Units (Elective)						<b>2</b>	
	Total Credit Units						<b>21</b>	

### 300 Level Second Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
CHM 302	Instrumental Analytical Methods	C	CHM 206	2	0	0	2	Chemistry
CHM 304	Biophysical Chemistry	C	CHM 204	2	0	0	2	Chemistry
CHM 306	Management & Chemical Industry II	C		2	0	0	2	Chemistry
CHM 308	Process Science	C	Nil	2	0	0	2	Chemistry
CHM 314	Environmental Chemistry	R		2	0	0	2	Chemistry
CHM 316	Colour & Textile Industry	C		2	0	0	2	Chemistry
CHM 318	Organic Chemistry II	C		2	0	0	2	Chemistry
	Elective	E		2	0	0	2	Chemistry
	Total Credit Units (Compulsory)						<b>14</b>	
	Total Credit Units (Elective)						<b>2</b>	
	Total Credit Units						<b>16</b>	

### 400 Level First Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
CHM 399	SIWES	C		2	0	0	6	Chemistry
CHM 401	Coordination Chemistry	C		2	0	0	2	Chemistry
CHM 403	Electro Chemistry	C		2	0	0	2	Chemistry
CHM 405	Macromolecular Chemistry	C		2	0	0	2	Chemistry
CHM 409	Physical organic chemistry	C		2	0	0	2	Chemistry
CHM 411	Organic Synthesis	C		2	0	0	2	Chemistry
CHM 471	Seminar	C		1	0	0	1	Chemistry
	Elective	E		0	0	0	0	
	Total Credit Units (Compulsory)			2	0	0	<b>17</b>	
	Total Credit Units (Elective)						<b>0</b>	
	Total Credit Units						<b>17</b>	

### 400 Level Second Semester

Course Code	Course Title	Status	Pre-req.	L	P	T	Unit	Servicing Department
CHM 402	Food & Pharmaceutical Chemistry			2	0	0	2	Chemistry
CHM 406	Chemical Kinetics	C	CHM 203	2	0	0	2	Chemistry
CHM 414	Material Science	C	CHM 202	2	0	0	2	Chemistry
CHM 416	Wood , Pulp and Paper	C	Nil	2	0	0	2	Chemistry
CHM 499	Research Project	C	Nil	0	5	0	5	Chemistry
	Elective	E	Nil	2	0	0	2	Chemistry
	Total Credit Units (Compulsory)						<b>13</b>	
	Total Credit Units (Elective)						<b>2</b>	
	Total Credit Units						<b>15</b>	

**List of Elective Courses (from which students can choose)**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>	<b>Status</b>
CHM 234	Industrial Management Accounting	2	E
CHM 210	Unit Operations	2	E
BIO 204	Biological Techniques	2	E
GEY 206	Introductory to Petrology	2	E
CHM 310	Heat Transfer	2	E
CHM 312	Ceramics and composite material Chemistry	2	E
CHM 321	Nuclear and Radiochemistry	2	E
CHM 331	Food and nutritional chemistry	2	E
CHM 332	Medicinal Chemistry	2	E
CHM 342	Solid State Chemistry	2	E
CHM 352	Photochemistry	2	E
CHM 404	Organometallic Chemistry	2	E
CHM 415	Quantum Chemistry	2	E
CHM 410	Heterocyclic Chemistry	2	E
CHM 412	Organic Reaction Mechanism	2	E
CHM 423	Chemistry of Lanthanides and Actinides	2	E
CHM 431	Forensic Chemistry	2	E
CHM 441	Industrial Chemistry Practical	2	E
CHM 432	Nanotechnology	2	E
CHM 442	Geochemistry	2	E

**Note:****R = Required    C= Compulsory    E = Elective**



## 8.4. Course Description or Synopsis

### **CHM 101 General Chemistry I** **2 + 1 +0 (3 Credits)**

Physical quantities and Units, Error treatments, States of matter: Derivation and calculations involving the use of the laws of gases. The mole concepts and determination of relative masses. Chemical equation and Stoichiometry: Modern electronic theory of atoms and electronic Configuration. Building up of periodic table and the periodicity. Chemical bonding and intermolecular bonds. Concept of Acid, Base and Salts. Chemical equilibria. Chemical Kinetics. Thermochemistry. Electrochemistry. Introduction to Nuclear Chemistry.

### **CHM 102 General Chemistry II** **2+1+0 (3 Credits).**

Introduction to Organic Chemistry: Hybridization in carbon  $Sp^3$ ,  $Sp^2$   $Sp$ . Nomenclature and classes of organic compounds. Homologous series of hydrocarbons, functional groups. Types of organic reactions: elimination, addition, substitution and rearrangement. Isomerism: structural and stereoisomerism. Chemistry of benzene, alcohols, phenols, aldehydes, ketones, acids, amines and amides. Structure of simple sugars, polysaccharides such as starch and cellulose, peptides and proteins, fats and oils. Isolation and purification of organic compounds.

### **CHM 107 Practical Chemistry I** **0+0+3 (1Credit)**

A course designed to illustrate the principle covered in lecture course of CHM 101 Viz; Measurements using measuring Cylinder and use of the Top loading Balance, Data treatments; Volumetric Analysis: titration of strong acid against strong base/weak base, Standardization of Potassium tetraoxomaganate, Ethanoic acid; Back titration.

**CHM 108 Practical Chemistry (II) 0+0+3 (1Credit)**

A course designed to illustrate the principle covered in lecture course of CHM 102 Viz; Test for Organic functional groups: Unsaturated hydrocarbons, alcohols, aldehydes and ketones., carboxylic acids, Ester, Phenol. Determination of melting point; determination of suitable solvent for recrystallization; separation by distillation

**CHM 110 Industrial Drawing**

Instruments for engineering drawing and their uses. Drawing paper sizes, margins and title blocks, lettering and types of line. Geometrical construction, bisection of lines and angles and their application, polygon, triangle, locus of simple mechanisms, pictorial drawing, isometric, oblique and perspectives, orthographic projection. Dimensioning and development of simple shapes. Assembly drawing of simple components, conventional representation of common engineering features. Freehand sketching. Use of engineering drawing software

**CHM 201 Basic Inorganic Chemistry I 2 + 1 +0 (3 Credits)**

*Pre-requisite CHM 101*

A quantitative introduction to the basic principle of inorganic chemistry. The theory of valency - molecular orbital, crystal field and valence bond theory. Three centre ionic bonding, electronegativity, ionic solids and lattice energy. Hydrogen bonding, molecular solids introduction to coordination chemistry of the first row.

Periodicity of Physical Properties: The variation in physical properties with atomic number across the 2nd and 3rd periods (lithium to neon, sodium to argon). Variation in first ionization energies, atomic radii, melting points and explanation in terms of structure and bonding in elements. The relevance of ionization energy and electronic configuration. Comparative chemistry of Group IA, IIA, VA and VIII

elements. Chemistry of noble metals (Ag, Au, Cu and Pt).and their uses.

**CHM 202 Quality Control and Industrial Safety 2 + 0 +0  
(2 Credits)**

Chemical and technical quality control in selected products such as drugs, foods, soaps and detergents, dyes, plastics, textiles and cosmetics. Introduction to laboratory organization. First-aids and response to laboratory and industrial accidents.

**CHM 203 Physical Chemistry 2 + 1 + 0 (3 Credits)**

*Pre-requisite CHM 101*

Bond dissociation energies. Energy cycles (Born – Haber cycle) of covalent compounds. Heats of formation and their determination. The law of thermodynamics; Entropy and free energy, reaction and phase equilibria, chemical kinetics- Factors affecting the rates of chemical reactions. Rate laws. Order of reaction and molecularity of elementary processes. Relationship of order to mechanism. Rate equation for zero, first and second order reactions. Half lives. Experimental investigation of reaction rates. Sampling and physical methods of following reactions. Determination of order. Effect of temperature on reaction rate. The Arrhenius equation. Presentation of collision and transition state theories. Catalysis, simultaneous reactions, opposing, consecutive, side and chain reactions; Mechanism and theories of elementary processes; Photochemical reactions.

Basic electrochemistry: Properties of electrolytes Concept of activity-Debye-Huckel theory, conductance and its measurement, interaction in electrolyte solutions. Ideal solutions, non- ideal solutions; Interfacial relationships, adsorption, adsorption isotherms, Colloidal systems, classification of colloidal systems, Micelle and its formation. Preparation and properties of lyophilic and lyophobic sols. colligative

properties. Non-aqueous solvents. Solution properties of compounds i.e. solute-solvent interactions.

**CHM 204 Organic Chemistry I 2 + 0 +0 (2 Credits)**

*Pre-requisite CHM 102*

Review of chemical bonding in organic chemistry; Alcohols and their reactions; Ethers and epoxides, carboxylic acids and their derivatives, aldehydes and ketones; Carbanions I and II – Unsaturated compounds, Carbanion II – Amines, Aromatic and Alicyclic chemistry. Preparation and reactions of benzene derivatives. Reactive intermediates: formation and reaction (carbenes, free radicals etc). Nucleophilic substitution at saturated carbon atom (SN<sub>1</sub> and SN<sub>2</sub> mechanisms). Electrophilic and nucleophilic aromatic substitution reactions. Elimination reactions (E<sub>1</sub> and E<sub>2</sub> mechanisms). Neighbouring group participation and rearrangement reactions. Stereochemistry: Stereochemistry of organic compounds and optical isomerism of compounds with one or more asymmetric centres. Heterocyclic chemistry- the chemistry of five and six membered ring.

**CHM 205 Protein and Enzyme Biochemistry 2+0+0 (2 Credits)**

Amino acids as units of protein structure; the peptide bond; primary, secondary, tertiary and quaternary levels of structure and the forces maintaining them. The biologically active state of proteins; protein denaturation. Enzymes as proteins and as biological catalysts; the active centre; enzymes binding and catalysis: enzyme specificity. Michealis – Menten treatment for one – substrate reaction, including inhibition and the use of graphical directed and enzyme – catalyzed reactions. Dissimilation and biosynthesis. Glycolysis as an example of a metabolic pathway, its reactions, enzymes and yield of ATP. Advantages and disadvantages of in vitro experiments with tissue/cell rupture and homogenization; the isolation of organelles. The purification of proteins with emphasis on enzymes. Elementary theory

and practice of solubility methods and methods and methods based on chromatographic, electrophoric centrifugation and bio-affinity techniques.

**CHM 206 Analytical Chemistry 2 + 0 + 0 (2 Credits)**

Theory of errors; Statistic treatment of data; Theory of sampling; Chemical methods of analysis including volumetric, gravimetric and physiochemical methods. Separation methods; Chromatography: Thin Layer, paper and column chromatograph. The use of  $R_f$  values;

**CHM 207 Experimental Inorganic/Physical Chemistry 0+ 0 +3 (1 Credit)**

A course designed to illustrate the principle covered CHM 203 – Determination of rate of reactions, order of reaction

**CHM 208 Experimental Organic Chemistry 0 + 0 +3 (1 Credits)**

A course designed to illustrate the principle covered in CHM 204- qualitative determination of alcohol, amine ketone.

**ICH 210 Unit Operations 2 + 0 + 0 (2 credit)**

Introductory fluid mechanics and fluid handling processes. Physicochemical Industrial Processes: Grinding, Size-reduction, Extraction, Filtration, Distillation and Solvent extraction processes.

**CHM 212 Experimental Analytical Chemistry 0 + 0 +3 (1 Credits)**

Selection of experiments to illustrate principles taught in CHM 206. Experiments to include sampling techniques and statistical treatment of data, solvent extraction, chromatography and sample separation.

**CHM 301 Inorganic Chemistry II 2 + 1 +0 (3 Credits)**

*Pre-requisite CHM 201*

Concept of hard and soft acids and bases. Crystal field theory and chemistry of complex ions. Stereochemistry and nomenclature of inorganic compounds. Introduction to group theory and symmetry. Ionic solids. Inorganic applications of standard reduction potentials. Chemistry of Transition elements, Inorganic reaction mechanisms. Role of metals in living systems. Lantanides and actinides and their uses

### **CHM 302 Instrumental Analytical Methods 2+0+0(2 Credit)**

Instrumental method of analysis –electroanalytical methods; coulometry, conductometry, Polarograph ;Amperometry, voltametry spectroscopic techniques Colorimetry, fluorescence technique, refractometry, and colorimetry, Optical methods of analysis; Polarimetry,. Refractometry and ion interferometry; X-ray methods, Nuclear magnetic resonance,; Electron spin resonance;;.

### **CHM 303 Chemical Literature 1+0+0 (1 Credit)**

Scientific Report writing, Use of Internet in literature searching; Chemical literature; The scientific journal; Synthetic reaction Search, Structural and Sub structural searches; the patent Literature; Outline searching. Microsoft PowerPoint presentation; Use of Chemdraw/ Chems sketch.

### **CHM 304 Biophysical Chemistry 2 + 0+0 (2 Credit)**

Anatomy of the nervous system, smooth and voluntary muscles. Introduction to autonomic pharmacology. The endocrine glands – its function and roles. Components of blood and coagulation. Ventilation. The gastrointestinal system. Excretory organs and their functions. Homeostasis, urine formation, acid-base balance, role in the maintenance of blood volume and pressure. Introduction on pharmacology. Origins and classification of drugs administration to drug receptor theories, dose response curves antagonism, principles of drug metabolism and excretion. Drug screening, bioassay, drug toxicity.

**CHM 305 Physical Chemical II 2+0+0 (2 Credit)**

*Pre-requisites: CHM 203*

First, second and third laws of thermodynamics are to be given a more rigorous treatment than CHM 203. The Inorganic principles are considered in relation to chemical potential. When relationship of the thermodynamics function phase equilibria gaseous and liquid mixtures, colligative properties of solutions, chemical potential; activities and Activity coefficient.

**CHM 306 Management and Chemical Industry I 2+0+0  
(2 Credits)**

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 role. Organization structure and management structure. Authority and organization. Corporate policy and organizational constraints on management process. The decision process, managerial techniques 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 behavior.

**CHM 307 Management and Chemical Industry II 2+0+0  
(2 Credits)**

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 308 Process Science****2+0+0 (3 Credits)**

Survey of chemical raw materials in Nigeria. location, energy, primary chemical products. Process variables; Data presentation analysis; Material and Energy balance; process flow sheet and stoichiometry for Industrial processes; large scale and bench scale processes; steam generation; Heat transfer and mass transfer process, Unit operations - Physicochemical industrial processes, filtration, distillation, extraction crystallization, drying. Unit operation equipments. Reactor types, design and optimization, waste treatment and utilization. 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. Production of primary intermediates and synthesis of industrial organic chemical polymers; adhesives, dyes, explosives, insecticides, herbicides, flavouring agents, growth regulators, Fermentation process; Resources depleting and recycling.

**CHM 309 Natural Product Chemistry****2+0+0 (2 Credits)**

Chemistry of terpenoids, steroids, alkaloids, antibiotics, faconoids prostagladins and chlorophylls; Natural products of pharmaceutical importance; General and specific methods of isolation, separation, purification and structure determination of the natural products classification by chemical and spectroscopic methods; Biosynthesis of selected examples.

**EPS 301 Entrepreneurial Studies II**

Some of the ventures to be focused upon include the following:

1. Soap/Detergent, Tooth brushes and Tooth paste making
2. Brewing
3. Glassware production/Ceramic, production
4. Paper production
5. Water treatment/Conditioning/Packaging
6. Vegetable oil/and Salt extractions
7. Dye and tie
8. Production of ethanol.



**ICH 310 Heat Transfer 2 + 0 + 0 (2 credit)**

Introductory heat transfer: Conduction, Convection and Radiation as modes of heat transfer, Principles and applications in chemical industries, Natural and Forced Convections, Steady and Unsteady state conductions, Radiation, boiling and condensation, boilers and heat exchangers.

**CHM 311 Petroleum Chemistry 2+0+0 (2 Credits)**  
**Required**

Nature, classification and composition of crude petroleum. Characteristic and scope of petroleum industry. Physical and chemical outlay of refinery operations. Oil refining. Crude oils and separation processes. Steam reforming and major reforming reactions. Catalytic cracking and desulfurization; Chemical conversion- alkylation, amination, halogenation; Petrochemicals and the production. Corrosion and bio-corrosion in oil field and pipeline.

**CHM 312 Ceramics and Composite Material Chemistry 2 + 0 +0 (2 Credits)**

Chemistry, structure and properties of soils containing useful clays. Ceramics. Definition, structure, production, chemical and physical properties and applications Composites: Definitions, types of production, properties and applications of some commercial composites - glass, cement and asbestos.

**CHM 313 Polymer Chemistry 2+0+0 (2 Credits)**  
**Required**

The nature of polymer; Types of polymer and polymerization processes; addition, condensation polymerization and their mechanism; Physical properties of polymers; Solubility and solution properties; Fibre forming polymers.

Co-polymerization, Stereospecific polymerization, polymer characterization – molar masses, chain dimensions and structures. Polymer technique. Degredation of polymers. Polymer additives, polymeric surface coatings and adhesives, industrially important thermoplastic and thermosetting polymers

**CHM 314 Environmental Chemistry 2 + 0 +0 (2 Credits)**

**Required**

Concepts of elementary cycles, characteristics of the atmosphere. Sources, type and effects of environmental pollution. Water cycles, characteristic of water, water pollution, Water and Waste water treatment and analysis. Components of Atmosphere, Air and clean air, air pollution, greenhouse gases and Ozone, depletion of ozone layer and its implications. Global warming and it's effect. Soil Chemistry and solid waste disposals, hazardous wastes and environmental toxicology. Chemical and physical instrumentation in environmental science.

**CHM 315 Glass Blowing Practical 0+0+3 (1 Credit)**

Properties of glass in general use; Manufacturers symbol and what they represent; Types of glass used for laboratory wares; Identification methods, working temperatures; Coefficient of expansion, annealing, thermal resistance, correlation of these factors; Identification of basic tools,;Gas supplies, safety measures, Cutting, Rotation and reaming, ring seal and side grinding and polishing.

**CHM 316 Colour and Textile Chemistry 2 + 0 +0 (2 Credits)**

**Required**

Dye intermediates, classification and preparation of dyes. Application of various types of dyes to man made fibres. Unit operations and quality control in dyes and fibres manufacturing. Dye printing machineries. Colouring matters for food, drugs and cosmetics. Dyes used in paper industry and colour photography

Principle of yarn manufacture ( natural and man made). Basic machine processes involved. Textile processing. Singeing, desizing, scouring, bleaching, mercerization and optical brightening. Color and constitution. Management problems in textile industries.

**CHM 317 Applied Spectroscopy** **2+0+0 (2 Credits)**  
Basic principles and applications of UV, IR NMR and MASS spectroscopy in the determination and elucidation of structures of organic compounds

**CHM 318 Organic Chemistry II** **2+ 0+ 0 (2 Credit)**  
*Pre-requisites: CHM 204*  
Molecular dissection phenomenon. Sunthon and Target molecular approach/strategic device to organic synthesis. Convergent and divergent synthesis. Construction relations: one-two group disconnections involving various functional groups. Illogical two group disconnections: oxidation and reduction reactions synthesis.

**CHM 321 Nuclear and Radiochemistry** **2 + 0 +0 ( 2Credits)**  
Natural radioactivity fission decay processes, nature of radiation, nuclear models, energetic of nuclear reaction. Principle and measurement of radioactivity. The uses and applications of radio isotopes, radiation hazards

**CHM 331 Food and Nutritional Chemistry** **2 + 0 +0 (2 Credits)**  
Nutritional importance of food, food preservation techniques. Treatment of other analytical method for food analysis – colorimetric, polarimetric etc. Food analysis: proximate analysis – ash, protein, fat, carbohydrate. Mineral analysis of food, amino acids, fatty acids vitamins.



complex molecules. thermodynamic stability. Stability constant Theory Structure and bonding. Structural investigation by physical methods. Magnetic properties, absorption and vibrational spectra. The spectrochemical series. Preparation and reaction of complexes. Kinetics and Mechanism. Application of Coordination Compounds.

**CHM 402 Food and Pharmaceutical Chemistry 2 + 0 +0  
(2 Credits)**

Occurrence, structure and functions of carbohydrates, protein, fats and oils, physical and chemical properties. Starch behaviour during baking and staling of bread. Glucose syrup chemistry of enzymatic and non-enzymatic products. Chemistry of fermentation process in the food industry. Effect of enzymes in food. Enzymatic and non-enzymatic browning.

Classification of the varioustypes of drugs, chemistry and properties of some drugs. Production of selected drugs from natural and synthetic sources

**CHM 403 Electrochemistry 1+0+0 (2 Credits)**

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 elationships). Potentiometric titration including measurement of pH. Redox reactions. The electrical double layer and its applications.

**CHM 404 Organometallic Chemistry 2 + 0 +0 (2 Credits)**

*Pre – requisite CHM 301*

Classification of Organometallic compounds, preparation, structures and reactions including abnormal behaviour of Organometallic compounds, synthetic utility of organometallic Compounds, generation and detection of free radical from organometallic compounds.

**CHM 405 Chemistry of Macromolecular 2 + 0 + 3 (3 Credits)**

Classification of macromolecules; polymers and copolymers as natural, modified natural or synthetic substances. The structure and chemistry of carbohydrates, proteins, nucleic acids, DNA. Detergents and their properties. Structure-property relationship of selected macromolecules. Physical methods for the determination of the structures and properties of macromolecules.

**CHM 406 Chemical Kinetics 2 + 0 +0 (2 Credits)**

*Pre – requisite CHM 305*

Review of first, second and third order rate equations. Rate constants and equilibrium constants. Collision theory, transition state theory, reaction coordinates, unimolecular reaction theory, bimolecular reaction mechanisms, chain reaction mechanisms, catalysis and Heterogeneous reactions. Photochemical reaction mechanisms.

**CHM 409 Physical Organic Chemistry 2+0+0 ( 2 Credits)**

Pre-requisite: CHM 204

Stepwise and concerted reaction mechanism. Kinetic studies, non-kinetic studies, Nucleophilic displacement reactions. The mechanisms of SN1, SN2, SN1 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 +  
6m/P+0+6+m/o application to evaluation of mechanistic pathways.  
Review of reaction intermediates viz. benzyne, carbenes, nitrenes,  
carbonium ions. Orbital symmetry in Pericyclic reactions. Electrocyclic  
reactions. Sigmatropic rearrangements. Woodward Hoffman Rule.  
Huckel Rule and aromaticity.

**CHM 410 Heterocyclic Chemistry 2 + 0 +0 (2 Credits)**

The synthesis and mechanism of fused heterocyclic system particularly  
quinolines, isoquinolines, benzofurans, benzothiophenes, indoles,  
benzophylium salts, coumarines and chromones. Occurrence in nature  
and application of heterocyclic system in drug analysis.

**CHM 411 Organic Synthesis 2+0+0 (2 Credits)**

Reduction methods. Catalytic hydrogenation. Reduction with boron and  
aluminum hydrides and their analogues and derivatives. Metal  
reductions. Selective reduction in polyfunctional compounds. Oxidation  
methods. Epoxidation, hydration and Hydroxylation of alkenes,  
oxidative cleavage of glycol. Peroxyacids and coupling and relevance to  
biosynthesis survey of synthetic applications of Organometallic  
Organoboranes. Hydroboration oxidation to ketones. Carboxylation  
reactions and protonolysis phosphorus halides and their applications.  
Enamines: synthesis and applications. Formation of polycyclic  
compounds. Aldol type reactivity and reaction of minimum salts with  
nucleophile. Synthesis of complex molecules. Pericyclic reactions.  
Methodology for the construction synthetic routes.

**CHM 412 Organic Reaction Mechanism 2 + 0 +0 (2 Credits)**

**Pre-requisites : CHM 204**

Selected types of reactions to be discussed in relation to mechanistic  
concepts. Discussion includes alkylation and acylation processes, aldol-  
type condensations, synthesis with organometallic compounds.

**CHM 414 Material Science****2 + 0 +0 (2 Credits)***Pre-requisites : CHM 305*

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 415 Quantum Chemistry****2 + 0 +0 (2 Credits)**

Quantum mechanical description of molecular orbitals (M.O.). Wave functions and energies of homo- and heteronuclear diatomic molecules. Correlation diagrams, ground and excited state potential energy diagrams of diatomic molecules. Hybridization and stereochemical relations in simple polyatomic molecules. M. O. theories of unsaturated polyatomic (up to four atoms) molecules. Brief discussion of the theories of chain reactions, combustion, explosions and fast reactions in solution and gas phase.

**CHM 416 Wood, Pulp and Paper Chemistry (2 units)**

Forest-classification, exploration and conservation. Species, physical and chemical properties (chemistry) and classification of wood. Preparation of wood for pulping. Physical and chemical methods of pulping. Detailed studies of the technology of pulp and paper manufacture. Special papers and structural boards.

**CHM 422 Chemistry of Lanthanides and Actinides 2 + 0 +0  
(2 Credits)**

The elements and the position of the two series in the periodic table. Comparison of the two series. The electronic configuration and their



sequence on oxidation state, size relationship, magnetic properties and colour. Chemical properties and structure of the elements and their compounds. Recovery and separation of the elements.

**CHM 431 Forensic Chemistry 2 + 0 +0 (2 Credits)**

A forensic science perspective on the fundamental concepts of chemistry with emphasis on applications of scientific methods to criminal investigations. Some of the topics are atomic clues, chemical evidence, drug= chemistry, chemistry of addiction, chemistry of explosions, and poisons. Conclusive methods for drug identification.

**CHM 432 Introduction to Nanotechnology 2 + 0 +0 (2 Credits)**

Introduction to Nanotechnology. What is Nanomaterial? The need for Nanomaterial. Types of Nanomaterials. Preparation of nanomaterials. Property, characterization and device fabrication. Application of nanotechnology. Simple organic nanoparticles. Applications nanoscience: Sensors, Biomedical Application, Optics and electronics, Energy etc

**CHM 499 Research Project 0 + 0 +5 (5 Credits)**

This is a six unit project carried out over two semesters constituting the final year thesis of the undergraduate program. It is aimed at exposing the graduating student into the technique of designing and executing a research topic of relevance to the current national needs and those of the various industries. It is carried out under the supervision of members of the academic staff of the department.

**CHM 471 Seminar 2 + 0 +0 (2 Credits)**

Literature search, presentation of seminars on comprehensive literature reviews of selected topics of research interests.

## **9.0. Career outlets and job opportunities for graduates of the programme**

A graduate of Industrial Chemistry finds employment in government departments, parastatals, research and development institutes, production, biotechnology, quality control, pharmaceutical industry, process industry, fertilizer production industry, plastics industry, pulp and paper industry, tanning industry, chemical industry, consumer industry, oil and petroleum industry, textile industry, dyes and paints industry, cosmetics industry, cement industry, glass industry, water and wastewater purification, etc

Related jobs include:

Analytical chemist

Forensic chemist

Nanotechnologist

Research scientist

Toxicologist

Environmental chemist

Quality control scientist

Formulation chemist

Laboratory chemist

Material scientist

Academics, etc

## 10.0. Staffing

### 10.1. Academic staff

The Department of Industrial Chemistry has the following staff:

#### Academic Staff

S/N	Name	Qualification	Designation
1	Dr P. O. Okolo	<i>BSc, MSc, Ph.D (Uniben)</i>	Associate Professor & HOD
2	Prof. Laide Lawal	<i>BSc (UNAB) MSc, PhD (UI)</i>	Professor
3	Prof. Amire A Olasoji	<i>B.Sc (UI) 1970 Ph.D (UI)1976</i>	Professor
4	Prof. C. O Akintayo	<i>BTech (FUTA), MSc, Ph.D (UI)</i>	Professor
5	Dr. E.G. Olumayede	<i>BSc(OSUA now EKSU), MSc, MPhil, Ph.D (Uniben)</i>	Senior Lecturer
6	Dr. D. Malomo,	<i>BSc (ABU), MSc (Uniben), Ph.D (EKPOMA)</i>	Senior Lecturer
7	Dr (Mrs) H.O..Adubiaro,	<i>BSc (UI), MSc, Ph.D (UNAAD now EKSU)</i>	Senior Lecturer
8	Dr. Ayanda S	<i>BSc, MSc (Unilorin), Ph.D (CPUT)</i>	Lecturer I
9	Dr. (Mrs) J.O. Ogundele,	<i>BTech, MTech, Ph.D (FUTA)</i>	Lecturer I
10	Dr. K.O. Sodeinde,	<i>BSc (UNAAB), MSc (UI)</i>	Lecturer II
11	Mr. S.O. Olusanya,	<i>BSc, MSc (Unilorin)</i>	Assistant Lecturer
12	Mr.Abimbade, S.F	<i>BTech (LAUTECH), MSc (UI)</i>	Assistant Lecturer

## 10.2. Non-Academic

### Technologist

SN	Name	Designation	Type of Appointment	Qualification
1	Mr Ayomipo. M Ojo	Technologist	Full Time	B.Sc Industrial Chemistry
2	Mr Ekundayo Ajibaye	Technologist	Full Time	B.Sc Industrial Chemistry
3	Mr Sunday O Ige	Technologist	Full Time	HND (SLT)
4	Mr. Olapade .S Akinlolu	Technologist	Full Time	HND (SLT)
5	Mrs. Rebecca A. Adigun	Technologist	Full Time	B.Sc.Ed Chemistry
6	Mrs. Tejumade.F Olatunji	Technologist	Full Time	B.Tech Industrial Chemistry
7	Mr Daniel.U Momodu	Technologist	Full Time	HND (Glass Tech)
8	Mr Sunday O Ojo	Laboratory Assist	Full Time	NCE
9	Miss Bunmi E Oluwalore	Laboratory Assist	Full Time	NCE
10	Mr. Ebenezer O Ajayi	Laboratory Assist	Full Time	NCE

### **Administrative Staff**

<b>SN</b>	<b>Name</b>	<b>Designation</b>	<b>Type of Appointment</b>	<b>Qualification</b>
1	Mrs. Onipede Fadekemi O.	Admin Officer II	Full Time	B. Tech. Biology
2	Mr.Oyelude Yekeen	HEO	Full Time	PGD Management
3	Mr Adurosakin Gbenga Rowland	HEO	Full Time	HND Banking and Finance
4	Mr. Ogunjobi Shola	Executive Officer	Full Time	ND Business Admin
5	Mrs Agboola Mercy	C. O.	Full Time	School Certificate



## Staff Profile

### **Dr. Okolo Patrick Okechukwu**

*B. Sc.(Hons), M. Phil, Ph.D (Analytical chemistry). Research Analytical Chemist.*

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[Email:okolopao@yahoo.com](mailto:okolopao@yahoo.com)

Phone :08023772897

Dr. Okolo Patrick Okechukwu earned his B. Sc.(Hons) (Industrial Chemistry) in 1986, M.

Phil(Chemistry) in 1991 and Ph.D. (Analytical Chemistry) in 1998 from University of Benin, Nigeria.

He started his career as an Assistant Lecturer in 1991 and rose to Associate Professor in 2007.

### *Membership*

Member, American Chemical Society (1991 till date).

### ***Research interest***

Dr. Okolo, P. O. is interested in developing new methods of chemical/ biochemical analysis, and in conversion of solar energy into useful electrical energy through the agency of some organometallics.



**Professor Olayide Samuel LAWAL, B.Sc, M.Sc, P.hD**

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### **Brief Biography:**

Prof. Olayide Samuel Lawal holds a B.Sc (Hons) in Chemical Science from Federal University of Agriculture Abeokuta, M.Sc (Inorganic

Chemistry) and Ph.D (Industrial Chemistry) both from University of Ibadan. He started his career as an Assistant Lecturer in the year 2000 and rose through the ranks to become Professor of Industrial Chemistry in 2011.

Professor Lawal is an Associate of Biophysics of the living State at the International Centre for theoretical Physics Italy. He was a postdoctoral fellow of Alexander von Humboldt Foundation at the Institute for Technical and Macromolecular Chemistry, University of Hamburg, Germany and a visiting Scientist to University of Osnabruek, Germany. He was a postdoctoral fellow of the Japan Society for the promotion of Science, Tokyo, Japan and visting Scientist to Osaka City University, Japan. He is a receipient of research award from International Foundation for Science in Sweden. He is currently a Professor of Industrial and Macromolecular Chemistry, Federal University Oye-Ekiti.

#### *Membership and Affiliation*

1. Member, Institute of Chartered Chemistry of Nigeria
2. Member Chemical Society of Nigeria
3. Member, New York Academy of Science.

**Research interests:** Macromolecular Chemistry with emphasis on Isolation, Modification and Characterisation of natural polymers for value-added industrial applications. Preparation of Industrial raw materials from Agricultural waste. Nano-Biomaterials.



**Prof. Cecilia Olufunke Akintayo** (*B.Tech., MSc. Ph.D Ind. Chem*)

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**Brief Biography:**

Prof. Cecilia Olufunke AKINTAYO obtained B.Tech Industrial Chemistry in 1995 and Ph.D Ind. Chemistry in 2005. She started her career as an assistant Lecturer in 1997 and rose up the ladder as an Associate Professor in 2012. She undertook Postdoctoral work at the Institute for Organic Chemistry, University of Potsdam, Potsdam and Karlsruhe Institute of Technology, Karlsruhe Germany between 2009 and 2011 under the auspices of the Alexander von Humboldt Fellowship. She has standing collaboration with Prof (Dr) Mike Meier of Karlsruhe Institute of Technology till date. Prof. Cecilia Akintayo is also a grantee of Schlumberger Faculty for the Future fellowship and has visited Chemistry Department, Syracuse University, New York United State of America for postdoctoral research in collaboration with Prof Daniel Clark.

### **Membership and Affiliation**

Member, Institute of Public Analyst of Nigeria

Member, Nigeria Institute of Food Science and Technology

**Research interests:** Applied Chemistry with particular interest in renewable organic synthesis, oleochemistry.





**DR. EMMANUEL GBENGA OLUMAYEDE,**  
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**Brief Biography:**

**Dr. E.G Olumayede** is a Senior Lecturer of Environmental Chemistry at Department of Industrial Chemistry. His academic qualifications include B.Sc(Hon) Chemistry, M.Sc (Industrial Chemistry), MPhil (Environmental Chemistry) and Ph.D. in Environmental Chemistry *magna cum laude* granted on August 12<sup>th</sup>, 2011, by the University of Benin, Benin City, Nigeria. Before the current appointment, he was employed as Senior Lecturer, Department of Chemical Sciences at Ondo State University of Science and Technology, Okitipupa, Ondo State, Nigeria

**Membership and Affiliation**

Member, Institute of Public Analyst of Nigeria

Member, Nigeria Institute of Food Science and Technology

**Research interests:** Environmental chemistry viz Atmospheric, Ecotoxicology and chemical fate of pollutants development of predictive/interpretive models thereof.

**Publications:** Dr. E.G Olumayede has over 20 scientific articles at International and National Journals, and author/co-author of four textbooks for students use. Some of the papers are list below:



**Dr Dosu Malomo** (*B.Sc., M.Phil, Ph.D.*  
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### **Brief Biography:**

Dr Dosu Malomo graduated 1983 from Ahmadu Bello University (ABU), Zaria where he obtained his first degree certificate. After a stint stay in secondary school, he proceeded to University of Benin and completed his M.Phil degree in Polymer Science in 199. His versatility and inquisitive mind afforded him the opportunity to have a taste of research in Ambrose Alli University, Ekpoma, Nigeria where he had his PhD. He has trained the younger generations in the area of polymer science at various universities, such as Niger Deltan University, Joseph Ayo Babalola University among others, since the time he began his career in the University. He is currently a senior lecturer in the department of Industrial chemistry, Federal University, Oye Ekiti, Nigeria

### **Membership of Professional Bodies:**

Member

1. Chemical Society of Nigeria (CSN),
2. Polymer Institute of Nigeria (PIN)
3. and Institute of Chartered Chemist of Nigeria (ICCON)

**Research interests:** polymer technology, Natural rubber latex, coagulant, crumb rubber, Gum Arabic, Guayule Rubber, Organic Chemistry Synthesis, macromolecules and organic chemistry



**DR Habibat Omolara ADUBIARO *B.Sc, M.Sc, PhD***

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**Brief Biography:**

Dr (Mrs) Habibat Omolara Adubiaro bagged her B.Sc Chemistry in 1994 from University of Ibadan,. In her quest for more education, she attended Ekiti State University and got her M.Sc with Ph.D grade and Ph.D in Food Chemistry in 2004 and 2010 respectively. She worked as the Quality Control Supervisor for five years before she joined the service of Federal Polytechnic, Ado Ekiti and lectured for 13 years where she rose to the position of Senior Lecturer before she later joined Federal University, Oye Ekiti in February, 2013 as Lecturer I.

**Membership of professional Bodies:**

1. Member Institute of Chartered Chemists of Nigeria (ICCON)
2. Member Chemical Society of Nigeria (CSN)
3. Member Nigeria Institute of Food Science and Technology (NIFST).

**Research interests:** Food Chemistry And Organic Synthesis



**Dr Joan Olayinka OGUNDELE** *B. Tech, M.Tech, Ph. D (FUTA),*

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### **Brief Biography:**

Dr Ogundele is an alumnus of Federal University of Technology, where she had her first degree in Industrial Chemistry, M. Tech in Analytical Chemistry and Ph.D Food Chemistry. She started her career as a Lecturer in Josephh Ayo Babalola University, Ikeji- Arakeji and is presently lecturing in Industrial Chemistry Department, Federal University Oye Ekiti, Ekiti State.

### **Membership of professional Bodies:**

- (1) Chemical Society of Nigeria (CSN)
- (2) Third World Organization for Women in Science (TWOWS)
- (3) Institute of Chartered Chemists of Nigeria (ICCON).

**Research interests:** protein, medicinal and functional foods



### **Dr O.S Ayanda's Profile**

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Lecturer I

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Dr O.S Ayanda graduated from the university of Ilorin with a Bachelor of Science B.Sc. (Hons) and Master of Science (M.Sc) Industrial Chemistry in 2005 and 2009 respectively. He holds a doctorate degree in Chemistry at Cape Peninsuala University of

Technology (South Africa), specializing in the remediation of organotin compounds by adsorption onto nano oxides, fly ash and composite materials. He proceeded on a Postdoctoral Research Fellowship at the University of Western Cape, South Africa from 2013 to 2014.

He is an active reviewer to more than 20 international peer-reviewed journals and has published over 40 journal articles in accredited peer-reviewed journals. The Marquis Who's Who in the World listed Dr O.S Ayanda as one of the leading scientific achievers around the world.

### **Membership of professional Bodies**

Member, Institute of Charter Chemist of Nigeria

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**Dr Kehinde Oluseun SODEINDE** (*B.Sc., M.Sc. Anal Chemistry*)

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### **Brief Biography:**

SODEINDE Kehinde Oluseun obtained his B.Sc (Hons). degree in Chemistry from the Federal University of Agriculture, Abeokuta, Ogun State in 2006 and later proceeded to the prestigious Department of Chemistry, University of Ibadan for his M.Sc. degree in Analytical Chemistry in year 2010. He started his lecturing career as an assistant lecturer at the department of Chemical Sciences, Achievers University in year 2011 from where he joined the Department of Industrial Chemistry, Federal University Oye-Ekiti, Ekiti State in 2012. He was a

visiting Ph.D student under Professor Neerish Revaprasadu at the Department of Chemistry, University of Zululand, Kwadlangezwa and the Department of Biochemistry, Venda University, Limpopo, South Africa between October, 2013- September, 2014 where he specialised in green synthesis of metallic nanoparticles and their applications.

**Research interests:** Analytical Chemistry/Green nanotechnology

**Samuel Olalekan OLUSANYA** (*B.Sc., M.Sc. Physical Chemistry Option*)



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### **Brief Biography:**

OLUSANYA Samuel Olalekan obtained his B.Sc. degree in Chemistry with a good grade from the University of Ilorin, Kwara State in 2004 and later proceeded to have his M.Sc. degree in Chemistry from the same department in year 2009. He is currently focusing on research in Physical chemistry as his area of specialization. He began his lecturing career as an assistant lecturer at Oduduwa University in year 2010. In year 2012, he was offered another appointment as an assistant lecturer at the Department of Industrial Chemistry, Federal University Oye-Ekiti, Ekiti State.

**Research interests:** heterogeneous /homogeneous catalyst



**Sunday Felix ABIMBADE** (*B.Tech , M.Sc. Organic Chemistry*)

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**Brief Biography:**

ABIMBADE Sunday Felix obtained his B.Tech degree in Pure and Applied Chemistry from Ladoke Akintola University of Technology (LAUTECH), Nigeria in 2006 and M.Sc. degree in Organic Chemistry from the University of Ibadan, Nigeria in 2010. During his M.Sc. Programme, he won a Joint Nigeria and Sao Tome and Principe/Addax Petroleum Scholarship for Postgraduate Students to complete his programme. He began his lecturing career in 2012 as an Assistant Lecturer in Crawford University, Igbesa, Ogun State. He later joined the service of Federal University Oye Ekiti in 2014 where he lectures Organic Chemistry and other related courses.

**Research interests:** Natural Products Chemistry and Organic Synthesis