**OBAFEMI AWOLOWO UNIVERSITY**

**ILE-IFE**

 Phone: +2348034049111



**FACULTY OF TECHNOLOGY**

**DEPARTMENT OF CHEMICAL ENGINEERING**

**CHEMICAL ENGINEERING B. Sc. HONOURS DEGREE HANDBOOK**

**2017**

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**1. GENERAL BACKGROUND**

* 1. **Brief history of the Department**

The Department of Chemical Engineering was established to take care of the manpower needs of the growing industries such as the oil and gas, petrochemicals, soap, pulp and paper, and food-processing industries. The Department of Chemical Engineering which started as the Department of Chemical Technology is one of the pioneer Departments in the Faculty of Technology of Obafemi Awolowo University and the first of its kind in Nigeria and sub-Saharan Africa. The first batch of students for the undergraduate programme in Chemical Engineering was admitted in September, 1969 in the Department of Chemistry and Applied Chemistry. The then Department of Chemical Technology became full fledge Department of Chemical Engineering with effect from October 1, 1970, within the framework of the Faculty of Science. The Department became a constituent of the Faculty of Technology since October 1, 1971.

The Department at its inception was able to establish research activities with main focus on raw material processing and application of knowledge. The research activities in different aspects include coal processing, pulp and paper, and tar sand processing which was carried out in collaboration with the Geology Department of the University. There were good research collaborations among the various groups in the Department. Within the University, Chemical Engineering Department had taken some significant positions in the early years. The Department was well renowned and reckons with for excellence in administration and sound academic training of students. Most importantly, Chemical Engineering Department had established a very good working relationship with industries and by so doing contributed immensely to the development of Oil and Gas sector and other sectors of the Nigerian economy by providing them with competent human resources.

**1.2 Achievements of the Department**

Chemical Engineering has proved to be indispensable to national survival and Chemical Engineering Department, Obafemi Awolowo University, Ile-Ife, has contributed immensely to this position. The Department is the first Department of Chemical Engineering in Nigeria. The first two sets of graduates 1974 and 1975 were employed enmasse by the then NNOC (Nigeria National Oil Corporation) forming the bedrock of future development in the oil, gas and petroleum sectors. In subsequent years, lesser percentage of the graduates got engaged in the oil sector. With the others moving to other chemical industries (Lever Brothers, Chemical and Allied Product, Textile, Breweries, Metallurgical and glass, Iron and steel, etc.)

It is worthy of note that former graduates of this Department had become executive managing directors of the Warri Refinery, Port Harcourt refinery, Nigeria fertilizer company etc.., while others have been directors at Production Marketing company, NETCO, and currently the new Liquefied Natural Gas Company. We have both male and female executives in Mobil Producing Nigeria, Shell Petroleum Development Company, Elf, etc. Also, many of our graduates are great industrialists in both Chemical and Energy sectors of the nation. Many own private oil servicing outfits and Information Technology establishment.

The Department is taking the lead research in Biotechnology, Environmental Engineering, Exergy, Energy and Process Design, Computer-Aided Design, Process System Engineering and Separation Technology. This is a catalogue of great achievement. There is no Chemical Engineering Department in this country that does not have former graduate of this Department on its academic staff list.

**1.3 Departmental Staff**

**1.3.1 Academic Staff**

|  |  |
| --- | --- |
| A.S. Osunleke | B.Sc. M.Sc. Ph. D. MNSChE, MNSE, R. Eng. Senior Lecturer & Head |
| S. A. Sanni  | B.Sc., M.Sc., Ph.D, FNSChE, FNSE, R. Eng, FAE Emeritus Professor  |
| O. Taiwo | B.Sc. M.Sc. Ph. D, FNSChE, FNSE, R. Eng. Professor |
| B.O. Solomon | B.Sc. M.Sc. Ph. D, FNSChE, FNSE, R. Eng. Professor |
| F. A. Akeredolu | B.Sc. M.Sc. Ph. D, FNSChE, FNSE, R. Eng. Professor |
| B. Ademodi | B.Sc. M.Sc. Ph. D. MNSChE, MNSE, R. Eng. Professor |
| E.A. Taiwo | B.Sc. M.Sc. Ph. D. MNSChE, MNSE, R. Eng. Professor |
| J.A Sonibare | B.Sc. M.Sc. Ph. D. MNSChE, MNSE, R. Eng. Professor  |
| E. Betiku | B.Sc. M.Sc. Ph. D MNSChE; MNSE, R. Eng. Professor |
| E.F. Aransiola | B.Sc. M.Sc. Ph. D. MNSChE, MNSE, R. Eng. Reader |
| O.J. Odejobi | B.Tech. M.Sc. PhD, MNSChE, MNSE, R. Eng. Senior Lecturer  |
| O.S. Alade | B.Tech. M.Sc. Ph. D. MNSChE, R. Eng. Lecturer I |
| A. Bamimore | B.Tech. M.Sc. PhD. MNSChE, R. Eng. Lecturer I |
| O. Sanda | B.Sc. M.Sc. Ph. D. MNSE, R. Eng. Lecturer I |
| O. Bello | B.Sc. M.Sc. Ph. D. MNSChE, R. Eng. Assistant Lecturer |
| M.O. Daramola | B.Sc. M.Sc. PhD. MNSChE R. Eng. Assistant Lecturer |
| E.O. Ehinmitola | B.Sc. M.Sc. Assistant Lecturer |
| A.M Rabiu  | B.Sc. M.Sc. MNSChE. Assistant Lecturer |
| J.K. Adewole | B.Sc. M.Sc. MNSChE. Graduate Assistant |
| A.I. Adebimpe | B.Sc. Graduate Assistant |
| I.A. Oladele | B.Sc. Graduate Assistant |

**1.3.2 ASSOCIATE LECTURERS**

|  |  |
| --- | --- |
| A. O. Ogunfowokan | B.Sc. M.Sc, Ph. D |
| E. A. Oluyemi | B.Sc, M.Sc, Ph. D |
| O. O. Soriyan | B.Sc. M.Sc, Ph. D |
| J. A. Oyekunle | B.Sc. M.Sc, Ph. D  |
| T. O. Olomola | B.Sc, M.Sc, Ph. D |
| O. Turoti | B.Sc. M.Sc, Ph. D |
| R. C. George | B.Sc. M.Sc, Ph. D.  |
| I. O. Olabanji | B.Sc. M.Sc, Ph. D |
| F. O. Taiwo | B.Sc, M.Sc, Ph. D |
| O. S. Balogun | B.Sc, M.Sc, Ph. D |
| I. O. Otemuyiwa | B.Sc, M.Sc, Ph. D |
| O.O. Fadodun | B.Sc, M.Sc, Ph. D |
| S.O. Akindeinde | B.Sc, M.Sc, Ph. D |
| A.O. Akinwumi | B.Sc, M.Sc, Ph. D |
| M.O. Ogundiran | B.Sc, M.Sc, Ph. D |
| A.A. Fabelurin | B.Sc, M.Sc, Ph. D |
| B.O. Akinyemi  | B.Sc, M.Sc, Ph. D |
| M.L. Salami | B.Sc, M.Sc, Ph. D |
| O.A. Odejobi | B.Sc, M.Sc, Ph. D |
| A.B. Fajobi | B.Sc, M.Sc, Ph. D |
| K.T. Oladepo | B.Sc, M.Sc, Ph. D |
| M.A. Eleruja | B.Sc, M.Sc, Ph. D |
| E.A. Ariyigbe | B.Sc, M.Sc, Ph. D |
| Dr. M.D. Shittu | B.Sc, M.Sc, Ph. D |
| Dr. Ogunsina | B.Sc, M.Sc, Ph. D |
| Prof. J.A. Osunbitan | B.Sc, M.Sc, Ph. D |
| Malomo | B.Sc, M.Sc, Ph. D |
| Obayopo | B.Sc, M.Sc, Ph. D |
| O.O. Ilori | B.Sc, M.Sc, Ph. D |
| T. A. Ajayeoba | B.Sc, M.Sc |
| O. S. Ajayi | B.Sc, M.Sc |
| H.A. Owolabi | B.Sc, M.Sc |

**1.3.3 TECHNICAL STAFF**

|  |  |
| --- | --- |
| Adedokun, F.O | HNC, B.Sc., PGD., Chief Technologist |
| Akinfolarin, Tolulope | OND; HND, SeniorTechnical Officer |
| Ajibola, O.O. | OND; HND., Senior Technical Officer |
| Omisore S. | NCE, NIST, HND. Technologist I |
| Olayemi K. A | OND, NIST, HND, Technical Officer |
| Kolade, E. | SSCE, Trade Test I & II, Senior Workshop Supervisor |
| Ola, O.F. | WASC, Laboratory Supervisor |

**1.3.4 ADMINISTRATIVE STAFF**

|  |  |
| --- | --- |
| Mrs. F. Oroboade  | Commercial 4 certificate, OND, HND. Confidential Secretary |
| Mrs. H.R. Okunola | G.C.E., B.Sc. (Ed.), Chief Secretarial Assistant |
| Mr. T.O. Elufowoju | WASC, ND, Advanced Diploma Certificate in Accounting, Higher Executive Officer |
| Mrs. Y.O. Awotide | WASC, OND, HND. Office Assistant |

**1.3.5 FORMER HEADS OF DEPARTMENT**

Prof. G.N. Bhat 1970 – 1973

Dr. S.A. Sanni 1973 – 1979

Dr. Toks Osinowo 1979 – 1981

Dr. S.K. Layokun 1981 – 1984

Dr. Toks Osinowo 1984 – 1985

Dr. O. Taiwo 1986 – 1990

Dr. B.O. Solomon 1990 – 1992

Dr. S.O. Fasesan 1992 – 1995

Dr. F. A. Akeredolu 1995 – 1998

Dr. A.N. Anozie 1998 – 2001

Prof. S.K. Layokun 2001 – 2007

Dr. E.A. Taiwo 2007 – 2009

Dr. J.A. Sonibare 2009 – 2011

Dr. E. Betiku 2011 – 2013

Dr. A.S. Osunleke 2013 – 2015

Dr. E.F. Aransiola 2015 – 2017

**1.3.6 SOME FORMER MEMBERS OF STAFF**

Prof. S.A. Sanni

Late Prof. Toks Osinowo

Late Prof. S.K. Layokun

Prof. A.N. Anozie

Late Prof. S.O Fasesan

Dr. P.O. Akinjiola

Dr. S. Momoh

Dr. M.O. Ohanomah

Late Dr. O. Omole

Dr. S.R.A Macaulay

Late Dr. V.A. Adewusi

Late Mr. I. Ogunkanmi

Mr. S.O. Fagbenro

Mr. Y. Erinosho

Mr. J.A. Awe

Mr. C.T. Nuga

Mr. R.T. Omotayo

**2. GENERAL REGULATION**

**2.1 Residence**

A student is deemed to have been in residence if she/he has throughout a prescribed period fulfilled all the requirements for her/his course of study to the satisfaction of the Head of Department and the Dean of Faculty. The period of residence for a first degree is normally between four and five years, and during this period, students are required to be regular and punctual in their attendance at such instruction as may be prescribed, and they will be allowed to remain in residence only as long as they made satisfactory progress in their course of study and comply with the requirements of the University.

If a student is prevented by illness or any urgent cause from fulfilling the requirement of his/her course of study for a semester, the senate may grant him/her grace, provided that not more than one semester is granted to any individual in any one academic year. A student may be permitted to extend the period of study on grounds of absence from the University or inability to sit for examinations on ground of ill-health or for other reasons approved by senate. A student is allowed an additional period of 50% of the duration of his/her programme after which his studentship should be deemed to have lapse whether or not he/she has CGPA of 1.00. The duration excludes approved Leave of Absence granted to the student.

**2.2 Discipline**

The University expects students to behave at all times in a manner creditable to the good name of the University. Regulations for the maintenance of discipline and order in the University are published from time to time, and students are required to take notice of these regulations and to observe them. Students should note that regulations relating to Halls of residence, the University Library and other organ of the institution have the same force as University regulations and any breach of these regulations may be dealt with as such punishment as the Vice-Chancellor or any Officer acting under the Vice-Chancellor’s authority shall impose. A student will also be required to make good to the satisfaction of the Vice chancellor any damage he/she may cause to University property.

**2.3 Student Workload**

Work is defined in terms of course unit. One Unit represents one hour of lecture or one hour of tutorial, or 2-4 hours of practical work per week, throughout the semester. All courses shall run for a period of one semester or a full session of two semesters.

**2.4 Mode of Studies**

The Department runs full-time studies. A student is required to register for a minimum of 15 units and maximum of 24 units in a semester. Normally, a student shall not be required to enroll for less than 15 units of coursework in any semester except it is to satisfy faculty requirements. Such request should be communicated formally to the senate through the candidates’ Head of Department.

**2.5 Registration**

All students are required to be screened on admission to the university and thereafter to register for courses at the beginning of teach semester in accordance with the rules made form time o time by the University. A student shall be deemed to have begun his course of studies on the date of his /her course of studies on the date of his/her registration for the course. Only on an exceptional case and with special permission of the senate, will a student be permitted to register after the appointed date and no student, will be allowed to register after the period for late registration. The studentship of any student who fails to register for courses for two consecutive semesters without permission will be deemed to have terminated.

***2.5.1 Course Registration Procedure***

The procedure of registration for courses shall include payment of due fees and other charges. To register for a course, the student must meet the pre-requisite/co-requisites or equivalent courses, as prescribed for that course. Each student completes the registration for each semester within the period prescribed for registration. Any addition to or reduction in the courses for which a student is formally registered must be made with the consent of his/her Head of Department. Such alterations must be effected within four weeks from the commencement of the registration period and on the prescribed form.

***2.5.2 Withdrawal from Courses***

A student may withdraw from a course for which he/she was registered without incurring the penalty of a grade F for the course only with the approval of the Dean of the Faculty. Permission to withdraw must be sought by completing a withdrawal form, countersigned by the course instructor or the Head of Department. Withdrawal without penalty will be granted up to the end of the fourth week from the commencement of the semester in which the course is offered. Unauthorized withdrawal will earn the grade of F.

***2.5.3 Leave of Absence***

A student who failed to register at the expiration of the period of late registration with penalty, on the ground of ill-health or financial difficulties may apply for leave of absence. Such application must be made within six weeks from the commencement of the semester. The request must be directed to the candidate’s Head of Department and accompanied with concrete evidence. In the case if ill-health, the student must have been examined by a University Medical Officer and medical report submitted as evidence of claim.

**2.6 Examinations**

University examinations will be held at the approved period in each semester. Examination fees must be paid at the beginning of the session. An extra fee will be charged for late registration. In addition, a student must present herself/himself at such examination as may be required by his/her Department. Absence from any examination without previous permission, except on medical grounds, will be regarded as a breach of discipline.

A student who on account of illness is absent from examination, other than a final examination, may be permitted by the senate to presents himself/herself for examination at a future date provided that the:

(a) illness has been reported to the registrar;

(b) student has been examined by a University Medical Officer and medical report submitted to the Registrar within the shortest possible time of the absence under this regulation; and

(c) Registrar has informed the respective Deans of Faculties before the final meeting of the Board of examiners.

***2.6.1 Pattern of Examination***

Each course shall be examined at the end of the course. The examination shall be conducted as prescribed by Senate. Each course will normally be examined by a theory paper of 1-3 hours in addition to which there may be a practical paper and/or an oral examination.

***2.6.2 Measure of Performance***

Performance in course shall be measured in terms of the results of prescribed theory and practical examination and/or assessment of such essays, practical exercises and reports prescribed for each course.

***2.6.3 Levels of Performance***

A candidate shall be recorded as having attained in a course, a level of achievement grade as follows

|  |  |  |
| --- | --- | --- |
| A | Excellent | 70-100% |
| B | Very Good | 60-69% |
| C | Good | 50-59% |
| D | Satisfactory | 45-49% |
| E | Adequate | 40-44% |
| F | Failure | Below 40% |

The overall performance of each candidate during an entire session shall be determined by means of weighted grade point average, obtained by awarding credit points in respect of each course on the basis of the unit value of the course multiplied by the numerical value of the grade obtained, such that

|  |  |
| --- | --- |
| A | 5 Credit points per Unit |
| B | 4 Credit points per Unit |
| C | 3 Credit points per Unit |
| D | 2 Credit points per Unit |
| E | 1 Credit point per Unit |
| F | 0 Credit point per Unit |

***2.6.4 Cumulative Grade Point Average (CGPA)***

The overall result of candidate is a cumulative grade Point average obtained over the period of study. The grade point average GPA is computed as the total number of credit points (TCP) divided by the total number of units (TNU) for all courses taken during a particular semester.





= credit point scored in course *i*

= number of units of course *i*





***Sample Calculation***

|  |
| --- |
| **Candidate’s Registration Number : CHE/XX/001** |
| **Harmattan Semester** | **Rain Semester** |
| **Course code** | **NU** | **Score** | **CP** | **Course code** | **NU** | **Score** | **CP** |
| MTH 101 | 5 | 45D | 10 | MTH 102 | 5 | 50C | 15 |
| PHY 101  | 3 | 60B | 12 | MTH 104 | 2 | 40E | 2 |
| PHY 107 | 1 | 75A | 05 | PHY 102 | 3 | 66B | 12 |
| CHM 101 | 5 | 50C | 15 | PHY 108 | 1 | 55C | 3 |
| SER 001 | 2 | SC |  | CHM 102 | 5 | 60B | 20 |
|  |  |  |  | SER 002 | 4 | P |  |
|  |  |  |  | SEH 002 | 2 | F |  |
|  |
|  | **TCP** | **TNU** | **GPA** |  | **TCP** | **TNU** | **GPA** |
| **Previous** | - | - | - | **Previous** | 42 | 14 | 3.00 |
| **Present** | 42 | 14 | 3.00 | **Present** | 52 | 16 | 3.25 |
| **Cumulative** | 42 | 14 | 3.00 | **Cumulative** | 94 | 30 | 3.13 |
| OUTSTANDING COURSES: Nil | OUTSTANDING COURSES: SEH 002 |

***2.6.5 NRI and TOS Grade***

A student will be credited NRI (No Registration Information) and 0F in 15 Units if he/she does not register and as well does not obtain a Leave of Absence for the semester. When a candidate records NRI for two consecutive semesters, he/she will be awarded TOS (Termination of Studentship). The studentship of such candidate is automatically terminated from the University.

***2.6.6 Probation and Withdrawal from University.***

Candidate whose cumulative Grade Point Average CGPA is less than one (1.00), is placed under Probation. If his/her performance does not improve in the subsequent semester, that is, the CGPA is less than 1.00, he/she will be placed on withdrawal from the University.

***2.6.7 Final Assessment and Awards***

The performance of candidates in all examinations may be moderated in such a manner, as Senate may determine, by Senate from outside the University. In particular, external assessors may be require to review the results of course examinations and such other records as are necessary and appropriate for the determination of the performance of all candidates for the degree. They may also take part in or request for an oral or practical examination of candidates. The final award and the class of the degree shall be based on the cumulative grade point average obtained by each candidate in all prescribed courses and approved electives taken at this or any other approved University.

A candidate who has satisfactorily completed all requirements for the degree with an overall grade point average of not less than 1.50 shall be awarded the honours degree as indicated below:

First Class 4.50 and above

Second Class Upper Division 3.50 – 4.49

Second Class Lower Division 2.40 – 3.49

Third Class 1.50 – 2.39

A candidate who does not reach the standard for the Honours may be awarded the Pass Degree, provided his/her overall grade point average is not less than 1.00.

***2.6.8 Release of Examination Results***

At the end of each semester, a Provisional list of successful candidates in course examination shall be published by the Registrar soon after the recommendation of the faculty Board to Senate. The final results of candidates for the award of a degree shall be published by the Registrar after they have been approved by Senate.

***2.6.9 Repetition of Courses***

A student may repeat only those courses in which he/she has obtained a grade F. The grade earned for a repeated course will be recorded and used in computation of the grade point average in the usual way.

**2.7 Conferment of Degrees**

No person may describe herself/himself as holding a degree or diploma or certificate of the University unless such qualification has been awarded at a graduation ceremony or by resolution of Senate. A degree shall ordinarily be conferred upon a candidate presented fit I person at a Graduation Ceremony unless the Vice-Chancellor considers that adequate reasons for absence have been produced, in which case the degree be granted in absentia.

**3. ACADEMIC CONTENT OF PROGRAMME**

* 1. **B. Sc. Chemical Engineering Programme**

# ***Highlights:***

In keeping with the tradition of being the first and leading Department of Chemical Engineering in Nigeria, the contents of the courses offered in the new programme have been updated in line with the developments in the profession and with COREN/NUC minimum standards.

**3.2 Objectives**

Recognizing the relevant of technological education to the industrial development in Nigeria, the Obafemi Awolowo University took the proactive step of establishing the Department of Chemical Engineering ahead of any other Universities in Nigeria, the Department was planned in such a way that the course and the research activities hitherto provide instructional and training required for:

1. the evaluation of natural resources useful as raw materials;
2. providing technical and managerial skills to industry through training programs at professional level;
3. adapting available technology to local conditions; and
4. developing techniques to process local materials hitherto not developed.

# **3.3 Programme Structure**

The Departments offers 5-years course leading to the award of the Honors degree of Bachelor of Science (Chemical Engineering). The aim of the course is to provide training in basic sciences in engineering, and in industrially oriented disciplines. The contents and the structure of the course have been envisaged in such a way as to ensure that, for the whole course, Chemistry and Physics are the underlying Sciences, Mathematics is its evaluating and analyzing language, Unit Operations, Reactions Engineering, Process Design and Process Technology are its professional need, and Economics and Human Relations are its guide in practice. Practical work forms an essential part of all courses within the Department and a wide range of laboratory experiment is being offered. Each student is also required to carry out a research and /or a design assignment and write a thesis in the final year. Every student is expected to work in relevant industry for about three months at the end of every academic session in Parts II and III. Similarly, the Rain Semester of Part IV is to be spent in an industry to acquire industrially based practical experience to complement both the practical and theoretical knowledge acquire during the course of study in school. The emphasis on the industrial experience shall be on the students subjecting themselves to industrial discipline and showing willingness to adapt to the industrial way of life and rigour. Written reports are to be submitted to the Department and an oral presentation of the same shall be made by the students to assess the levels of knowledge gained after each period of industrial attachments.

# **ADMISSION REQUIREMENTS**

# **UTME**

The minimum requirements for admission to courses leading to B. Sc. Degree in the Department of Chemical Engineering are those for entry into the Faculty of Technology. Candidates are required to have credits in five subjects at the SSCE or WASC or NECO level (or passes at GCE ‘O’ Level) including Mathematics, Physics Chemistry and English Language.

# **DIRECT ENTRY**

Candidates are required to have good passes at Advanced Level of GCE (or equivalent) in Physics, Chemistry, Pure Mathematics or Applied Mathematics or the combined pure and applied Mathematics, or approved equivalent qualifications (such as OND Upper Credit). HND Upper Credit holders may be admitted to part III of the five year undergraduate program.

**3.4 Requirements for the Award of Degree**

To be eligible for a degree in Chemical Engineering, a candidate must satisfactorily complete a minimum of 194 Units including:

1. 31 units from the Science Foundation. (Direct Entry students i.e students joining in Part II, may be exemption from some of these courses)
2. 74 units of Chemical Engineering: CHE201 to CHE521
3. 6 units of Chemical Engineering Electives with the approval of the Head of Department.
4. 8 units from the Department of Mathematics: MTH201, MTH202. MTH104 is compulsory for Direct Entry students.
5. 20 units from the Department of Chemistry: CHM201,CHM202, CHM203, CHM205, CHM206, CHM208, CHM301, CHM311
6. 5 units from the Department of Agricultural Engineering: AGE202, AGE302
7. 6 units from the Department of Electronic and Electrical Engineering: EE201, EEE202, EEE 291, EEE 292
8. 5 units form the Department of Computer Science and Engineering: CSC201, CSC208
9. 10 Units form the Department of Mechanical Engineering: MEE203, MEE204, MEE205, MEE303.
10. 3 units from the Department of Metallurgical and Material Engineering: MME201
11. 5 units from the Department of Civil Engineering: CVE202, CVE401
12. 6 units from Technology Planning Units: TPD501, TPD502, TPD503
13. 12 units of Special Electives as prescribed by the University Senate
14. 15 units of Industrial Training: CHE200, CHE300, CHE400

It is possible for a candidate to exceed the prescribed minimum total number units by electing approved courses with prior approval of the Head of Department.

**LIST OF COURSES**

|  |
| --- |
| **Courses Within the Department** |
| **Course** **Code** | **Course Title** | **Units** |
| CHE 201 | Engineering Thermodynamics  | 3 |
| CHE 202 | Industrial Process Calculation | 3 |
| CHE 301 | Chemical Engineering Thermodynamic | 3 |
| CHE 303 | Transport Phenomena  | 3 |
| CHE 305 | Engineering Analysis I  | 3 |
| CHE 306 | Engineering Analysis II  | 3 |
| CHE 308: | Principles of Biochemical Engineering  | 2 |
| CHE 310 | Chemical Reaction Engineering | 2 |
| CHE 312 | Mass Transfer Operations | 2 |
| CHE 405 | Heat Transfer | 3 |
| CHE 407 | Chemical Reaction Engineering | 2 |
| CHE 411 | Chemical Engineering Analysis | 3 |
| CHE 502 | Process Optimisation | 2 |
| CHE 504 | Chemical Eng. Lab. III | 2 |
| CHE 505 | Process Design I | 3 |
| CHE 506 | Process Design II | 3 |
| CHE 507/508 | Research Project I & II | 9 |
| CHE 509 | Process Dynamics | 3 |
| CHE 510 | Process Control and Instrumentation | 3 |
| CHE 511 | Polymer Science and Technology | 3 |
| CHE 512 | Petroleum Production Technology | 3 |
| CHE 513 | Technology for Fossil Fuel Processing | 3 |
| CHE 514 | Organic Chemical Technology | 3 |
| CHE 515 | Inorganic Chemical Technology | 3 |
| CHE 516 | Biochemical Engineering | 3 |
| CHE 517 | Pulp and Paper Technology | 3 |
| CHE 518 | Loss Prevention in Process Industries | 3 |
| CHE 519 | Particulate Engineering | 3 |
| CHE 521 | Environmental Engineering | 3 |
| **Courses Outside the Department** |
| **Course Code** | **Course Title** | **Units** |
| MTH 101 | Elementary Mathematics I | 5 |
| MTH 102 | Elementary Mathematics II | 5 |
| MTH 104 | Vectors | 2 |
| MTH 201 | Mathematical Methods I | 4 |
| MTH 202 | Mathematical Methods II | 4 |
| PHY 101 | General Physics I | 3 |
| PHY 102 | General Physics II | 3 |
| PHY 107 | Experimental Physics IA | 1 |
| PHY 108 | Experimental Physics IB | 1 |
| CHM 101 | Introductory Chemistry I | 5 |
| CHM 102 | Introductory Chemistry II | 5 |
| CHM 205 | Experimental Physical/Inorganic Chemistry | 1 |
| CHM 201 | Basic Inorganic Chemistry | 4 |
| CHM 202 | Basic Organic Chemistry | 4 |
| CHM 203 | Basic Physical Chemistry | 4 |
| CHM 206 | Experimental Organic Chemistry | 1 |
| CHM 208 | Introductory Analytical Chemistry. | 2 |
| CHM 311 | Instrumentation and Analytical Chemistry | 2 |
| MEE 203 | Engineering Drawing I | 2 |
| MEE 204 | Engineering Drawing II | 2 |
| MEE 205 | Engineering Mechanics I | 3 |
| MEE 303 | Fluid Mechanics I | 3 |
| MEE 515 | Energy Technology | 3 |
| CSC 201 | Computer Programming I | 3 |
| CSC 208 | Computer Technology | 2 |
| CSC 307 | Numerical Computation I | 3 |
| EEE 201 | Applied Electricity I | 2 |
| EEE 202 | Applied Electricity II | 2 |
| EEE 291 | Applied Electricity Lab I | 1 |
| EEE 292 | Applied Electricity Lab. II | 1 |
| MSE 201 | Engineering Materials | 2 |
| CVE 202 | Strength of Materials | 2 |
| CVE 401 | Technical Report Writing | 2 |
| AGE 202 | Workshop Practice | 2 |
| AGE 302 | Statistics for Engineers | 3 |
| TPD 202 | Technology and Society | 1 |
| TPD 501 | Industrial Economics | 2 |
| TPD 503 | Industrial Law and Management | 2 |
| TPD 502 | Technology Policy | 2 |
| **Special Electives** |
| **Course Code** | **Course Title** | **Units** |
| SER 001 | Use of English | 2 |
| SER 002 | The Humanities and the African Experience | 2 |
| SEO 001 | Fundamental of Human Behaviour | 2 |
| SEO 002 | Man and the Environment | 2 |
| SEH 001 | Man and His Health | 2 |
| SHE 002 | Community Health and Man’s Behaviour | 2 |
| SEL 001 | Introduction to Law | 2 |
| SEL 002 | Introduction to Legal Institution and Practice | 2 |
| SEA 001 | Govt. and Administration of Public | 2 |
| SEA 002 | Elements of Administration | 2 |
| SEE 001 | Educ. & the Social Organisation Customs | 2 |
| SEE 002 | Indigenous Education in Nigeria | 2 |
| SEM 001 | Fundamentals of Building & Design | 2 |
| SEM 002 | Issues of Land and Management | 2 |
| SEP 001 | Drug and the Society I | 2 |
| SEP 002 | Drug and the Society II | 2 |

**3.5 Programme Workload by Students**

PART I: HARMATTAN SEMESTER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| MTH 101 | Elementary Mathematics I |  | 4 1 0 | 5 |
| PHY 101 | General Physics I |  | 4 0 0 | 4 |
| PHY 107 | Experimental Physics IA |  | 0 0 4 | 1 |
| CHM 101 | Introductory Chemistry I  |  | 3 1 0 | 4 |
| CHM 103 | Experimental Chemistry IA  |  | 0 0 3 | 1 |
| TPD 101 | Engineers in Society |  | 1 0 0 | 1 |
| SER 001 | Use of English (SC) |  | 2 0 0  | 2 |
| SE | Special Elective |  | 2 0 0 | 2 |
| **Total**  |  |  | **16 2 7** | **20** |

PART I: RAIN SEMESTER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| MTH 102 | Elementary Mathematics II |  | 4 1 0 | 5 |
| MTH 104 | Vectors |  | 2 0 0 | 2 |
| PHY 102 | Experimental Physics II |  | 4 0 0 | 4 |
| PHY 108 | Experimental Physics IB |  | 0 0 4  | 1 |
| CHM 102 | Introductory Chemistry II |  | 3 1 0 | 4 |
| CHM 104 | Experimental Chemistry IB |  | 0 0 3 | 1 |
| SER 001 | Use of English |  | 2 0 0 | 2 |
| SE | Special Elective |  | 2 0 0 | 2 |
| **Total** |  |  | **16 2 6** | **21** |

PART II: HARMATTAN SEMESTER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite/** **Co-requisite** | **L T P** | **Unit** |
| MTH201 | Mathematical Methods I | MTH 101 | 3 1 0 | 4 |
| MEE 203 | Engineering Drawing I  |  | 1 0 3 | 2 |
| MEE 205 | Engineering Mechanics I | MTH 104 | 2 1 0 | 3 |
| CSC 201 | Computer Programming I | MTH 102 | 2 0 3 | 3 |
| CHE 201 | Engineering Thermodynamics | MTH 101 CHM 102 | 2 1 0 | 3 |
| EEE 201 | Applied Electricity I | PHY 101/ PHY 102 | 2 0 0 | 2 |
| EEE 291 | Applied Electricity Lab. I | PHY 101/ PHY 102 | 0 0 3 | 1 |
| MSE 201 | Engineering Materials |  | 1 0 3 | 2 |
| CHM 205 | Experimental Physical/ Inorganic Chemistry | CHM 101/102 | 0 0 4 | 1 |
| SE | Special Elective |  | 2 0 0 | 2 |
| **Total**  |  |  | **15 3 16** | **23** |

## PART II – RAIN SEMESTER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| MTH 202 | Mathematical Methods II | MTH 201 | 3 1 0 | 4 |
| MEE 204 | Engineering Drawing II | MEE 203 | 1 0 3 | 2 |
| CVE 202 | Strength of Materials | MEE 205 | 1 0 3 | 2 |
| CSC 208 | Computer Technology | CSC 201 | 1 0 3 | 2 |
| EEE 202 | Applied Electricity II | EEE 201 | 2 0 0 | 2 |
| EEE 292 | Applied Electricity Lab II | EEE 291 | 0 0 3  | 1 |
| AGE 202 | Workshop Practice |  | 1 0 3 | 2 |
| CHE 202 | Ind. Process Calculations | MTH 101 | 2 1 0 | 3 |
| SE | Special Electives |  | 2 0 0 | 2 |
| **Total** |  |  | **14 2 12** | **23** |

## LONG VACATION (To be registered in Part IV Rain)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| CHE 200 | Student’s Industrial Work Experince Scheme (SIWES) |  | 0 0 9  | 3 |

PART III: HARMATTAN SEMESTER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| MEE 303 | Fluid Mechanics I | MEE 205 MTH 202 | 2 1 0 | 3 |
| CHE 301 | Chemical Engineering Thermodynamics | CHE 201 CHE 202 | 2 1 0 | 3 |
| CHE 303 | Transport Phenomena | CHE 201/202 | 2 1 0 | 3 |
| CHE 305 | Engineering Analysis I | MTH 201 MTH 202 | 2 1 0 | 3 |
| CHM 201 | Basic Inorganic Chemistry | CHM 101 CHM 102 | 3 1 0 | 4 |
| CHM 203 | Basic Physical Chemistry | CHM 101 CHM 102 | 3 1 0 | 4 |
| SE  | Special Elective |  | 2 0 0 | 2 |
| **Total**  |  |  | **16 6 3** | **22** |

PART III: RAIN SEMESTER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| CHE 306  | Engineering Analysis II | CHE 305 | 2 1 0 | 3 |
| AGE 302 | Statistics for Engineers | MTH 202 | 2 1 0 | 3 |
| CHE 308 | Principles of Biochemical Engineering |  | 2 1 0  | 3 |
| CHE 310 | Chemical Reaction Engineering I | CHE 201 CHE 202 | 2 1 0 | 3 |
| CHE 312 | Mass Transfer Operation | CHE 201 | 2 1 0 | 3 |
| CHM 202 | Basic Organic Chemistry | CHM 102 | 3 1 0 | 4 |
| CHM 206 | Exp. Organic Chemistry | CHM 102 | 0 0 4 | 1 |
| CHM 208 | Intro. Analytical Chemistry | CHM 102 CHM 205 | 1 0 3 | 2 |
| SE | Special Elective |  | 2 0 0 | 2 |
| **Total** |  |  | **18 2 4** | **24** |

## LONG VACATION (To be registered in Part IV Rain)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| CHE 300 | Student’s Industrial Work Experince Scheme (SIWES) |  | 0 0 9 | 3 |

## PART IV: HARMATTAN SEMESTER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite** | **L T P** | **Unit** |
| CHE 405 | Heat Transfer | CHE 201 MTH 201 | 2 1 0 | 3 |
| CHE 407 | Chemical Reaction Eng. II | CHE 310 | 2 1 0 | 3 |
| CHE 409 | Chemical Eng. Lab. I | CHE 310 CHE 312 | 0 0 9  | 3 |
| CHE 411 | Chemical Engineering Analysis  | CHE 305, CHE 306 | 2 1 0  | 3 |
| CHM 301 | Instrumentation and Analysis Chemistry I | CHM 208 | 2 0 0 | 2 |
| CHM 311 | Instrumentation and Analytical Chemistry II |  | 2 0 0 | 2 |
| TPD 501 | Industrial Economics |  | 1 1 0 | 2 |
| CVE 401 | Technical Report Writing |  | 1 1 0 | 2 |
| SE | Special Elective |  | 2 0 0 | 2 |
| **Total** |  |  | **14 5 9** | **22** |

RAIN SEMESTER (To be regsistered together with CHE 200 and CHE 300)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite/****Co-requisite** | **L** | **T** | **P** | **Unit** |
| CHE 400 | Student Industrial Work Experience Scheme II |  | 2 | 0 | 18 | 9 |

PART V: HARMATTAN SEMESTER

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite/****Co-requisite** | **L** | **T** | **P** | **Unit** |
| CHE 503 | Chem. Eng Lab II | CHE 409 | 0 | 0 | 6 | 2 |
| CHE 505 | Process Design I | CHE 411 CHE 405 | 1 | 1 | 0 | 2 |
| CHE 507 | Research Project | All Part IV Courses | 0 | 3 | 0 | 3 |
| CHE 509 | Process Dynamics | CHE 411 | 2 | 1 | 0 | 3 |
| CHE 519 | Particulate Engineering | CHE 303 | 2 | 1 | 0 | 2 |
| CHE 521 | Environmental Engineering |  | 2 | 1  | 0 | 3 |
| TDP 503 | Industrial Law & Management  |  | 2 | 0 |  | 2 |
|  | **Restricted Electives (3 units) to be selected from**  |  |  |  |  |  |
| CHE 511 | Polymer Science & Technology | CHM 201 | 2 | 1 | 0 | 3 |
| CHE 513 | Technology for Fossil Fuel Processing | CHM 201 | 2 | 1 | 0 | 3 |
| CHE 515 | Inorganic Chemical Technology |  | 2 | 1 | 0 | 3 |
| CHE 517 | Pulp and Paper Technology |  | 2 | 1 | 0 | 3 |
| CSC 307 | Numerical Computation I | MTH 201 | 2 | 0 | 0 | 2 |
| MEE 515 | Energy Technology |  | 2 | 1 | 0 | 3 |
| **Total** |  |  | **11** | **8** | **6** | **20** |

PART V: RAIN SEMESTER

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Prerequisite/****Co-requisite** | **L** | **T** | **P** | **Unit** |
| CHE 502 | Process Optimization | CHE 411 | 2 | 1 | 0 | 3 |
| CHE 504 | Chemical Eng. Lab. III | CHE 409 | 0 | 0 | 6 | 2 |
| CHE 506 | Process Design II | CHE 411 CHE 405 | 0 | 3 | 0 | 3 |
| CHE 508 | Research Project II | All Part IV courses | 0 | 9 |  | 3 |
| CHE 510 | Process Control and Instrumentation | CHE 509 | 2 | 1 | 0 | 3 |
| CHE 518 | Loss Prevention in Process industries |  | 2 | 1 | 0 | 3 |
| TPD 502 | Technology Policy  |  | 2 | 0 | 0 | 2 |
|  | **Restricted Electives (3 units) to be selected from:** |  |  |  |  |  |
| CHE 512 | Petroleum Production Technology |  | 2 | 1 | 0 | 3 |
| CHE 514 | Organic Chemical Technology |  | 2 | 1 | 0 | 3 |
| CHE 516 | Biochemical Engineering |  | 2 | 1 | 0 | 3 |
| **Total** |  |  | **10** | **6** | **15** | **21** |

* 1. **DESCRIPTION OF COURSES**

**CHE 201: Engineering Thermodynamics (2 1 0) – 3 units, H**

Definitoion Definition of terms and general concepts of system, surrounding, process, temperature, heat, work and energy. First law of Thermodynamics Application to heat engines, Entropy, First and Second Law combined. Perfect Gases. Joule Thompson coefficient. Equilibrium processes. Maxwell’s relations. Two phase systems Thermodynamic functions of solution. P – V – t relationship, work from Heat energy. Refrigeration.

**CHE 202: Industrial Process Calculations (2 1 0) – 3 units, R**

Unit and Dimension. Stoichiometry Vaporization Processes. Material balance involving Chemical reactions. Heat balance; simultaneous heat and mass balances. Unsteady state heat and mass balances Introductory Process Economics.

**CHE 301: Chemical Engineering Thermodynamic (2 1 0) – 3 units, H**

Generalized P – V – T Relations: The P – V – T behaviours of pure substances. Equation of state for gases. The principle of corresponding state. Compressibility relations, reduced pressure, reduced volume, temperature, Pseudocritical constants. P – V – T approximations for gaseous mixture – ideal gas mixture. Dalton’s law of additive pressure, Amagat law of additive Volume. Pseudocritical point method. Kay’s rule. Gililland’s method.

Heat Effects: Heat capacities as a function of temperature. Heat capacities of liquids and solids. Heat effects accompanying phase change – Clausius Clayperon equation. Standard heats of reaction, formation and combustion. Effect of temperature on heat of reaction. Heats of mixing and solution. Enthalpy – concentration diagrams for H2SO4 – H2O etc. Partial enthalpies; single and multiple effect evaporators with regards to heat effects.

Industrial stoichiometry: Gas analysis – Orsat method, determination of components in fuels. Calculations based on fuel analysis. Combustion of carbon, Hydrogen and hydro-carbons. Correction for nitrogen and oxygen in the fuel; correction for Sulphur. Net hydrogen-carbon ratios in the fuel and fuel percent excess air. Air/fuel and ratios. Interrelations of fuel and fuel-gas analysis. High nitrogen Mixed fuel.

Thermodynamics of Flow Processes: Fundamental equations: continuity equation, equation of motion, energy equation, Bernoulli’s equation. Flow in pipes, laminar and turbulent flows. Reynolds’ number friction factor – Fanning equation. Flow meters, Nozzles, Compression single stage and multistage, effect of clearance.

Phase Equilibria: Criteria of equilibrium. Fugacity of gas mixture. Effects of Temperature and pressure on fugacity. Pressure – temperature – composition relationship. Phase behavior at low and elevated pressure. Raoult’s law, Equilibrium constant: Activity coefficient. Gibbs-Duhem equation. Margules’ and Van Leer equations.

Chemical Reaction Equilibria: Standard free energy change and equilibrium constant. Evaluation of equilibrium constants. Effects of temperature and pressure on equilibrium constants. Calculation of conversion. Gas-Phase reactions, Percent conversation. Liquid-phase reactions. Heterogeneous reactions.

**CHE 303: Transport Phenomena (2 1 0) – 3 units, H**

Basic laws of mass, momentum and energy transfer processes and their relationship. Simple problems involving dimensionless groups such as Re, Sc. Pr, Measurement, Calculation and Prediction of transport coefficient.

**CHE 305: Engineering Analysis I (2 1 0) – 3 units, H**

Linear Algebra Elements of matrices, determinants, in verse of matrix, theory of linear equations, eigen-values and eigen-vectors. Analytical geometry coordinates transformation – solid geometry, polar, Cylindrical and spherical coordinates. Elements of functions of several variables, surface variables. Ordinary integrals and multiple integrals. Evaluation of double integrals, triple integrals, line integrals, surface integrals. Derivation and integrals of vectors. The gradient of scalar quantities. Flux, of vectors. The curl of a vector field, Gauss, Green’s and Stocks’ Theorems and applications. Single-valued functions. Multi-valued functions. Analytic functions. Cauchy-Riemann equations. Singularities and zeros. Contour integration including the use of Cauchy’s integral theorem. Bilinear transformation.

**CHE 306: Engineering Analysis II (3 0 0) – 3 Units, R**

Series solution of second order linear differential equations with variable coefficients. Bessel and Legendre equations. Equations with variable coefficients. Sturm-Louiville boundary value problems. Solutions of equations in two or three dimensions by separation of variables. Eigen value problems. Use of operations in the solution of partial differential equations and linear integral equations. Integral transforms and their inverses including Fourier, Laplace, Mellin and Handel transforms. Convolution integral and Hilbert transforms. Simple mathematical modeling in Engineering leading to nonlinear and ordinary differential Equations. Numerical methods for solution of nonlinear equation: Bisection, Fixed-point, Newton-Raphson, Aitken, etc. Simple programming using MATLAB, MAPLE and MATHEMATICA. Calculus of finite differences: Forward, Backward and Central differences. Interpolation formulae. Finite difference equations. Runge-kutta and other methods in the solution of ordinary and partial differential equations. Numerical integration and differentiation.

**CHE 308: Principles of Biochemical Engineering (2 0 0) – 2 units, R**

Definition and scope of biochemical engineering. Introduction to microbiology and biochemistry Enzyme kinetics, production purification and applications. Classification and growth characteristics of micro-organism. Isolation and enumeration of microorganisms Metabolic pathways. Characteristics of viruses. Introduction to recombination DNA technology. Cloning of gene libraries. Vector systems. Joining of DNA molecules. Transfer of DNA into bacterial host cells. Screening clones. The use of restriction enzymes in Genetic Engineering.

**CHE 310: Chemical Reaction Engineering I (2 0 0) 2 units, R**

Review of fundamentals of Chemical thermodynamics and of Chemical Kinetics as well as would be relevant to reactors design. Homogenous reactions: Analysis of constant volume batch reactor and variable volume batch reactor. Design of single homogenous ideal batch, ideal flows and ideal back-mix flow reactors. Temperature effects on yield and selectivity; Residence – Time – distribution.

**CHE 312: Mass Transfer Operations (2 0 0) – 2 units, R**

Review of theories for prediction of mass transfer coefficients. Application of distillation (McCabe-Thiele & Ponchon Savarit method) extractive and azeotropic distillation. Multicomponent distillation; Gas absorption. Liquid/liquid extraction. Drying, leaching and humidification.

**CHE 405: Heat Transfer (2 1 0) – 3 units, H**

Introduction: The meaning of “Heat Transfer” and its role in industry; modes of heat Transfer; Basic definition of heat transfer; Resistance-potential formulation of problems; Basic concepts in mathematical modeling; units.

Heat Transfer by Conduction: Basic equations; Boundary conditions; Steady one-dimensional heat conduction (with and without heat generation) in various co-ordinate systems; Heat Transfer from extended surfaces; Isolation of higher-dimension steady-state and transient processes. (Separation of variable, Laplace transformation, compounding of variables, use of charts etc.): Approximate solution methods (flux plot, finite difference technique, etc.)

Dimensional Analysis in Heat Transfer: Definitions (Dimensional analysis, Dimensional homogeneity, similitude, Fundamental dimensions); Applicability common dimensionless quantities in Heat Transfer; procedures for dimensional analysis.

Heat Transfer by Convection: Determination of coefficient of Heat Transfer (Dimensional analysis of cane experiment, Exact boundary-layer analysis, analogy between mass, momentum and heat transfer); correlations for heat transfer coefficients (forced free and mixed convection).

Heat Connection with Phase Change: Drop wise condensation film condensation; Pool boiling; Flow boiling.

Heat Transfer by Radiation: Definitions; Basic Laws of Thermal Radiation; radiation involving black surfaces, gray surfaces and re-radiating surfaces; Thermal-circuit analysis; Matrix formation; Generating view factors for elongated channels; Gas radiation.

Heat Exchange Equipment: Type of heat-exchange equipment; Heat exchanger classification; Heat exchanger modeling; Design of hear exchangers (The LMTD model); Rating of heat exchangers (NTU/Effectiveness approach).

**CHE 407: Chemical Reaction Engineering II: (2 0 0) – 2 units, H**

Heterogeneous reactions: Fluid-solids interacting systems. Non catalytic, and solid catalyzed gas-phase reaction. Tabular reactor design equation based on plug flow for isothermal and adiabatic cases. Transport effects, packed bed design. Fluidized and slurry-phase reactors and their uses. Factors affecting choice of reactors. Optimization – output and yield problems. Conditions of stability of reactors. Rate-controlled regime in gas-solid reactions catalyzed by porous catalysts. Scale-up procedure-batch and continuous flow reactors.

**CHE 411: Chemical Engineering Analysis (2 1 0) – 3 units H**

Review of elementary theorems and operations on vectors and matrices. Theory of linear systems including ranks degeneracy, dimension, bases and span. Properties of Eigen values and eigenvectors Cayley – Hamilton and Sylveseis theorems. Reduction to diagonal and Jordan forms. The state transition matrix and solution of linear ordinary differential equations. Numerical methods for solving linear and nonlinear algebraic equations. Gauss-seidel and Newton-Raphson methods. Numerical procedures for solving ordinary and partial differential equations including boundary value problems. Formation of simple and complex chemical engineering problems and their solutions. Application to chemical engineering stage processes including rectification, multicomponent distillation, staged absorbers, all types of reactors and heat exchangers.

**CHE 502: Process Optimization: (1 1 0) – 2 units, R**

Stationary Optimization: Differential Approach, Numerical Approach, linear, linear and non linear programming. Trajectory Optimization including dynamic programming, calculus of variation and Pontryagin Optimum Principle. Numerical computational techniques including first and second order methods.

**CHE 505: Process Design I: (2 1 0) – 3 units, H**

Presentation and discussion of real process design problems. Blocks diagrams, process and engineering flow diagrams, process outline charts incorporating methods study, and critical examination. Specification of vessels, examples include distillation towers and ancillaries, heat exchangers vaporizer, knockout vessel. Emphasis on conception and invention of processes as well as analysis and economic conditions, Discussion of a variety of cases throughout the course.

**CHE 506: Process Design II: (0 3 0) – 3 units, R**

Individual student is required to work independently and with in a group on an assigned design project which will involve the application of all the Chemical Engineering Principles encountered in earlier courses. A detail design of the assigned project will be submitted.

**CHE 507/508: Research Project II (0 3 0) / (0 9) – 9 units, R**

A research topic of interest shall chosen by each student under the supervision of an academic staff with specialization in that area. It involves laboratory experiment and/or computer application. Each candidate is required to write a thesis on the selected topic. The candidate will also be required to defend the thesis orally in addition to presenting seminars.

**CHE 509: Process Dynamics (2 1 0) – 3 units, H**

Physical Process Modeling; Obtaining Process equation from process description in time, Laplace and frequency domains and the relationship between them. Transfer Functions: Different test signals and process response. Open and closed loop systems and system stability. Discrete events and the 2 transforms. Order of a system and domain poles. Multivariable systems and process identification.

**CHE 510: Process Control and Instrumentation (2 1 0) – 3 units, R**

Measuring instrument for level, pressure, flow, temperature and physical properties. Chemical composition. Gas chromatograph and mass spectrometer sampling of open and closed-loop systems. Negative feedback, sensitivity, Robustness and disturbance rejection. Controller tuning procedures. Feed forward, cascade, ratio control and the internal model control principles control system using root locus, Nyquist diagrams and Nichols charts. Control system design for multivariable systems. Adaptive and other modern control methods. Control of typical chemical engineering processes such as distillation columns, absorbers, reactors and at exchangers.

**CHE 511: Polymer Science and Technology (2 1 0) – 3 units, H**

Introduction to polymers and their characteristics. Source of monomers. Structure and physical properties of polymers; rheology, solubility and molecular weights. Plasticity and elasticity the William Landel Ferry equation. Polymerization reactions and manufacturing methods; Ziegler Natta catalysis. Processing and Technology of Polymers.

**CHE 512: Petroleum Production Technology: (2 1 0) – 3 units, R**

Origin of oil, conditions necessary for the accumulation of oil. Drilling, drilling fluids, hole control. Basic petrophysics, measurement of resistivity, porosity and other petrophysical properties. Reserves, measurement and production. Models of oil reservoirs. Material balances for Gas drive, solution drive and water drive fields. Elementary oil production engineering.

**CHE 513: Technology for Fossil Fuel Processing (21 0) – 3 units, H**

Source, availability and characterization of fossil fuel (Petroleum, Natural Gas, Tar Sands, Coal) Modern processing technology choice of product lines and products, alternative product lines and product specifications will be emphasized.

**CHE 514: Organic Chemical Technology (2 1 0) – 3 units, R**

Consideration of the technology of the following processes: Oils, fats and soaps. Chemicals from petroleum source. Chemicals from Aromatics. Dyes and Dyestuff, with emphasis on availability of raw material and economics, methods of production and process selection. Plant location, and other engineering problems.

**CHE 515: Inorganic Chemical Technology (2 1 0) – 3 units,** H

Production techniques and process operation in the following industries:

1. Sulphuric acid
2. Fertilizer
3. Chloro-Alkali Industries
4. Industrial Gases
5. Cement Industries
6. Sugar

Chemical Engineering unit operations and special engineering and operations problems will be emphasized.

**CHE 516: Biochemical Engineering (2 1 0) – 3 units, R**

Theory of batch, semi-continuous and continuous cultures mass and energy balances in microbial cultures. Oxygen transfer in microbial culture. Design of fermentors Air filtration, Instrumentation and control of fermentation systems. Introduction to brewing technology, antibiotic production, and lactic acid production. Biological waster treatment. Biomass conversion and utilization of waste.

**CHE 517: Pulp and Paper Technology (2 1 0) – 3 units, H**

Cellulose and Hemi cellulose-structures and characteristics. Lignin. Pulp woos-types and properties. Types of pulping processes-sulphate, alkaline, mechanical semi chemical etc. Bleaching fibre preparation, nature of fibre bounding. Sheet formation. Water usage and disposal in pulp and paper industries. Microbiology. Internal and surface sizing. Wet strength. Colouring. Properties of paper. Pigment coating, printing, laminating and comigating. Saturation of paper and paper plastics.

**CHE 518: Loss Prevention in Process Industries (2 0) – 2 units, R**

Hazards in Chemical Process industries. Safety in plants. Types and causes of accidents in processes. Use of FAFR. Prevention of accidents. Hazard and operability analysis techniques. Maintenance of plant to minimize losses. Case studies.

**CHE 519: Particulate Engineering (3 1 0) – 3 units, H**

Particles Fluid Mechanics: Motion of single particle and drops in a fluid. Stock’s law. Terminal falling velocities. Flow past sphere assemblies. Hindered settling. Thickener calculations. Centrifugation. Types of centrifuges. Gas cleaning equipment (e.g. Gravity separation, centrifugal separation, fabric filters, Electrostatic precipitator, wet scrubber’s droplet agglomeration and coalescence). Flow of single fluids through packed beds: calculation of pressure drop. Counter-current and co-current flow of single fluids through packed columns. Flooding and loading rates. Filtration: constant rate and constant –pressure filtration: Washing and drying of cakes. Selection of equipment fluidization: Types of fluidization characteristics: Behaviours of bubbles: Heat and Mass transfer and chemical reaction in fluidized beds. Conveying: Principles of pneumatic and hydraulic conveyance. Flow of non-Newtonian suspension. Size Reduction: Laws of comminution. Particle size distributing and size analysis. Selection of equipment. Atomization of liquids. Size enlargement. Mixing of fluids and solids; Power requirements and selection of equipment.

**CHE 521: Environmental Engineering (2 1 0) – 3 units, H**

Pollution and the Environment - definitions and interrelationships, natural and man-made pollution; the economics of pollution. Environmental management systems. Environmental assessment and certification codes (EMAS, ISO 9000, BS 7750 etc.) Air Pollution- gaseous and particulate pollutants and their sources. Effects on weather, vegetation materials and human health. Legislation relating to air pollution. Methods of control of gaseous emissions – thermal and catalytic destruction, cyclones, inertial separators, electrostatic precipitators, bag filters, wet washers, etc. Dispersion from chimneys and methods of calculating chimney heights. Flare stacks. Water pollution – River pollution by industrial effluents. Legislation and standards for effluent discharge. Impurities in natural water and their effects. Brief survey of river ecology and the effects of effluent discharge on the ecosystems. Treatment processes including precipitation, flocculation, coagulation, sedimentation, clarification and colour removal. Principles of biological treatment. Treatments for water refuse, ion exchange. Cooling water treatment. Land pollution – Disposal of solid wastes by incinerator and dumping. Possible future trends including conversation of solid wastes into useful materials or energy. Treatment of other types of pollution: Noise Thermal and Nuclear pollution.

**1 List of Laboratories**

1. Unit Operations Laboratory: - This laboratory houses most of the equipment used for chemical engineering unit operations such as distillation columns (plate type and packed type), climbing film evaporators, gear pumps etc. This is the largest laboratory we have.
2. Reaction Engineering Laboratory: - This is where research related to reaction Engineering is performed. It also contains some of our equipment for undergraduate practical classes.
3. Petroleum Petrochemical Laboratory: - This is where research related to petroleum and petrochemicals are carried out. It also houses equipment such as Pour Point Determination Equipment etc.
4. Biochemical Engineering Laboratory: - This is where Biochemical Engineering research is carried our. It houses the fermentors and incubators.
5. Systems Engineering Laboratory: - This is where research in control and systems engineering are carried out. It will house our proposed Computer Laboratory which will help those in computational area and help to reduce computer illiteracy amongst our lots.
6. Applied Thermodynamics and Process Developemnt: This is the research group where exergy analysis of process, energy management, process integration, pinch analysis and process development and design of processes are done for optimum and economic utilization of limited energy resources.
7. Environmental Engineering Laboratory: In this laboratory, research studies on the environment are carried out with emphasis on air pollution monitoring, modelling and control. The laboratory houses air samplers, combustion analyzers, ambient gases and particulate matter direct read out instruments of different forms. Also, it has software for noise and air quality modelling.
8. Separation Process Engineering Laboratory: This is where research activities related to the applications of transport and separation process principles (distillation, solvent extraction, ion exchange and adsorption, drying etc), minerals processing, and polymer technology take place. It houses various bench scale unit operations equipments such as distillation units, extraction units, dryers, etc.

**5.0 Research Group/Thrust in the Department**

Members of staff do engage in joint research efforts that cut across specializations. The areas of research in the Department can safely be partitioned and identified as follows:

1. Biochemical/Biotechnology Engineering
2. Chemical Reaction Engineering
3. Energy, Thermodynamics/Process Development and Design
4. Engineering Analysis
5. Environmental Engineering
6. Petroleum/Petrochemicals Engineering
7. Process Systems Engineering
8. Separation Processes/Computational Fluid Dynamics

Final year thesis projects are given to students in all these areas. Postgraduate students are admitted to take projects in any of these areas at both the M.Sc. and Ph.D. levels.

**POSTGRADUATE PROGRAMME**

**DEPARTMENT OF CHEMICAL ENGINEERING**

**1. Introduction**

The undergraduate programme in the Department of Chemical Engineering encompasses the broad spectrum of the Chemical Engineering field of practice. It seeks to arm the student with the theoretical and practical background for a career in industry, or in academia. Recognizing the need for industrial development of the nation with less dependence on foreign expertise, it has become imperative to upgrade the level of instruction and research in the Department. The aim of such upgrading is to enable it produce the much needed personnel to evaluate the natural resources useful as raw materials provide technical and managerial skills to industry, adapt available technology to local conditions and to develop economically viable techniques to process local materials hitherto not developed. One of the immediate solutions is the establishment of the postgraduate programme in Chemical Engineering.

**2. Objectives**

The graduate programme is designed to provide advanced training (course work and research) in those areas of Chemical Engineering which are relevant to the industrial development of the country. The programme also accommodates graduates of other disciplines who wish to reorientate their specializations and are prepared to make up for deficiencies in their former training. The specializations are therefore tailored to meet the needs of a graduate planning to settle for a professional career in industry or academia.

**3. The Degree Programme**

The Department offers the following postgraduate programmes:

(i) M.Sc. degree programme

(ii) Ph.D degree programme

Each programme is based on course work and research

(a) M.Sc. Degree programme.

The duration of M.Sc. programme is normally four semesters. A course work of at least 22 units is required. Candidates are to offer all courses listed in group A below and other select other courses in groups B and C to make up the 22 units and in line with the research interest of the candidate. Each candidate will be required to submit a thesis equivalent to 6 course units on original research work.

b) Ph.D Degree Programme

The duration of the PhD Programme is normally six semesters. Course work required is at least 32 units including those prescribed for the M.Sc and at least 12 units from courses chosen from Group B and C which must include two courses from Group B at least one course from Group C. Courses taken during the M.Sc Programme may be evaluated and credited accordingly. In addition, each candidate will be required to present a thesis equivalent to 6 course units on original research work. Detailed programme of course work and the plan of the research work are subject to the approval of the Board of Postgraduate School.

**4. Admission Requirements**

 (i) M.Sc. Programme

 A candidate with at least a second lower B.Sc. Honours degree in Chemical

Engineering from the Obafemi Awolowo University will be considered for admission Candidates from other Universities will at least a second class lower B.Sc. honors in

Chemical Engineering will also be considered. Candidates with at least a Second Class Lower B.Sc. degree in Chemistry. Petroleum or Petrochemical Engineering or any other relevant discipline will be considered but such candidates will be required to make up for any deficiencies as prescribed by the Department.

 (ii) Ph.D. Programme

 A candidate holding a M.Sc. degree in Chemical Engineering with a B+ average from the Obafemi Awolowo University or from a recognized shall be considered for admission.

**5. List of Courses**

The courses offered are divided into three groups.

**Group A** **Units**

CHE 601 Chemical Engineering Thermodynamics 3

CHE 602 Transport Phenomena 4

CHE 603 Chemical Reaction Engineering 4

CHE 604 Chemical Engineering Analysis 4

**Group B Units**

CHE 605 Topics in Fluid and Particulate Mechanics 3

CHE 606 Systems Engineering 3

CHE 607 Biochemical Engineering 3

CHE 608 Process Design and Economics 3

CHE 609 Mass Transfer 3

CHE 610 Petroleum Technology 4

MSE 607 Extractive Metallurgy 2

**Group C Units**

CHE 611 Numerical Computations in Chemical Engineering 3

CHE 612 Simulation and Modelling 3

CHE 613 Advanced Numerical Methods 3

CHE 614 Microbial Processes and Applications 3

CHE 615/CHM 602 Theoretical Aspects of structure Determination 3

CHE 616/CHM 615 Fibres and Textile Chemistry and Technology 3

CHE 618 Advanced Topics in Environmental Engineering 3

**6. Course Work Examination and Thesis**

 ***(i) M.Sc. degree***

Examination of all prescribed subjects will consist of 3 hours papers. The candidate will sit for the examination at the end of the semester during which the subjects are offered. A thesis based on the original research work on an approved project shall be submitted by each candidate who will also be required to pass an oral examination. The board of examiners shall include the Head of Department, the candidate’s supervisor(s) and at least one examiner external to the University.

 ***(ii) Ph.D.***

Upon successful completion of course requirements as indicated in section 3, every candidate shall be required to submit a thesis on an approved project. He or she shall be required to pass an oral examination. The board of examiners shall include the Head of Department, the candidate’s supervisor(s), at least one other member of Department and at least one examiner external to the University.

**7. Course Description**

***CHE 601: Chemical Engineering Thermodynamics (3 units)***

 Basic postulates of classical thermodynamics. Application to transient open and closed systems. Criteria of stability and equilibria. Thermodynamic properties of pure materials and mixtures with estimation and correlating technique. Phase and chemical equilibria. Intermolecular forces include dipole, and Liner-type forces. Application of intermolecular force theories to the problems of predicting equilibrium and transport properties of gases and liquid. Review of modern theories of liquid structure.

***CHE 602: Transport Phenomena (4 units)***

 Rate of molecular transport processes. Molecular properties and their prediction the Kinetic Theory of gases: the Chapman – Enskoy theory Transport in laminar flow and in solid. Equations of change. Boundary layer theory, Transport in turbulent flow. Interphase transfer coefficients. Dimensionless correlations, Transport by radiation. Microbalances in large flow systems. Simultaneous transport of mass, momentum, heat.

***CHE 603: Chemical Reaction Engineering (4 units)***

 Rate Equations for homogeneous and heterogeneous reaction. Series and parallel reactions. Reaction Networks, catalysis and Catalytic reactors. Kinetics of Catalyst deactivation and regeneration Pulse and continuous reactors. Techniques of reactor optimization and control.

***CHE 604: Chemical Engineering Analysis (4 units)***

Analytical and numerical solutions of stiff different equations. Hyperbolic and parabolic systems. Method of characteristics. Applications to flow and diffusion processes. Wave responses. More difficult boundary value problems. Advanced applications of Laplace transforms. Variational Techniques in Chemical Engineering. Difference Equations. Regressions.

***CHE 605: Topics in Fluid and Particulate Mechanics (3 units)***

A review of the theological properties of fluids. Application of equations from macroscopic energy mass and momentum balances, compressible flow. Navier-stokes equation and its application. Turbulent flow. Non-Newtonian fluids: the concept of “slip”. Fluid Particle Systems: Stokes law, Motion of fluid particles: Fluidization, heat and mass transfer in fluidized system. Transport of multiphase systems. Two-phase gas liquid flow; flow patterns and consideration of energy requirements; critical two phase flow, Boiling heat transfer in two-energy requirements; critical two phase flow. Boiling heat transfer in two-phase flow; burnout in nuclear reactors. Solid-liquid system; hydraulic and pneumatic transport, Durand’s equation, deposition of solids from slurries. Applications of hydraulic transport.

***CHE 606: Systems Engineering (3 units)***

System analysis, dynamics, and control. General time and periodic processes. Stability of linear and non linear systems. Optimal Control Theory, State Optimisation Including numerical Optimisation. Dynamic Optimisation for continuous and discrete processes. Multi-level Optimisation Operations Research.

***CHE 607: Biochemical Engineering (3 units)***

 Growth and non-growth associated fermentation systems. Kinetics in Chemostat (steady-state) and in other fermentor configurations. Development of cellulosic and hydrocarbon based materials by microbes (moulds, yeast, algal and bacterial. Biochemical Reactor Design Product Isolation and recovery Modelling of fermentation systems.

***CHE 608: Process Design and Economics (3 units)***

 Costs and Cost estimation, Process Evaluation and, commercialization. Design of Multistage processes computer-aided SPEEDUP. Case studies involving complex processes suitable for computerisation. Optimisation in design. Money’ Tables, Profitability estimation. Statistical methods in costing. Cost benefit analysis. Public and private financing, Budgeting and cost control.

***CHE 609: Mass Transfer Operations (3 units)***

Review of analogies unifying heat, mass and momentum transfer. Estimation of transport properties with emphasis on mass diffusion coefficient. The kinetic theory of gases. The theory of separations processes involving gas-liquid, liquid-liquid and liquid-solid systems, prediction, correlation and representation of equilibrium data include non-ideal systems. Binary and multicomponent systems, Design principles for absorption distillation extraction and humidification. Reactive Mass Transfer.

***CHE 610: Petroleum Technology (4 units)***

(a) Petroleum Engineering:

Reservoir Dynamics Compressibility. Advanced Petroleum Geology. Production Engineering Designs. Surface Operation Secondary Recovery including Water and Gas injection, in-Situ combustion. Natural Gas Engineering, Gathering, Liquefaction and storage, transportation and regasification processes.

(b) *Hydrocarbon Processing and Petrochemicals*

Refinery processes, petroleum chemical, Unit Operations in petrochemicals manufacture, Lubrication.

***MSE 601: Extractive Metallurgy (2 units)***

Classification of iron ores Agglomeration and beneficiation processes. Iron and Steel making fuels, fluxes and refractions. Last furnace reactions, Temperature profiles and mass and energy balance in the blast furnace, Pig iron casting. Direct reduction processes for sponge iron production. Classification, properties and application of alloy steels. Casting technology.

***CHE 611: Numerical Computation in Chemical Engineering (3 units)***

 Rational functions and continued functions. Summation series, Bernoulli numbers and Polynomials. Application of Newton-Cotes formulae and Gauss’s integration formula in numerical integration and differentiation. Buler and Runge-Kutta methods. Predictor-corrector methods Hyperbolic, Parabolic and Elliptic equations. Error estimation.

***CHE 612: Simulation and Modelling (4 units)***

 Classification and characteristics of models. Formulation of sub-systems models Parameter estimation. Selecting of Statistical procedure. Variance Reduction Technique Advanced features of FORTRAN; PL/I. ALGOL SIMCRIPT, GPSS, Comparison of simulation Languages for chemical data cases.

***CHE 613: Advanced Numerical Methods (4 units)***

Finite Interpolation. Unisolvence representation theorems, General remainder theorems for interpolation in liner spaces. Best real error estimates. Best approximations in normal linear systems. Trigonometric approximation.

***CHE 614: Microbial Process and Applications (3 units)***

Microbe isolation and strain selection in fermentation systems. Genetics of microorganisms. Formulation of media for microbial activity. Application of moulds, yeasts and bacteria in antibiotic synthesis and the production of vaccines. Morphology of microbes in various fermentation systems. Microbial kinetics and Enzymes production.

***CHE 618: Advanced Topics in Environmental Engineering (3 units)***

 Philosophy of Environmental Pollution Control: Strategies and tactics. Cleaner technology versus End of Pipe treatment approaches.

*Atmospheric Chemistry:* Types of atmospheric chemical transformations, role of solar radiation in atmospheric chemistry, gas phase chemical reaction pathway, heterogeneous reactions, scavenging and removal of pollutants from the atmosphere.

*Meteorological basis of atmospheric pollution:* Ventilation, stagnation, meteorological conditions during historic episode, pollutant removal mechanisms, air-pollution climatology.

*Transport and Dispersion of Air Pollutants*: Concepts of wind velocity turbulence, use of atmospheric tracers.

*Environmental Pollution; Modeling and Prediction:*  Air Pollution-modeling techniques, modeling of non-reactive pollutants, modeling of pollutant transformations, model performance assessment. Similar applications to water qualify modeling. Eulerian models. Langrangian models. Stochastic models. Regulatory implications of modeling in establishment of link between emission/discharge standards and ambient/water quality standards.

*Control System Design for stationary sources, mobile sources:* Mechanisms and modeling equations. Efficiency versus power consumption relationships; Multistage and versus single stage control systems.

*Cleaner Technology*: Cleaner technology applications to major processes/industries (Term Paper applies) New Trends in Environmental Management: e.g. ISO 14002, EMAS and updates; Environmental risk assessment methodologies; Life Cycle Assessment.

**CHM 607: *Theoretical Aspects of Structure Determination (3 units)***

This course deals with the theoretical aspects of spectroscopic and diffraction techniques of structure determination comprising of vibrational spectroscopy; Electronic Spectroscopy, Magnetic Sensibilities. Nuclear Magnetic Resonance, Electron paramagnetic spin resonance and X-ray diffraction.

***CHE 616/CHM 615: Fibre and Textile Chemistry and Technology (3 units)***

 Structural, physical and chemical characteristics of fibres. Natural fibres and chemically modified natural fibres e.g. Cotton, wool, Viscose, Cellulose acetate. Synthetic fibres e.g. polyamides. Polyesters. Polyvinyl chloride. Polyacrylonitrile. Detergents and detergency. Textile finishing processes e.g. Shrink resistance, water proofing.

**LIST OF STAFF FOR POSTGRADUATE PROGRAMME**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **NAMES** | **QUALIFICATION** | **STATUS** | **SPECIALIZATION** |
| 1. | Emeritus Prof. S.A. Sanni | B.Sc. (Ibadan) M.Sc. (MIT) Ph.D. (Cantab) | Professor | Thermodynamics Process Petrochemical Engineering |
| 2. | Prof. O. Taiwo | B.Sc. (London) M.Sc., Ph.D. (London) | Professor | Process Systems Engineering |
| 3. | Prof. B.O. Solomon | B.Sc, M.Sc, Ph.D. (Kansas State) | Professor | Biochemical Engineering and Microbial Process Design |
| 4. | Prof. F.A. Akeredolu | B.Sc. (Ife) M.Sc. Ph.D. (Strathclyde) | Professor | Environmental Engineering, Process Design |
| 5. | Prof. B. Ademodi | B.Sc. (Iowa) M.Sc. (Penn.) Ph.D. Ife | Professor | Petroleum/Petrol Chemicals and Hydrocarbon Processing. |
| 6. | Prof. E.A. Taiwo | B.Sc. (OSU), M.Sc., Ph.D. (Ife) | Professor | Separation Processes, Mass Transfer |
| 7. | Prof. J.A. Sonibare | B.Sc., M.Sc., Ph.D. (Ife) | Professor | Environmental Engineering.Mathematical Analysis |
| 8. | Prof. E. Betiku | B.Sc. M.Sc. (Ife), Ph.D (Germany) | Professor | Biochemical Engineering,Thermodynamics. |
| 9. | Dr. E.F. Aransiola | B.Sc. M.Sc., Ph.D. (Ife) | Reader  | Biochemical/Reaction Engineering |
| 10. | Dr. A.S. Osunleke | B.Sc. M.Sc. (Ife), Ph.D. (Okayama) | Senior Lecturer  | Process Systems Engineering |
| 11. | Dr. O.J. Odejobi | B.Sc. (Lautech) M.Sc., Ph.D (Ife) | Senior Lecturer  | Energy, Thermodynamics/Process Development and Design |
| 12. | O.S. Alade | B.Sc. (Lautech), M.Sc., Ph.D. (Ife) | Lecturer I | Petroleum/Petrol Chemicals and Hydrocarbon Processing. |
| 13. | Dr. O. Sanda | B.Sc., M.Sc., Ph.D. (Ife) | Lecturer I | Separation Processes, Mass Transfer |
| 14. | Dr. A. Bamimore | B.Sc. (Lautech) M.Sc., Ph.D (Ife) | Lecturer I | Process Systems Engineering |