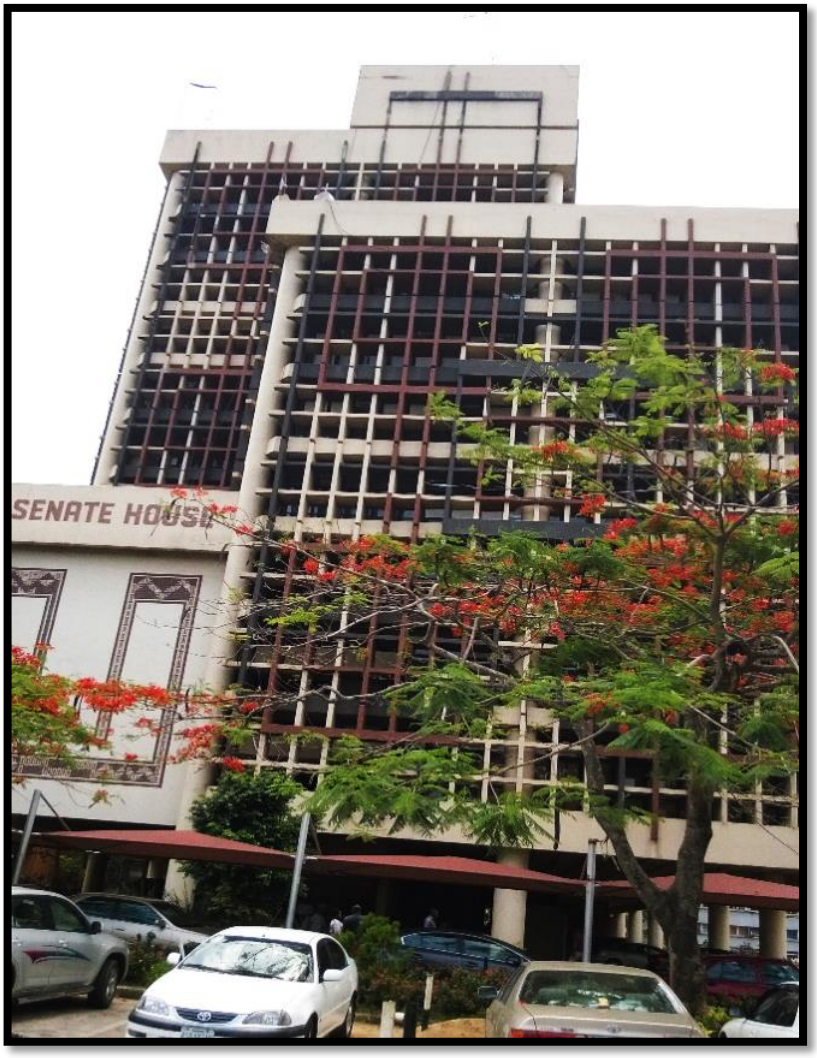


University of Lagos

Professor R. A. Bello
B.Sc. (Ife), M.A.Sc., Ph.D (Waterloo)
Vice Chancellor

The Origin

The Ashby Commission on Post-School Certificate and Higher Education appointed by the Federal Government in 1959 recommended, among other things, the establishment of a University in Lagos which should give special emphasis to schools of Commerce and Business Administration and of Economics and Social Sciences. The Federal Government in accepting the recommendation stated that the University of Lagos should have a Medical School and a Faculty of Law and expressed strongly the view that opportunities should be provided for higher technological studies and the training of graduate teachers.

In order to give more detailed consideration to the proposed University of Lagos, the Federal Government requested the United Nations Education Social and Cultural Organisation (UNESCO) to setup an Advisory Commission to make recommendations on the organization, administration and financing of the University of Lagos and to formulate a plan for its development. This Commission was set up in June 1961, and submitted its report in September of that year. The report forms the main basis for the planning of the University of Lagos.

In April 1962, the University of Lagos Act was passed by the Federal Parliament and both the Provisional Council and the Medical School Council were inaugurated. The Provisional Council met for the first time on13th of November 1962.

The first academic year commenced in October 1962, in temporary premises in Surulere, Lagos with day courses in Faculty of Business and Social Studies, the Faculty of Law and the Medical School. In January 1963, evening courses in the Faculty of Law commenced. The student population at inception in Business and Social Studies was 46, the Faculty of Law 56, and in the Medical School 28.

In October 1964, four new Faculties; Arts, Education, Engineering and Science were established. The total new enrolment in each Faculty was as follows: Arts (40); Business and Social Studies (95); Engineering (38); Law (60); Medicine (27) and Science (53). In the middle of the second term of 1964/1965 session, the University was plunged into a crisis brought about by the change of Vice Chancellorship. This led to the closure of the University from 1st of March1965 to the end of the academic year. Students who were to have taken their final examinations in June 1965 sat for their examinations in November1965.

Of the 42 students who sat for the B.Sc. (Hons.) and LL.B. (Hons.) degree Examinations, 41 were successful. These successful candidates were the first graduates produced by the University in1965.

The University moved to its permanent premises located in the North-East Yaba, at the beginning of the1965/66 academic year with an enrolment of 993 students. The buildings available then comprised the first phase of the Development plan, the foundation stone of which was laid on the 18th of January 1964, by the late Prime Minister of the Federation, the Rt. Hon. Sir Abubakar Tafawa Balewa, K.B.E., M.P. In October 1967, the University began the sixth academic year with a total enrolment of1, 800 students in its two colleges, (College of Medicine and College of Education), two faculties, six schools and two Institutes.

The University of Lagos Act, 1962 was amended on 25th of April 1966 by Decree No.29 to provide for a new Provisional Council. On 16th of March

1967, the amended Act was replaced by the University of Lagos Decree 1967, also (known as Decree No.3 of 1967) under which many aspects of the University were re-organized and new offices were created. The Decree integrated the former Medical School more fully into the University as its College of Medicine and also incorporated the former Federal Advanced Teachers College as its College of Education. This Decree resolved the legal problem of having the Medical School as an autonomous unit of the University. The Decree produced an integrated and bigger University and ensured the integrity of the University. It emphasized the overall control of Senate over academic affairs and provided for the constitution of one Council with overall authority over the entire University. With this problem settled, attention was paid to the type of integration and co-operation that would grant as much as possible the greatest measure of autonomy. This resulted in the granting of the status of a college to a deserving Unit. In reconstituting the entire University, the positions, functions and duties of Council, Senate and other bodies were well defined. The procedures for the appointment of key officers of the University, especially the Vice-Chancellor, were clearly spelt out.

It gave the University a collegiate system. The collegiate system reconciled the need for local autonomy with the necessity for overall control by Senate and Council. Thus, the Medical School became the College of Medicine of the University of Lagos, headed by a Provost. It has an Academic Board with some academic functions delegate to it by Senate and a Board of Governors. It has an Academic Board with some academic functions delegated to it by Senate and a Board of Governors, a Statutory and Elected Body with a Chairman appointed from outside and on which the Provost and the Deputy Provosts at. With the main University comprising Faculties, Schools, Institutes and Centres, a new pattern of a University incorporating semi-autonomous Colleges emerged and this has enabled the University to operate both as a first-class institution of higher learning and a training ground for essential middle level manpower. The installation of the first Chancellor and the conferment of honorary degrees and first degrees of the University were held on 18th of January1968. Apart from the Chancellor, Chief Samuel Jereton Mariere who received an honorary degree of Doctor of Letter, honorary degrees were also conferred on the following: Alhaji Ado Bayero, Emir of Kano and Chancellor of the University of Nsukka (LL.D.); Dr. Joseph Herman Taggart, Executive Dean of the school of Business, New York University (LL.D.); Chief Obafemi Awolowo, Federal Commissioner for Finance, and Chancellor of the University of Ife(D.Litt); His Excellency Mohammed El Fasi, Rector, Mohammed V University, Rabat(D.Litt.) and Dr. John Hamilton, Vice-President for Health Sciences, University of Toronto, Canada(D.Sc.). Two hundred and seventy-nine graduates from the various schools, faculties and colleges were awarded first degrees. Financial assistance from the USAID was used for the establishment of the twin schools of Administration and Social Sciences, while the Ford Foundation supported the establishment of the Comparative Education Study and Adaptation Centre, CESAC and the grant from UNESCO was channeled into the building of the Faculty of Engineering.

1.1 University of Lagos Vision and Mission

Vision: To be a top class institution for the pursuit of excellence in knowledge, character and service to humanity.

Mission: To provide a conducive enviroment for teaching, learning, research and development, where staff and students will interact and compete effectively with their compete effectively with their counterpart globally.

1.2 Restructuring of the Teaching Units (1975/76 and 1992/93 Session)

Restructuring of the Teaching Units of the University of Lagos took place between 1975/76 and the 1992/93 Sessions. The exercises ought to achieve further consolidation, encourage the pooling of resources, minimize duplication, reduce the number of administrative units and

maximize the utilization of available resources. As a result of the exercise, the following units emerged: the College of Medicine; the Faculty of Arts (a merger of the School of Humanities and School of African and Asian Studies); the Faculty of Business Administration (formerly the School of Administration); the Faculty of Engineering; the Faculty of Law; the Faculty of Science (a merger of the School of Biological Sciences, the School of Mathematical and Physical Sciences, and the academic sector of the former Institute of Computer Sciences); the Faculty of Social Sciences (a merger of the School of Social Studies with the Department and Institute of Mass Communication); the Faculty of Environmental Design; and the Institute of Education. As a result of the restructuring of the Teaching Units of the University in 1975, an amendment was made to the1967 Act. It was this amendment (University of Lagos Amendment Decree1975) that dissolved the College of Education which then became a Faculty of Education and in addition, an Institute of Education. In addition to all these Teaching Units, the following academic support units came into existence: a Human Resources Research unit in the Faculty of the Social Sciences, the University Computer Center, and an Institute of Child Health in the College of Medicine.

1.3 Development Plans

The development of the University of Lagos was planned to take place in three phases. The first phase began in October 1962, when the University opened with a Faculty of Business and Social Studies, Faculty of Law and a Medical School. Emphasis had been laid from the start on co-operation between faculties. Thus, the Faculty of Law provided courses in Commercial Law for students of the Faculty of Business and Social Studies and the Faculty of Business and Social Studies provided courses on the economic and social environment for Law students. Provision was also made for students to take additional courses outside their fields of study. Thus, all students were required to take a year's course in General African Studies. Courses were also given in "Introduction to Modern Thought" for Science students and in "Introduction to Science and Technology" for non-Science students. At least, one year of French was required in some faculties.

This conditional phase started in October 1964, with the addition of the Faculty of Engineering. The faculties of Science, Arts and Education came into existence in 1964. The three faculties, Science, Arts and Education worked closely together with the initial aim of producing teachers in Science and Arts subject. The Schools of Business Administration and of Social Studies which already included Economics, Accounting and Political Science departments had developed with other disciplines such as Sociology and Psychology. The School of Humanities was teaching Modern Languages (Nigerian and Foreign). The School of Biological Sciences was expected to expand its activities in the field of Marine Biology and Oceanography which were little known in West Africa at the time. In order to ensure maximum utilization of the resources of the University, evening courses were initiated in all appropriate Faculties and Schools. The School of Administration, Social Studies and the Faculty of Law started evening programme. Consideration was also given to the establishment of the Correspondence Open Studies Unit and also Extramural programmes. These started with the Schools of Business Administration and Social Studies and later transformed into a Continuing Education programme embracing all the Faculties and Schools of the University. Thus by 1973, the Teaching Units in the University were as follows: (The Colleges of Medicine and Education, Faculties of Law and Engineering; School of Humanities; African Languages and Literature; Social Studies; Administration; Mathematical and Physical Sciences; Biological Sciences and Environmental Design; Institute of Computer Science; Mass Communication and a Center for Continuing Education). The third phase began in 1975, when the University embarked on extensive construction of Faculty buildings, staff quarters and students hostels. These included the Faculty of Engineering building, College of Medicine, the Arts Block consisting of two wings comprising of a seven storey block of offices, and a five storey block of classrooms. It was designed to accommodate the Faculties of Arts, Social

Sciences and Centre for Cultural Studies. The block also accommodated the Correspondence and Open Studies Unit (COSU) which later became Correspondence and Open Studies Institute (COSIT); and later Distance Learning Institute (DLI), the Information Unit, the Admissions Office and a section of the Appointments Office. The Chemical Engineering Building was completed and occupied during this period. The period between 1977 and 1985 witnessed the addition of major buildings to the Faculties on the Campus; (a)the Auditorium designed to seat 2,000 people which was utilized extensively during Festival of Art and Culture (FESTAC), (b) the University of Lagos Guest Houses/Conference Centre, which comprises five main units; Guests Accommodation, Restaurant Block, Administrative Block, Conference Halls and Reception Block; (c) Faculty of Science Complex (designed to ease the congestion of the Academic groups outh, based on the concept of pooling staff together in one building) The latter was occupied in September 1978. During this period, the High–Rise staff quarters, 2001 students' hostel, Mosque and Chapel buildings were constructed. Also, this period witnessed the construction and completion of the International School Complex, the Access Road linking the Second Gate to Iwaya and the twelve storey "Senate Building", which now accommodates the offices of the Vice-Chancellor, Deputy Vice-Chancellor (Academic and Research), Deputy Vice-Chancellor (Management Services), Registrar and Bursar, and the Director of Academic and Research the Administrative Centre of the University.

The third developmental phase was to witness the expansion of those faculties or schools for which Lagos offers special advantages. Thus, courses such as Agriculture, Forestry or Veterinary Science were not proposed. Efforts were made to achieve the maximum and economic use of resources as well as flexibility in the employment of academic staff through organization into schools rather than faculties and departments. In keeping with the policy of developing Academic programmes best suited to Lagos, the Urban and Environment Studies were to feature prominently in the University's plan. Also, it aimed to establish an African Studies Centre which was to serve as a focal point for researches into problems having bearing on the African Culture and modernization as a prelude to establishing undergraduate degree programmes in these fields. Another pointer was to be the introduction of courses in Public Administration to facilitate the training of public Servants and local diplomats who reside in the Federal Capital. In July 1984, the National Universities Commission (NUC) informed the University of Lagos of the decision of the Federal Military Government to merge the Federal University of Agriculture, Abeokuta, with it. The University, therefore, setup the machinery to effect the directive. The speed with which it initiated and completed the merger demonstrated clearly its maturity in accepting challenges. Backed by a resolution of Senate, it assessed the Academic, Administrative and Financial aspects of the merger and came out with enduring solutions. The NUC at this time also began to insist on rationalization in Universities. The University of Lagos then setup in January 1985, a Rationalization Committee charged principally with rationalization of academic programmes in all the teaching units so as to reduce duplication of courses to the barest minimum and suggesting ways of reducing overload of Academic Staff to acceptable limits stipulated by the NUC Regulations on the established students/staff ratio for each unit. The recommendations of the Committee were accepted and implemented by the University in October 1986. The Department of Engineering Analysis was merged with Mathematics, Geography was excised from Arts and merged with the former Faculty of Environmental Design to inaugurate a new Faculty of Environmental Sciences consisting of three departments-Geography and Planning, City and Regional Planning, and Architecture. The Department of Building Technology was moved to Engineering Complex. The Department of Music, Human Resources Research Unit along with some other service units were phased out.

The fourth phase began in 1995, and saw the construction and completion of the two students' hostels (Newest Halls I and II), Water Project, Unilag Consult Building, Faculty of Education Administrative Block, Faculty of Science Annex

and the Staff Training Centre. There was also rehabilitation, renovation and reconstruction of the Sport Centre and upgrading of the Medical Centre of the University of Lagos. In order to keep pace with the rapid and unprecedented growth, and to meet its objectives of catering for the needs of an urban population, the University expanded its academic programmes and instituted Evening Courses and Correspondence and Open Studies Institute which was later restructured and renamed Distance Learning Institute in 1997.

1.4 Logo & Motto

The logo of the University is represented by a rising sun embedded in the National GREEN WHITE GREEN colour of the nation, a book and the Lagoon depicting academics and the natural environment of the University respectively.

The motto of the University is " In deed and in Truth" which depicts the democratization nature of manner in which University of Lagos conducts her affairs without recourse to gender, colour, ethnic and demographic consideration. The University of Lagos was conceived as a thorough-going urban University to cater for the educational needs of an urban and professional community. Consequently, the University aims to assist, the individual in the achievement of his full intellectual powers and capacities and the community and state in developing the necessary knowledge and research for training the technologists, specialists and professional men and women increasingly required in modern society. To achieve this, the University has provided for:

- Day and evening courses leading to degrees in Commerce, Business Administration, Economics and Higher Management Studies at the Postgraduate level.
- A Medical School utilizing the existing medical institutions for training in clinical medicine.
- A Faculty of Law
- Special departments for the study of Economics and Commercial subjects together with the acquisition of professional qualification in Banking, Insurance, Accounting and Business Administration.
- Undergraduate Degree programmes in Science, Engineering, Education, Architecture, Humanities, and Creative Arts which were later introduced to meet the increasing manpower requirements of the Nation.

1.5 Vision Statement

To be a top class institution for the pursuit of excellence in knowledge through learning and research, as well as in character and service to humanity.

1.6 Mission Statement

To provide a conducive teaching, learning, research and development environment where staff and students' can interact and compete effectively with their counterparts both nationally and internationally in terms of intellectual competence.

1.7 The Objectives of the University

The goals and objectives of the University emanate from and are consistent with the Philosophy, Mission and the Objectives of Higher Education in Nigeria as enunciated above. The law establishing the University of Lagos (University Act 1962, No1) has, indeed, stated the objectives of the University as follows:

a) To encourage the advancement of learning and to hold out to all persons without distinction of race, creed, sex or political conviction the opportunity of acquiring a higher education.

b) To provide Courses of Instruction and other Facilities for the pursuit of learning in all its branches and to make those facilities available on proper terms to such persons as are equipped to benefit from them.

c) To encourage, promote and conduct research in all fields of learning and human endeavour.

To undertake any other activities appropriate for a University of the highest standard.

1.8 Students' Halls of Residence

The University has thirteen students' halls of residence for undergraduate students and two halls of residence for postgraduate students. A number of students also reside in private residences and hostels outside the campuses. However, due to the inevitable annual increase in student population, there are future plans to provide more halls of residence. The existing students' halls of residence are:

1.9.1 Male Hall

- King Jaja Hall
- Jereton Mariere Hall
- Saburi Biobaku Hall
- El Kanemi Hall
- Sodeinde Hall
- Eni-Njoku Hall

1.9.2 Female Hall

- Kofoworola Ademola Hall
- Moremi Hall
- Queen Amina Hall
- Honours Hall
- Aliyu Makama Bida Hall
- Fagunwa Hall
- Madam Tinubu Hall

1.9 Libraries

The University of Lagos Library which is the Main Library was established in 1962 and is located close to the Senate Building. It comprises the Gandhi Library, Law Library, Medical Library, and Boulos Engineering Library among others. The Law library is a legal depository, which means that it is entitled to request a free copy of every Law book published in Nigeria. The library's collections include more than 500, 000 accessioned volumes of books, 30, 000 periodicals and impressive stocks of rare books, prints and archives. The library also offers access to extensive electronic resources. The library's collections can be accessed through the OPAC system with workstation located within the library. The library has experienced unprecedented development from holding only traditional print materials to designing gateways to networked information. The Main Library coordinates from the main Campus a large number of libraries attached to the various Schools, Institutes, Faculties, and Departments of the University, most of which are autonomous. The Library is the hub for academic work in the University. All academic related functions such as teaching, research and learning find their support-base in the library where all types of documents, are categorized for easy access to members of the University community. Other prominent libraries include the Education Library and Taslim Olawale Elias Library.

1.10 Past Vice Chancellors of the University

Vice-Chacellor	Date
Professor Rahmon Ade Bello	2012-date
Professor Babatunde Adetokunbo Sofoluwe	2010-2012
Professor Tolu Olukayode Odugbemi	2007-2011
Professor Oyewusi Ibidapo Obe	Ag. 2000-2002 2002-2007
Professor Jelili Adebisi Omotola:	1995-2000
Professor Nurudeen O. Alao	1988-1995
Professor Akin O. Adesola	1981-1988
Professor Kwaku Adadevoh	1978-1980
Professor Jacob F. Adeniyi Ajayi	1972-1978
Professor Saburi Biobaku:	1965-1971
Professor Eni Njoku	1962-1965

1.11 Campus Facilities, Units and Services

- Division of Students Affairs
- University Health Services/Medical center
- Sports center
- The Bursary
- Registry
- Internal Audit
- Unilag Consult
- Unilag Ventures
- Bookshop and Press
- Unilag Park
- Guest Houses and Conference Center
- Central Industrial and Liaison Placement Unit
- Unilag 103.1 FM Radio Station
- Main Auditorium
- Botanical and Zoological gardens
- Lagoon Front Resort
- Community Pharmacy
- Office of Advancement
- Academic Planning Unit
- Guidance and Counseling Unit
- Estate Unit
- Media and Corporate Affairs
- Works and Physical Planning Unit
- Hydraulic Research Unit
- Alumni Relations Unit
- Legal Unit
- Security Unit
- Records Unit
- Quality Assurance and Servicom Unit

1.12 Undergraduate Awards Tenable in the University

- African American Institute
- G. Leventis Nig. Limited
- Arney Road Tone
- Association of African University
- Commonwealth Scholar
- Elder Dempster Agency
- Gulf Oil of Nigeria Limited
- International Merchant Bank (1MB)
- International University Exchange Fund
- Julius Berger Nigeria Limited
- Mobil Oil Nigeria Limited
- National Library of Nigeria
- National Electric Power Authority
- Nigerian Army and Navy Scholarship
- Nigerian Breweries Limited
- P. Z. and Co. Nigeria Limited
- Shell B. P. Petroleum Development of Nigeria Ltd.
- U.A.C. of Nigeria Limited
- United Nations Development Programme (UNDP)
- United States Information Services (USIS)
- Van Leer Containers Co.
- Nigerian Tobacco Co. Limited
- Federal Cameroon Government Scholarship
- Federal Republic of Germany
- Mobil Exploration of Nigeria Scholarship
- Nigerian Ports Authority
- Elf Nigeria Limited
- Standard Bank of Nigeria Limited
- West African Portland Cement Co. Ltd.
- Federal Government of Nigeria Scholarship
- Federal Government of Nigeria (State) Scholarship
- Seven-Up Company
- Nigeria National Petroleum Company
- The United Nigeria Insurance Company Limited (UNIC)
- Nigerian Postal Services (NIPOST)
- Various Philanthropists

1.13 Academic Calendar for 2013/2014 Session

Authorities of the University of Lagos have issued the 2013/2014 academic calendar. It is as follows:

1.14.1 First Semester 2013/2014 Session

Date	Activity	Duration
February 17 – March 30, 2014	Registration of all returning students	(6 weeks)
March 31 –April 13, 2014	Late Registration / Editing of Registration	(2 weeks)
To be determined by DSA	Returning students move into residence	
To be determined by DSA	Orientation programme for fresh students	
Monday, March 3, 2014	Lectures Begin	
Friday, June 6, 2014	Lectures End	(14 weeks)
Friday, April 4, 2014	Matriculation Ceremony	
Tuesday, June 10, 2014	Convocation Lecture	
Wednesday, June 11, 2014	Convocation Ceremony	
Thursday, June 12, 2014	Convocation Ceremony	
June 9 –14, 2014	Lecture free week	(1 week)
June 16 –June 28, 2014	Undergraduate Exams in all Faculties	(2 weeks)
June 30 – July 5, 2014	Examination in core courses in Faculty of Education	(1 week)
Saturday, July 5, 2014	Students Depart	
July 7 – July 18, 2014	First Semester Break	(2 weeks)
August 7, 2014	Consideration of Results by BCOS commences	(4 weeks after exams)
August 27, 2014	Senate meeting for consideration of Results.	

1.14.2 Second Semester 2013/2014 Session

Date	Activity	Duration
July 21, 2014	Resumption/Lectures begin	
July 7 – August 3, 2014	Registration of students	(4 weeks)
August 4 – 17, 2014	Late Registration /Editing of Registration	(2 weeks)
October 17, 2014	Lectures End	(14 weeks)
October 20 – 24, 2014	Lecture Free week	(1 weeks)
October 27 – November 7, 2014	Examination in all Faculties	(2 weeks)
November 10 – 15, 2014	Examination in all core courses in Faculty of Education	(1 week)
November 15, 2014	Students Depart/End of Session	
November 17, 2014	DLI Residential programme commences	(5 weeks)
December 20, 2014	DLI students depart	
December 11, 2014	Consideration of Results by BCOS commences	(4 weeks after Exams)
December 31, 2014	Senate meeting for consideration of Results	
January 5, 2015	Proposed date of resumption, 2014/2015 session	(6 weeks holiday)

1.14.3 Statutory Programmes

Date	Activity
2nd Wednesday of every month	Faculty Board of Studies/Examiners
3rd Wednesday of every month	Inaugural Lecture
Last Wednesday of every month	Senate meeting
Two weeks after Examinations	Uploading of Results

1.14 Academic Calendar for 2014/2015 Session

Authorities of the University of Lagos have issued the 2014/2015 academic calendar. It is as follows:

1.15.1 First Semester 2014/2015 Session

Date	Activity	Duration
November 17, 2014 – January 4, 2015	Registration of all returning students	(6 weeks)
To be determined by DSA	Returning students move into residence	
To be determined by DSA	Orientation programme for fresh students	
January 5, 2015	Lectures Begin	
April 10, 2015	Lectures End	(14 weeks)
February 21, 2015	Matriculation Ceremony	
April 7, 2015	Convocation Lecture	
April 8, 2015	Convocation Ceremony	
April 9, 2015	Convocation Ceremony	
April 13 –April 18, 2015	Lecture free week	(1 week)
April 20 –May 2, 2015	Undergraduate Exams in all Faculties	(2 weeks)
May 4 – May 9, 2015	Examination in core courses in Faculty of Education	(1 week)
May 9 2015	Students Depart	
May 11 – May 22 2015	First Semester Break	(2 weeks)
June 4, 2015	Consideration of Results by BCOS commences	(4 weeks after exams)
June 24, 2015	Senate meeting for consideration of Results.	

1.15.2 Second Semester 2014/2015 Session

Date	Activity	Duration
May 25, 2015	Resumption/Lectures begin	
May 9 – June 6, 2015	Registration of students	(4 weeks)
August 4 – 17, 2015	Late Registration /Editing of Registration	(2 weeks)
August 28, 2015	Lectures End	(14 weeks)
August 31 – September 4, 2015	Lecture Free week	(1 weeks)
September 7 – September 18, 2015	Examination in all Faculties	(2 weeks)
September 21 – September 26, 2015	Examination in all core courses in Faculty of Education	(1 week)
September 26, 2015	Students Depart/End of Session	
September 28, 2015	DLI Residential programme commences	(5 weeks)
October 31, 2015	DLI students depart	
October 21, 2015	Consideration of Results by BCOS commences	(4 weeks after Exams)
October 28, 2014	Senate meeting for consideration of Results	
November 2, 2015	Proposed date of resumption, 20152016 session	(6 weeks holiday)

1.15.3 Statutory Programmes

Date	Activity
2nd Wednesday of every month	Faculty Board of Studies/Examiners
3rd Wednesday of every month	Inaugural Lecture
Last Wednesday of every month	Senate meeting
Two weeks after Examinations	Uploading of Results

1.15 Admission Guideline

Every prospective student must get at least 200 in UTME (JAMB) before he or she can be offered admission.

See JAMB's website for more details jamb.org.ng or jambonline.org

1.16 Travel Information

There are intra-campus cabs available to students at a subsidised rate for transpotation within the campus. Furthermore, there are commercial buses that links the campus to various parts of Lagos city at affordable rates. Within the city of Lagos, are metroline buses including the state owned BRT (Bus Rapid Transit) with dedicated routes linking all parts of Lagos state.

1.17 Clubs / Associations

- National Association of Social Work Students
- National Association of Delta State Students
- National Association of Akwa Ibom State Students
- Mountain of Fire & Miracles Ministies Campus Fellowship
- Deeper Life Campus Fellowship
- National Association of Osun State Students
- National Association of Student Exmays (NASEM)
- University of Lagos Diplomacy and Strategic Association (ULDSSA)
- National Association of Ondo State Students
- Christian Living Spring Apostolic Ministry
- Creative Arts Students Association
- Junior Chamber International
- Kegistes Club International
- The Maker's Church Campus Felowship
- Muslim Postgraduate Association
- The Press Club
- Nigerian Institution of Surveying and Geo Informatics Students
- Every Nation Campus Ministries
- National Union of Lagos State Students
- National Federation of Catholic Students
- Linguistics, African and Asian Studies (LAASSA)
- Federation of Oyo State Students Union
- Nigerian Society of Biochemistry Students
- National Association of Osun State Students
- King's College Old Boys Association
- The Nigerian Institution of Mechanical Engineers
- The Parliament
- The Church of Christ
- The Lifter's Church
- Youth Career and Leadership Foundation
- International Youth Fellowship
- Postgraduate Christian Fellowship

1.18 Supermarkets

The University has different kind of modern supermarkets that adequately meet the diverse needs of both students and staff ranging from daily provions, electronics, designer wears, manicure and pedicure, pharmacy stores, food stuffs stores, eateries and lots more.

1.19 Place of Worship

The University of Lagos promotes harmonious relationship between the adherents of diverse religious persuations. The various religious groups co-exist under a peaceful atmosphere and freedom of worship. This is evident in the location of the place of worship on the Campus. For example, The Mosque, the Chapel of Christ Our Light and the St. Thomas Moore Catholic Church are located directly opposite the Student Union Building, close to the University Sports Centre. All religious activities on Campus takes place in this location.

1.20 Security

The University has a Security Unit that ensures the security of life and property on Campus. Located in the Faculty of Education Compound, the Unit is headed by a Chief Security Officer (CSO). The Unit also collaborates with the Lagos State Government's Security outfit to ensure peace on campus. It provides several security patrol vehicles, which maintain 24-hour monitoring of Campus activities. The presence of a handful of regular policemen further reinforces the strength of the campus security unit.

The Security Unit is equipped with walkie-talkies, which are also made available to the University's Principal Officers who are in regular touch with the Security Unit on a24-hourbasis.

The University also has a functional Fire Service Station strategically located on campus to handle emergency situations.

The following numbers could be contacted in terms of emergencies:

Chief Security Officer (CSO) Direct Line – 08037867935 Security Unit (Help Lines) – 07088976915. Fire Station (Help Line) - 07088777431

1.21 Medicals

The University has a Medical Centre within its Main Campus. It also operates a full-fledged teaching hospital (Lagos University Teaching Hospital - LUTH) at Idi-Araba mainly for referral cases. University regulations allow free medical services to all full-time students during periods of residence.

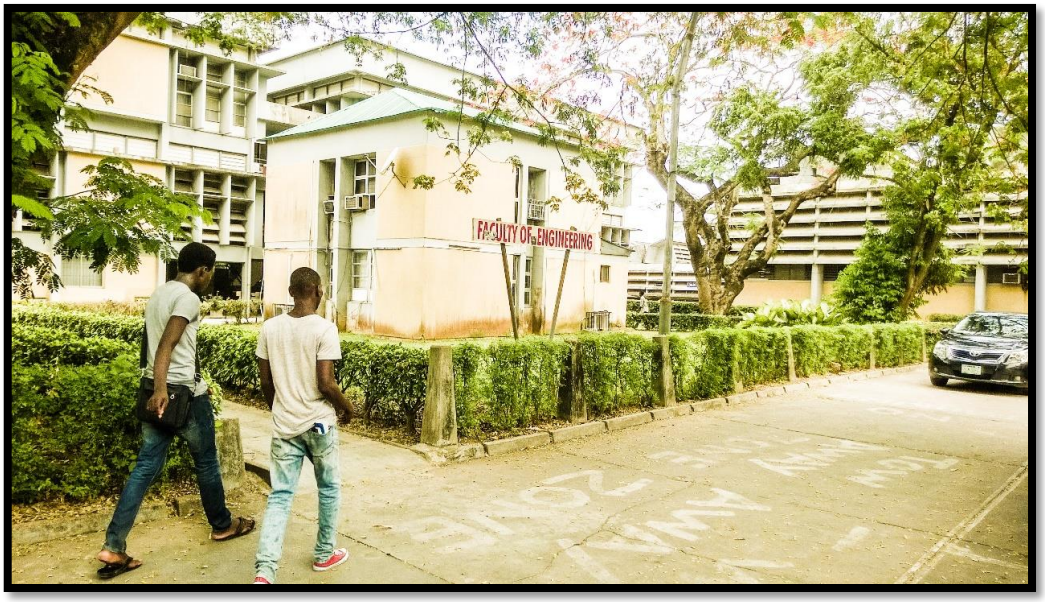
All emergencies are seen at the Medical Centre. However, it is the doctor on duty that determines what constitutes a medical emergency.

Normal consultation takes place from 8.00am to 3.30pm daily from Monday to Friday. There are also facilities for the care of sick patients in the sick-bay, while skeletal services are provided after work hours from 3.00pm to 8.00am the following day on week days and on Saturdays, Sundays and Public Holidays, between 8.00am and 9.00am. Priority is always given to students and other deserving cases.

However, in order to utilize the services of the University Medical Centre, every student on admission is usually required to go through a medical examination at the Medical Centre. This enables the Centre to have records of every students Medical History for use especially in case of emergencies.

1.22 Water Front

University of Lagos is the only university in Nigeria surrounded by a lagoon. Two-third of the land area of the University of Lagos is a lagoon area. The north and the east side of the campus is bounded by a lagoon which makes the campus a beautiful serene and a tourist center



Welcome to the Faculty of Engineering at the University of Lagos

The University of Lagos is one of the top Engineering Faculties in Nigeria. We have been in Engineering Education for more than fifty years producing some of the biggest names in Engineering Nigeria has known. Operating from the commercial capital of the nation, we are close to industry and economic activities that the profession serves. We have also made landmark achievements, boasting of a higher number of Merit Award Winners and LNG among several prestigious recognitions in the country.

In the second half of its first centenary, the faculty of engineering is refocussing. We are placing a higher premium on industry participation in our undergraduate programs. This visibly shows in the number of Laboratories and other projects being funded by government and nongovernmental private commercial interests. We believe that engineering education should take place in the context of engineering practice. This has led us into the ongoing creation of the Unilag-LG Air-conditioning academy which mixes technician training with engineering training and allows the graduates to easily transform into entrepreneurs after graduation. We are also home to the National Center for Engineering Efficiency and we are introducing new certifications in Communications and other areas. During your stay at this faculty, you will discover that there are several of our new projects at various stages of completion. The new PTDF Chemical Engineering Building and the extension of the main engineering center are helping develop new laboratories and enhance the younger programmes in Oil and Gas engineering and Systems Engineering.

We are poised to give you the skills that you will need to compete with the best in the world. In the era of globalization, critical thinking, teamwork and multidisciplinary emphasis are needed to give the competitive edge. This informs our multidisciplinary programs in Systems Engineering and other programs to follow. In this prospectus, you will find the information you need to navigate your way into course registrations and data that may be useful for decisions on courses and other relevant issues that may affect your studies. We have added a chapter on Frequently Asked Questions. These are not complete but are a work in progress. The good news is that your prospectus is now available online for free downloads so that changes that we will bring in from time to time will be available to you. On behalf of the faculty of Engineering, I wish you all the best in your professional development to become an engineer that can help Nigeria compete with the rest of the world.

OA Fakinlede, PhD, R. Eng
Dean

Professor O. A. Fakinlede
B.Sc. Eng (Lagos), Ph.D. (Alberta), R. Eng
Dean

2.1 The Engineering Profession

We are proud of the role we play in educating future professional engineers. In Nigeria, engineering is a profession with a powerful and revered tradition of ethics, accountability, and service. The completion of a B.Sc. degree in engineering from the University of Lagos is the first step on the road to becoming professional engineers. Following a specified period of work experience, our graduates are able to register with their local professional engineering association, and practice engineering across Nigeria and around the world.

2.2 Focus

We are a highly qualitative, academic-oriented, research-intensive and student centered faculty committed to creating an innovative teaching and learning environment for all students. Today's society is faced with many opportunities and challenges on the basis of which our faculty programmes are tailored to satisfy. The faculty has made significant contributions to the development of engineering education as well as other sectors of the economy. The fields of:

- Communications Power
- Information Technology
- Transportation and
- Construction have benefited immensely from our various programs.

Our laboratories are equipped with modern facilities manned by highly experienced technologies – all to the advantage of our students. The faculty also partners with the private sector in the provision of infrastructures, notably the new LG Engineering design laboratory and Nigerdock engineering laboratory. We can also boast of a well-stocked library to ease issues of making references, which by faculty contribution complements the Boulous Engineering library located in the University main library.

By virtue of its large population and rapidly developing industrial activities, Lagos offers a favourable setting for a Faculty of Engineering in the University of Lagos. This fact was highlighted by the report of Ashby Commission in 1959 for the establishment of University of Lagos which considered the case in its report. Consequently, the decision to establish a Faculty of Engineering at the University of Lagos was based on the fact that Lagos, being the largest centre of engineering activities in Nigeria, would be an ideal training centre for engineers. The Faculty of Engineering of the University of Lagos has the objective "to produce graduates who will be well qualified to operate and develop the public services, to initiate and carry out engineering designs, to engage in industrial management and pursue development and research".

The Faculty of Engineering was established in the 1964/65 academic year with three departments namely; Civil, Electrical and Mechanical Engineering. A significant development arising from the recognition of the

crucial role of mathematical and related analytical techniques in the development and application of modern engineering systems was the establishment, in 1973, of a Sub-Department of Engineering Analysis. The Sub-Department constituted the core group of hybrid mathematicians and professional engineers who provided academic leadership in various areas of Engineering Analysis. It was later to become the Engineering Analysis Unit. Later in 1973, two other departments; Chemical Engineering and Surveying were established. At present, the Faculty consists of seven departments namely Chemical, Civil & Environmental, Computer, Electrical Electronics, Mechanical, Metallurgical & Materials, Petroleum & Gas, Surveying and Geoinformatics and Systems Engineering.

As a result of the nature of Nigeria as a developing country, our graduates are provided with a wider range of general engineering education. At the end of their training, our graduates are to be well versed in theory and practice and to be capable of taking on full professional responsibilities shortly after qualification.

At its inception in 1964, the Faculty had a three year post A-level degree programme. The curriculum underwent a major restructuring in 1976 when a four-year programme was introduced to replace the erstwhile 3-year programme while incorporating a compulsory 9-month period of supervised industrial training (split into two separate periods of 3months and 6months) into the programme. Beginning from the 1982/83 session, the Faculty switched over to the present 5-year programme, characterized by the Unit Course System. The programme became more intensive, courses are assessed continuously and it is now possible to closely monitor students' performance since subject materials are taught in smaller doses and examined in greater depth.

All the programmes in the Faculty are accredited by Council for the Regulation of Engineering in Nigeria (COREN). The Surveying undergraduate programmes are also accredited by the Surveyors Council of Nigeria (SURCON).

The seven departments in the faculty offers nine programmes leading to the award of B.Sc. (Hons) in Engineering as follows:

i. Chemical engineering
ii. Petroleum & gas engineering
iii. Civil & environmental engineering
iv. Electrical and electronics engineering
v. Computer engineering
vi. Mechanical engineering
vii. Surveying and geoinformatics
viii. Metallurgical and materials engineering
ix. Systems engineering

Entry into degree programmes depend on:

- Success in the Senior Secondary Certificate Examinations or their equivalent, with five credits in subjects which must include English Language, Mathematics, Further Mathematics, Physics and Chemistry all in one sitting.
- Successful candidates are also required to have acceptable levels of performance in the Universal Tertiary Matriculation Examinations (UTME) administered by Joint Admissions and Matriculations Board (JAMB).
- Candidates with GCE A' level passes in Mathematics (Pure and Applied). Chemistry and Physics in addition to (a) above may be admitted to the 200 level of the five-year programmes.
- Successful candidates in the University Foundation programme with acceptable level of performance are to be admitted to the 200 level of the five year programmes.

In addition to the usual laboratory courses associated with the degree programmes offered by these departments, students are required to acquire industrial experience by practicing in a well-designed Supervised Industrial Work Experience Scheme (SIWES), for a minimum cumulative period of nine months; three months after the third year; and six months at the end of the first semester of the fourth year. All departments offer viable and widely

acknowledged postgraduate programmes leading to the award of the degrees of M.Sc., M.Phil. and Ph.D.

Members of staff of the Faculty are actively involved in research in the various fields of Engineering and Surveying. Conscious effort is made to make the research conducted in the Faculty very relevant to the society and related local problems. Some of the projects are sponsored by external bodies, partly as recognition of the high level of research activities in the faculty, society, and more importantly, because of the relevance of their research works to the society.

For instance, the Hydraulic Research Laboratory in the Faculty was built and equipped under a Nigeria/Netherlands Technical Assistance Programme. The laboratory is capable of providing models to simulate the conditions that obtain in Lagos harbour and in other marine or riverine situations in order to solve practical problems confronting ports, dams, offshore exploration etc. The unit is also responsible for data collection and for training research personnel in hydraulics and water resources.

The Faculty recognizes the need to provide postgraduate courses in branches of engineering which have special relevance to Nigeria. Such programmes include courses leading to the Master's and Doctor of Philosophy degrees in the areas of petroleum, refinery, biochemical engineering, control engineering, high voltage engineering, electronics and telecommunication, air conditioning, metallurgical and Materials Engineering, highways and transportation engineering structural engineering, geodesy, photogrammetry, remote sensing, and geographic/geospatial information systems.

The United Nations Special Fund gave financial assistance to the faculty of Engineering during its first five-year development period. The special fund covered the cost of (internationally recruited experts), equipment for laboratories and fellowship. The UNESCO participations have since ended. Recently, other organizations such as Nigerdock, Schlumberger, Akoka Engineers, Flour Daniel Canada, Julius Berger Plc, Ericsson Nig. Ltd. and the Boulos Families have given substantial support to the growth of the Faculty. Radical changes in some of our programmes have been introduced to reflect the new orientation and emphasis in engineering and technology.

In order to enrich the faculty outreach programme, to keep our staff and students current and relevant, the Faculty organizes Breakfast Receptions for Chief Executives of Blue-Chip Companies. Research, Retreats, Distinguished Lecture Series, Conferences, Workshops and Seminars are also periodically organized. The direct benefit of our outreach programme is that the Faculty has now established research groups on:

- Energy
- Artificial Intelligence
- Environment
- Information Technology

2.3 Dean & Sub-Dean

Professor O. A. Fakinlede	Dean
Dr. M. A. Bodude	Sub-Dean

2.4 Past Deans of the Faculty

Dean	**Year**
Prof. K. A. Everad	1964-1965
Prof. A. O. Adekola	1965-1971
Prof. L. O. Oladapo	1971-1975
Prof. H. E. Enahoro	1975-1977
Prof. C. O. Oragun	1977-1981
Prof. V. O. S. Olunloyo	1981-1983
Prof. F.A. Fajemirokun	1983-1987
Prof. S. A. Balogun	1987-1991
Prof. A. A. Susu	1991-1995
Prof. O. Ibidapo-Obe	1995-1999
Prof. O. Ogboja	1999-2003
Prof. O.O. Akindele	2003-2006
Prof. O. Adegbenro	2006-2008
Prof. M. A. Salau	2008-2012

2.5 Committees of the Faculty of Engineering

2.5.1 Faculty Appointments and Promotions (A&P) Committee

Membership

- Dean - Chairman
- All Professors
- All Associate Professors
- All Heads of Departments
- Faculty Officer

Terms of Reference

- *To consider and recommend as appropriate all appointments, confirmations and promotions of all academic staff.*
- *To consider and recommend as appropriate all recommendations of the departments in respect of applications for contract and adjunct appointments.*

2.5.2 Foundation Programme Monitoring Committee

Membership

- *Dean - Chairman*
- *All Heads of Departments*
- *Sub - Dean*
- *Faculty Officer - Secretary*

Terms of Reference

- *To monitor and supervise all academic activities of the programme.*
- *To attend to students and staff welfare.*

2.5.3 Faculty Business Committee

Membership

- *Dr. K.O. Aiyesimoju - Chairman*
- *All Departmental Examination Officers*
- *Faculty Officer*
- *Secretary*

Terms of Reference

- *To carry out preliminary screening of Results or other proposals for the Faculty Board to ensure such are presented in the in the required format.*
- *To review curriculum or other proposals emanating from the faculty to the university administration to ensure such are presented in the required format.*

2.5.4 Technical and Publications Committee

Membership

Name	Department
Prof. F.A. Falade [**Chairman**]	Civil & Environmental Engineering
Dr. Tolu Ajayi [**Member**]	Chemical Engineering
Dr. O.T. Badejo [**Member**]	Surveying & Geoinformatics
Dr. O.S. Asaolu [**Member**]	Systems Engineering
Dr. S.J. Ojolo [**Member**]	Mechanical Engineering
Faculty Officer [**Secretary**]	Faculty Office

Terms of Reference

- To publish the Journal of Engineering Research (JER) regularly.
- To develop, update and publish or setup JER and other faculty materials on relevant media e.g. Prospectus, Newsletter, Website, VLE etc. as approved by the Board.

2.5.5 Research Committee

Membership

Name	Department
Prof. J.B. Olaleye [**Chairman**]	Surveying & Geoinformatics
Prof. A.I. Mowete [**Member**]	Electrical/ Electronics Engineering
Dr. O.A. Olafadehan [**Member**]	Chemical Engineering
Dr. E.O. Longe [**Member**]	Civil & Environmental Engineering
Dr. G.I. Lawal [**Member**]	Metallurgical & Material Engineering
Dr. J.S. Ajiboye [**Member**]	Mechanical Engineering
Dr. T.A. Fashanu [**Member**]	Systems Engineering
Faculty Officer [**Secretary**]	Faculty Office

Terms of Reference

- To consider applications for Central Research Funds, Faculty Research Funds and recommend same to the Development Committee for approval.
- To consider and recommend proposals for Faculty Research Projects.

2.5.6 Conference/ Workshop Planning Committee

Membership

Name	Department
Prof. F.N. Okafor [**Chairman**]	Electrical/ Electronics Engineering
Prof. L.O. Oyekunle [**Member**]	Chemical Engineering
Dr. E.E. Ikponmwonsa [**Member**]	Civil & Environmental Engineering
Dr. S.A. Oke [**Member**]	Mechanical Engineering
Dr. J.O. Olusina [**Member**]	Surveying & Geoinformatics
Dr. O.S. Asaolu	Systems Engineering
Mrs. A. Oladoye [**Member**]	Metallurgical &Materials Engineering
Faculty Officer [**Secretary**]	Faculty Office

Terms of Reference

- To plan and organize retreats, distinguished lectures, workshop and conferences.
- To solicit for administrative and external support towards the fulfillment of its mandate.

2.5.7 Sanitation, Beautification and Maintenance Committee

Membership

Prof. O.M. Sadiq [**Chairman**]	Civil & Environmental Engineering
Dr. F.U. Babalola [**Member**]	Chemical Engineering
Dr. O.M. Kamiyo [**Member**]	Mechanical Engineering
Dr. J.O. Olusina [**Member**]	Surveying & Geoinformatics
Dr. T.T. Akano [**Member**]	Systems Engineering
Mrs. A. Oladoye [**Member**]	Metallurgical & Materials Engineering
Mrs. K.A. Abdulsalam [**Member**]	Electrical/ Electronics Engineering
Faculty Officer [**Secretary**]	Faculty Office

Terms of Reference

- *To advise the Dean regarding the beautification and sanitation of the Faculty.*
- *To monitor the physical environment including the greenery areas.*
- *To oversee the maintenance of structures, services and restrooms.*

2.5.8 Honours, Award &Disciplinary Committee

Membership

Name	Department
Prof. C.O.A. Awosope [**Chairman**]	Electrical/Electronics Engineering
Prof. I.A. Mowete [**Member**]	Electrical/Electronics Engineering
Prof. P.C. Nwilo [**Member**]	Surveying & Geoinformatics
Dr. D.S. Aribike [**Member**]	Chemical Engineering
Dr. J.O. Akanmu [**Member**]	Civil & Environmental Engineering
Dr. O. Damisa [**Member**]	Mechanical Engineering
Dr. T.A. Fashanu [**Member**]	Systems Engineering
Faculty Officer [**Secretary**]	Faculty Office

Terms of Reference

- *To advise the Dean on recommendation of individual(s) for the Faculty Honour or Award.*
- *To advise the Dean on any matter on Award referred to it from time to time.*

2.5.9 Fund-Raising, Alumni and Public Relation Committee

Membership

Name	Department
Prof. O.A. Fakinlede [**Chairman**]	Systems Engineering
Prof. F.N. Okafor [**Member**]	Electrical/Electronics Engineering
Prof. P.C. Nwilo [**Member**]	Surveying & Geoinformatics
Dr. K.T. Ajayi [**Member**]	Mechanical Engineering
Dr. K.O. Aiyesimoju [**Member**]	Civil & Environmental Engineering
Mr. O.I. Sekunowo [**Member**]	Metallurgical & Material Engineering
Mrs. A.O. Ogunbayo [**Member**]	Chemical Engineering
Faculty Officer [**Secretary**]	Faculty Office

Terms of Reference

- *To advise and assist the Dean on the projection of the image of the Faculty.*
- *To compile the list of Alumni of the Faculty since inception.*
- *To mobilize the Alumni and others for development of the faculty.*
- *To source for funds from firms/donors to sponsor projects, adopt classrooms etc. in the faculty.*

2.5.10 Benevolent Fund Committee

Membership

Name	Department
Prof. P.C. Nwilo [**Chairman**]	Surveying & Geoinformatics
Engr. Odekunle [**Member**]	Electrical/Electronics Engineering
Dr. O.O.E. Ajibola [**Member**]	Systems Engineering
Engr. N.O. Obaji [**Member**]	Civil & Environmental Engineering
Dr. O.I. Sekunowo [**Member**]	Metallurgical & Material Engineering
Dr. O.Y. Ogunmola [**Member**]	Mechanical Engineering
Faculty Officer [**Secretary**]	Faculty Office

Terms of Reference

- *To continually source for independent funds of purely humanitarian or philanthropic gesture.*
- *To administer such funds to assist faculty and staff or their immediate families as and when necessary inline with laid down guidelines.*

2.6 The Faculty of Engineering Board of Studies and Examiners

2.6.1 Membership

- Dean of Engineering – Chairman
- Vice-Chancellor
- Deputy Vice-Chancellor (Academic & Research)
- All Academic Staff of the Faculty of Engineering
- Faculty Officer – Secretary

2.6.2 Functions

i. *To advise and report to senate on all matters relating to the organization of education, teaching and research in the faculty, including curricula and examinations;*

ii. *To consider the progress and conduct of students in the Faculty and to report thereon;*

iii. *To recommend to senate, persons for appointment as examiners;*

iv. *To deal with any academic matters referred to it by senate;*

v. *To consider examination results.*

vi. *To deal with any academic matters referred to it by the Senate.*

2.7 Faculty Map

2.8 Students' Union Activities in the Faculty

2.6.1 Structure

Students' Union activities are organized along the following structural units:

1) The University of Lagos Engineering Student Association (ULES) comprising:

- *The ULES Executive Committee*
- *The ULES Representative Committee*
- *The ULES Congress made up of all paid up student members of the faculty*
- *Staff Adviser –The Sub-Dean*

2) Departmental Association comprising Association in the following Departments:

- *Department of Chemical Engineering*
- *Department of Civil and Environmental Engineering*
- *Department of Electrical and Electronics Engineering*
- *Department of Mechanical Engineering*
- *Department of Metallurgical and Materials Engineering*
- *Department of Surveying and Geoinformatics*
- *Department of Systems Engineering*

2.6.2 Membership

All bona fide students of the Faculty are entitled to membership of the University of Lagos Engineering Student Association as well as their respective Departmental Associations on the payment of appropriate membership fee prescribed by the Associations.

2.9 Philosophy and Goals of Engineering Degree Programmes

2.8.1 Philosophy

The general philosophy of engineering programmes is to produce graduates with high academic standard and adequate practical background for self-employment as well as being of immediate value to government industry and the public in general. To achieve the national goals and objectives of Industrialization and self-reliance, the Engineering Education should be geared towards:

- *the development of a thorough practice in training*
- *early broad-based training in general Engineering*
- *practical application of Engineering processes*
- *adequate training in human and organization behavior*
- *introduction to entrepreneur education and training*
- *close association of the programmes with industries in the country*

2.8.2 Goals and Objectives

The general aims and objectives of Engineering training is to produce graduates that must be resourceful, creative, knowledgeable and able to perform the following:

- *Design Engineering projects and supervise their construction.*

- *Design and make components, machines equipment and systems.*
- *Design and develop new products and production techniques in industries.*
- *Install and maintain complex Engineering systems so that they can perform optimally in our environment.*
- *Adapt and adopt exogenous technology to solve local problems.*
- *Exercise original thought, have good professional judgement and able to make responsibility for the direction of important tasks.*
- *Manage human, financial, energy and time resources.*

- Improve on indigenous technology to enhance local problems solving capability.

2.10 Regulations Governing First Degree Programmes

General Regulations

- Programmes of Courses are provided which lead to the Bachelor of Science Honours degree denoted by the letters B.Sc.(Hons)

The programmes normally extend over a period of five academic years for a full time student.

A full time student is a person who carries not less than the minimum load stipulated by the Faculty

The maximum period of study permissible by the Board of Studies for the Bachelor of Science Degree Programmes shall be 10 academic years

The minimum load permissible per semester is 12 units while the maximum load is 24 units.

Permission to carry less than the minimum load or more than the maximum load may be granted by the Dean on behalf of the Faculty Board of Studies, upon the recommendation of the Head of Department.

- Instruction is by courses quantified into course units.
- One unit is granted for a series of fifteen, one hour lectures or tutorials, or a series of fifteen three-hour laboratories or practice classes or an equivalent combination of these types of instructions.
- (a) The following levels of courses shall be provided for the 5 years degree programme.

- *Year I Courses shall be designated as 100 series*
- *Year II Courses shall be designated as 200 series*
- *Year III Courses shall be designated as 300 series*
- *Year IV Courses shall be designated as 400 series*
- *Year V Courses shall be designated as 500 series*

(b) Students admitted for the five year Degree programme shall normally start with 100 level Courses.

(c) Senate may on recommendation of the Faculty of Engineering Board of Studies permit students to start with other level of Courses.

- (a) Courses in Faculty of Engineering are identified by three letter codes as follows:-

Subject	Code
Chemical Engineering	CHG
Civil Engineering	CEG
Computer Engineering	CPE
Electrical and Electronics Engineering	EEG
Mechanical Engineering	MEG
Mettalurgical and Materials Engineering	MME
Petroleum and Gas Engineering	PGG
Surveying and Geoinformatics	PGG
Systems Engineering	SSG
General Engineering	GEG

(b)Students may also take in other Faculties, suchcourses as are specified in the curricula.

- No course shall carry less than one or more than three course units, except for full time programmes such as Industrial Training.
-

a) A pre-requisite course is one which must be taken before a higher level course; and in which the student is to score at least 40% (E) before moving to the next level.

b) A pre-requisite course may be waived for a suitably qualified candidate by the Faculty of Study on behalf of Senate.

c) A concurrent requirement will be satisfied if the student registers for the courses within the same semester or has already passed it.

d) A major is the subject area in which the student intends to obtain a single honours degree. Courses in the subject area are called major courses.

e) A minor is a prescribed course from cognate field which is indispensable for an understanding and appreciation of the student's major field.

f) Each Department stipulates its major courses and advises the students on what minor courses to take.

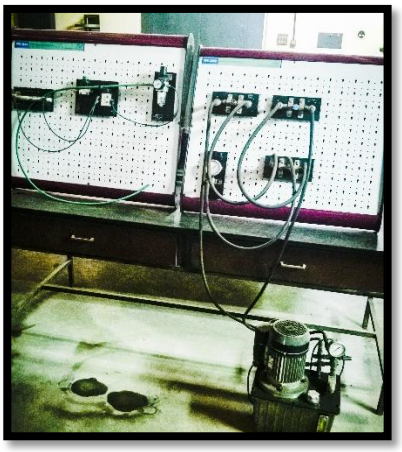
g) (g) A university course requirement is a course that must be registered for and passed before a degree is awarded vis: Use of English (4 Units); Basic Computer Studies (2 units); General Studies (4 Units); Philosophy (2 units); Recreation (2 units);

h) A compulsory course is one which must be registered for and passed by a student to obtain the degree and is counted towards his/her classification of the degree.

i) An optional course is one which may be taken to make up the minimum requirements or to increase the choice of courses up to the maximum number of units allowed by the regulations. All courses taken which are approved by respective departments count towards the degree classification.

j) (j) An audited course is one which the student attends but not examined on.

- Graduation Requirements: To be eligible for the award of a degree, a student must pass a minimum total number of units in a five year programme inclusive of the University course requirement as follows:



Department	Units
Chemical Engineering	190
Civil and Environmental Engineering	190
Computer Engineering	184
Electrical and Electronics Engineering	187
Mechanical Engineering	189
Petroleum and Gas Engineering	184
Surveying and Geoinformatics	190
Metallurgical and Materials Engineering	200
Systems Engineering	184

- Distribution and concentration requirement are satisfied when a STUDENT has completed the following:

- (a) University Requirements

Course Code	Courses	Units
GST102	Philosophy and Logic	2
GST105	Use of English	2
GST201	General African Studies	2
GST202	General African Studies	2
GST307	Entrepreneurship	2
Total		10

(b) **Faculty Requirements**

(i) **General Courses in the Faculty of Engineering**:

Subject Code	Courses	Units
GEG101 &102	Engineering Pure Maths I and II	3+3
GEG103 &104	Engineering Applied Maths I and II	3+3
MEG103 &104	Technical Drawing I and II	2+2
MEG101 &102	Workshop Practice I and II	1+1
PHS101 &102	Introductory Physics I, II and III	2+3
PHS103	Laboratory Physics	2
GEG101	Engineering Maths I	3
GEG102	Introduction to Engr. Stat. and Comp.	3
EEG201	Fundamentals of Electrical Engr.I	3
SIW300	Industry Training I	4
SIW400	Industry Training II	8
GEG402	Num. Methods in Engineering	3
GEG403	Engineering Statistics	3
GEG501	Engineering Economics	2
GEG502	Engineering law and Management	2
GEG401	Tech. Communication	1
Total		59

(ii) **Department Requirements**

Department	Units
Chemical Engineering	123
Civil and Environmental Engineering	119
Computer Engineering	116
Electrical and Electronics Engineering	116
Mechanical Engineering	118
Metallurgical and Materials Engineering	129
Petroleum and Gas Engineering	123
Surveying and Geoinformatics	119
Systems Engineering	129

(iii)Industrial Experience with (12) Units and satisfactory completion of two periods of the approved Industrial work experience is required for the award of a degree. These will be accomplished in two periods, the first of not less than 10 weeks during the long vacation following year III (SIW300): and a second period of not less than 26 weeks during the second semester of and the long vacation following year IV(SIW400).

- Admission and withdrawal from courses:
  a) Registration for courses shall be at the beginning of each semester.
  b) Admission into courses close at the third full week of the semester.
  c) A student can withdraw from a course without penalty anytime upto and

including the seventh week of the semester. Any student who withdraws after the seventh week will be deemed to have failed except special cases approved by Senate.

- Continuous Evaluation

  The progress of the students enrolled in each course is continuously assessed by means of test, written assignments, report and/or such other means as may be appropriate and consistent with the objectives and conduct of the course as determined by the Department.

- Course Grades

  During the eighth week of each semester, students taking courses in the Faculty of Engineering will be advised of their progress by means of mid-semester grades based on their performance up to that time.

- Assessment of Industrial Training

  The total marks for the SIWES Programme is 100% and the criteria for evaluation is as follows:

  a) A log-book prepared according to specifications provided by the Faculty of Engineering and signed by a visiting Faculty Staff (30%).
  b) A final report prepared by the students on the experience (30%).
  c) An oral presentation of the activities during the six months period (40%)

- Examination

  a) Each course is normally examined at the end of the semester in which it is offered.
  b) The length of any examination shall be a period of not less than 1hour and not more than 3 hours.
  c) The Chief Examiner who is the Head of Department shall be responsible for all examinations in the department.
  d) The teacher of a course shall be the examiner and shall set the questions for co- examination, and for the Chief Examiner to moderate and countersign before submission of the Examination questions or results.
  e) The absence of the Examiner shall not affect the validity of the examination questions or results.

- Final Marks

  a) Each course shall be graded on the basis of 100 total marks with proportions for continuous assessment and semester examinations as determined by the appropriate Departments. In no case shall the proportion for continuous assessment be less than 30% or greater than 50%.
  b) The basis on which marks are determined shall be announced at the first meeting of each course and shall be available for ready reference in the Departmental Office. The minimum pass marks in any course shall be 40 marks and assigned appropriate letter grades and grade points as follows:

Marks (%)	Letter Grades	Grade Points
70–100	A	5.0
60-69	B	4.0
50-59	C	3.0
45–49	D	2.0
40–44	E	1.0
0–39	F	0.0

- Grading and Grade Points:

  All letter grades and grade points will appear on the report slips and permanent records. The following additional letters shall be used where appropriate:

AUD	Audited Course Only
EXE	Exempted
WTD	Withdrawal from course
INR	Incomplete
WSC	Weighted Score
GPA	Grade Point Average
SGPA	Semester Grade Point Average
CGPA	Cumulative Grade Point Average

After the seventh week of a semester, a student who fails to complete the requirements for any course owing to unforeseen reasons approved by the senate would be given the incomplete grade. Such a student could repeat the course without any penalty.

- No credit shall be awarded for any course in which a student fails. However, failed courses only, maybe repeated.
- There shall be no Resit Examination in any course in the Faculty of Engineering
- Transcripts of examination scores shall be issued to students as appropriate at the end of each semester.
- External Examiners shall be appointed to participate in the evaluation of all 500 level courses.
- Grade Point Average
  a) The Weighted Score (WS) shall be obtained by multiplying the grade point assigned to the letter grade obtained in each course by the number of units assigned to the course.
  b) The sum of the Weighted Scores divided by the total number of units in the Grade Point Average (GPA)
  c) The GPA Calculated for the courses in a given semester is the semester GPA (SGPA) and that calculated for all the courses taken to date is the cumulative GPA (CGPA)
- Academic Standing
  a) To make normal progress towards the degree, a student must obtain an SGPA of at least 1.0 each semester.
  b) Any student whose CGPA and/or SGPA at the end of any semester is less than 1.0 shall be placed on academic warning until CGPA is raised to at least 1.0.
  c) Any student whose SGPA/CGPA for any semester is less than 1.0 while on warning shall be placed on probation.
  d) Any student who fails to achieve an SGPA/CGPA of at least 1.0 during any semester while on probation will be asked to withdraw from the Engineering Faculty. Petitions presenting justification for re-admission after withdrawal for academic reasons may be presented to the Faculty for consideration.
- Students who transfer from other Faculties/Universities to the Faculty of Engineering may be credited with those courses passed before transfer which are within the curriculum of the Faculty of Engineering.
- Classification of Degree

The degree classification shall be based on the Cumulative Grade Point Average (CGPA) as follows:

Classification	CGPA
1st Class	4.50 – 5.00
2nd Class Upper	3.50 – 4.49
2nd Class Lower	2.40 – 3.49
3rd Class	1.50 – 2.39
Pass	1.00 – 1.49

2.11 O/Level, Utme & Direct Entry Reqirements

Courses	UTME subject	O/level Requirement	Direct entry Requirement
Chemical Engineering	English Language, Chemistry, Mathematics & Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry.	UNILAG DIPLOMA in Chemical Engineering or HND/ND (Distinction) or A'level Cambridge Plus O/L requirements
Civil & environmental Engineering	English Language, Chemistry, Mathematics & Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physics and Chemistry.	UNILAG DIPLOMA in Civil Engineering or HND/ND (Distinction) or A' level Cambridge Plus O/L requirements..
Computer Engineering	English Language, Chemistry, Mathematics & Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry.	UNILAG DIPLOMA in Computer Engineering or HND/ND (Distinction) or A'level Cambridge Plus O/L requirements.
Electrical & electronics Engineering	English Language, Chemistry, Mathematics & Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry.	UNILAG DIPLOMA in Elect. & Elect. Engineering or HND/ND (Distinction) or A' level Cambridge Plus O/L requirements.
Mechanical Engineering	English Language, Chemistry, Mathematics &Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry.	UNILAG DIPLOMA in Mechanical Engineering or HND/ND (Distinction) or A'level Cambridge Plus O/L requirement.
Metallurgical &Materials Engineering	English Language, Chemistry, Mathematics &Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry.	UNILAG DIPLOMA in MET & MAT Engineering or HND/ND (Distinction) or A' level Cambridge Plus O/L requirements.
Pet. & Gas Engineering	English Language, Chemistry, Mathematics & Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry.	UNILAG DIPLOMA in Pet. & Gas Engineering or HND/ND (Distinction) or A' level Cambridge Plus O/L requirements.

Surveying & Geoinformatics	English Language, Chemistry, Mathematics & Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry. (Geography is accepted in lieu of Chemistry).	UNILAG DIPLOMA in Surveying & Geoinformatics Engineering or HND/ND (Distinction) or A' level Cambridge Plus O/L requirements.
Systems Engineering	English Language, Chemistry, Mathematics & Physics.	Five O/L Credits in English, Mathematics, Further Mathematics, Physic and Chemistry	UNILAG DIPLOMA in Systems Engineering or HND/ND (Distinction) or 'A' level Cambridge Plus O/L requirements.

2.12 Examination Rules and Regulations

- The examination process starts at the very beginning of the semester after registration. Students are expected to register on-line for compulsory and elective courses at the beginning of each semester clearly stating the course codes and titles after due consultation with the course advisers. The University of Lagos employs the "Continuous Assessment Evaluation Policy."
- Each course is normally examined at the end of the semester in which it is offered.
- The length of any examination shall be a period of not less than one hour and not more than three hours.

2.12.1 Conduct before Examination

- Attendance of Lectures and records are usually kept by the Lecturer and all students should sign same after each lecture.
- Class-work, Tests, Seminars and Tutorials are given periodically which constitute an integral part of the examinations.
- Marks are ascribed to them and added to form the final marks of the students.
- To be eligible to write an exam, you must have attended at least 65% of the Lectures for the course, Examiners have the right to prevent defaulters from sitting for the examinations.
- Any student that registered for a course must sit for the examination; otherwise a score of zero would be given. The only extenuating reason is a Medical Report from the University Medical Centre.

2.12.2 Conduct during Examination

- Candidates must be ready to enter the examination hall ten minutes before the time the examination is due to start. Candidates who arrive more than half an hour after an examination has started shall be admitted only at the discretion of the invigilator(s).
- Candidates should not leave the hall during the first half and the last quarter of an hour of the examination.
- Candidates must bring with them to the examination hall their own biros, pens, pencils and erasers.
- All rough work must be done in the answer booklets and crossed neatly throughout.

- Communication between candidates is strictly forbidden.
- The only permissible way of attracting attention of the invigilator is by the raising of hand.
- Candidates are to write legibly. Names are not to be written on the answer booklets. The answers to each question must be on a separate/new page.
- Attendance register is to be signed at the commencement of the examination and as each candidate hands over his/her script to the invigilator.
- Candidates must ensure that they have indicated at the appropriate places on the front cover of their booklets, their examination numbers and the number of questions they answered.
- Mobile phones either switched on, or off are not allowed in the examination hall. Keep your mobile phones in the hostel. If you bring your mobile phone to the examination hall, it would be seized. Handbags of any sort are not allowed in the examination hall and the surroundings.
- Candidates are hereby informed that any student caught or implicated in any act of misconduct would automatically cease to continue with the examination until the case has been decided.

2.13 Grading System

- Each course is graded on the basis of 100 marks with proportions for continuous assessment and course examination as determined by the appropriate Faculty Board. Most Faculties however assign 30% to continuous assessment.
- The minimum pass mark in any course shall be 40%.
- Each course is graded out of a maximum of 100 marks and the score for each course assigned appropriate letter grades and grade points as follows:

Marks %	Letter Grade	Grade Points
70-100	A	5.00
60-69	B	4.00
50-59	C	3.00
45-49	D	2.00
40-44	E	1.00
0-39	F	0

2.14 Determination of Academic Standing

a) A student shall be in **good standing** as long as his cumulative G.P.A. and CGPA are not below 1.00.

b) A student shall be given a **warning** if his/her GPA is below 1.00.

c) A student shall be placed on **PROBATION if his/her GPA is below 1.00 for two consecutive semesters.** For Example Semester 1: GPA = 0.50; Semester 2: GPA = 0.85**: Probation**

d) If his/her GPA is below 1.00 for a third consecutive semester he/she will be asked to WITHDRAW. Example (continued).Semester 2: Probation: Semester 3: GPA = 0.95 = WITHDRAW

e) A student whose CGPA is below 1.00 but whose GPA is at least 1.00 will be given a **warning.** (Note that this will apply only to second semester 100 level students since their first CGPA at the end of the 2nd Semester could be less than 1.00 because of a very poor 1st semester GPA). Example: 1st Semester GPA = 0.50; 2nd Semester GPA = 1.00 CGPA = 0.80, **Warning**

f) A student whose CGPA is below 1.00 for two consecutive semesters but whose GPA is at least 1.00 will be placed on PROBATION. Example Semester 1: CGPA = 0.75, Semester 2: GPA = 1.20; CGPA = 0.80: Probation. If his/her CGPA remains below 1.00

for a third consecutive semester, he/she will be asked to withdraw. Example (continued) Semester 3: GPA = 1.40, CGPA = 0.90: Withdraw.

g) A student whose **CGPA** and **GPA** are both below **1.00** shall be placed on **PROBATION.** If his/her GPA is below 1.00 in the following semester he/she will be asked to **WITHDRAW**. Example Semester 1 GPA = 1.50, CGPA = 1.40: Good standing; Semester 2: GPA = 0.50, CGPA = 0.80: **Probation**: Semester 3: CGPA = 0.90**: Withdraw**

N.B: Please note that with effect from 2013/2014 academic session, a student shall be in good standing as long as his/her Cumulative Grade Point Average (CGPA) is 1.50

2.14.1 Conditions for Withdrawal (Summary)

Three consecutive GPAs less than 1.00, i.e. warning, probation, withdrawal. (see"c" above).

GPA and CGPA less than 1.00 then GPA less than 1.00 i.e. probation then withdrawal. (see "f" above).

CGPA less than 1.00 followed by GPA of at least 1.00 but CGPA still less than 1.00 then CGPA still less than 1.00, i.e. probation followed by probation then withdrawal (see "e" above).

2.14.2 For Direct entry student, applicable to the first year of entry

First Semester: GPA less than 1.00 therefore probation; if GPA is again less than 1.00 in the second semester the student will be asked to **withdraw.**

First semester: GPA is at least 1.00 but less than 1.00 in the second semester such a student will be placed on **probation**: if the GPA is again less than 1.00 in the following semester the student will be asked to **withdraw.**

First semester: GPA less than 1.00 therefore probation but if the GPA is at least 1.00 in the second semester and the CGPA is less than 1.00, the student will remain on **probation;** if the CGPA is still less than 1.00 in the next semester the student will be asked to **withdraw**.

2.15 Duration of Programme

With effect from the 2003/2004 session, the maximum time a student can spend on any undergraduate programme is as itemized below:

For a 3 year programme – 10 semesters or 5 sessions

For a 4 year programme – 12 semesters or 6 sessions

For a 5 year programme – 14 semesters or 7 sessions

For a 6 year programme – 16 semesters or 8 sessions

2.16 Transfer Students

For the avoidance of doubt, any student desiring transfer from one course to another shall not be admitted if it is certain that he cannot complete the programme and graduate within the stipulated period for the course.

2.17 Withdrawal from Course

A student can withdraw from a course without penalty any time up to and including the seventh full week of the semester. Any student who withdraws after the seventh week will be deemed to have failed except in special cases approved by senate.

2.18 Examination Misconduct

Any action which prejudices the integrity of the University Examinations shall be considered to be an academic misconduct and shall be punishable by appropriate disciplinary action. **Academic Misconduct** includes cheating in examinations, assignments, project or any other test used in judging students performance in the course of a programme of study.

Impersonating another student or entering into agreement with another person to be impersonated is an act of examination misconduct. The following are some of the

common academic misconducts and their penalties.

S/N	Misconduct	Penalty
1	Impersonation, Forgery	Expulsion
2	Physical attack or assault on invigilators	Expulsion
3	Coming to examination hall with prepared answer scripts.	Expulsion
4	Smuggling question papers out of examination hall for help and returning with answer script.	Expulsion
5	Being found in examination hall with jotted notes (cribs or chips) on body, under the locker or in the vicinity. Writing relevant materials on palms and other places	Rustication-4 semesters
6	Copying, exchange of sheets or question papers in the Examination hall.	Rustication-4 semesters
7	Consultation or soliciting or giving information or assistance	Rustication-2 semesters
8	Coming to examination hall with mobile phone(s)	Rustication-1 semester
9	Destruction of evidence (perverting of justice) and Mutilation of Matric No.	Rustication-4 semesters
10	Failure to appear before the misconduct panel.	Suspension-2 semesters after which non-appearance leads, to Expulsion.
11	Rude and disorderly behavior in the examination hall.	Rustication-2 semesters
12	Failure to submit answer script at the end of examination.	Rustication-2 semesters
13	Failure and /or refusal to fill the Examination Misconduct Form when apprehended.	Rustication-2 semesters

2.19 Social Misconducts and Penalties

S/N	Misconduct	Penalty
1	**Sexual Misconduct**	
	Sexual Harassment: This is an act of unwelcome social advances, requests for sexual favours and other verbal or physical conduct directed to a person because of his/her sex.	
	Behaviours that may constitute sexual harassment:	**2 semesters**
	▪ Unwelcome verbal harassment of a sexual nature.	**2 semesters**
	▪ Unwelcome pressure or sexual activity, plating, pinching or physical contact.	**2 semesters**
	▪ Unwelcome sexual behavior or words including demands for	**2 semesters**

	sexual favours accompanied by implied or other threat concerning an individual. ▪ Unwelcome behavour, verbal or written words or symbols directed at an individual because of gender. ▪ Non-consensual Penetration.	**Expulsion**	
2	**Monetary/Property Misconduct** University Policy requires all students and groups to respect the money, property, valuables and services of others (including that of the University). Monetary/Property misconduct is a broad term that includes but not limited to the following: ●Act of intentionally taking or appropriating the money, property, valuable, services of another. ●Unauthorized possession and use of the money, Property, valuable, services of another; ●Unauthorised conversion and/or use of the money, Property, valuable, services of another. ●Wrongful appropriation or possession of the	2 semesters plus restitution.	
	money, Property, valuables, services of another. ●Willful destruction of University property.		
3	**Weapons, Firearms And Explosives Misconduct** It is against Laws of the Federal Republic of Nigeria, Lagos State Laws, and University of Lagos Policy, to possess and/or use weapons, firearms and explosives on University of Lagos property. Students are not permitted to possess and/or use on campus any weapon, firearms and explosive of any kind, including but not limited to guns (of any kind), Pistols (of any kind), rifles (of any kind), sword, machets, axe, daggers, switchblade knife, knife (other than for domestic usage), blackjack, metallic knuckles and the likes. Any violation while on any University property will amount to misconduct accordingly:		
	▪ Being in possession or custody; ▪ ▪ Use, attempt to use, or threat of use		4 semesters Expulsion
	Ownership of a permit does not constitute		

	authorization or defence to violate the University Policy, as no weapon, firearms, and explosives is permitted on University of Lagos property.	
4	**Drug and Drugs Related Misconduct** University of Lagos prohibits members of its community, Individuals, students and groups from manufacturing, selling, delivering, distributing, possessing, using, or being under the influence of any controlled substance without legal authorization, Controlled substance includes any drug, substance or immediate precursion under Federal or Lagos State Laws, including but not limited to opiates, barbiturates, amphetamines, marijuana, and hallucinogens.	Expulsion
5	**Molestation/Coercion** Conduct by any means that is sufficiently severe, pervasive or persistent and objectively offensive so as to threaten an individual	2 semesters
6	**Disruption of Peace** **Assault:** This includes unwanted physical contact As well as fighting and physical altercations.	2 semesters
	Disorderly conduct such as: ▪ Drunkenness ▪ Exhibitionism ▪ Indecent exposure ▪ Dangerous driving ▪ Any other act that can disrupt peace on campus.	2 semesters
7	**Illegal Use or Possession of Univerrsity Documents (other related property):** Forgery, alteration or unauthorized use of University documents e.g. letter head, records, keys and students identification.	Expulsion
8	Cyber Offence of any nature ▪ "Yahoo Yahoo" ▪ Posting naked pictures on internet.	Expulsion

2.20 Registration

The candidate signs and returns his/her letter of acceptance as he/she is admitted. Registration of the candidate then commences (see Figure 1). After registration the candidate is then qualified to be refereed to as a student of the University of Lagos.

Online course registration starts at the beginning of each semester and ends three weeks into the semester.

You are allowed to delete courses online without any consequences within the first seven weeks of

a semester. Make sure that the course adviser is informed appropriately with such changes.

There is no provision for withdrawal after the seventh week. Such a case can only be approved by the senate.

Fatigue Tester

Candidate receives admission letter from JAMB office (usually via JAMB's website). The name of the candidate will be published on the website.

↓

Candidate proceeds to designated screening centres with required documents (usually Multipurpose halls by the University gate)

↓

Candidate pays school fees to Unilag approved bank(s) and collects bank teller

↓

Candidate fills bio-data online on Unilag website using information from the documents collected from bank(s)

↓

Candidate proceeds with forms and bank teller to Faculty Office for registration

↓

Candidate completes registration material after consultation with course adviser and sign course forms with Adviser and HOD.

↓

Candidates submits filled course form (printed from Unilag website to Course Adviser. Other registration) material are also submitted at the same time to the Course Adviser (Please ask the Departmental Secretary for your Course Adviser)

↓

Candidate matriculates (usually at the Multipurpose hall or university auditorium near the Senate building)

Fig. Flow Chart showing pathway to registration for a new student at University of Lagos

After registration, student must liaise with his or her Course Adviser at all times for clarification as appropriate (or may be necessary).

2.21 General Guidelines for Inter/Intra Faculty Transfer

2.21.1 Eligibility for Transfer

- Any candidate for transfer must satisfy the following conditions:
- Should apply to the Director, Directorate of Academic Affairs Division through his/her Course Adviser, Head of Department and the Dean.
- Must present his/her results showing the current CGPA.
- Must have obtained a CGPA of not less than 1.50 at the end of 200 level. (Applicable to students admitted as from 2013/2014 academic session while a CGPA of not less than **1.00** for returning students).
- Must possess the pre-requisite Ordinary/Advanced level subjects for admission into the intended programme.
- Must have successfully completed 200 level.
- Students who have been granted transfer in the past need not apply.

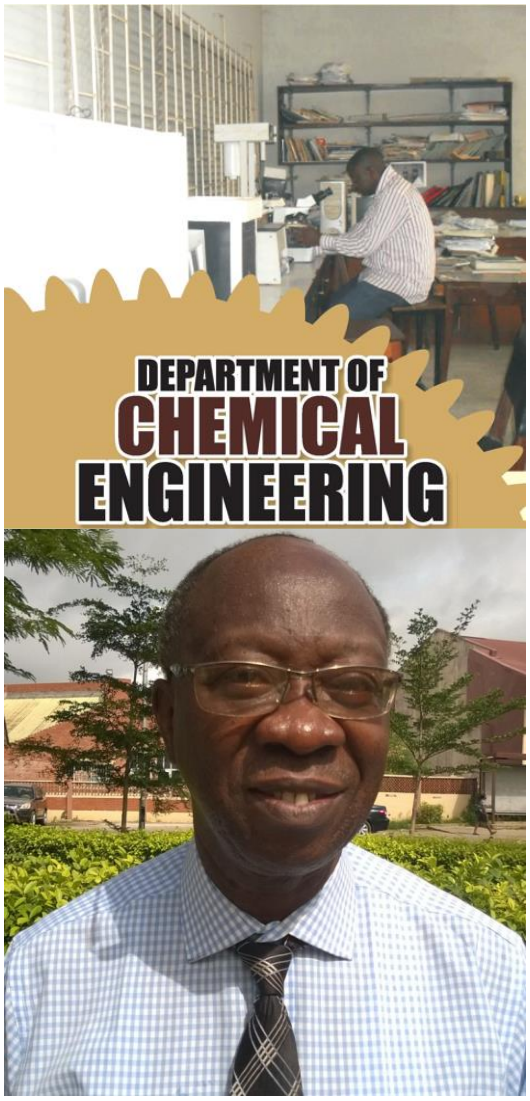
2.21.2 Permissible Areas of Transfer

From	To
Faculty of Engineering	Faculty of Business Administration (Actuarial Science) Faculty of Science. Faculty of Education (Science & Technology).

2.22 Minimum Number of Units for Graduation

Department	5 Years (UTME)	4 Years (Direct Entry) OND, A Level, Dip II	3 Years (HND Direct Entry)
Mechanical Engineering	185	153	100
Chemical Engineering	184	149	106
Pet & Gas Engineering	184	149	106
Civil & Environmental Engineering	173	147	115
Electrical & Electronics Engineering	167	141	107
Computer Engineering	167	141	107
Systems Engineering	175	151	120
Metallurgical & Materials Engineering	191	156	94
Surveying & Geoinformatics	180	154	111

Departments



Professor A. O. Denloye
B.Sc., Ph.D.(Birm)
Head

3.1.1 History of the Programme

3.1.1.1 What is Chemical Engineering?

Chemical engineering involves the application of physics, chemistry, biochemistry, and mathematics leading to the conversion of raw materials into essential products, such as plastic parts for automobiles, biomaterials, therapeutic proteins and other drugs, processed foods, computer chips, paints, fibres, semiconductors, adhesives, biopolymers, specialized fuels, solar cells, and ceramics. The chemical engineer continues where the chemist stops taking laboratory results or conceptual ideas and turning them into value added products in a cost effective, safe and environmentally friendly manner. A chemical engineer's skills and training find application in pollution control, artificial kidney production, oil refining and many more.

The scope of chemical engineering education at the University of Lagos is so wide such that graduates of the department make their living from a broad scope of activities. Our graduates are found in small, medium and large scale manufacturing industries; petroleum industry; pharmaceutical industry, consulting; development/ management of industrial information systems; energy & environment management; engineering education; industrial law; and bioengineering services. Some are known to have excelled in other endeavours such as government service; banking and finance; sports; music; non-profit organizations; public relations; fashion design; and politics.

3.1.1.2 History of Chemical Engineering in University of Lagos

The Department was established in October 1973 with an intake of fifteen students for the three-year Bachelor of Science Honours Degree course with the GCE A-Level entry qualification. This pioneering set graduated in June 1976. The programme has since then been modified to a five year-course with the Senior Secondary School Certificate or GCE O-Level certificate as entry qualification; or four year-course with the GCE A-Level entry qualification. Beginning from the 1982/83 session, the 5-year programme has been characterized by the Unit Course System. The programme became more intensive, as courses are assessed on continuous basis thus making it possible to closely monitor students' performance since subject materials are taught in smaller doses and examined in greater depth. In 2001, the Department commenced admission of graduates of the University of Lagos Foundation (formerly Diploma II) Program into the second year.

The Petroleum and Gas Engineering Programme was established in 2001/2002 academic session with an intake of thirty students for the 5-year Bachelor of Science Honours Degree course and the first set graduated in2006/2007 session.

The academic programmes offered by the Department lead to the award of B.Sc. (Honours) degree in Chemical Engineering and B.Sc. (Honours) degree in Petroleum and Gas Engineering at the undergraduate level. The two programmes are accredited by the Council for the Regulation of Engineering in Nigeria (COREN) and the National University Commission (N.U.C.).

At the Post Graduate level, the degrees awarded are: Post Graduate Diploma (PGD), Master of Science (M.Sc.), Master in Process Engineering (M.P.E.), Master of Philosophy (M. Phil.) and Doctor of Philosophy (Ph.D.) all in Chemical Engineering.

3.1.2 Philosophy and Objectives of the Programmes

The Department of Chemical Engineering at the University of Lagos has the objective "to produce graduates with relevant knowledge and skills to operate and to develop the private sector and the public service, to initiate and carry out engineering designs, to engage in industrial management and to pursue research and development activities".

As a result of the fact that Nigeria is a developing country, our graduates are provided with a wide range of general engineering education, more than is common in long – established industrial communities of Europe and North America. At the end of their training, our graduates are expected to be well versed in theory and practice and to be capable of taking on full professional responsibilities shortly after qualification.

3.1.2.1 Philosophy

*To develop and provide engineering education geared towards the achievement of national goals and objectives of industrialization and self reliance

* The provision of training in theory and practice of Engineering

* Early introduction of students to entrepreneurial education and training

* Acquisition of practical industrial experience through partnership with local industries.

3.1.2.2 Objectives

- *To produce graduates with adequate knowledge and skills that can perform the following:*
- ** Work in both the private and public sector of the economy*
- *Initiate and carry out engineering designs and studies*
- *Engage in the management of industrial production operations*
- *Pursue Research and Development activities*

3.1.3 Graduation Requirements

To be eligible for the award of a degree, a student must meet the following minimum requirements coupled with sound moral character.

S/N	Requirement units	Chemical	Pet & Gas
1	University Requirements (GSTs)	10	10
2 (i)	Faculty Requirements	54	54
(ii)	Departmental Requirements	126	130
	Total	190	194

- *In order to be eligible for an award of a degree a student admitted for a five-year programme must successfully complete a minimum total of 184 Units and must pass all compulsory courses and the University required courses.*
- *In order to be eligible for and award of a degree, a student admitted through direct entry into 200 – level must successfully complete a minimum total of 149 Units and must pass compulsory courses and University required courses.*
- *In order to be eligible for an award of a degree, a student admitted through direct*

entry into 300-level must successfully complete a minimum total of 114

- *Units and must pass compulsory courses and University required courses.*

3.1.4 Course Structure and Outline for B.Sc. (Hons) Chemical Engineering

3.1.4.1 Course Structure

100 Level: First Semester

Course Code	Course Title	Units	Type
FSC102	Introductory Chemistry I	3	C
FSC105	Introductory Physics I	3	C
GEG101	Engineering Pure Mathematics I	3	C
GEG103	Engineering Applied Mathematics I	3	C
GST102	Intro. Logic of Philosophy	2	C
GST105	Use of English I	2	C
MEG101	Workshop Practice I	2	C
Total		18	

100 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHM101	Introductory Chemistry	4	C	-
CHM102	Chemistry Practical I	2	C	-
GEG102	Engineering Pure Mathematics II	3	C	GEG 101
GEG104	Engineering Applied Mathematics II	3	C	GEG 103
MEG102	Workshop Practice II	2	C	-
MEG104	Engineering Drawing	2	C	-
PHS101	Introductory Physics II	3	C	-
PHS102	Introductory Physics III	3	C	-
PHS103	Physics Practical	2	C	-
Total		24		

200 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG201	Transport Phenomena I	3	C	-
CHG203	Chem. Eng. Proc. Analysis I	2	C	-
CHM201	Basic Inorganic Chemistry	4	C	CHM 101 FSC 102
CHM203	Basic Organic Chemistry	4	C	CHM 101 FSC 102
CHM204	Experimental Chemistry II	2	C	CHM 102
GEG201	Engineering Mathematics I	3	C	GEG 101,GEG 102
CEG201	Mechanics of Materials I	3	C	-
GST201	General African Studies I	2	C	-
Total		23		

200 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG202	Introduction to Chemical Eng. Operations	2	C	-
CHG204	Chemical Engineering Process Analysis II	2	C	CHG 203
CHM202	Basic Physical Chemistry	4	C	CHM 101 FSC 102
CHM205	Experimental Chemistry III	2	C	CHM 101 FSC 102
GEG202	Intro Eng. Statistics& Computer System	3	C	-
GST103	Nig. Peoples History & culture	2	C	-
TotaL		15		

300 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG301	Transport Phenomena II	2	C	CHG 201
CHG303	Separation I	3	C	CHG 202 CHG203
CHG305	Chemical Engineering Laboratory I	2	C	CHG 201,202,203
GEG301	Engineering Mathematics II	3	C	GEG 201
EEG201	Fundamentals of Electrical Engineering I	2	C	-
EEG201	Fundamentals of Electrical Engineering I Lab.	1	C	-
MME309	Science of Materials	3	C	-
MME311	Introduction to Corrosion of Metals	3	C	-
MEG311	Mechanical Engineering Technology	3	C	-
CHM303	Methods of Chemical Analysis	2	C	CHM 205
Total		24		

300 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG302	Transport phenomena III	3	C	CHG 201 CHG 301
CHG304	Separation II	3	C	CHG 202 CHG 303
CHG306	Chemical Engineering Thermodynamics I	3	C	CHG 204 CHM 202
CHG308	Chemical Reaction Kinetics	3	C	CHG 202
CHG310	Chemical Engineering Laboratory II	2	C	CHG 305, 301, 303
GEG302	Operational Methods I	2	C	GEG 202 GEG301
Total		16		

400 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG401	Industrial Chemistry I	3	C	CHM 201, 202,203
CHG403	Chemical Reaction Engineering	3	C	CHG 308
CHG405	Principles of Plant Design I	3	C	CHG301, 302,303
CHG407	Chemical Engineering Analysis	3	C	CHG 302
CHG409	Introduction to Biochemical Engineering	3	C	
CHG411	Chemical Engineering Thermodynamics II	3	C	CHG 306
CHG413	Chemical Engineering Laboratory III	2	C	CHG 305 CHG 310
GEG401	Technical Communications	1	C	-
GST307	Entrepreneurship& Corporate Governance	2	C	-
Total		23		

400 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG400	Industrial Training	6	C	-
Total		6		

500 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG501	Process Dynamics & Control	3	C	CHG 407
CHG503	Transport Phenomena IV	3	C	CHG 302 CHG 304
CHG505	Chemical Engineering Process Design I	3	C	CHG403, 405,411,407
CHG507	Chemical Eng. Research Project I	3	C	-
CHG509	Chemical Eng. Entrepreneurship	2	C	CHG 415
CHG511	Principles of Plant Design II	2	C	CHG 405
GEG501	Engineering Economics	2	C	-
Total		18		
CHG513	Petroleum Reservoir Engineering	3	E	-
CHG515	Introduction to Polymer Engineering	3	E	CHM 203 CHM303
CHG517	Pulp & Paper Technology	3	E	-
CHG519	Environmental Pollution Eng.	3	E	-
Total		21 (Max.)		

KEY: "C" Implies compulsory course
"E" Implies Elective course

500 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG502	Process Optimization	3	C	CHG 407
CHG504	Industrial Chemistry II	3	C	CHG 401
CHG506	Chemical Eng. Process Design II	3	C	CHG 505
CHG508	Chemical Eng. Research Project II	3	C	CHG 507
CHG510	Biochemical Engineering	3	C	CHG 409
GEG502	Law and Management	2	C	-
Total		17		
CHG512	Sugar Technology	3	E	-
CHG514	Petrochemical Science & Technology	3	E	CHM203 CHM403
CHG516	Polymer Processing	3	E	-
TotaL		20 (Max.)		

KEY: "C" Implies compulsory course

"E" Implies Elective course

3.1.5 Course Outline

3.1.5.1 100 Level

FSC 102 Introductory ChemistryI (3, 0)

Measurement and Precision. Hypothesis.Theory and Law with appropriate illustration.Nature of matter – the states of matter, atomic structure electronic energy levels and orbitals, per classification of elements and its relationship to their electronic configurations. Mole concept and calculations based on it, including application to titrimetry balancing of equation by electron transfer method. Types and chemical reactions stoichiometric calculations, different methods of expressing concentrations of solutions Chemical kinetics and equilibria, and related simple calculations, important applications of equilibria like pH, solubility, product and solubility of ionic solids. Thermochemistry and simple calculations based on Hess's Law. Electrochemistry and working of various cells, brief mention of corrosion. Organic chemistry: simple reactions of hydrocarbons alcohols and acids, petroleum chemistry, oils and fats, hydrogenation of oils, Polymer and biologically important molecules.

FSC 105 Introductory Physics I (3, 0)

Physical quantities, standards and units, Kinematics: uniform velocity motion, uniform acceleration motion. Dynamics: Newton's laws of motion. Newton's universal law of gravitation.Work, energy, conservation laws.

Concept of mechanical equilibrium. Centre of mass and centre of gravity. Moment of a force. Rotational motion, angular momentum and torque. Total mechanical energy; elasticity, Hooke's laws, Young's shear and bulk modulus Hydrostatics: pressure, buoyancy, Archimedes principle. Elements of hydrodynamics. Molecular properties of fluids, viscosity, surface tension, adhesion, cohesion, capillarity, drops and bubbles.Temperature and Zeroth law of thermodynamics. Quality of heat. Heat transfer. Gas laws. First and second laws of thermodynamics. Application to kinetic theory of gases.

CHM 101Introductory Chemistry II (0, 4)

Chemical bonding: ionic, covalent, coordinate, metallic, hydrogen and van der Waals forces. Bond energy and bond angle. Shapes of simple covalent molecules. Gaseous state – ideal and non-ideal behaviour. Solutions – types of solution, solubility and vapour pressure.Simple treatment of Chemical thermodynamics: Internal energy change ΔU, enthalpy change, ΔH, entropy change, ΔS and free energy change, ΔG and the relationship between them ($\Delta G = \Delta H - T\Delta S$) and applications of the equation. Trends in the physical and chemical properties of elements and their compounds (oxides, hydrides, hydroxides and chlorides) in periods of the periodic table.

Transition metals – first row only. Characteristic properties of the elements and their ions. Introductory radioactivity.

Organic Chemistry – alcohols, acids, esters, aldehydes, ketones (aliphatic and aromatic), polymers and biologically important molecules.

CHM 102 Chemistry Practical I.(0, 2)

Practicals in inorganic and organic chemistry

A. **Inorganic Practical**: Two main sections: Qualitative and Quantitative

1. Qualitative inorganic practicals consist of identification of ions (anions and cations) in solution.
2. Quantitative inorganic practicals are only by volumetric analysis. Practice in volumetric analysis includes acid-base, redox and precipitation titrations.

B. **Organic practicals** involve reactions of simple functional groups, simple preparations, recrystallisation and determination of m.pt of organic compounds.

PHS 101 Introductory Physics II (0, 2)

Prerequisite: FSC 105 or Credit in O.L. Physics Geometrical Optics; law of reflection and refraction. Location of images. Plane and curved mirrors. Converging and diverging thin lenses. Aberrations. The eye. Optical instruments.Simple Harmonic motion. Wave motion and wave types. Dispersion. Production of sound in strings and pipes resonance; applications. Simple descriptions of diffraction and interference, applications to both light and sound waves. Polarisation of transverse waves.Atomic structure. Production and properties of X-rays. Radioactivity, Photoelectric emission.

PHS 102 Introductory Physics III (0, 2)

Prerequisite: FSC 105 or Credit in O.L. Physics

Electrostatics, potential and capacitance, dielectrics, production and measurement of static electricity. Current, Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters.D.C. circuits, sources of emf and currents, Kirchhoff's laws. Electrochemistry. The Earth's magnetic field. Magnetic fields and induction. Faraday's and Lenz's laws. Force on a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators.

PHS 103 Introductory Practical Physics (0, 2)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 and PHS 102 theoretical courses.

GEG 101: Engineering Pure Maths I (3, 0)

Axiomatic Set theory, Operations on Set, Boolean Algebra, Switching circuits, logic circuits and propositional logic. Transfinite induction and recursion. Cosequences of axioms of choice. Sequences. Mononic sequences and convergence, Caychy criteria. Series. Power series. Tests for convergence. Taylor's series, operations on power series. Limits continuity and Differntiability. Mean value theorems. Techniquesand applications of Differentiation. The definite integral. Fundamental theorems of integral Calculus. Techniques and applications of integral calculus. Improper integrals.

GEG 102 Engineering Pure Maths II (0, 2)

The real and the complex number systems. Mathematical induction matrices and determinants. Complex numbers: representations and algebra. Complex functions. Roots of Unity. De-Moivres theorem and applicatios.

Basic matrix theory and algebra. Systems of linear equations: elementary row reduction, types and methods of solution echelom form. Applications ofmatrices. Introduction to systems of inequalities and linear programming.

GEG 103 Engineering Applied Mathematics I (3, 0)

Representation of vectors: Resultant of several vectors in Euclidean space: lines, places and spheres. The dot and cross products. Direction cosines. Differentiation of vector functions. Lami's theorem. Polygon of forces. Conditions of equilibrium of coplanar forces. Newton's laws of motion. Analytical treatment of static equilibrium of particles and rigid bodies.

Distributed forces. Centroids and centres of gravity. Moments of inertia. Analysis of structures nand trusses. Forces in beams and tables. Friction.

GEG 104 Engineering Applied Mathematics II (0, 2)

An introduction to kinematics and kinetics of a particle, systems of particles and rigid bodies. Energy and momentum methods. Applications. Impulsive. Motions. Motion of rigid body (i) about a fixed axis (ii) in a plane. Equations of motion.

MEG 101 WORKSHOP PRACTICE I.(1, 1)

Introduction to basic equipment in wood, machine and welding workshops. Element of safety practice with various tools used in the workshops. Discussion of general safety precautions. General principles governing the various workshops machines. Selection and use of tools for specific operations in the various workshops. Practical demonstration of use of tools and machines in performing basic workshop processes.

MEG 102 Workshop Practice II. (1,1)

Introduction to more advanced machinery and equipment in the workshops. Introduction to sketching and labeling of machine parts and tools. Emphasis is laid on the ability of students to be able to completely handle standard workshop equipment.

Machining: Practical works on machines for the purpose of carrying out individual projects. Detection of faults in work pieces. Fitting: Shaping and finishing of metallic objects. Welding: Preparation of pieces for welding, visual observation of welds etc.

Woodwork: Introduction to constructional technique of woodwork joints.

Simple individual projects in different aspects of workshop practice.

MEG 104 Engineering Drawing (1, 1)

Introduction to drawing instruments and their proper use. Use of scales, line-work and lettering. Geometrical constructions including tangents, normals, polygons, etc. Loci, including paths of point of simple mechanisms and cam profiles.Orthographic projections of simple objects in first and third angles. Isometric and oblique projections. Isometric projections from orthographic projections.

PHS 101 Introductory PhysicsII (3, 0)

Prerequisite: FSC 105 or Credit in O.L. Physics

Geometrical Optics; law of reflection and refraction. Location of images. Plane and curved mirrors. Converging and diverging thin lenses. Aberrations. The eye. Optical instruments. Simple Harmonic motion. Wave motion and wave types. Dispersion. Production of sound in strings and pipes resonance; applications. Simple descriptions of diffraction and interference, applications to both light and sound waves. Polarisation of transverse waves. Atomic structure. Production and properties of X-rays. Radioactivity. Photoelectric emission.

PHS 102 Introductory Physics III (3, 0)

Prerequisite: FSC 105 or Credit in O.L. Physics

Electrostatics, potential and capacitance, dielectrics, production and measurement of static electricity. Current, Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters. D.C. circuits, sources of emf and currents, Kirchhoff's laws. Electrochemistry. The Earth's magnetic field. Magnetic fields and induction. Faraday's and Lenz's laws. Force on a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators.

PHS 103 Introductory Practical Physic (0,2)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 and PHS 102 theoretical courses

3.1.5.2 200 Level

CHG 201 Transport Phenomena I.(3,0)

Units and Dimensions; Properties of Fluids; Momentum and Energy Equations; Vortex Motion In Liquids; Friction; Types of Flow; Flow in Open Channels; Dimensional Analysis; Flow Measurement Devices; Pumps, Compressors, Valves and Piping.

CHG 202 Introductory Chemical Engineering Operations (2,0)

Introduction to Chemical Engineering Unit Operations (distillation, gas absorption, dehumidification, adsorption, liquid extraction, leaching, crystallization, desorption etc.) and Ancillary Facilities; Diffusion processes and equilibrium stages identification. Mass transfer theories. Heat transfer and its applications in unit operations. Chemical Engineering Process Flow Charts and Process Symbols.

CHG 203 Chemical Engineering Process Analysis I (2,0)

Introduction to Chemical Engineering and the Basic Operations of Industries; Introduction to Process Calculations; Important Chemical and Physico-Chemical Data for Process Analysis; Industrial Chemical Reactions and Reaction Stoichiometry; Techniques for Solving Problems and Simple Mathematical Tools Required; Principles of Conservation of Matter and its Application to Industrial Processes – Material Balances; Use Of Direct Solution and Substitution Algebraic Techniques for Solving Material Balance Problems; Recycle, Bypass and Purge Streams; Properties of Fluids and Solids; Principles of Conservation of Energy and Applications to Simple Industrial Processes – Energy Balances; Enthalpy Changes with and without Phase Changes.

CHG 204 Chemical Engineering Process Analysis II (2,0)

Energy Balances with Chemical Reaction; Heats of Solution and Mixing. The Use of Various Forms of Thermo chemical, Chemical Kinetics and Physical Data; Use of Various Forms of Data Plotting Ternary Diagrams (Log-Log, Semi-Log plot etc) Enthalpy – Concentration Charts; Humidity Charts and their Uses; Simultaneous Material and Energy Balances.

3.1.5.3 300 Level

CHG 301 Transport Phenomena II (2,0)

Fluid Flow: Flow In Pipes and Nozzles; Flow in Open Channels; Mass Transfer: Fick's Law; Diffusion in Stationary Media; Additivity of Resistances; Diffusion of Vapour; Cooling Tower Design: Psychometric Charts; Estimation Of Tower Heights; Humidifying Tower; Drying Mechanisms; Estimation Of Drying Periods; Description and Function of Industrial Dryers.

CHG 302 Transport Phenomena III (3,0)

Conduction: The Fourier Equation and Application to Composites. Cylinders and Spheres. Analytical and Numerical Solutions of Steady and Unsteady State Conduction Equations.

Convection: Principles of Free and Forced Convection. Determination of Film Transfer Coefficients. Heat Exchanger Design. General Diffusion and Convective Equations – Navier Stokes Equations, Problems Formulation and Solution.

Radiation: Mechanism of Radiative Heat Transfer, Shape Factors, Heat Exchange between Radiating Surfaces, Radiating Networks. Boiling and Condensation: Different Phases of Boiling, Heat Flux Relations. Film and Dropwise Condensation, Film Transfer Coefficient, Condensation Number, Boiler Design.

CHG 303 Separation Processes I (3,0)

Stoke's and Newton's Laws: Flow in particle beds. Characteristics of packed columns. Estimation of fluidisation point and bed expansion. Regions of fluidisation. Pressure drop, heat and mass transfer in fluidised beds. Sedimentation, flocculation, filtration, centrifuging and electrostatic precipitation.

CHG 304 Separation Processes II (3,0)

Physical properties of importance to separation processes. Stagewise exchange and equilibrium stages. Leaching and extraction with immiscible solvents. Binary distillation. Continuous contact columns, NTU and HTU. Application to hydrodynamic limitation and performance data.

CHG 305 Chemical Engineering Laboratory I (2,0)

Distribution coefficient, cooling tower, sedimentation, fluid flow in packed columns, flow measuring apparatus.

CHG 306 Chemical Engineering Thermodynamics I (3,0)

First law of thermodynamics. Second law, Isothermal, isentropic, polytropic compression. Carnot efficiency, thermodynamic cycles, refrigeration, steam and gas turbines, jets and rockets. PVT relationships, equilibria, immiscible and partly miscible systems.

CHG 308 Chemical Reaction Kinetics (3,0)

General principles of experimental techniques. Homogeneous reactions. Interpretation of kinetic data. Kinetics of homogeneous reactions. Kinetics of heterogeneous catalytic reactions. Kinetics of heterogeneous non-catalytic reactions.

CHG 310 Chemical Engineering Laboratory II (2,0)

Fluid circuit system; Saponification in a batch reactor; Vortex tube; Fluid particle system; Double pipe heat exchanger.

3.1.5.4 400 Level

CHG 400 Industrial Training (0,6)

Students Industrial Work Experience Scheme (24 weeks - one semester plus long vacation)

CHG 401 Industrial Chemistry (3,0)

Encyclopaedic review of the manufacturing processes of various heavy chemicals and intermediates. These include sulphuric, hydrochloric, and nitric acids; ammonia, caustic soda, soaps and detergents; petrochemicals; fertilizers; cement; pulp and paper; industrial fermentation processes and metal processing. Processes and systems in chemical technology. Sources of raw materials and requirements of energy. Engineering problems involved in the management of materials and energy.

CHG 403 - CHEMICAL REACTION ENGINEERING I (3,0)

Classification of chemical reactions and reactors. The rate equation. Ideal reactor concept. Design equations for batch and flow (CSTR and PFR) reactors. Multiple reactions and reactor systems. Reactor design calculations under isothermal and non –isothermal conditions.

CHG 405 Principles Of Plant Design I (3,0)

Process design principles. Flowsheets. Chemical engineering design of mass and heat transfer equipment (plate columns, absorption towers, distillation column, heat exchangers, vessels, columns, storage tanks, heat exchangers, *et cetera*.). Piping and instrumentation. Costing and project evaluation.

CHG 407 Chemical Engineering Analysis (3,0)

Use of mathematical tools for the analysis of chemical engineering operations. Process modeling and dynamic analysis. Statistical tests, regression analysis. Design of Experiments.

CHG 409 Introduction To Biochemical Engineering (3,0)

Aspects of microbiology and biochemistry of interest to fermentation and food industries. Classification and growth characteristics of micro-organisms. Physico-chemical properties of biological compounds. Metabolism and biochemical kinetics.

CHG 411 Chemical Engineering Thermodynamics II (3,0)

The Euler equation, Gibbs-Duhen equation. Phase equilibria. Partial molar quantities. Gaseous and liquid non-reactive multicomponent systems. Chemical equilibria-multicomponent, multiphase systems. Phase transitions.

CHG 413 Chemical Engineering Laboratory III (2,0)

Laboratory experiments designed to teach basic and advanced laboratory techniques and practices in chemical engineering. Design of experiments. Errors in measurement of experimental results. Selected experiments in heat transfer, mass transfer, simultaneous heat and mass transfer, chemical reaction engineering, biochemical engineering, process dynamics and control.

3.1.5.5 500 Level

CHG 501 Process Dynamics and Control (3,0)

Introductory concept: Introduction to process dynamics and control, Review of mathematical tools needed for modeling and simulation.

***Process Dynamics*:** Review of Laplace transforms. Transient behaviour of 1st, 2nd and higher order systems.

***Process Control*:** Basic components of the process control system and their characteristics. Closed loop transient response. Stability Analysis/Frequency Response Analysis. Design of feedback controllers-based on transient response criteria, Design of feedback controllers-based on frequency response criteria. Design of model based controllers such as IMC, DMC etc.

CHG 502 Process Optimization (3,0)

A chemical engineering treatment of the popular forms of the calculus of variations, maximum principle, dynamic programming, optimisation of staged systems. Optimum seeking methods. Network analysis and queuing theory.

CHG 503 Transport Phenomena IV (3,0)

Compressible flow and normal shock waves. Boundary Layer theory. Turbulence. Penetration theories. Application of mass transfer principles to multi-component separation process – solvent extraction, distillation of multi-component mixtures, extractive and azeotropic distillation, crystallization etc.

CHG 504 Industrial Chemistry II (3,0)

Examples of important industrial manufacturing processes. The manufacture of sulfuric acid, ammonia, nitric-acid. The manufacture of alcohols. Production of basic fertilizers. The chemical technology of fuels. Air pollution chemistry.

CHG 505 Chemical Engineering Process Design I (0,3)

A design problem involving the study of a chemical process. Preparation of flowsheets; heat and mass balances. Detailed design of some plant items. Economics, safety and environmental considerations.

CHG 506 Chemical Engineering Process Design II (0,3)

This is a continuation of CHG 505

CHG 507 Chemical Engineering Research Project I (0, 3)

Individual research projects under the supervision of academic staff. Projects focus as much as possible on national and industrial problems.

CHG 508 Chemical Engineering Research Project II (0, 3)

This is a continuation of CHG 507

CHG 509 Chemical Engineering Entrepreneurship (2,0)

Manufacturing and raw material availability. Research and Development. Sources of information. Patents, copyrights etc. Entrepreneurship/organization of business. Small scale business operations and problems. Venture capital, capital sources. Federal and State governments' regulation on chemical industries. Market research methods and feasibility reports. Small scale business case studies.

CHG 510 Biochemical Engineering (3,0)

Methods of solving processing problems imposed by both physical and biological factors in food industries. Theory and design of microbial culture processes in the manufacture of pharmaceutical and commercial enzymes, alcoholic beverages and biological waste treatment.

CHG 511 Principles Of Plant Design II (2,0)

General design considerations. Parameters for siting a plant. Process services (water, steam, compressed air, vacuum). Effluent treatment and waste disposal. Material handling, transportation and storage. Industrial hazards – safety, environmental pollution and legal implications. Process design-methodology for process design and presentation.

CHG 512 Sugar Technology (3,0)

Description of equipment and consideration of the unit operations involved in the manufacture

of refined sugar from sugar cane. Utilisation of the by-products of the refining operation. Safety, economic and environmental considerations. Energy Recovery.

CHG 513 Petroleum Reservoir Engineering (3,0)

Properties of Crude petroleum oil and gas. Composition of crude oil and natural gas. Classification. Classic properties of single and multiple fluid saturated rocks e.g. porosity, permeability and fluid saturation. Reservoir fluid behavior – PVT analysis, formation volume factors. Concepts of fluid flow through porous media. Testing of reservoirs and well completion. Concepts of petroleum production. Gas lifts, surface production equipment. Reservoir types. Estimating reserves, material balance equations. Steady state and transient flow in the reservoir.

CHG 514 Petrochemical Science And Technology (3,0)

The petroleum oil industry and its relevance to the petrochemical industry. The non-oil fossil fuels and their relevance to the petrochemical industry. Petrochemical precursors. Socio-economic, socio-political and geographical implications of the petrochemical industry. Planning petrochemical industry for a developing country.

CHG 515 Introduction To Polymer Engineering (3,0)

Polymer chemistry and polymerization systems. Polymer characterization, molecular weight measurements, configuration and conformation, transition temperatures, solid state properties, dynamic mechanical testing. Rubber elasticity, rheology. Polymer processing.

CHG 516 Polymer Processing (3,0)

Continuous processes: Calendering, single-screw extrusion, flow in dies, fibre spinning, film casting, film blowing. Cyclic operations: injection moulding, blow moulding, structural foam moulding, structural web moulding.

CHG 517 Pulp and Paper Technology (3,0)

Structural, physical and chemical properties of raw materials for the industry. Preparation of pulpwood. Mechanical, Semi-Chemical, Chem-Mechanical, Sulphite, Sulphite/Kraft pulping processes. New laboratory pilot plant scale processes. Recovery processes of energy and chemicals from pulping processes residuals. Bleaching of pulps and stock preparation. Paper making and finishing operations. Economics and ecological aspects of paper manufacture.

CHG 518 Petroleum Refining Technology (3,0)

Petroleum processing equipment, storage tanks, rectification columns; heat exchange apparatus; pipe furnaces, pipelines and fittings; compressors and pumps. Preliminary processing. Thermal processes; thermal cracking; coking; pyrolysis. Catalytic processes; brief description; catalytic cracking; catalytic reforming; hydrogenation processes; hydrocracking.

CHG 519 Environmental Pollution Engineering (3,0)

Gaseous, liquid and solid pollutants, measurements, air pollution control, water pollution control, solid waste control. Design and objectives of pollution control systems. Case studies, waste recycling.

3.1.6 Course Outline for B.Sc. (Hons) Petroleum and Gas Engineering

100 level: First Semester

Course Code	Description	Units	Type	Pre-Requisite
FSC102	Introductory Chemistry I	3	C	-
FSC105	Introductory Physics I	3	C	-
GEG101	Engineering Pure Mathematics I	3	C	-
GEG103	Engineering Applied Mathematics I	3	C	-
GST102	Introduction toLogic of Philosophy	2	C	-

GST105	Use of English	2	C	-
MEG101	Workshop Practice I	2	C	-
Total		18		

100 Level: Second Semester

Course Code	Description	Units	Type	Pre-Requisite
CHM101	Introductory Chemistry	4	C	-
CHM102	Chemistry Practical I	2	C	-
GEG102	Engineering Pure Mathematics II	3	C	GEG 101
GEG104	Engineering Applied Mathematics II	3	C	GEG 103
MEG102	Workshop Practice II	2	C	-
MEG104	Technical Drawing II	2	C	-
PHS101	Introductory Physics II	3	C	-
PHS102	Introductory Physics III	3	C	-
PHS103	Physics Practical	2	C	-
Total		24		

200 Level: First Semester

Course Code	Description	Units	Type	Pre-Requisite
CHG201	Transport Phenomena I	3	C	-
CHG203	Chem. Engineering Proc. Analysis	2	C	-
CHM201	Basic Inorganic Chemistry	4	C	CHM 101 FSC 102
CHM203	Basic Organic Chemistry	4	C	CHM 101 FSC 102
CHM204	Experimental Chemistry II	2	C	CHM 102
CEG201	Mechanics of Materials I	3	C	-
GEG201	Engineering Mathematics. I	3	C	GEG 102
GST201	General African Studies I	2	C	-
Total		23		

200 Level: Second Semester

Course Code	Description	Units	Type	Pre-Requisite
GEG202	Intro to Eng. Statistics &Computer System	3	C	-
CHM202	Basic Physical Chemistry	4	C	CHM 101 FSC 102
CHG204	Chemical Engineering Process Analysis II	2	C	CHG 203
CHM205	Experimental Chemistry III	2	C	CHM 101 FSC 102
PGG202	Intro. To Petroleum & Gas Engineering	2	C	-
GST103	Nigerian Peoples & Culture	2	C	-
Total		15		

KEY: "C" Implies Compulsory Course

300 Level: First Semester

Course Code	Description	Units	Type	Pre-Requisite
GEG301	Engineering Mathematics II	3	C	GEG 201
EEG201	Fundamentals of Electrical Engineering. I	2	C	-
EEG209	Fundamentals of Electrical Eng. Practicals	1	C	-
MEG311	Mechanical Engineering Technology	2	C	-
MME309	Science of Materials	3	C	-
MME311	Intro to Corrosion of Materials	3	C	
CHG301	Transport Phenomena II	2	C	CHG 201
CHG303	Separation Processes I	3	C	CHG 202, CHG 203
PGG301	Structural Geology	2	C	-
PGG303	Petroleum Geology	2	C	-
PGG305	Petroleum Engineering Laboratory I	2	C	-
Total			25	

300 Level: Second Semester

Course Code	Description	Units	Type	Pre-Requisite
GEG302	Operational Methods I	2	C	GEG 202GEG301
CHG306	Chemical Engineering Thermodynamics I	3	C	CHG 204 CHM 202
PGG302	Fluid Flow Through Porous Medium	2	C	PGG 204 PGG 301
PGG304	Form. Evaluation & Geophy. Meth.	3	C	-
PGG306	Basic Petroleum Reservoir Engineering.	3	C	-
PGG308	Drilling Methods	3	C	-
PGG310	Petroleum Engineering. Laboratory II	2	C	PGG 305
GST307	Entrepreneurship/Corporate Governance	2	C	-
Total		20		

400 Level: First Semester

Course Code	Description	Units	Type	Pre-Requisite
GEG401	Technical Communications	1	C	-
CHG405	Principles of Plant Design I	3	C	CHG 301,302,303, 304
PGG401	Petroleum Reservoir Engineering	3	C	PGG 306
PGG405	Petroleum Production Engineering	3	C	-
PGG407	Pressure Build Up and Test Methods	2	C	PGG 303
PGG409	Gas Processing Equipment	2	C	-
PGG411	Gas Dynamics	3	C	-
PGG413	IntroductionTo Well Logging & Interpr.	2	C	-
PGG415	Petroleum Engineering Laboratory III	2	C	PGG 305, PGG 310
Total		25		

400 Level: Second Semester

Course Code	Description	Units	Type	Pre-Requisite
PGG400	Industrial Training	6	C	-
Total		6		

500 Level: First Semester

Course Code	Description	Units	Type	Pre-Requisite
GEG501	Engineering Economics	2	C	-
CHG501	Process Dynamics & Control	3	C	-
PGG501	Adsorption and Fractionation	3	C	-
PGG503	Refrigeration and Liquefaction	3	C	-
PGG505	Gas Transportation	2	C	PGG 409
PGG507	Research Project I	3	C	-
CHG509	Engineering Entrepreneurship	2	C	PGG 307 PGG417
Total		18		

Electives (at least one):

Course Code	Description	Units	Type
PGG509	Petroleum Reservoir Modeling and Simulation	3	E
PGG519	Environmental Pollution Engineering.	3	E
CHG515	Introduction to Polymer Eng.	3	E
Total		21 (Max.)	

500 Level: Second Semester

Course Code	Description	Units	Type	Pre-Requisite
GEG502	Law and Management	2	C	-
PGG502	Petroleum Economics	3	C	-
PGG504	Gas Sweetening and Sulphur Recovery	2	C	-
PGG508	Valves and Pipeline Design	3	C	-
PGG510	Gas Process Vessel & Equip. Design	3	C	PGG 409
PGG512	Research Project II	3	C	-
Total		16		

Electives (at least one):

Course Code	Description	Units	Type
CHG514	Petrochemical Science &Technology.	3	E
CHG518	Petroleum Refining Engineering.	3	E
Total		21 (Max.)	

3.1.7 Course Outlines

3.1.7.1 100 LEVEL

FSC 102 Introductory Chemistry I (3, 0)

Measurement and Precision. Hypothesis. Theory and Law with appropriate illustration. Nature of matter – the states of matter, atomic structure electronic energy levels and orbitals, per classification of elements and its relationship to their electronic configurations. Mole concept and calculations based on it, including application to titrimetry balancing of equation by electron transfer method. Types and chemical reactions stoichiometric calculations, different methods of expressing concentrations of solutions Chemical kinetics and equilibria, and related simple calculations, important applications of equilibria like pH, solubility, product and solubility of ionic solids. Thermochemistry and simple calculations based on Hess's Law. Electrochemistry and working of various cells, brief mention of corrosion. Organic chemistry: simple reactions of hydrocarbons alcohols and acids, petroleum chemistry, oils and fats, hydrogenation of oils, Polymer and biologically important molecules.

FSC105 Introductoryphysics I (3, 0)

Physical quantities, standards and units, Kinematics: uniform velocity motion, uniform acceleration motion. Dynamics: Newton's laws of motion. Newton's universal law of gravitation. Work, energy, conservation laws.

Concept of mechanical equilibrium. Centre of mass and centre of gravity. Moment of a force. Rotational motion, angular momentum and torque. Total mechanical energy; elasticity, Hooke's laws, Young's shear and bulk modulus Hydrostatics: pressure, buoyancy, Archimedes principle. Elements of hydrodynamics. Molecular properties of fluids, viscosity, surface tension, adhesion, cohesion, capillarity, drops and bubbles.Temperature and Zeroth law of thermodynamics. Quality of heat. Heat transfer. Gas laws. First and second laws of thermodynamics. Application to kinetic theory of gases.

CHM 101 Introductory Chemistry II (0, 4)

Chemical bonding: ionic, covalent, coordinate, metallic, hydrogen and van der Waals forces. Bond energy and bond angle. Shapes of simple covalent molecules. Gaseous state – ideal and non-ideal behaviour. Solutions – types of solution, solubility and vapour pressure.Simple treatment of Chemical thermodynamics: Internal

energy change ΔU, enthalpy change, ΔH, entropy change, ΔS and free energy change, ΔG and the relationship between them (ΔG = ΔH - TΔS) and applications of the equation. Trends in the physical and chemical properties of elements and their compounds (oxides, hydrides, hydroxides and chlorides) in periods of the periodic table. Transition metals – first row only. Characteristic properties of the elements and their ions. Introductory radioactivity.

Organic Chemistry – alcohols, acids, esters, aldehydes, ketones (aliphatic and aromatic), polymers and biologically important molecules.

CHM 102 Chemistry Practical I (0, 2)

Practicals in inorganic and organic chemistry

Inorganic Practical: Two main sections: Qualitative and Quantitative

Qualitative inorganic practicals consist of identification of ions (anions and cations) in solution.

Quantitative inorganic practicals are only by volumetric analysis. Practice in volumetric analysis includes acid-base, redox and precipitation titrations.

Organic practicals involve reactions of simple functional groups, simple preparations, recrystallisation and determination of m.pt of organic compounds.

PHS 101 Introductory Physics II (0, 2)

Prerequisite: FSC 105 or Credit in O.L. Physics

Geometrical Optics; law of reflection and refraction. Location of images. Plane and curved mirrors. Converging and diverging thin lenses. Aberrations. The eye. Optical instruments.Simple Harmonic motion. Wave motion and wave types. Dispersion. Production of sound in strings and pipes resonance; applications. Simple descriptions of diffraction and interference, applications to both light and sound waves. Polarisation of transverse waves.Atomic structure. Production and properties of X-rays. Radioactivity, Photoelectric emission.

PHS 102 Introductory Physics III (0, 2)

Prerequisite: FSC 105 or Credit in O.L. Physics

Electrostatics, potential and capacitance, dielectrics, production and measurement of static electricity. Current, Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters.D.C. circuits, sources of emf and currents, Kirchhoff's laws. Electrochemistry. The Earth's magnetic field. Magnetic fields and induction. Faraday's and Lenz's laws. Force on a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators.

PHS 103 Introductory Practical Physics (0, 2)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 and PHS 102 theoretical courses.

GEG 101 Engineering Pure Maths I (3, 0)

Axiomatic Set theory, Operations on Set, Boolean Algebra, Switching circuits, logic circuits and propositional logic. Transfinite induction and recursion. Cosequences of axioms of choice. Sequences. Mononic sequences and convergence, Caychy criteria. Series. Power series. Tests for convergence. Taylor's series, operations on power series. Limits continuity and Differntiability. Mean value theorems. Techniquesand applications of Differentiation. The definite integral. Fundamental theorems of integral Calculus. Techniques and applications of integral calculus. Improper integrals.

GEG 102 Engineering Pure Maths II (0, 2)

The real and the complex number systems. Mathematical induction matrices and determinants. Complex numbers: representations and algebra. Complex functions. Roots of Unity. De-Moivres theorem and applications.

Basic matrix theory and algebra. Systems of linear equations: elementary row reduction, types and methods of solution echelom form. Applications ofmatrices. Introduction to systems of inequalities and linear programming.

GEG 10 Engineering Applied Mathematics I (3, 0)

Representation of vectors: Resultant of several vectors in Euclidean space: lines, places and spheres. The dot and cross products. Direction cosines. Differentiation of vector functions. Lami's theorem. Polygon of forces. Conditions of equilibrium of coplanar forces. Newton's laws of motion. Analytical treatment of static equilibrium of particles and rigid bodies. Distributed forces. Centroids and centres of gravity. Moments of inertia. Analysis of structures nand trusses. Forces in beams and tables. Friction.

GEG104 Engineering Applied Mathematics II (0, 2)

An introduction to kinematics and kinetics of a particle, systems of particles and rigid bodies. Energy and momentum methods. Applications. Impulsive. Motions. Motion of rigid body (i) about a fixed axis (ii) in a plane. Equations of motion.

MEG 101 Workshop Practice I (1,1)

Introduction to basic equipment in wood, machine and welding workshops. Element of safety practice with various tools used in the workshops. Discussion of general safety precautions. General principles governing the various workshops machines. Selection and use of tools for specific operations in the various workshops. Practical demonstration of use of tools and machines in performing basic workshop processes.

MEG 102 Workshop Practice II (1,1)

Introduction to more advanced machinery and equipment in the workshops. Introduction to sketching and labeling of machine parts and tools. Emphasis is laid on the ability of students to be able to completely handle standard workshop equipment.

Machining: Practical works on machines for the purpose of carrying out individual projects. Detection of faults in work pieces. Fitting: Shaping and finishing of metallic objects. Welding: Preparation of pieces for welding, visual observation of welds etc.

Woodwork: Introduction to constructional technique of woodwork joints.

Simple individual projects in different aspects of workshop practice.

MEG 104 Engineering Drawing (1, 1)

Introduction to drawing instruments and their proper use. Use of scales, line-work and lettering. Geometrical constructions including tangents, normals, polygons, etc. Loci, including paths of point of simple mechanisms and cam profiles.

Orthographic projections of simple objects in first and third angles. Isometric and oblique projections. Isometric projections from orthographic projections.

PHS 101 Introductory Physics (3, 0)

Prerequisite: FSC 105 or Credit in O.L. Physics

Geometrical Optics; law of reflection and refraction. Location of images. Plane and curved mirrors. Converging and diverging thin lenses. Aberrations. The eye. Optical instruments. Simple Harmonic motion. Wave motion and wave types. Dispersion. Production of sound in strings and pipes resonance; applications. Simple descriptions of diffraction and interference, applications to both light and sound waves. Polarisation of transverse waves. Atomic structure. Production and properties of X-rays. Radioactivity. Photoelectric emission.

PHS 102 Introductory Physics III (3, 0)

Prerequisite: FSC 105 or Credit in O.L. Physics

Electrostatics, potential and capacitance, dielectrics, production and measurement of static electricity. Current, Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters. D.C. circuits, sources of emf and currents, Kirchhoff's laws. Electrochemistry. The Earth's magnetic field. Magnetic fields and induction. Faraday's and Lenz's laws. Force on a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators.

PHS 103 Introductory Practical Physics(0, 2)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 and PHS 102 theoretical courses

3.1.7.2 200 Level

CHM 201 Basic Inorganic Chemistry (4, 0)

Prerequisite CHM 101

Origin of the Quantum theory. Atomic spectra: the Bohr atom, extension of Bohr theory. Wave mechanical treatment of atomic structure. Particle-wave duality. The Schrodinger wave equation. Atomic orbitals multi-electron systems. Periodic classification and electronic configuration. Periodic properties-atomic and ionic radii, covalent radii. Periodic trend of atomic radii, ionization energy, electron affinity and electronegativity. Chemical bonding: ionic bonding-energetics of ionic bonds: Lattice energy and its application (Born-Haber cycle). The valence bond theory: Hybridisation, molecular – orbital method. The LCAO method, Homo – and Heteronuclear diatomic molecule. Bond length, metallic bonding – band or zone theory. Intermolecular forces – van der Waals, hydrogen bonding, dipole-dipole interactions. Electrode potential, non-aqueous solvent. Co-ordination compounds (structure of complexes, co-ordination number and geometry). Nomenclature, isomerism, simple treatment of crystal field theory (CFT). Splitting of d-orbitals into octahedral, square planar and tetrahedral.

CHM 202 Basic Physical Chemistry (4, 0)

The kinetic theory of gases. Molecular velocities and their distribution. Heat capacity of gases and the equipartition of energy. First law of thermodynamics and its applications. Applications of physical properties to chemical constitution: refraction, magnetic rotation, dipole moments, etc. Electrochemistry of solutions, concentration terms, molarity etc. Fractional and steam distillations. Partition law and absorption chromatography, colligative properties. Formulation of rate equations for simple systems.

CHM 203 Basic Organic Chemistry (4, 0)

Application of the concepts of atomic and molecular orbital of the alkanes, alkenes, alkynes.Nomenclature, methods of preparation, physical and chemical properties of the aliphatic hydrocarbons. The chemistry of benzene and the alkyl benzene, including electrophilic aromatic substitution. The chemistry of monofunctional aliphatic and aromatic compounds including halogeno-compounds, alcohols and phenols, ethers, aldehydes and ketone, carboxyclic acids and derivatives, nitrogen compounds (amines, nitrites and nitrohydrocarbons). Emphasis should be laid on mechanistic interpretation of the reactions of the organic compounds. Mention should be made of the industrial methods of preparation and applications where applicable, the impact of chemicals from petroleum should be stressed.

CHM 204 Experimental Chemistry II (0,2)

Physical and Inorganic Practicals

Experiments in these courses are designed to demonstrate the practical details of the course. Such experiments will involve the determination of critical solution temperature of binary systems, demonstration of partition coefficient in two immiscible solvents, determination of relative mass from colligative properties, determination of solubility of sparingly soluble salts from conductance measurements, conductometric titration, pH measurements. Other areas to be covered include gravimetric analysis and determination of hardness of water by complexometric titration. Systematic analysis of cations and anions will also be carried out. Demonstration experiments should be carried out in column chromatography and ion-exchange chromatography.

CHM 205 Experimental Chemistry III (0,2)

Determination of physical constants, preparation of esters, aldehydes and ketones, methods of recrystallisation, qualitative analysis and preparation of crystalline derivatives.

CEG 201 Mechanics of Materials I (2,1)

Forces, moments, couples resultants and equivalent force systems, direct stresses and strains, Hooke's law. Method of Superposition. Stresses and deformation resulting from temperature changes, Stresses in thin cylinders

and spheres. Stresses on inclined planes; principal stresses. Structural mechanics of statically determinate rigid body systems and plane pin jointed frames.

CHG 201 Transport Phenomena I (3,0)

Units and dimensions. Properties of fluids, momentum and energy equations Vortex motion in liquids. Friction, types of flow, flow in open channels. Dimensional analysis. Flow measurement devices. Pumps, compressors, valves and piping.

CHG 203 Chemical Engineering Process Analysis I (2,0)

Introduction to chemical engineering and the basic operations of industries. Introduction to process calculations. Important chemical and physio-chemical data for process analysis. Chemical reactions and industrial stoichiometry. Techniques for solving problems and simple mathematical tools required. Principles of conservation of matter and its application to industrial process – material balances. Use of direct solution and substitution. Algebraic techniques for solving material balance problems. Recycle, bypass and purge streams. Properties of fluids and solids and relevant material balances. Principles of conservation of energy and applications to simple industrial process – energy balances. Enthalpy changes with and without phase changes.

CHG 204 Chemical Engineering Process Analysis II (2,0)

Energy balances with chemical reaction. Heats of solution and mixing. The use of various forms of thermochemical, chemical kinetic and physical data. (Use of various forms of plotting data-ternary diagrams, log-log, semi-log etc) Enthalpy – concentration charts and humidity charts and their uses. Simultaneous material and energy balances.

GEG 201 Engineering Mathematics I (3,0)

Elementary vector space theory: Linear vector spaces and matrices; dimensionality of space; summation convention Matiices and linear Transformations.

Elementary Compex Analysis: Logaritmitthic, Exponential and Circular complex functions. Mapping by elementary complex functions; Limit, continuity and Differentiability of complex functions: Cauchy-Reinmanis Equations; Line intergrals. Integration of function of Complex Variables. Cauchy's integral theorem; cauch's integral formula; Residue theorem. Introduction to differential equation; classification of ordinary differential equations; order, degree and linearity. Types and techniques of solution of first order ODEs; Picard' iterative method; types and techniques of solution of second order ODEs. System of Linear ODEs. Engineering Applications of ODEs.

GEG 202 Introductory Engineering Statistics Computer System. (3,0)

Introduction to statistics: Fundamentals of probability theory; random variables and expectations. Discretes and continuous distributions. Probability and relative frequency. Independent trials. The laplace-De-Moivre's limit theorem. Poisson's law. Concepts used in statistics: Expectation of a sum, variance, covariance and correlations. Theory of errors. Estimation of variance and correlation. Linear regression. Radom events. Frequency analysis. Data reduction techniques. Distributions and density functions. Expectation and other moments.

GST 201 General African Studies I(P/F) (2,0)

Library studies; History of Sudanese (West African) States; Early History.

GST 103 Nigerian People and Culture II (P/F) (2,0)

Society and Culture; African Literature and Languages; African Music and Dance; Geography of African; Traditional Medicine in African.

PGG 202 Introduction to Petroleum and Gas Engineering (2,0)

Definition of petroleum Upstream and Downstream operations. Uses of petroleum and gas. Introduction to gas processing and refinery processes.

3.1.7.3 300 Level

CHG 301 Transport Phenomena II (2,0)

Fluid Flow: Flow in pipes and nozzles. Flow in open channels. Mass transfer: Fick's Law, diffusion in stationary media, additivity of resistances, diffusion of vapour. Cooling tower design: Psychometric charts, estimation of tower heights, humidifying tower. Drying mechanisms, estimation of drying periods, description and function of industrial dryers.

CHG 303 Separation Processes I (3,0)

Stoke's and Newton's Laws: Flow in particle beds. Characteristics of packed columns. Estimation of fluidisation point and bed expansion. Regions of fluidisation. Pressure drop, heat and mass transfer in fluidised beds. Sedimentation, flocculation, filtration, centrifuging and electrostatic precipitation.

EEG 201 Fundamentals of Electrical Engineering 1 (2,0)

Circuit Law: Kirchoff's Law, Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Millman's Theorem, Rosen's Theorem, Network problems arising in Energy distribution.Methods of analysis suitable for the problems in Network Theory in terms of currents, voltages, energy/voltage amperes, Loop and Nodal analysis.

Resistors, Electric fields and capacitors, Magnetic fields and inductance, Energy stored in capacitors and inductors. Electromagnetic Induction and Magnetic forces, self and mutual inductance. Electrochemical Power Sources.

EEG 201 Fundamentals of Electrical Engineering 1Laboratory (1,0)

GEG 301: Engineering Mathematics II (3,0)

Calculus of several variables: Limits and continuity. Partial derivatives of first and higher orders. Total differential of a function. Jacobians. Higher order partial and total deriviatives and gradient of a function integration of total differentials with applications to mechanics. Introduction to vector fields – divergence and curt. Generalised Taylor's series; the extremum of a functions of several variables. Differentiation under the integral sign. The calculus of variations. Line integral with applications on computation of areas and volumes. Functions of complex variables. Cauchy-Reinmann Equations. Analytical functions, Mapping by elementary functions.

GEG 302 Operational Methods I (2,0)

Fourier series: Periodic functions, Dirichlet conditions, odd and even function. Half-range. Fourier sine and cosine series. Parseval's identity. Differentiation and integration of Fourier series. Boundary value problems. The Laplace transform and applications (excluding the use of inversion integral and convolution theorem).

MEG 311 Mechanical Engineering Technology (2,1)

Second law of thermodynamics and its application to flow and non-flow processes. Thermodynamic property relations. Elementary heat transfer; steady-state heat conduction, one-dimensional heat conduction, conduction through composite walls, electrical analogy, convection as an extension of conduction. Power transmission by screw threads, friction clutches and belt drives. Simple and epycyclic gear trans. Introduction to the thermodynamics and kinetics of corrosion of metals and alloys. Description of methods of corrosion control and prevention. Introduction of metals and metal alloy systems. The metallic bond and structure of alloys.

MME 309 Science of Materials (3, 0)

Atomic structure. Mass number and isotopy. The physical model of the atom. Electron notation of atoms including valency model of the atom. Valency and inert gasses and inertness. Excitation, ionization energy. Structure and properties of atomic nuclei. Radioactivity. Inter atomic bonding. Crystal structure. Stacking sequence and stacking faults. Miller indices. Interplanar distance. Crystal imperfections. Atomic movements. Phases, equilibrium diagrams and alloys. Solid state transformations. Survey of occurence and extraction of metals. Non-crystalline and multiphase solids including polymers. Ceramics and composiste materials, fibre – reinforced materials, dispersion strengthened materials and cements.

MME 311 Introduction to Corrosion of Materials (3,0)

Introduction to the thermodynamics and kinetics of electrochemical corrosion of metals and alloys. Description of metallurgical factors, effect of applied stress (stress corrosion cracking and corrosion fatigues) and passivity. Description of methods of corrosion control and prevention. Moulding alloy, selection of inhibitors, design rules, anodic and cathodic protection. Treatment of environmental degradation of non-metals (Ceramics, concrete and silicate glasses). Discussion of current materials degradation problems in marine environments, the petroleum industry, energy conversion and generating systemsbeds in series and in parallel. Poiseuille's Law for Capillary flow. Flow through fractures. Radial flow of incompressible and compressible fluids. Flow of compressible fluids in bounded drainage areas. Average pressure in radial flow systems and re-adjustment time. Productivity index, Permeability variations. Zonal damage and well stimulation. Gas well spacing, recovery and deliverability. Displacement of Oil and Gas.

PGG 303- Petroleum Geology (3,0)

Requirement for petroleum accumulation; Plate tectonics. Origin of hydrocarbon, migration and trapping mechanisms. Reservoir rock properties. Depositional environment, petro-physical properties.

PGG 304 Formation Evaluation & Applied Geophysical Methods (3,0)

Application of geophysical methods to formation evaluation.

PGG 305 Petroleum Engineering Laboratory I (0,2)

Laboratory analysis of Reservoir rocks.

PGG 306 Basic Reservoir Engineering (3,0)

General composition of Petroleum. Fundamental properties of fluid permeated rocks. Properties of Porous media containing multiple fluid saturations. Fundamentals of the behavor of hydrocarbon fluids. Determination and application of reservoir fluid properties. Properties of Water. Data Evaluation for reservoir calculations. The material balance.

PGG 308 Drilling Methods (3,0)

Petroleum explorations methods and general testing practices. Cable tool drilling; Rotary Drilling, Rotary Drilling hydraulics. Factors affecting penetration; Rotary Drilling techniques including vertical drilling, directional drilling and fishing operations. Drilling fluids. Well logging Formation damage. Well cementing and casing practices. Well completion.

PGG 310 Petroleum Engineering Laboratory II (0,2)

Coring and core analysis. Porosity and permeability measurements. Liquid saturation measurements.

PGG 312 Computer Programming for Petroleum Engineers (0,2)

Relevance of computer to petroleum engineering practice.Review of computer programming and their applications to petroleum engineering problems. Introduction to technical computation softwares (i.e. Matcad, Mathematica, Matlab, Visual Basic, C $^{++}$, Fortran)

3.1.7.4 400 Level

CHG 405 Principles of Plant Design I (3, 0)

Process design principles. Flowsheets. Chemical engineering design of mass and heat transferequipment (plate columns, absorption towers, distillation column, heat exchangers, vessels, columns, storage tanks, heat exchangers etc. Piping and instrumentation. Costing and projectevaluation.

GEG 401 Technical Communications (1, 0)

Introduction to the techniques of non-scientific and scientific report writing, uses of language inreport writing, formats and types of reports, presentations – oral and written.

PGG 400 Industrial Training (0, 6)

Students Industrial work Experience Scheme (24 weeks - one Semester plus long acation)

PGG 401- Petroleum Reservoir Engineering (3,0)

Study of gas-condensate and undersaturated reservoirs including recovery methods. Oil reservoirs under simultaneous dissolved gas drive, Gas cap drive and water drive. Water influx.

PGG 405- Petroleum Production Engineering (3,0)

Theoretical basis for the rise of fluids in production columns. Pottman and Carpenter, Gilbert, Duns and Ros and other methods. Production of crude oil by natural eruption. Gas lift method. Production by pumping; Collection of oil well gases and use of compressed gases. Secondary recovery methods.

PGG 407 Pressure Buildup and Test methods (2,0)

Mathematical basis for pressure analysis, Determination of average reservoir pressure, pressure drawdown analysis. Multiple-rate flow test analysis, Well interference tests, Pulse tests, Drill stem tests. Effect of reservoir hetrogeneities on pressure behaviour.

PGG 409 Gas Processing equipment (2,0)

Study of compressors, valves including valve mechanics, pumps and other processing equipment.

PGG 411 Gas Dynamics.(3,0)

Review of thermodynamics concepts. One-dimensional gas dynamics. The continuity equation, Energy and Euler's equations. Reservoir conditions. The momentum equation, Isentropic condition, Bernoulli equation. Dynamic Pressure and flow at constant area. I-D wave motion including propagating shock wave and isentropic equations. Supersonic flow in ducts. Measurement methods. Frictionless flow effects of viscosity and conductivity.

PGG 413 Introduction to Well Logging and Interpretation (2,0)

Driller's logs, Sample logs, Mud logging. Electric logging, Radioactivity logging. Miscellaneous logging devices. Wire line logs. Well logging interpretation.

PGG 415- Petroleum Engineering Laboratory III (0,2)

Experimental investigation of some elementary petroleum engineering concepts relating to reservoir fluid and rock properties particularly solubility, shrinkage, saturation and oil viscosity tests, capillary, permeability porosity evaluation.

PGG 417 Process Modeling and Simulation (2,0)

Formulation of simple and complex petroleum engineering problems and their solutions. Application to chemical engineering stage processes including rectification, multicomponent distillation, Stage absorbers, all types of rectors and heat exchangers. Development of solution approaches through the usage of computer programming and softwares like (MATLAB, HYSYS). However a computer-based term paper is required in this course.

3.1.7.5 500 Level

CHG 501 Process Dynamics and Control (3,0)

Introductory concept: Introduction to process dynamics and control, Review of mathematical tools needed for modeling and simulation.

Process Dynamics: Review of Laplace transforms. Transient behaviour of 1st, 2nd and higher order systems.

Process Control: Basic components of the process control system and their characteristics. Closed loop transient response.Stability Analysis/Frequency Response Analysis. Design of feedback controllers-based on transient response criteria, Design of feedback controllers-based on frequency response criteria. Design of model based controllers such as IMC, DMC etc.

CHG 509 Petroleum Engineering Entrepreneurship (2,0)

Ventures in the petroleum oil and sector. Research and Development. Sources of information. Patents, copyrights etc. Entrepreneurship/organization of business. Small scale business operations and problems.

Venture capital, capital sources. Federal and State governments' regulation on chemical industries. Market research methods and feasibility reports. Small and medium scale business case studies.

GEG 501 Engineering Economics (3.0)

Concept of Project Analysis and Demand Estimation, Investigation of Technical Aspects of a Project, Criteria for Project Choice, Investigation of Financial Aspects, Project Financing

GEG 502 Engineering Management (2,0)

Part 1: Contract (Law)

Definition of a contract classification of a contract ingredient of a valid contract. Elements of a Contract Consideration, Intention to create legal relation Capacity of a contract consent of a party, Concept of brevity of a contract and its exceptions. Mistakes of a contract duress in a contract undue influence in a contract Misrepresentation a contract illegality in a contract. Discharge of a Contract, How does a contract come to an end remedies for breach of a contract.

Part II: Management

Introduction to Management; Decision Analysis' How to model a decision situation; Quantitative

Techniques for situations of uncertainty; Decision tree; Project Management; Project evaluation and review techniques; Concept of motivation; Theories of motivation; Hertzberg 2 factor theory; Transportation management model.

PGG 501 Adsorption and Fractionation (3,0)

Isothermal adsorption curves, (Gas-solid equilibrium curves) applied industrial gas and liquid adsorption processes. Mechanism and technology of adsorption on carbon of mixtures of hydrocarbons. Fractional distillation, Fractional distillation of an ideal mixture of n-components (n>2). Fractionation columns extractive fractionation.

PGG 502 Petroleum Economics (3,0)

Uncertainty in evaluations. Decision methods and yardsticks. Petroleum evaluation review. Return on investment properties of probability distributions and applications. Appraisal of uncertain ventures. Decision trees and economic models. Simulation- The Monte Carlo method. Evaluation of expected discoveries in mature regions, Bayos strategies and estimates of valve. Evaluation of future production by performance trends.

PGG 503- Refrigeration and Liquefaction (3,0)

Basic principles of refrigeration and liquefaction. Application of first and second laws of thermodynamics cycles. Refrigerants. Vapour compression systems and equipments. Multistage refrigeration. Cycles compression fundamentals. Introduction to cryogenic systems. Joule- Thompson effect. Expansion turbines. Equipment selection.

PGG 504- Gas Sweetening and Sulphur Recovery (2,0)

Gas purification and odourisation. Absorption processes. Use of DEA, Cuprous solution and Na_2CO_3 in gas purification. Extraction processes. Removal of H_2S from liquefied gas. Sulphur recovery processes.

PGG 505- Gas Transportation (2,0)

Fluid statics and kinematics. Dynamics of ideal fluids. One dimensional motion of a fluid, Laminar flow of viscous fluid. Turbulent flow. Flow of fluids through orifices and valves. Gas pipelines. Gas transportation through pipes. Classification of pipes. Pipeline economics. Compression and production pipes. Application of jet compressors to gas transportation. Gas preparation for transport and distribution.

PGG 507 Research Project I (0,3)

A topical project in Gas and Petroleum Engineering to be assigned.

PGG 508- Valves and Pipeline Design (3,0)

Design of Simple pipelines, pipes in series, in parallel, branched pipes and pipelines with continuous flow regime.

PGG 509 Petroleum Reservoir Modeling and Simulation (3,0)

Basic principles of reservoir modeling. Modeling gas, oil and gas-condensate reservoir. Numerical techniques - Finite difference method, Finite element, Method of weighted residuals etc. Setting up of a simulation study: data collection, fluid properties etc. History matching, Performance prediction. Case studies. Specialised applications: Waterflooding, Gas cycling, Infill drilling, Miscible flooding, etc.

PGG 510 Gas Processes, Vessel and Equipment Design (3,0)

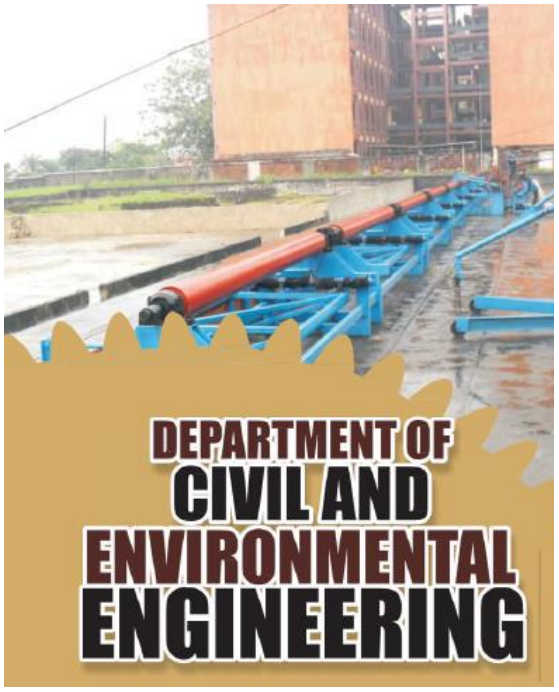
Design of gas compressors and allied equipment.

PGG 512 Research Project II (0,3)

A topical project in Petroleum and Gas Engineering.

PGG 519 Environmental Pollution Engineering (3,0)

Introduction to environmental pollution. Air and water pollution in upstream and downstream processes Pollution control methods. Solid waste treatment in oil installations. Case studies in oil and gas industry.



Professor O.M. Sadiq
M.Sc., Ph.d (Kiev)
Head

3.2.1 History of the Programme

The Department of Civil & Environmental Engineering was one of the pioneering departments of the Engineering Faculty and has, since its establishment in 1962 produced many outstanding graduates serving in various capacities in communities worldwide. The department runs academic programmes at both undergraduate and post graduate levels, leading to the award of B.Sc. (Honours) and the M.Sc/Ph.D degree in Civil Engineering. Options at the postgraduate level are available in the areas of Structures, Highway and Transportation, Water Resources and Environmental, and Foundation and Geotechnical Engineering.

The Civil and Environmental Engineering Department has also received the approval of the University Senate and Council to offer courses leading to the award of a B.Sc. degree in Water Resources and Environmental Engineering and will soon begin to admit students into the programme.

This move is to accommodate the already existing emphasis on teaching and research in the department as it exists presently and also to allow for even better performance in addressing the pressing need of the society for the water and environmental engineers. The new curriculum, which has already been approved by the Senate of the University, will allow greater flexibility in the training of manpower for the water environment industry.

As we move into the decades ahead, we invest more in manpower development and also in attracting and retaining highly qualified academics into the department. We would need to invest in new technologies, as well as co-operate with others in the development of new technology. We want private sector of the economy, which are the major beneficiaries of the products of our teaching and research endeavours.

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3.2.2 Laboratories and Research Facilities

The department is equipped with standard equipment for its teaching and research activities. The major laboratories in the department are:

- *Concrete and Materials/ Structure*
- *Highway and Transportation*
- *Hydraulics and Hydrology*
- *Hydraulics Research Modelling Basin*
- *Public Health Engineering*
- *Rock Mechanics*
- *Soil Mechanics*

3.2.3 Course Outline For B.Sc (Hons) Civil & Environmental Engineering

3.2.3.1 Course Structure

100 Level: First Semester

Course Code	Course Title	Lecture Units	Lab Units	Pre -Requisite
MEG 101	Workshop Practice I	1	1	-
GEG 101	Engr. Pure Maths. I	2	-	-
GEG 103	Engr. Applied Maths I	2	-	-
FSC 102	Intro. Chemistry I	2	1	-
FSC 105	Intro. Physics I	2	1	-
GST 102	Intro. To Logic & Philosophy	2	-	-
GST 103	Nigerian People & Culture	2	-	-
GST 105	Use of English	2	-	-
		15	3	
Total		18		

100 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
MEG 102	Workshop Practice II	1	1	-
GEG 102	Engr. Pure Maths II	2	-	-
GEG 104	Engr. Applied Maths II	2	-	-
CHM 101	Intro. Chemistry II	4	-	-
PHS 101	Intro. Physics II	3	-	-
PHS 102	Intro. Physics III	3	-	-
PHS 103	Physics Practical	-	2	-
MEG 104	Engineering Drawing	1	1	-
SVY 102	Basic Surveying I	1	-	-
		17	4	
Total		21		

200 Level: First Semester

Course Code	Course Title	Lecture Units	Lab Units	Pre-Requisite
CEG 201	Mechanics of Materials I	2	1	-
CEG 207	Intro. to Safety in Engr. Practice	2	-	-
GEG 201	Eng. Maths I	3	-	GEG101, GEG 102
CEG 203	Intro. to Civil & Environmental Engr.	1	-	-
MEG 201	Thermodynamics	2	-	-
SVY 201	Basic Surveying II	2	1	-
SSG 205	Intro. to Engrg. Computing	1	1	-
GST 201	General African Studies I	(2)	-	-
		15	3	-
Total		18		

200 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab Units	Pre- Requisite
CEG 202	Mechanics of Materials II	2	-	CEG 201
CEG 204	Concrete Technology	1	1	-
CEG 206	CAD for Civil Engineers	1	1	-
CEG 208	Fluid Mechanics	2	1	-
CEG 210	Engineering Geology	2	1	-
GEG 202	Intro. Engineering Statistics	2	-	-
GEG 208	Engineer In Society	2	-	-
SVY 202	Engineering Surveying	2	1	SVY 201
GST 202	General African Studies II	(2)	-	-
		16	5	
Total		21		

300 Level: First Semester

Course Code	Course Title	Lecture Units	Lab Units	Pre- requisite
CEG 301	Structural Analysis I	2	-	CEG 202
CEG 303	Intro. to Concrete & Timber Design	2	-	-
CEG 313	Structural Detailing	1	1	-
CEG 305	Mechanics of Fluids II	2	1	CEG 208
CEG 307	Transportation Engr. I	2	-	-
CEG 309	Properties of Civil Engr. Materials	2	-	-
GEG 301	Engr. Maths 11	2	-	GEG 201, 202
MEG 311	Mech. Engr. Technology for Non-Mech. Engr.	2	1	-
GST 307	Entrepreneurship & Corporate Governance I	2	-	-
CEG 311	Civil Engr. Technology for Non-Civil Engr.	(2)	-	-
		17	3	
Total		20		

300 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab Units	Pre- Requisite
CEG 302	Mechanics of Materials III	2	1	CEG 202
CEG 306	Soil Mechanics	2	1	-
CEG 308	Design of Reinforced Concrete Structures	2	1	-
CEG 304	Solid Waste Engr.	2	-	-
CEG 310	Hydraulics	2	1	
GEG 302	Operational Methods 1	2	-	GEG 301
EEG 320	Electrical Engineering Technology	2	1	-
	TOTAL	14	5	
Total		19		

400 Level: First Semester

Course Code	Course Title	Lecture Units	Lab Units	Pre-requisite
CEG 401	Structural Analysis II	2	-	CEG 301
CEG 403	Design of Steel Structure	2	1	
CEG 405	Foundation Engr. I	2	1	CEG 306
CEG 413	Transportation Engr. II	2	1	CEG 302
CEG 411	Water & Wastewater Engr.	2	1	-
CEG 415	Urban Drainage Planning & Design	2	-	-
GEG 401	Technical Communication	1	-	-
GEG 402	Numerical Methods in Engr. OR	2	-	-
GEG 403	Advanced Engr. Statistics	2	-	-
		15	4	
Total		19		

400 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CHG400	Industrial Training	6	C	-
Total		6		

3.2.4 Course Description FOR B.SC. Civil and Environmental Engineering

MEG 101 Workshop Practice I (1, 1)

Introduction to basic equipment in wood, machine, fitting and welding workshops. Elements of safety practice with the various tools used in the workshops. Discussion on general safety precautions. General principles governing the various workshop machines. Selection and use of tools for specific operations in the various workshops. Practical demonstration of use of tools and machines in performing basic workshop processes.

GEG 101 Engineering Pure Mathematics (3,0)

Axiomatic Set Theory, Operations on Set, Boolean Algebra, Switching circuits and Prepositional Logic. Transfinite induction and recursion. Consequences of axiom of choice. Sequences, Mononic sequences and convergence. Caychy criteria. Series. Power Series. Tests for convergence. Taylor's Series, Operations on Power Series. Limits, Continuity

and Differentiability. Mean Value Theorems. Techniques and Applications of Differentiation. The Finite Integral. Fundamental Theorems of Integral Calculus. Techniques and Application of Integral Calculus. Improper Integrals.

MEG 102 Workshop Practice II (0, 1)

Introduction to more advanced machinery and equipment in the workshops. Introduction to sketching and labeling of machine parts and tools. Emphasis is laid on the ability of students to be able to competently handle standard workshop equipment.

Machining: Practical works on machines for the purpose of carrying out individual projects. Detection of faults in work pieces.

Fitting: Shaping and finishing of metallic objects.

Welding: Preparation of pieces for welding visual examination of welds, etc.

Woodwork: Introduction to constructional technique of woodwork joints.

Simple individual projects in different aspects of workshop practice.

MEG 104: Engineering Drawing (1, 1)

Introduction to drawing instruments and their proper use. Use of scales, linework, lettering and dimensioning. Geometrical constructions including tangents, normal, polygons, etc. Loci, including paths of point of simple mechanisms and cam profiles. Orthographic projections of simple objects in first and third angles. Isometric and oblique projections. Isometric projections from orthographic projects.

CHM 101 Introductory Chemistry I (4.0)

Chemical bonding: ionic, covalent, coordinate, metallic, hydrogen and van der Waals forces. Bond energy and bond angle. Shapes of simple covalent molecules. Gaseous state-ideal and non-ideal behaviour. Solutions-types of solution, solubility and vapour pressure.

Simple treatment of Chemical thermodynamics: Internal energy change ΔU, enthalpy change, ΔH, entropy change, ΔS and free energy change, ΔG and the relationship between them($\Delta G = \Delta H - T\Delta S$) and applications of the equation.

Trends in the physical and chemical properties of elements and their compounds (Soxides, hydrides, hydroxides and chlorides) in periods of the periodic table. Transition metals-first row only. Characteristic properties of the elements and their ions. Introductory radioactivity.

Organic Chemistry - alcohols, acids, esters, aldehydes, ketones (aliphatic and aromatic), polymers and biologically important molecules.

FSC 102 Introductory Chemistry I (3. 0)

Measurement and Precision: Hypothesis, theory and laws with appropriate examples. Nature of matter, the three states of matter, electronic energy levels and orbitals. Periodic classification of elements and its relationship to their electronic configurations. Mole concept and calculations based on it, including application to titrimetry and balancing of equations by electron transfer method. Types of chemical reactions and stoichiometric calculations, different methods of expressing concentrations of solutions. Chemical kinetics and equilibra, and simple calculations involving the concepts. Important applications like pH, Solubility products and solubility of ionic solids. Thermochemistry and simple calculations based on Hess's Law. Electrochemistry and the working of various cells, brief treatment of corrosion.

Organic Chemistry: Chemical bonding, polarity in organic compounds, their isolation, purification and analysis. Empirical, molecular and structural formulae, Nomenclature and Isomerism. Simple reactions of hydrocarbons-alkanes, alkenes, alkynes.

FSC 105 Introductory Physics (3, 0)

Physical quantities, standards and units. Kinematics: Uniform velocity, uniform acceleration motion. Dynamics: Newton's Laws of motion. Newton's universal Law of Gravitation. Work, Energy, Conservation Laws. Concept of mathematical equilibrium. Center of mass and center of gravity. Moment of a force. Rotational motion, angular momentum and torque. Total mechanical energy, elasticity, Hooke's law, Young's shear and bulk modulus. Hydrodynamics. Molecular properties of fluids, viscosity, surface tension, adhesion, cohesion, capillarity, drops and bubbles.

Temperature and the zeroth law of thermodynamics. Quantity of heat. Heat transfer. Gas laws. First and second law of thermodynamics. Application to kinetic theory of gases.

GEG 102 Engineering Pure Mathematics II (2, 0)

The real and the complex number systems. Mathematical induction matrices and determinants. Complex numbers: representations and algebra. Complex functions. Roots of Unity. De-Moivres Theorem and Application. Basic Matric Theory and Algebra. Systems of Linear Equations: Elementary Row Reduction, types and Methods of Solution echolom form. Application of Matrices. Introduction to Systems of Inequalities and Linear Programming.

GEG 103 Engineering Pure Mathematics III (3,0)

Representation of vectors: Resultants of several vectors. Vectors in Euclidean Space: Lines, Spaces and Sphere. The Dot and Cross Products. Direction Cosines. Differentiation of Vector Functions. Lami's Theorem. Polygon of Forces. Newton's Laws of Motion. Analytical Treatment of Static Equilibrium of Particles and Rigid Bodies. Distributed Forces. Centroids and Center of Gravity. Moments of Inertia. Analysis of Structures and Trusses in Beams and Tables. Friction.

GEG 104 Engineering Applied Mathematics II (2, 0)

An Introduction to Kinematics and Kinetics of a Particle. Systems of Partial and Rigid Bodies. Energy and Momentum Methods. Applications. Impulsive Motions. Motion of Rigid Body (i) about a fixed axis (ii) in a plane. Equations of Motion.

GST 102 Introduction to Logic and Philosophy (2, 0)

A brief survey of the scope, notion, branches and problems of philosophy, elements of Western and African philosophy; symbolic logic,(special symbols in symbolic logic, conjunction, affirmation, negation, disjunction, equivalence and conditional statements). Laws of thought, the method of deduction, using rules of inference and bi-conditionals, quantification theory. Fallacies and other selected topics.

GST 105 Use of English (2,0)

Effective communication and writing in English study skills, language skills, writing of essay. Instruction on lexis, sentence construction outlines and paragraphs. Collection and organization of materials and logical presentation. Punctuation and logical presentation of papers. Use of library. Phonetics. Art of public speaking and oral communication.

PHS 101 Introductory Physics II (3, 0)

Pre-requisite: FSC 105 or credit in O' level physics.

Geometrical optics: Laws of reflection and refraction. Location of images, plain and curved mirrors. Converging and diverging thin lenses. Aberration. The eye. Optical instruments. Simple harmonic motion. Wave motion and wave types. Dispersion. Production of sound in strings and pipes resonance; applications. Simple description of diffraction and interference, application to both light and sound waves. Polarization of transverse waves. Atomic structure. Production and properties of X-rays. Radioactivity. Photoelectric emission.

PHS 102 Introductory Physics III (3, 0)

Electrostatics, potential and capacitance, dielectricss, production and measurement of static electricity. Current, Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters.

D. C. circuits, sources of emf and currents, Kirchoff's law. Electrochemistry. The Earth's magnetic field. Magnetic fields and induction. Faraday's and Lenz's laws. Force on a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators.

PHS 103 Introductory Practical Physics (2, 0)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 courses.

SVY 102 Basic Surveying I (1,0)

Design, adjustment, care and use of surveying instruments including modern levels, theodolites,

tachometers. Chain surveying. Chains, steel bands/tapes, line tapes, surface taping, offsets, sources of error, accuracy, corrections. Theodolite and compass traversing, computations and adjustment. Principles of leveling, sources of error. Horizontal and vertical staff systems. Tacheometry and telemetry, substance bar and its uses. Preparation of large scale plans, grid leveling, contouring, plan revision.

CEG 201 Mechanics of Materials I (2, 1)

Forces, moments, couples, resultants and equivalent force systems. Direct stresses and strains, Hooke's law. Method of superposition stresses and deformation resulting from temperature changes, stresses in thin cylinder and spheres. Stresses on inclined planes, principal stresses. Structural mechanics of statically determinate rigid body systems and plane pin-jointed frames.

CEG 202 Mechanics of Materials II (2,0)

Tension, compression, torsion, and hardness. Fracture mechanics, fatigue, creep and viscoelasticity. Elementary plasticity, thin plates and shells, yield criteria and stress concentration. Buckling instability, stress-strain transformation. Bending moment and shearing forces in beams. Bending stress in beams. Slope and deflection, statically determinate and indeterminate stress systems.

CEG 203 Introduction to Civil & Environmental Engineering (1,0)

Basic fundamentals of Civil and environmental engineering, group dynamics, oral presentation skills, engineering report writing techniques, and uses of the computer. Basics of environmental engineering, highway and transportation engineering, structural engineering, surveying, materials, water resources engineering, construction engineering and management

CEG 204 Concrete Technology (1, 1)

Concrete constituents (cement, aggregate and water) and their properties. Properties of fresh and hardened concrete. Mixing ratio, Mix Design, Curing, Cube-strength Determination, Mortar mixing and plastering, Block Laying. Admixtures and miscellaneous concrete components. Design and manufacture of concrete.

CEG 206 Cad for Civil Engineering (1,1)

Fundamental uses of the AutoCAD software package. Basic two dimensional drawing techniques. Three dimensional drawing, rendering and animation. Students are required to become familiar with AutoCAD.

CEG 207 Introduction to Safety in Engineering Practice (2,0)

Introduction to safety and safety standards. Protective equipment and safety gadgets. Construction and renovation equipment, installation and inspection. Safety precautions, Emergency Responses e.g. fire outbreaks, building collapses, e.t.c. Importance of safety education and training. Related insurance and policies.

CEG 208 Mechanics of Fluids II (2, 1)

Fundamental concepts and properties of fluids: physical characteristic of fluids, properties of fluids. Fluids at rest: pressure at a point, Pascal's law, Pressure variation with elevation, pressure measurements, and hydrostatic forces on curved surface. Buoyancy and equilibrium: Archimedes' principles, stability of submerged and floating bodies, stability of fluids itself, liquids in relative equilibrium.

Kinematics of the flow field: definitions of pathline, streamline, control volume, system, etc. Basic equations of mass momentum and energy conservation and their applications.

CEG 210: Engineering Geology (2,0)

Relevance of geology to engineering. The structure of the planet earth. Basic principles of stratigraphy; the geologic time scale; the importance of fossils. Rocks and minerals:- common rock-forming processes and rock cycle. External earth processes and agents. Erosion and evolutiom of landforms. Internal earth processes; igneous processes-plutonic& volcanic; metamorphic processes, metamorphism types; rock deformation, fault and folds. Fundamentals of plate tectonics; earthquakes and tsunamis.

Distribution of rock minerals and principal geologic features(structures) in Nigeria.

SVY 201 Basic Surveying II (2,1)

Basic principles, use of topographic map method of obtaining field data for topographic surveys. Levelling and barometric heighting. Planning of control surveys. Recce, selection of stations, station marking, description and recovery. Field procedures and observations, place tabling minor triangulation, trilateration and traversing. Intersection and resection. Numerical, graphical and semi-graphical methods. Field completion and detail surveys. Plotting and reproduction of plans/maps.

SVY 202 Engineering Surveying (2, 1)

Location and setting out of works, roads, bridges, railways, tunnels, pipelines and buildings. Setting out of simple, compound and reverse. Volumes, sectioning, longitudinal and cross profiles. Calculations of volumes from contours, spot heights and sections. Curvature correction in earthwork measurements.

GEG 201 Engineering Mathematics I (3, 0)

Module 1

1.1 Functions of Complex variables, Complex mapping, Linear mapping, Inversion, non-linear mapping. Bi-linear mapping, Polynomial mappings. Conformal mapping.

1.2 Differentiation of complex functions, Cauchy- Reinman Equations, Harmonic functions.

1.3 Complex series, Complex power series, Taylor's series, Laurent's series.

1.4 Singularities and Zeros, Residues, Contour Integration, Contour Integrals. Cauchy's theorem, Cauchy's Integral theorem, Residues theorem. Evaluation of definite real integrals. Engineering Applications.

Module 2

2.1 General introduction to Differential Equation: Order, degree, linearity, concepts of solutions, initial and boundary value problems.

2.2 First Order Differential Equation: Techniques of solutions variable separable homogeneous equations. Exact and Inexact equations. Use of integrating factors. Numerical methods using Picard's. Picard's interactive technique. Bernoulli's equation. Engineering applications.

2.3 Second Order Differential Equation: General definition, second order differential equations with constant co-efficient, characteristic equations and solutions, operator D method. Method of variation of parameters.

2.4 System of order differential equation.

2.5 Laplace transforms. Use of Laplace transforms in the solution of differential equations.

2.6 Differential Equations. Z – Transforms.

GEG 202 Introductory Engineering Statistics (2, 0)

Introduction to statistics: Fundamentals of probability theory, random variables and expectations. Discrete and continuous distributions. Probability and relative frequency. Independent trials. The Laplace-De-Moivre's limit theorem. Poisson's law. Concepts used in statistics: Expectation of a sum, variance, covariance and correlations. Theory of errors. Estimation of variance and correlation. Linear regression. Random events. Frequency analysis. Data reduction techniques. Distributions and density functions. Expectation and other moments.

MEG 201 Thermodynamics (2, 0)

Introductory survey of thermodynamics. What is thermodynamics? Historical background and scope of thermodynamics, dimensions and units. Fundamental concepts: systems, control volume, properties and states, processes, heat and work, pressure, temperature and the zeroth law. Elementary form of the continuity equation. The first law of thermodynamics and its corollaries: conservation of energy, internal energy, enthalpy. Thermodynamic properties of pure substances: P-V-T relations and diagrams, the ideal gas, property tables and charts. The second

law of thermodynamics and its corollaries. Reversibility, irreversibility, efficiency and thermodynamics temperature scale. Entropy: Claudius inequality, heat engines and heat pumps.

SSG 205 Introduction to Engineering Computing (1,1)

Introduction to computer systems. Flow charts and basic data processing cycles. The mathematics of computing. Introduction to programming languages: Programming in QBASIC, FORTRAN and C.

GEG 208: Engineer in Society (1, 0)

Philosophy of science. History of Engineering technology. Safety in Engineering and introduction to risk analysis. The role of engineers in nation building. Invited lectures from professionals.

CEG 301 Structural Analysis (2, 0)

Loading systems, analysis of statically determinate and statically indeterminate beams, frames, trusses, structural floor systems for buildings, bridges and other structural assemblies. Shear force and bending moment diagrams in frames. Moment area and moment distribution methods of analysis, influence lines. Theory of 3-pinned arches.

CEG 302 Mechanics of Materials (2, 1)

Encastre and continuous beams. Flexure of beams with unsymmetrical sections, strain energy methods with special application to springs, curved bars. Shear stress distribution. Shear centre. Simple theories of failure. Thick cylinders. Rotation discs. Engineering properties and applications of metals, alloys(steel in particular) and non-metallic materials(glass, rubber, plastics, wood, ceramics and concrete).

CEG 303 Introduction to Concrete & Timber Design (2, 1)

Introduction to Timber Design: Properties of timber, timber preservation, simple timber design. Introduction to Concrete Design: Design of slabs, beams, columns and pad-foundations using the limit State Design Method.

CEG 304 Solid Waste Engineering (2, 0)

Properties of solid waste. Collection and disposal by sanitary landfills, incineration, composting and open dumping. Leachate and its control in sanitary landfills. Organisations and regulations controlling collection, management and disposal. Design and maintenance of sanitary landfills.

CEG 305 Mechanics of Fluids II (2, 1)

Dimensional Analysis. Potential Flow Viscous flow and shear forces in pipes and between parallel plates. Turbulent pipe flow, Flow measurements. Pipe Network analysis, Reservoir emptying. Turbo-Machinery. Unsteady flow in pipes with special emphasis on water hammer and the use of surge tanks.

CEG 306 Soil Mechanics (2, 1)

Soil as an engineering material. Origin. Physical and chemical nature of soils. Engineering properties of soils including permeability. Flow net seepage in soils. Compaction of soil. Principles of effective stress. Shear strength and consolidation of soils.

CEG 307 Transportation Engineering I (2.0)

Introduction to Transportation Engineering, Design and location of highway; design controls and criteria; elements of design; fundamental of traffic engineering. Airport plan and layout; aircraft data related to airport classification and design; design standards.

CEG 308 Civil Engineering Autocad (2, 1)

Computer aided design of structural elements such as beams, slabs, columns, foundations, hydraulic structures such as dams, spillways, e.t.c and transportation networks such as roads, highways, rail tracks, airports, using current softwares such as AutoCAD, Prokon, StadPro, Orion, archiCAD, etc.

CEG 309 Properties of Civil Engineering Materials 1 (2, 0)

Highway materials: Bituminous materials in road construction and maintenance work. Design of surface treatment and asphalt concrete mixtures, timber, glass, asbestos, clay bricks, steel, wood and similar construction materials. Asphalt

cement, tars, cutbacks and emulsions. Paints used in civil projects

CEG 310 Design of Reinforced Concrete Structures (2,1)

This course covers the theory and practice of reinforced concrete design. Limit State Design of structural elements – slabs (solid, flat, waffle, ribbed), beams, columns, staircases, foundations (footings), retaining walls using BS Codes and new modern codes and introduction to composite structures.

CEG 311 Civil Engineering Technology (3, 0)

Steel Design; Steel section. Introduction to B.S. 449. Simple beam and column design. Simple and eccentric loading. Reinforced concrete design: Concrete technology, Introduction to B.S. 8110. Slab and timber design and detailing. Simple and composite beams. Surveying: Chain surveying, triangulation and leveling.

EEG 320 Electrical Engineering Technology

Basic theory and understanding of the following, with a view to specifying and making civil engineering provision for:

- *Direct current and Alternating current.*
- *Power Transmission and Distribution.*
- *Electrical Machines: types, advantages/disadvantages, specification.*
- *Electronic Circuits: components, analysis and diagrams.*
- *Electrochemical Power Sources.*
- *Solar and other Electrical Power.*

MEG 311: Mechanical Engineering Technology (3,0)

Fundamental concepts in heat transfer. Conduction, convection and thermal radiation, combined mechanisms of heat. Vapour-compression and vapour-absorption refrigeration components-basic concepts. Types of refrigeration and air-conditioning systems. Power transmission by screw threads, friction clutches and belt drives. Simple and epicyclic gear trains. Vibrations of simple mechanical systems in translation, rotation and torsion. Qualitative description of various damping mechanisms in mechanical systems. Principles of metal cutting. Forming and shaping processes: rolling, forging, extrusion, drawing, sheet-metal forming.

CEG 312 Hydraulics (2, 1)

Steady uniform and steady non-uniform flow in open channels; gradually varied flow and rapidly varied flow. Dimensional Analysis and Hydraulic Modelling.

CEG 315 Introduction To Environmental Engineering (2,1)

Environmental impact of population growth and energy demand, water resources(source selection, Intake, pumps and reservoir), water chemistry, water quality standards, environmental microbiology, waste water characteristics, receiving water quality and dissolved oxygen budgets, water pollution abatement, sludge management, solids and hazardous waste management, and an introduction of air and noise pollution.

Environmental Engineering Laboratory.

Laboratory experiments dealing with physical, chemical and biological treatment systems.

CEG 313 Structural Detailing (2, 1)

Basic principles involved in detailing engineering designs.

Requirement of current codes of pratice. Preparation of drawings and bending schedules.

GEG 301 Engineering Mathematics 11(2, 0)

Calculus of several variables: Limits and continuity. Partial derivatives of first and higher orders. Total differential of a function. Jaco0bians. Higher order partial and total derivatives and gradient of a function Integration of total differentials with applications to mechanics. Introduction to vector fields – divergence and curl. Generalized Taylor's series; the extremum of a function of several variables. Differentiation under the integral sign. The calculus of variations. Line integral with applications on computation of areas and volumes.

Functions of complex variables. Cauchy-Reinmann Equation analytical functions. Mapping by elementary functions.

GEG 302: Operational Methods I (2, 0)

Fourier series: Periodic functions; Dirichlet conditions; odd and even functions; half-range Fourier sine and cosine series. Parsevals; identify. Differentiation and integration of Fourier series. Boundary value problems. The Laplace transform and applications (excluding the use of inversion integral and convolution theorem).

GST 307 Entrepreneurship and Corporate Governance (2,0)

Introduction to entrepreneurship and new venture creation. Introduction to module, learning objectives and assessment; what is entrepreneurship; what is corporate governance. Entrepreneurship - myths and realities. The role of the entrepreneur

Entrepreneurship in theory and practice

How are new ventures created? Stevenson's model, entrepreneurial resources, the business plan, case study-R & R

The Opportunity

Sources of opportunity, identification, researching the opportunity, assessment, protecting your IP

The Entrepreneurial Team

What teams are important? Individual and team performance, putting together a winning team, team roles, team pathologies

Corporate Governance

Elements of corporate governance, systems and processes for entrenching corporate governance and the benefits of good corporate governance; case studies.

Entrepreneurial Finance

Determining your capital requirements, financing strategy, managing cash flow

Raising Financial Capital

Venture capital and informal equity, debt finance, other financial instruments.

Marketing and the new venture

Product, price, place, promotion, people; case study.

Innovation

R & D Management, determinants of innovation, the innovation process in new ventures, case study.

New Venture Workshop

Syndicate groups present their business ideas to class and receive constructive feedback from tutors and peers.

Group and Harvest

Theories of firm growth, Organic vs. M & A, Organic growth strategies, Resource implications, The Harvest.

CEG 401 Structural Analysis II (2,0)

Statically indeterminate structures. Moment distribution method for frames, sideways, settlement of supports. Slope-Deflection method of analysis of frames and beams. Theory of indeterminate arches.

CEG 403: Design of Steel Structures (2, 1)

This course covers the theory and practice of steel design.

Flexural behaviour of stable beam systems: Determinate and indeterminate systems. Stability: axial stability, stability of plates, torsion, loading and bending. Behaviour of bracing systems: Deflection, dynamic behaviour of building systems. Developing the design of a ductile frame. Design of steel superstructures, masts, towers, overhead storage reservoirs such as water tanks, oil tanks and steel pedestrian bridges. Design of offshore steel structures using BS codes and other modern codes and softwares.

CEG 405 Foundation Engineering I (2, 1)

Soil exploration. Sampling and in-situ testing techniques. Bearing Capacity. Stress Distribution and settlement. Design of shallow and deep foundations including pile load test. Pile group behaviour. Lateral earth pressures. Field Trips to construction sites.

CEG 411 Water and Wastewater Engineering (2, 1)

Review of water-quality standards, impurities in natural waters and the design and treatment processes for their removal such as aeration, water softening, coagulation, flocculation, sedimentation, filtration, disinfection, taste and odour control, corrosion control. Site visits to industries practicing water and wastewater treatment.

Water and wastewater Engineering Laboratory:

Wastewater characteristics, application of sources and effects of pollution, physical, chemical and biological wastewater treatment processes, and waste sludge management.

CEG 413 Transportation Engineering II (2, 1)

Permanent ways; Turnouts, side tracks and yards; Locomotives, train, resistance and velocity profile. Channel regulation. Port and harbours. Pipeline transportation. Tram-way and Belt conveyors

CEG 415 Urban Drainage Planning & Design (2, 0)

Natural Drainage system. Primary, Secondary and Tertiary Drainage System. Open and Closed Drainage Systems. Sizing and Designing of Drainage Appurtenances. Drainage of Urban coastal centres. Airport Drainage and Planning.

GEG 401 Technical Communication (2, 0)

Oral communication: Public speaking skills with effective use of visual aids and statistical and technical information. Principles of effective communication in interpersonal and mass communication process. Effective reading skills-extracting main ideas and reading for specific information through speed reading. Written communication skills-Technical Report writing, Proposal writing, Citation and referencing styles

GEG 402 Numerical Methods in Engineering II (3, 0)

Numerical Analysis: Numerical analysis with applications to the solution of ordinary and partial differential equations. Interpolation formula. Finite difference and finite elements methods. Application to solution of non – linear equations.

GEG 403 Engineering Statistics

Some aspects of probability theory. Random events, Frequency analysis, Data Reduction techniques Random variables Distribution and density function, Expectiaon and other moment's discrete distribution Binomial, Poison, Multinomial Distribution. Continuous Distributions: Normal, Chi-square, t-, F-, and Gamma Distributions. Sampling theory, Estimation of population parameters and Statistical Test. Regression analysis and Analysis of Variance.

CEG 501 Structural Analysis III (3, 0)

Energy methods in structural mechanics. Matrix methods of structural analysis. Flexibility and stiffness methods. Elastic instability. Limit state analysis of frames.

CEG 502 Advanced Structural Design (2, 1)

Limit state design of prestressed and precast concrete members. Design of simple span and continuous span bridges including steel plate deck bridges. Design of suspension bridges and offshore structures using BS codes and modern codes and modern softwares. Composite structures.

CEG 503 Surface Water Hydrology (2, 0)

The hydrological cycle. Precipitation, infiltration, evaporation, groundwater, surface run-off, floods and droughts. Physical and statistical analysis related to hydrological processes. Flood routing techniques. Hydrological system analysis. Unit hydrograph theory.

CEG 504 Groundwater Hydrology (2, 0)

Fundamentals of subsurface flow transport, emphasizing the role of groundwater in the hydrological cycle, the relation of groundwater flow to geologic structure, and the management of contaminated groundwater. Topics include: Groundwater occurrence: porosity, permeability, water holding formations, aquifers and aquifer types, aquicludes, aquifer boundaries, springs and streams in relation to groundwater. Aquifer

properties: transmissivity, storage coefficient, significance and typical magnitudes of these properties. Groundwater movement: flow lines and equipotentials, steady state and transient flows, streamlines and flow nets, natural flow, flow to wells, drawdown, cone of influence, radius of influence and interference. Well hydraulics, including Thiem and Theis equations and various tests, as well as contaminant transport, hydraulics of pumped wells, analytical methods and analysis of well pumping tests.

CEG 505 Foundation Engineering II (2, 0)

Stability of slopes; Design of earth retaining structures and sheet piles (concrete and steel) using BS and modern codes. Soil structure interaction; Lateral and pull-out loading of deep foundations. Foundations for offshore structures such as oil platforms; Pile-driving dynamics; Foundations for special structures and structured excavation.

CEG 506 Highway Engineering (2,0)

Geometric design of highways and railways, drainage structures. Structural design of highways and airfields using BS and modern codes.Pavement construction methods and evaluation. Highway economics and finance.

CEG 507 Principles of Construction Management (2,0)

Site office management and responsibilities, Site layout. Construction technology. Costing of equipment and productivity of labour. Project scheduling, tracking work and progress chart mapping. Skilled and casual labour requirements. Material ordering, specifications and testing. Supply chain management. Case studies. Alternative strategies and methods.

CEG 508 Case Studies in Environmental Engineering (2, 0)

Covers contemporary issues and problems in environmental engineering. Case studies ensure practical applications of environmental engineering knowledge to environmental engineering problems. Case studies should be drawn from the following areas of Environmental Engineering: Waste Water, Water Supply; Coastal Engineering and Engineering Hydrology.

CEG 509 Traffic Engineering (2, 1)

Traffic studies and analysis. Traffic legislation. Traffic flow theory capacity analysis. Traffic control devices and design of traffic signals.

CEG 510 Civil Engineering Practice and Project Management (3, 0)

Introduction: Types and functions of management, role of project management, project management skills and total quality management.

Working with Project Teams: Design and construction teams, team management, team building, motivation and conflict management.

Project Phases: Project initiation, Preconstruction planning; preliminary investigation and Report, construction and project close out.

Estimates: Establishing estimates work plan, methods and techniques, checklists and documentation, reviews and risk assessment, analysis and contingency.

Project Budgeting: Economic feasibility study, economic justifications and benefit-cost ratio design budgets, design calculations, drawings, bill of quantities.

Types of contracts: Fixed price contracts-schedule of rates contracts, Measure and value contracts, Lump sum contracts: Cost reimbursement contracts; Turnkey (package deal) contracts, contractor-financed contracts. Fast trade contracts.

Tendering Procedure: Contract documents; Advertisement; Open and Selective tendering; Opening of Tenders by Tender Board; Irregularities of Tenders; Tenders Board; Award of Contracts; Form of contract agreement

Contract Administration: Contractor programme, Role of Engineer, Duties of Resident Engineer and Site Engineer, Variation Orders; Interim payment certificates; Retention Money; Final Payment Certificate; Liquidated Damages; Arbitration; Engineer as Expert Witness; Professional Institutions and Professional Ethics.

CEG 511 Computer-Aided Design Of Structures (1.1)

Computers in Engineering. Computer language and computer programming methods. Matrix algebra. Computer-aided design of slabs, beams and columns.

CEG 512 Final Year Project (0, 6)

The student elects to do an in-depth study of a given problem in any major areas of Civil and Environmental Engineering (Structures, Water Resources, Environment, Geotechnics, Highway and Transportation). The project is spread over two (2) semesters.

CEG 514 Optimum Design and Control of Structural Systems (2.0)

Design of minimum weight or cost of structures. Full-stress Design, classical minimization procedure and mathematical. Programming methods. Control theory, practical control techniques for tall structures.

CEG 515: Computational Hydraulics (2.0)

Application of the Finite difference method, finite-element method, method of characteristics and boundary element method to surface and subsurface water flow problems. Student will use already developed computer models to solve practical problems.

CEG 516 Bridge Design (2.0)

Superstructure and substructure design. Design of simple span and continuous span bridges, including slab, beam and truss types. Introduction to orthotropic steel plate deck bridges. Suspension bridges.

CEG 518 Membrame Structure (2.0)

Bending and bucking of thin plate structural member, fundamentals of practical shell theory. Differential geometry of surfaces. Membrane and bending theory of shells. Analysis and Design of cylindrical shell, polygonal domes and paraboloids.

CEG 520 Stochastic Hydrologic Modelling (2.0)

Time and frequency domain, statistical techniques for hydraulic systems. Existing stream flow models. Drought and flood frequency estimation. Parameter estimation in dynamic systems.

CEG 521 Soil Mechanics II (2.0)

Advanced soil Mechanics, Soil Physics. Partial differential equation governing consolidation. Exact and approximate solutions. Land subsidence.

CEG 522 Advanced Hydrological Engineering (2, 0)

Properties of water. Properties of sediments i.e. transported material. Incipient motion of particles, calculation of sediment transport. Bed formation, Erodible channels. Hydraulic design of culverts, bridge, water way openings, spillway, stilling basins, hydraulic gates and gates structures, miscellaneous water control structures. Hydrologic design of dams and spillways.

CEG 523 Engineering Geology II (2.0)

Geological and engineering classifications of intact frock, rock discontinuities and rock masses. Weathering processes and classification of laterites and laterisation.

CEG 524 Coastal Engineering (2, 0)

Introduction to coastal engineering, national coastal morphology, mechanics of wave motion (small amplitude wave theory), propagation, velocities and acceleration, particle displacement and subsurface pressure. Wave and water level predictions, statistics and wave forecasting. Coastal protection methods. Practical field survey.

CEG 525 Embankment Dam Engineering (2.0)

Principles of analysis and design for earth and rock fill dams. Materials construction methods internal and external stability. Seepage and Drainage, Performance monitoring.

CEG 527 Urban Transportation (2.0)

Traffic studies and analysis. Traffic legislation. Traffic flow theory. Capacity analysis. Traffic Control Devices and Traffic signals Designs.

CEG 528 Tunnel Engineering (2, 0)

Principles of Analysis and Design for earth and rock tunnels. Materials, Construction methods. Stability and support systems. Deformations and performance monitoring.

CEG 529 Transportation Systems Analysis and Design (2.0)

Application of operations research and systems analysis techniques to transportation system (passenger and freight). Network flows. Routing and Scheduling. Technology Selection. Terminal operation. Techniques for design of transportation systems, including Networks of fixed facilities and route networks. Time-saving improvements. Use of low-capital cost options and the role of demonstration projects. Evaluation of alternate designs.

CEG 531 Labour Based Engineering Constructions (2.0)

Introduction to labour based engineering. Evolution of Civil Construction technology. Public works and employment creation. Basic concepts of labour based road works. Costing of equipment. Productivity of equipment. Cost and Productivity of labour.

Case Studies: Reasons for success. Road infrastructure investments Future directions. Maintenance: Alternative strategies and methods.

CEG 533 Environmental Management (2, 0)

Environmental Management: Definition, history, triggers, barriers and roles of stakeholders. Environmental Pollution: Sources, effects on the environment and economy, measures to abate/control environmental pollution. Theories and concepts of Green Environment.

Environmental Risks & Assessments. Environmental Management Tools:

- ***EIA*** *(Environmental Impact Assessment): Basic elements, procedures, legislation, methodologies and measures for implementation.*
- ***ECM*** *(Environmental Compliance Monitoring).*
- ***EA*** *(Environmental Audit).*

Capacity Building through Global Environmental Partnerships and Alliances. Environmental Policy Management.

GEG 501 Engineering Economics (2, 0)

Project development and financial analysis. Market analysis and demand estimation. Investigation and technical aspect of project development and financial analysis. Criteria for project choice. Project financing. Determination of Economic and Social profitability.

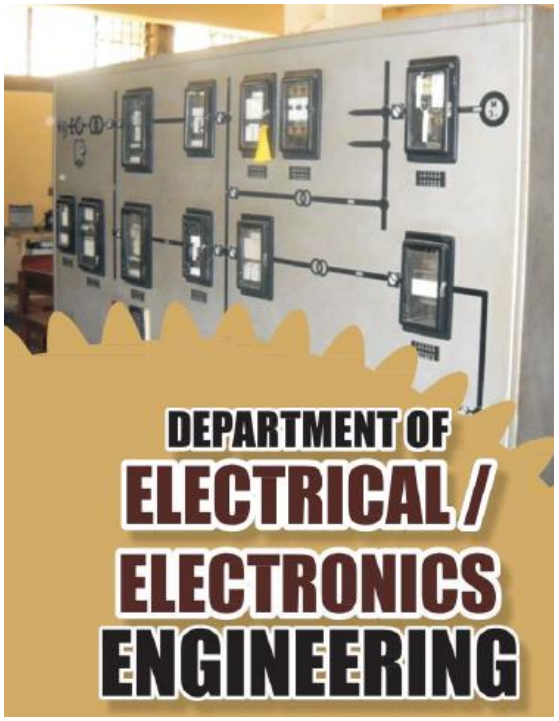
GEG 502 Engineering Law & Managemnt (2,0)

Part II: Law

Definition of a contract. Classification of a contract. Ingredients of a valid contract. Elements of a contract. Consideration. Intention to create legal relation. Capacity of a contract. Consent of a party. Concept of brevity of a contract and its exceptions. Mistakes of a contract and Duress in a contract. Misrepresentation in a contract. Illegality in a contract. How does a contract come to an end. Remedies for breach of a contract.

Part II: Managemnt

Introduction to Management. Decision Analysis. How to model a decision situation. Quantitative techniques for situations of uncertainty. Decision tree. Project Management. Project evaluation and review techniques. Concept of Motivation and Theories of Motivation. Hertzberg 2 factor theory. Transportation Management Model



Professor O. Adegbenro
B.Sc. (Lagos), M.Eng.
(Alberta), Dr.Eng. (Tohoku)
Head

3.3.1 History of the Programme Electrical and Electronics Engineering

The Department of Electrical Engineering was established in 1964, as one of the three pioneering departments of the Faculty of Engineering of the University of Lagos. Courses were offered in the department in a programme designed for the award of the degree of Bachelor of Science (Honours) in Electrical Engineering. Initially, the programme was a three year post A-level programme (four year post O-levels), but during the1976/77academicsession, it was modified to a four-year post A-level(or five-year post O-level) programme, in order to accommodate a one-year supervised industrial training scheme(the Students' Industrial Work-Experience Scheme(SIWES)). Furthermore, new courses were introduced during the1977/78academic session, in order to broaden the scope of the programme. The new courses include Antennas and Propagation of Radio-Waves, High-Voltage and Switchgear Engineering, Telephony and Telex Systems and Digital Communications Systems.

In a more recent review of the program, such other courses as Digital Computer Design, Microprocessors, Computer Graphics, Digital Measurement Technique, Instrumentation, and Microwave Optics and Microwave Engineering were introduced, in recognition of contemporary trends in electrical engineering at the undergraduate level. In addition to the Electrical Machines, Control and Electronics Laboratories, with which the Department started training students, the department has, over the years, developed laboratories in Microwaves, Remote Sensing and High Voltage Engineering. It may be remarked that Ericsson recently donated a GSM switch to complement the RBS equipment for teaching of communication courses, while the Power Holding Company of Nigeria (formerly NEPA) and ABB Limited in collaboration with our High Voltage Laboratory now operate a company known as HIVOTEC (Nigeria), which provides services to industrial concerns that utilize and deploy high voltage equipment.

It is also noteworthy that the academic staff of the department as of today includes four FELLOWS of the Nigerian Society of Engineers, two FELLOWS of the Nigerian Academy of Science, FELLOW of the British Institution of Electrical Engineers, FELLOW of the Acoustical Society of America, and two SENIOR MEMBERS of the American Institute of Electrical and Electronics

Engineers, as well as two FELLOWS of the Nigerian Academy of Engineering.

Postgraduate programmes leading to the award of the degrees of PGD, M.Sc., M. Phil. and Ph.D. are offered by the Department. Academic staff members of the Department are engaged in research activities in all branches of Electrical and Electronics Engineering, and in many applications-specific research efforts that are directed towards the solution of local Nigerian Engineering problems.

A proposal to effect the change of name of the programme from Electrical Engineering to Electrical & Electronics Engineering was approved by the University of Lagos Senate in1999, and consequently, the department now runs Electrical and Electronics Engineering Degree Programme.

The department has produced notable academics, researchers and industrialists both within and outside the country.

3.3.2 Computer Engineering

The B.Sc.(Hons.) Computer Engineering programme was introduced in 2001in recognition of the growth and importance of the Information and Communication Technology industry. Its establishment was predicated on the need to produce manpower with special focus on computer hardware and software engineering. The commencement of the programe led to the expansion of the laboratory facilities to include the computer hardware and software laboratories, programmable logic controllers laboratory.

Staff for this programme, derive mainly from the staff of the B.Sc. Electrical/Electronics Engineering honours degree program, although quite a few industry based experts also teach on the program. Students of the programme are also students of the UNILAG CISCO Local Networking Academy and typically become certified by the time they graduate.

3.3.3 Cousre Structure for Electrical and Electronics Engineering

100 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
GEG101	Engineering Pure Mathematics I	3	C	
GEG103	Engineering Applied Maths1	3	C	
FSC105	Introductory Physics I	3	C	
FSC102	Physical Chemistry	3	C	
MEG101	Workshop Practice	1	C	
MEG103	Technical Drawing I	2	C	
GST105	Use of English I	2	C	
GST102	Philosophy and Logic	2	C	
Total		19		

100 Level: Second Semester

Course Code	Course Title	Units	Type	Pre- requisite
GEG102	Engineering Pure Maths II	3	C	GEG101
GEG104	Engineering Applied Maths II	3	C	GEG103
MEG102	Workshop Practice	2	C	MEG101
MEG104	Technical Drawing II	2	C	MEG103
PHS102	Introductory Physics II	3	C	FSC105
PHS101	Introductory Physics III	2	C	FSC105
PHS103	Physics Laboratory	2	C	FSC105
GST106	Use of English	2	C	-
GST104	Philosophy	2	C	-
Total		21		-

200 Level: First Semester

Course Code	Course Title	Units	Type	Pre- Requisite
EEG201	Fundamental of Electrical Engineering I	2	C	FSC105,PHS 101,102,103
EEG203	Signals and Systems Theory	2	C	Ditto
EEG205	Electrical Engineering Materials	2	C	Ditto
EEG207	Electrical Systems Graphic	2	C	Ditto
EEG209	Fundamental of Electrical Engr. Laboratory	1	C	Ditto
GEG201	Engineering Mathematics I	3	C	GEG102, GEG104
GST201	General African Studies	2	C	
MEG201	Thermodynamics	2	C	PHS101, GEG104
MEG205	Engineering Mechanics I (Statics)	2	C	GEG102, GEG104
Total		18		

200 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
EEG202	Fundamental of Electrical Engineering II	2	C	EEG201
EEG204	Introduction to Switching and Logic Systems	2	C	EEG203
EEG206	Computer Programming I	2	C	GEG201
EEG208	Physical Electronics	2	C	EEG205
EEG210	Fundamental of Electrical Engineering II Laboratory	1	C	EEG201
GEG202	Introductory Engineering Statistics	3	C	GEG102
GST202	General African Studies II	2	C	
MEG202	Fluid Mechanics	3	C	MEG201
MEG208	Engineering Mechanics II (Dynamics)	2	C	MEG205
Total		19		

300 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
EEG 301	Circuits and Systems I	2	C	EEG 202
EEG 305	Electronic Circuits I	2	C	EEG 201, 208
EEG 307	Instrumentation and Measurement I	2	C	EEG 202
EEG 309	Energy Conversion	2	C	EEG 202
EEG 311	Computer Programming II	2	C	EEG206
EEG 313	Energy Conversion Laboratory	1	C	EEG 202,210
EEG 315	Electronic Circuits I Laboratory	1	C	EEG 202,208
GEG 301	Engineering Mathematics II	2	C	GEG 201
GST307	Entrepreneurship and Good Governance I	2	C	
CEG 311	Civil Engineering Technology	3	C	CEG 202
MEG 311	Mechanical Engineering Technology	3	C	MEG 201
Total		19		

300 Level: Second Semester

Course Code	Course Title	Units	Type	Pre- Requisite
EEG 302	Circuit and System II	2	C	EEG 301
EEG 304	Transmission Lines and Filters	2	C	EEG 301
EEG 306	Electronic Circuits II	2	C	EEG 305
EEG 308	Power Electronics	2	C	EEG305
EEG 310	Electrical Drives	2	C	EEG 309
EEG 312	Instrumentation and Measurement II	2	C	EEG 307
EEG 314	Logic Design of Digital Systems	2	C	EEG 204
EEG 316	Electronic Circuits II Laboratory	1	C	EEG305,315
GEG 302	Operational Method	2	C	GEG301
EEG318	Electrical Drives Laboratory	1	C	EEG202, 210
EEG320	Electrical Engineering Technology	3	C	EEG202
Total		21		

400 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
EEG 401	Microprocessor and Microcomputer	2	C	EEG 306, 314
EEG 423	Microprocessor and Microcomputer Laboratory Laboratory	1	C	EEG 316
EEG 403	Communication Systems Principles	2	C	EEG 302
EEG 405	Classical Control Systems	2	C	EEG 302, 306
EEG 407	Active Networks; Analysis, Synthesis and Design	2	C	EEG302, 306
EEG 409	Power Transmission and Distribution	2	C	EEG 302
EEG411	Electrical Machines	2	C	EEG310
EEG415	Electromagnetic Waves Theory I	2	C	GEG201
EEG417	Communication Principles Laboratory	1	C	EEG302, 316
EEG421	Control Systems Laboratory	1	C	EEG302, 316
EEG431	Electrical Machines Laboratory	1	C	EEG310,318
Total		18		

400 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
SIW400	Industrial Training	6	C	-
Total		6		

500 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
EEG 501	Power Systems Analysis Economics and Operation	2	C	EEG 409
EEG 503	Modern Communication Systems	2	C	EEG 403
EEG 505	Synthesis & Design of Control Systems	2	C	EEG 405
EEG 507	High Power Engineering I	2	C	EEG 409
EEG 509	Electromagnetic Waves Theory II	2	C	EEG 415
EEG 511	Power System Analysis	2	C	EEG 409
EEG 513	Project I	3	C	
GEG 501	Engineering Economics	2	C	
Total		17		
EEG 515	Introduction to VLSI Design	2	E	EEG 401
EEG 517	Micro-Computer Graphics	2	E	EEG401
EEG 519	Power System Planning, Design and Equipment	2	E	EEG 409
EEG 525	Telephony & Facsimile Systems	2	E	EEG 403
CPE 505	Information Theory and Coding	2	E	EEG 312

500 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
GEG 502	Law and Management	2	C	
EEG 504	Power Systems Protection	2	C	EEG 501
EEG 510	Energy and Power Quality Assessment	2	C	EEG 501
EEG 512	Digital Signal Processing	2	C	EEG 505
EEG 514	Project II	3	C	
Total			11	
EEG 518	Microwave Engineering	2	E	EEG 509
EEG 502	Digital Computer Design	2	E	EEG 401
EEG 506	Electrical Machines Design	2	E	EEG 411
EEG 508	High Power Engineering II	2	E	EEG 507
EEG 516	Antennas and Propagation	2	E	EEG 509
EEG 520	Digital Control Systems	2	E	EEG 505

3.3.4 Course Outline

GEG101 Engineering Pure Mathematics I (3.0)

Axiomatic Set Theory, Operations on Sets, Boolean Algebra, Switching circuits, Logic circuits and Prepositional Logic. Transfinite induction and recursion. Consequences of axioms of choice. Sequence, Monotonic sequences and Convergence. Cauchy criteria. Series, power series. Tests for convergence. Taylor's series, operations on power series. Limits continuity and differentiability. Mean value theorems. Techniques and applications of differentiation. The definite integral. Fundamental theorems of integral calculus. Techniques and application of integral calculus. Improper integrals.

GEG102 Engineering Pure Mathematics II (0.2)

The real and the complex number systems. Mathematical induction matrices and determinants. Complex numbers: representations and algebra. Complex functions. Roots of unity. De-Moivres theorem and application. Basic matrix theory and algebra. Systems of linear equations: elementary row reduction, types and methods of solution echelon form. Applications of matrices. Introduction to systems of inequalities and linear programming.

GEG103 Engineering Applied Mathematics I (3.0)

Representation of Vectors: Resultant of several vectors. Vectors in Euclidean space: lines, places, and spheres. The dot and cross products. Direction cosines. Differentiation of Vector functions. Lami's Theorem. Polygon of forces. Condition of equilibrium of coplanar forces. Newton's laws of motion. Analytical treatment of static equilibrium of particles and rigid bodies. Distributed forces. Centroids and centers of gravity. Moments of inertia. Analysis of structures and trusses forces in beams and table. Friction.

GEG104 Engineering Applied Mathematics II (0.2)

An introduction to kinematics and kinetics of a particle. Systems of particles and rigid bodies .Energy and momentum methods. Applications. Impulsive motions. Motion of rigid body (i) about a fixed axis (ii) in a plane. Equations of motion.

EEG201 Fundamentals of Electrical Engineering I (2.0)

Circuit Laws: Kirchoff's Law, Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Millman's Theorem, Rosen's Theorem. Network problems arising in Energy distribution.

Methods of analysis suitable for the problems in Network Theory in terms of currents, voltages, energy/voltage amperes, Loop and Nodal analysis. Resistors, Electric fields and capacitors, Magnetic fields and inductance. Energy stored in capacitors and inductors. Electromagnetic induction and Magnetic forces, self mutual inductance. Electrochemical power sources.

EEG202 Fundamentals of Electrical Engineering II (0.2)

Emf. Generation, Single phase Circuits; rms, mean, form factor, peak factor, phasor diagram. Series and parallel resonance circuits. Resonance, Q-factor, impedance and power P, S, and Q 3-phase circuits, delta and star conversion line and phase voltages.

Complex Notation and its Application to RLC circuits. Resonance, a-factor, impedance and admittance power, P, S, G. Introduction to D.C. Machines, A.C. Machines and Transformers.

EEG203 Signals And Systems (Signal Theory) (2,0)

Continuous and discrete signals, transformations and inverse transformations, spectral analysis of steps, ramps and impulse, signal descriptions by impulse and step functions. The independent variable; definitions of rise-time, settling time, overshoot, period magnitude and duration of a signal.

Fourier Analysis, Perseval Theorem, Periodic and Non-periodic signals, Devices and Models,

Network analysis and circuit with independent and dependent sources. Time invariant and stationary systems.

EEG204 Introduction to Switching and Logic Systems (0,2)

Number systems conversion between bases, Arithmetic with bases other than ten, 1 and 2s complement, BCD, weighted and unweighted codes; Gray codes. Truth Function and Truth Tables. Boolean Algebra and De-Morgan theorem, Truth function set or Venn diagram and truth tables. Minimization of Boolean function; using Boolean Algebra and Karnaugh Map (K-Map). Switching Relays, logic circuits. Realization of simple combinatorial circuit, binary single bit address, simple code conversion, bit comparators. Introduction to multivibrator circuits; Astable, Monostable and bistable.

EEG205 Electrical Engineering Materials (2,0)

Introduction to Quantum and Statistical Mechanics. Structure of Solid. Electrons in Solids. Dielectric

Properties Breakdown, piezo and Ferro-electric effect. Magnetic properties physics of magnetic

Materials. Atomic moment, the transition elements. Magnetic alloys. Ferrites Thermal properties of materials. Optical properties of materials. Introduction to Transducers.

EEG206 Computer Programming I (0,2)

Introduction to algorithms and programming languages; FORTRAN, C, C++ and MATLAB

EEG207 Electrical System Graphics (2,0)

Software tools for computer graphics, analytic geometry and computer graphics. Basics of 3-D graphics. Hidden line and Hidden surface routines. Graphic theory. Simulation of circuit elements, devices and components. Simulation of Electronic circuits.

EEG208 Physical Electronics (0,2)

Electrons and hole, carrier motion in semiconductors. Principles of Semiconductor devices; transport equation, mass action law; diode types; formation and applications; transistors; bipolar junction transistors –BJTs and field effect transistors – FETs; formation, characteristics and applications. Semiconductor sensors; thermistors, strain gauge; Power electronic devices, SCR, UJT, Diac SUS, SBS, C-SCR, IGBT, MCT, GTO, SCS power transistors (BJT and MOSFET). Opto-electronic devices; photoconductors, photodiodes, phototransistors, photovoltaic cells, LDRs, LEDs LCDs Introduction to microwave semiconductor devices. Introduction to lasers and masers. Introduction to microelectronics and IC Technology.

EEG209 Fundamentals of Electrical Engineering I Laboratory (1.0)

EEG210 Fundamentals of Electrical Engineering II Laboratory (0.1)

EEG301 Circuits and System I (2,0)

Network Theorems, Circuit Graphic. Elementary signals. Dynamic circuit elements. First and second order differential equations. Time domain solution of circuit equations. Impulse response. Network functions. Natural frequencies of networks. Convolution and some of its applications. Network equivalences. Introduction to the concept of auto- and cross-correlation. Sinusoidal steady state analysis.

EEG302 Circuits and Systems II (0,2)

Periodic and non-periodic signals. Harmonic analysis. Fourier series and Fourier Integral. Spectral analysis. Laplace Transformation. Network functions. Network analysis using Laplace transform and Fourier transform methods. Introduction to passive circuit synthesis; network functions, positive real functions. Realisation of RC, RL, LC and RLC functions. Foster and Cuaer synthesis methods.

EEG308 Power Electronics (2,0)

Electronics for high-power control. Amplification using Pulse Width Modulation(PMW) Comparison of the power transistor with the thyristor design and construction of thyristors for high currents and voltages. Cooling and protection of high-power semiconductors Design of firing circuits,

oscillations, blocking- oscillators transistor-inverters. A.C commutated converters, one-two and four-quadrant Distortion and Non-Linear Operation: Class A, AB, and C operations. Class C tuned amplifiers. Optical Devices and photo-electronics. Pulse circuits, sequential circuits, RS, JK, D and T. Diodes and Transistors Logic Circuits.

EEG304 Transmission Lines and Filters (0,2)

Transmission line theory. Partial differential equations. AC steady state differential equations. Parallel wire and coaxial lines. Transmission parameters and units. Attenuation and delay distortion. Heaveside lines. Group and phase velocities. Reflection. Exponential and hyperbolic equations. Transmission lines at high frequencies, resonant lines, standing wave ratio, lossless lines. Smith chart. Introduction to filter theory; image and iterative parameters. Theory of passive filters; low-pass, band-pass, high-pass and band elimination filters.

EEG305 Electronic Circuits I (2,0)

Modeling of circuit elements. Matrix representation of electronic devices and circuits; Z, Y and H matrices. Diodes and their applications; rectifying circuits and regulators. Waveshaping circuits. Transistor circuits (BJT, FET). Biasing and thermal stability. Amplifier circuits; dc and ac analyses, dynamic parameters, frequency response. Single-stage and multi-stage amplifier design. Power amplifier and other large signal circuits.

EEG306 Electronic Circuits II (0,2)

Tuned and Feedback amplifiers. Stability Unilateralisation, impedance matching. Direct-coupled multistage amplifier, difference. Cascade and Darlington circuits. High and low frequency response. Operational amplifiers. Oscillators and waveform generators. Temperature controllers.

Noise in electronic circuits. Special circuits; voltage controlled and sweep oscillators, phase locked loops.

EEG309 Energy Conversion

Electromechanical Energy Conversion:

Single and double coil devices, concentrated and distributed windings, mmf pattern in air-gap torque and induced voltage analysis, constructional features of synchronous; induction and D.C. machines.

Direct Energy Conversion:

The solar cell, thermo-electric energy conversion, the fuel cell MHD energy conversion. Power transformers. Phasor diagrams and equivalent circuits, regulations and efficiency calculations and measurements, three-phase transformers parallel operation of transformers.

Other types of transformers: auto transformers and instrument transformers. Per unit system of calculation. Transformer Design. Small A.C. Motors.

The single phase or induction motor-principle. The split-phase induction motor, capacitor start induction motor, the shaded-pole motor. The single-phase series motor.

EEG307 Measurement and Instrumentation I

Use of CRO in electronic/electrical measurements. Digital methods for measurement of physical qualities. Transducers Analogue electronic instruments for voltage, power wave-form, frequency and phase measurements. Digital instrumentation. Theory of errors. Absolute and relative treatment of errors. Moving coil, thermal, electrostatic and induction type instruments.

EEG310 Electrical Drives

Drive components and principles: Armature volts and Ward Leonard speed control schemes. Torque and speed control. The thyristor- models, characteristics, turn-on and turn-off requirements. Natural and forced commutation. Introduction to AC/DC, AC/AC and DC/DC conversions.

Industrial Drives: Choice of an electric motor for industrial drive. Specification of control system, duty performance, criteria, motor dynamic.

Control characteristics of the shunt motor, two-phase servomotor, stepped motor, stepper motor, matching motor and gearless system, motor enclosure, motor rating. Block diagram and models of electric Drives.

Power Control Devices: Operational amplifiers and thyristors, A.C. & D.C. Generator transfer functions, power gain/time constant, analogue and digital transducers for speed and position management. Block Diagram of Industrial Drives.

EEG311 Computer Programming II

EEG312 Instrumentation and Measurements II

Transducer, digital instruments, curve tracers, recorders, measurement of temperature, displacement magnetic ratio and multiple ratio measurements. Data conversion and interfacing. Data logging switches and displays. Data Acquisition Systems, Software Data Conversion, Multiplexing Spatrac Encoders, Errors.

EEG314 Pulse and Digital Electronics

Review of Boolean Algebra and Logic Circuits. Review of number systems and logic codes. Minimization of Boolean functions, map and tabular methods. Combinational logic systems, elements, adders, multiplexers, demultiplexers PLAS, error detecting and correcting codes. Parity checkers. Sequential logic systems elements, flips flops and their transition clock mode and pulse mode circuits. Designs of Synchronous sequential logic systems. Counters, registers, sequence generators. Logical design using MSI, LSI and VLSI parts. Memories and their realization. ROMS, PROM, EPROM, EEPROM, RAMS, SRAM, DRAM. Magnetic Memories HD, FD, CD, Tapes etc. Bipolar and MOS Technologies. TTL, ECL, COSMOS, P-MOS, N-MOS Totem Pole, Tri-state and open collector logic elements properties: Fan-out, fan-in, noise margin, propagation, delay and switching speed. MSI, LSI, ULSI Technologies. Interfaces and converters. Serial-parallel converters. Analogue digital and digital-analogue converters.R-2R ladder networks etc. TTL-MOS Interfaces.

EEG313 Energy Conversion Laboratory

EEG 315 Electronic Circuits I Laboratory

EEG320 Electrical Engineering Technology

EEG401 Microprocessors and Microcomputers

History of digital computers and microcomputers, microprocessor preliminaries, microprocessor in system design. Basic digital building block register, counter, clock etc. Microprocessor hardware, Algorithms and their suitability for microprocessor implementation, microprocessor software, microprocessor applications.

EEG403 Communications Systems

Spectral Analysis, Auto-correlation, Weiner-Khinchies theorem, Amplitude Modulation, Modulators and Demodulators. Angle, phase and frequency modulation. The sampling theorem, pulse modulation, PAM, PWM, PPM. Propagation of Radio Waves, multipath transmission. Introduction to Noise Remote Control and Supervisory Systems.

EEG405 Classical Control Systems Analysis

Modeling of physical systems, dynamic equation of mechanical, electrical, thermal and fluid flow systems. Transfer functions of mechanical, electrical and electromechanical control components. Block diagrams signals flow graphs. Characteristic equations, s-plane roots, and stability. Performance criteria. Roots locus, polar and Bode plots and N-diagrams.

Inverse Nyquist plots. State space description of control systems, analogue computer simulation of control systems.

EEG407 Active Networks; Analysis, Synthesis And Design

Differences between passive and active networks; network elements; RLC, NIC, NIV, GIV, GIC, gyrator. Network functions, Positive Real Functions, Realizability criteria. Approximation functions; Butterworth, Tchebyshev, Cauer, Bessel and Delay filters. Sensitivity analysis. Inductance simulation, Direct realization of active filters; biquad filter

functions; negative feedback topology, positive feedback topology, coupled network topology; universal filter realization. Switched Capacitor Filters.

EEG409 Power Transmission and Distribution

Electrical parameters. Long line equations, analytical and graphical methods of solution for shorthand long lines. Performance charts. Application of Matrix Methods. Circle diagrams and power limits of uniform long lines. Reactive power compensation. Insulators and voltage distribution. Conductor materials and configurations. Sag and Tension Calculations.

EEG411 Electrical Machines Theory

Three-phase synchronous machines, generation of three-phase power. Equivalent circuit linear and non- linear machine analysis. Parallel operation. Operation Charts of synchronous motor starting and performance. V. Curves, power factor control. Three phase diagram. Torque/speed characteristics, speed control. Starting induction regulators. Fractional-horse power motors.

EEG415 Electromagnetic Waves Theory

Scalar, Vector and Hertsian potentials for solving Maxwell's equations. Plane waves in free-space. Pointing Vector. Plane waves in conducting and dielectric media. Skin effect, guided waves. Waveguide structures, cavity resonators. The scattering of electromagnetic waves.

EEG417 Communication Systems Laboratory

EEG421 Control Systems Laboratory

EEG423 Microprocessor Laboratory

EEG431 Electrical Machines Laboratory

GEG501 Engineering Economics

Project development and financial analysis market analysis and demand estimation. Investigation and technical aspect of project development and financial analysis. Criteria for project choice. Project financing. Determination of Economic and social profitability.

GEG502 Engineering Management

Part I: Law

Definition of Contract, Classification of contracts, Ingredient of a valid contract, Elements of a contract, Consideration, Intention to create legal relation, capacity of a contract, consent of a party, concept of brevity of a contract and its exceptions, mistakes of a contract, duress in a contract, undue influence in a contract, misrepresentation of a contract, how does a contract come to an end, remedies for breach of a contract.

Part II: Management

Introduction to management, decision analysis, how to model a decision situation, quantitative techniquesforsituationofuncertainty,decision tree, project management, project evaluation and review techniques,concept of motivation, theories of motivation, Hertzberg factor theory, Transportation Management Model.

EEG501 Power Systems Analysis

Power Systems representation. Per-unit systems. Load-flow analysis and the use of digital computers. Short-circuit current and reactance of synchronous machines, three phase, symmetrical component theory balanced and unbalanced fault analysis. Steady and transient stability the swing equation and equal area criterion.

EEG502 Digital Computer Design

Hardware design of digital computers. Arithmetic and logic unit, adders, multipliers, dividers, logic and shifting operations. Floating point arithmetic. Memory organization, design of a basic computer. Instruction set, structure. Fetch-execute micro-operations, hardwired control unit. Index registered addressing, interrupt operation, direct memory access. Organization of commercially available computers.

EEG503 Communication Systems II

Binary PCM, FSK, DPSK. Data transmission. Multiple Access Techniques Matched filter

reception. Information and coding theory. Error correcting codes. The syndrome. Noise in digital communications systems. Introduction to satellite communication.

EEG504 Power Systems Protection

The concept of protective relaying in power systems. Distance relaying. Differential relaying protective systems in generators, motors, busbars and transformers. Basic principles of relay design, construction, characteristics, applications and testing.

EEG505 Synthesis and Design of Control Systems

Integral, proportional and derivative control actions, three term controllers. Lead, lag compensators, controllability and observability. Introduction to optimal control, pole assignment, and state estimation. Digital computer simulation. Non-linearities in control.

EEG506 Electrical Machine Design

Principles of electrical machines and design. The output equation, the calculation of machine parameters, saturation problems in machine design. Specific electric and magnetic loading related to cooling of machines. Specific design problems and computer-aided design of electrical machines. Definition and classification of windings: coil construction and insulation, physical problems connected with single and double layer-winding; voltage analysis of 3-winding symmetrization.

EEG507 High Power Engineering I

Generation of high A.C., D.C., and impulse voltages. High voltage measuring methods. Fundamental processes of electrical discharges. Breakdown mechanisms in gases. Influence of type of voltage, electrode configuration, distance, temperature, pressure and humidity on the characteristics of discharges and breakdowns. Electric field calculations for different electrode configurations. Generation and measurement of high currents. Thermal losses due to high currents. High impulse currents. Technical losses in power networks due to high currents. Compatibility issues.

EEG 508 High Power Engineering II

Breakdown in solid and liquid dielectrics. Circuit interruption. Arc extinction. Transient recovery voltages. Switch gear construction, oil switches. Minimum oil breakers, airblast and SF6 types. Arc- extinguishing devices. Resistance switching. Introduction to conducting, magnetic and insulating materials such as ceramics etc. Structure and properties of thin films; electronic transportation. Principle of solid, characteristics of dielectric materials, conducting materials and introduction to super-conductivity. Theoretical and experimental magnetism. Preparation and properties of materials.

EEG 509 Electromagnetic Fields and Waves II

Scalar, vector and Hertzian potentials for solving Maxwell's equations. Plane waves in free space. Poynting vector. Plane waves in conducting and dielectric media. Skin effect, guided waves. Waveguide structures, Cavity resonators. The scattering of electromagnetic waves.

EEG510 Energy Management and Power Quality Assessment

Energy needs of Nigeria. Energy conservation. Energy management. Energy auditing. Power quality: definitions: Voltage Dips (SAGS). Brief Interruption, Wells, Transients, Voltage fluctuations. Flickers, (causes and effect).Quality assessment .Notches, Harmonics, Inter-harmonics, Voltage unbalance.

Power assessment under waveform distortion: single phase definitions examples, three phase definitions examples. Power quality monitoring.

EEG511 Power Systems Economics and Operation

Component of power generating systems. Types of stations, voltage and frequency control design and organization. Load curve studies. Economic principles. Cost equations. Economic operation of generating plants. Effects of transmission on economy of systems. Electrical load

development. Tariffs. Load duration curves. Effects of power factor on plant economy.

EEG512 Digital Signal Processing

Microcontroller implementation of filters. Architecture issues, single chip programmable digital processors. Programming methods, languages, data representations. Optimizing for speed, optimizing for size, flooby dust on programming. Finite word-length effects: co-efficient quantization. Limit cycles FIR filter implementation. IIR Filter implementation. Examples: Implementing DFT, DFT to FFT. The Goertzel Algorithm: Implementation of the FFT on the 68HC16Code.

EEG515 Introduction to VLSI Systems Design

What is VLSI Technology? MOS transistor theory, Inverter Circuits. Data and control flow. MOS processing and design rules. Integration and system fabrication. Logic Design with MOS. Architecture and Design of system Fabrication. Logic with MOS, architecture and design of systems controllers, system timing. Highly concurrent systems and their suitability for VLSI implementation, signal processing using MOS VLSI technology, systems, and computational aspects of VLSI.

EEG516 Antennas and Propagation

Theory of Dipole. Antenna Arrays. Linear, loop, helical, biconical and Aperture antennas. Elements of beam shaping. Slot, horn reflector and lens antennas. Antenna gain directivity and effective aperture. Ground, sky and space wave propagation. Ionospeheric propagation, multi-path phenomena signal loss and fading, antennas for space communications.

EEG517 Microcomputers Graphics

Geometry and line generation, graphics primitives. Polygons. Fundamentals: homogeneous coordinates 2D and 3D geometric transformations and perspective. Segments. Clipping and windowing, scene modeling and animation. Algorithms for visible surface determination hidden line and surface elimination.

EEG518 Microwave Engineering

Microwave transmission networks and devices; Transmission lines; parallel plane lines, striplines, coaxial lines; waveguides – rectangular waveguides, circular waveguides. Microwave passive devices; microwave filters, directional couplers and hybrids, power dividers and combiners, ferrite components

Microwave active devices; Introduction to design, operation and application of microwave and millimetre wave vacuum tubes. Non-linear and active microwave devises; diodes, mixers, transistors, negative resistance devices; Oscillatory theory and design using transistors, tunnel diodes, IMPATT, TRAPAT T and Gunn devices, PIN diode switching circuits and phase shifters; Transceivers and radar systems, atmospheric effects, microwave heating, biological effects and safety.

Introduction to optical communication; principles and applications of optic fibre cables; optical transmitters and receivers. Comparison of optical fibre with copper transmission cables and waveguides.

Methods of analysis of microwave circuits and systems; geometrical optics, geometrical theory of diffraction, universal theory of diffraction; numerical methods, method of moments, finite element method, finite integration technique; some commercial available software; CST studio, MATLAB, COMSOL, ANSOFT, OPTIWAVE, etc. Microwave measurements; VSWR, power, frequency and wavelength, impedance, reflection coefficient, dielectric properties and resonator quality factor.

EEG519 Power Systems Planning, Design and Equipment

Power system planning and design: world energy resources. Methods of electrical generation. Load forecasting and source analysis. Principles and practice of HVAC transmission and distribution. Mathematical methods used in planning of source utilization and transmission networks. Generation scheduling. Power system equipment: alternators, factors affecting size and design, special problems of turbo and hydro-alternator, construction and operation

switchgear. Principle of circuit breaking, types layout of substation. Overhead lines and cables. Fabrication, erection and use.

EEG520 Digital Control System

Sampled data systems. Block diagrams. Characteristic roots in the Z-plane. Stability of digital control systems. Direct digital design. Digitalization of analog designs. Digital state space formulation and solution of the state equations. Introduction to microcontroller and microprocessor based control systems implementation.

EEG525 Telephony and Facsimile Systems

The telephone system and conventional Telephone sets. Speech-dialing, and ringing-circuits. Basic traffic theory digital transmission techniques. The central office basics of the external line plant design and installation digital switches. Wireless telephone MODEMS and FAX advances in modern telephone systems machines

3.3.5 Course Structure for Computer Engineering Program

100 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
GEG 101	Engineering Pure Maths I	3	C	
GEG 103	Engineering Applied Maths 1	3	C	
FSC 105	Introductory Physics I	3	C	
FSC 102	Physical Chemistry	3	C	
MEG 101	Workshop Practice	1	C	
MEG 103	Technical Drawing I	2	C	
GST 105	Use of English I	2	C	
GST 102	Philosophy and Logic	2	C	
Total		19		

100 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
GEG102	Engineering Pure Maths II	3	C	GEG101
GEG104	Engineering Applied Maths II	3	C	GEG103
MEG102	Workshop Practice	2	C	MEG101
MEG104	Technical Drawing II	2	C	MEG103
PHS102	Introductory Physics II	3	C	FSC105
PHS101	Introductory Physics III	2	C	FSC105
PHS103	Physics Laboratory	2	C	FSC105
GST106	Use of English	2	C	
GST104	Philosophy	2	C	
Total		21		

100 Level: First Semester

Course Code	Course Title	Units	Type	Pre- Requisite
EEG201	Fundamental of Electrical Engineering I	2	C	FSC105, PHS 101,102, 103
EEG203	Signals and System Theory	2	C	"
EEG205	Electrical Engineering Materials	2	C	"
EEG207	Electrical System Graphic	2	C	"
EEG209	Fundamental of Electrical Eng. Laboratory	1	C	"
GEG201	Engineering Mathematics I	3	C	PHS101, GEG104
GST201	General African Studies	2	C	
MEG201	Thermodynamics	2	C	PHS101, GEG 104
MEG205	Engineering Mechanics I (Statics)	2	C	GEG102, GEG 104
Total		18		

200 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
EEG202	Fundamental of Electrical Engineering II	2	C	EEG201
EEG204	Introduction to Switching and Logic Systems	2	C	EEG203
EEG206	Computer Programming I	2	C	GEG201
EEG208	Physical Electronics	2	C	EEG205
EEG210	Fundamental of Electrical Engineering Lab II	1	C	EEG201
GEG202	Introductory Engineering Statistics	3	C	GEG102
GST202	General African Studies II	2	C	
MEG202	Fluid Mechanics	3	C	
MEG208	Engineering Mechanics II (Dynamics)	2	C	
Total		19		

300 Level: First Semester

Course Code	Course Title	Units	Type	Pre- requisite
EEG 301	Circuits and Systems I	2	C	EEG 202
EEG 305	Electronic Circuits I	2	C	EEG 202
EEG 307	Instrumentation and Measurement I	2	C	EEG 202
EEG 309	Energy Conversion	2	C	EEG 202
EEG 311	Computer Programming II	2	C	EEG 206
EEG 313	Energy Conversion Laboratory	1	C	EEG 202, 210
EEG 315	Electronic Circuits Laboratory I	1	C	EEG 202
GEG 301	Engineering Mathematics II	2	C	GEG 201
GST307	Entrepreneurship and Good	2	C	
CEG 311	Civil Engineering Technology	3	C	CEG 202
MEG 311	Mechanical Engineering Technology	2	C	
Total		21		

300 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
EEG 302	Circuit and System II	2	C	EEG 301
EEG 304	Transmission Lines and Filters	2	C	EEG 301
EEG 306	Electronic Circuit II	2	C	EEG 305
EEG 308	Power Electronics	2	C	EEG305
EEG 310	Electrical Drives	2	C	EEG 309
EEG 312	Instrumentation and Measurement II	2	C	EEG 307
EEG 314	Logic Design of Digital Systems	2	C	EEG 204
EEG 316	Electronic Circuits II Laboratory	1	C	EEG 305, 315
GEG 302	Operational Methods	2	C	
EEG318	Electrical Drives Laboratory	1	C	EEG309
Total		18		

400 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CPE403	Principles of Communication Systems	2	C	EEG302
CPE 405	Computer Programming Languages	2	C	EEG311
CPE 409	Digital Computer Technology (Architecture)	2	C	EEG314
CPE 413	Software and Hardware Laboratory	2	C	
EEG 401	Microprocessor and Microcomputer	2	C	EEG306, 314
EEG 405	Classical Control Systems	2	C	EEG302
EEG 415	Electromagnetic Waves Theory(EMWT)I	2	C	
EEG 417	Communications Systems Laboratory	1	C	
EEG421	Control Systems Laboratory	1	C	
EEG423	Microprocessor Laboratory	1	C	
Total		17		

400 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
SIW400	Industrial Training	6	C	-
Total		6		

500 Level: First Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CPE501	Software Engineering Fundamentals	2	C	CPE405
CPE503	Machine Language Programming	2	C	
CPE507	Systems Programming I	2	C	
EEG509	Electromagnetic Waves Theory(EMWT) II	2	C	EEG415
CPE517	Project I	3	C	
GEG501	Engineering Economics	2	C	
CPE509	Digital Computer Design	2	C	EEG401
CPE511	Power Systems for Computer Engineers	2	C	
EEG517	Microcomputer Graphics	2	C	
EEG525	Telephony and Facsimile Systems	2	C	
Total		21		

Electives

EEG519	High Voltage Engineering	2	E	
CPE505	Information Theory and Coding	2	E	CPE403
EEG515	Introduction to VLSI Design	2	E	

500 Level: Second Semester

Course Code	Course Title	Units	Type	Pre-Requisite
CPE502	Database Management	2	C	
CPE510	Computer Networks	2	C	
CPE518	Project II	3	C	
GEG502	Law and Management	2	C	
CPE514	Digital Signal Processing		C	
EEG502	Digital Computer Design	2	C	EEG509
CPE506	Assembly & Machine Language Programing	2	C	
Total		13		

Electives

CPE512	Microprogramming and Structure	2	C	
EEG520	Digital Control Systems	2	E	EG405
CPE508	Systems Programming II	2	E	
EEG516	Antennas and Propagation	2	E	

3.3.6 Course Outline

GEG101 Engineering Pure Mathematics I

Axiomatic Set Theory, Operations on Set, Boolean Algebra, Switching circuits, Logic circuits and Prepositional Logic. Transfinite induction and recursion. Consequences of axioms of choice. Sequence, Monotonic sequences and Convergence. Cauchy criteria. Series, power series. Tests for convergence. Taylor's series, operations on power series. Limits continuity and differentiability. Mean value theorems. Techniques and applications of differentiation. The definite integral. Fundamental theorems of integral calculus. Techniques and application of integral calculus. Improper integrals.

GEG102 Engineering Pure Mathematics II

The real and the complex number systems. Mathematical induction matrices and determinants. Complex numbers: representations and algebra. Complex functions. Roots of unity. De-Moivres theorem and application. Basic matrix theory and algebra. Systems of linear equations: elementary row reduction, types and methods of solution echelon form. Applications of matrices. Introduction to systems of inequalities and linear programming.

GEG103 Engineering Applied Mathematics I

Representation of Vectors: Resultant of several vectors. Vectors in Euclidean space: lines, places, and spheres. The dot and cross products. Direction cosines. Differentiation of Vector functions. Lami's Theorem. Polygon of forces. Condition of equilibrium of coplanar forces. Newton's laws of motion. Analytical treatment of static equilibrium of particles and rigid bodies. Distributed forces. Centroids and centers of gravity. Moments of inertia. Analysis of structures and trusses forces in beams and table. Friction.

Geg104 Engineering Applied Mathematics II

An introduction to kinematics and kinetics of a particle. Systems of particles and rigid bodies. Energy and momentum methods. Applications. Impulsive motions. Motion of rigid body (i) about a fixed axis (ii) in a plane. Equations of motion.

EEG201 Fundamentals of Electrical Engineering I

Circuit Laws: Kirchoff's Laws, Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Millman's Theorem, Rosen's Theorem. Network problems arising in Energy distribution.

Methods of analysis suitable for the problems in Network Theory in terms of currents, voltages, energy/voltage amperes, Loop and Nodal analysis. Resistors, Electric fields and capacitors, Magnetic fields and inductance. Energy stored in capacitors and inductors. Electromagnetic induction and Magnetic forces, self mutual inductance. Electrochemical power sources.

EEG202 Fundamentals of Electrical Engineering II

EMF. Generation, Single phase; rms, mean, form, factor, peak factor, phasor diagram. Series and parallel resonance circuit. Resonance, Q-factor, impedance and power P, S, and Q 3 phase, delta and star conversion line and phase voltages.

Complex Notation and its Application to RLC circuits. , Resonance, a-factor, impedance and admittance power, P.S.G. Introduction to D.C. Machines, A.C. Machines and Transformers.

EEG203 Signals and Systems (Signal Theory)

Continuous and discrete signals, transformations and inverse transformations, spectral analysis of steps, ramps and impulse, signal descriptions by impulse and step functions. The independent variable; definitions of rise-time, settling time, overshoot, period magnitude and duration of a signal.

Fourier Analysis, Perseval Theorem, Periodic and Non-periodic signals, Devices and Models, Network analysis and circuit within dependent and dependent sources. Time invariant and stationary systems.

EEG204 Introduction to Switching and Logic Systems

Number systems conversion between bases, Arithmetic with bases other than ten,1 and 2s complement, BCD, weighted and unweighted codes; Graycodes. Truth Function and Truth Tables. Boolean Algebra and De-Morgan theorem, Truth function set or Venn diagram and truth tables. Minimization of Boolean function ;using Boolean Algebra and Karnaugh Map (K-Map). Switching Relays, logic circuits. Realization of simple combinatorial circuit, binary single bit address, simple code conversion, bit comparators. Introduction to multivibrator circuits; Astable, Monostable and bistable.

EEG208 Physical Electronics

Electrons and hole, carrier motion in semiconductors. Principles of Semiconductor devices. Introduction to microwave semiconductor devices. Introduction to lasers and masers. Introduction to microelectronics and IC Technology.

EEG207 Electrical System Graphic

Software tools for computer graphics, analytic geometry and computer graphics. Basics of 3-D graphics. Hidden line and Hidden surface routines. Graphic theory. Simulation of circuit

elements, devices and components. Simulation of Electronics circuits.

EEG205 Electrical Engineering Materials

Introduction to Quantum and Statistical Mechanics. Structure of Solid. Electrons in Solids. Dielectric Properties Breakdown, piezo and Ferro-electric effect. Magnetic properties physics of magnetic materials. Atomic moment, the transition elements. Magnetic alloys. Ferrites Thermal properties of materials. Optical properties of materials. Introduction to Transducers.

EEG301 Circuits and Systems I

Network Theorems, Circuit Graphic. Elementary signals. Dynamic circuit elements. First and second order differential equations. Time domain solution of circuit equations. Impulse response. Network functions. Natural frequencies of networks. Convolution and some of its applications. Network equivalences. Introduction to the concept of auto and cross-correlation. Sinusoidal steady state analysis.

EEG302 Circuit and Systems II

Periodic and non-periodic signals. Harmonic analysis. Fourier series and Fourier Integral. Spectral analysis. Laplace Transformation. Network functions. Network analysis using Laplace transform and Fourier transform methods.

EEG308 Power Electronics

Electronics for high-power control. Amplification using Pulse Width Modulation (PMW) Comparison of the power transistor with the thyristor design and construction of thyristors for high currents and voltages. Cooling and protection of high-power semiconductors Design of firing circuits, oscillations, blocking-oscillators transistor-inverters. A.C commutated converters, one-two and four-quadrant

Distortion and Non-Linear Operation: Class A, AB, and C operations. Class C tuned amplifiers. Optical Devices and photoelectronics. Pulse circuits, sequential circuits, RS, JK ,D and T .Diodes and Transistors Logic Circuits.

EEG306 Electronics Circuits II

Tuned and Feedback amplifiers. Stability. Unilateralisation, impedance matching. Direct-coupled multistage amplifier, difference. Cascade and Darlington circuits. High and low frequency response. Operational and waveform generators. Temperature controllers.

Noise in electronic circuits. Special circuits; voltage controller and sweep oscillators, phase locked loops.

EEG309 Energy Conversion

Electro mechanical Energy Conversion: Single and double coil devices, concentrated and distributed windings, mmf pattern in air-gap torque and induced voltage analysis, constructional features of synchronous; induction and D.C. machines. Direct Energy Conversion:

The solar cell, thermo-electric energy conversion, the fuel cell MHD energy conversion. Power transformers. Phasor diagrams and equivalent circuits, regulations and efficiency calculations and measurements, three-phase transformers parallel operation of transformers.

Other types of transformers: auto transformers and instrument transformers. Per unit system of calculation. Transformer Design. Small A.C. Motors. The single phase or induction motor-principle. The split-phase induction motor, capacitor start induction motor, the shaded-pole motor. The single-phase series motor.

EEG307 Measurement and Instrumentation I

Use of CRO in electronic/electrical measurements. Digital methods for measurement of physical qualities. Transducers Analogue electronic instruments for voltage, power wave-form, frequency and phase measurements. Digital instrumentation. Theory of errors. Absolute and relative treatment of errors. Moving coil, thermal electrostatic and induction type instruments.

EEG310 Electrical Drive

Drive components and principles: Armature volts and Ward Leonard speed control schemes. Torque and speed control. The thyristor- models, characteristics, turn on and turn off requirements. Natural and forced communication. Introduction of AC/DC/AC/AC and DC/DC conversion. Industrial Drives: Choice of an electric motor for industrial drive. Specification of control system, duty performance, criteria, motor dynamic. Control characteristics of the shunt motor, two-phase servomotor, stepped motor, stepper motor, matching motor and gearless system, motor enclosure, motor rating. Block diagram and models of electrical Drives.

Power Control Devices:

Operational amplifiers and thyristors, A.C. & D.C. Generator transfer functions, power gain/time constant, analogue and digital transducers for speed and position management. Block Diagram of Industrial Drives.

EEG312 Instrumentation and Measurements II

Transducer, digital instruments, curve and measurement tracers, recorders, measurement of temperature, displacement magnetic ratio and multiple ratio measurements. Data conversion and interfacing. Data logging switches and displays. Data Acquisition Systems, Software Data Conversion, Multiplexing Spatrac Encoders, Errors.

EEG314 Logic Design and Digital Systems

Review of Boolean Algebra and Logic Circuit. Review of number systems and logic codes. Minimization of Boolean functions, map and tabular methods. Combinational logic systems, elements, adders, multiplexers, demultiplexers PLAS, error detecting and correcting codes. Parity checkers.

Sequential logic systems elements, flips flops and their transition clock mode and pulse mode circuits. Designs of Synchronous sequential logic systems. Counters, registers, sequence generators. Logical design using MSI, LSI and VLSI part. Memories and their realization. ROMS, PROM, EPROM, EEPROM, RAMS, SRAM, DRAM. Magnetic Memories HD, FD,CD, Tapes etc. Bipolar and MOS Technologies. TTL, ECL,COSMOS, P-MOS, N-MOS Totem Pole, Tri-state and open collector logic elements properties: Fan-out, fan-in, noise margin, propagation, delay and switching speed. MSI, LSI, ULSI Technologies. Interfaces and converters. Serial-parallel converters. Analogue digital and digital- analogue converters. R-2R ladder networks etc. TTL MOS Interfaces.

CPE403 Principles of Communication Systems

Spectral analysis. Fourier series and transforms, auto-correlation, amplitude, angle, phase and frequency modulation. The sampling theorem and pulse modulation techniques, frequency and time division multiplexing.

CPE405 Computer Programming Languages

FORTRAN,BASIC,JAVA and languages, data processing concepts as numerical networks using interaction time-shared terminal computer systems, writing, debugging and running programs on different digital computer systems.

CPE409 Digital Computer Technology (Architecture)

Basic organization of computers, machine representation of instruction and data. Code conversion(BSD, Gray and XS3 Codes). Boolean algebra and K-maps method of minimization, sequence and data flow controls, error detection and correction techniques.

CPE411: Digital Electronics

Basic characteristics of electronic devices used in switching, sweeping and waveshaping circuits. Design of large signal circuits used in computer and communication systems. Design of logic gates and flipflops. Concepts in integrated circuits design. Multiple value logic concepts.

CPE413 Laboratory Sessions

Digital storage devices and sequential circuits. Characteristic features of integrated circuits. Analysis and design combinational switching circuits using IC's. Design of decoders, adders,

counters and shift registers, character generators and arithmetic circuits.

CPE501 Software Engineering Fundamentals

Programming methodologies, basic concepts, principles of software management, documentation and presentation. Software lifecycle: software economics.

CPE502 Database Management

Concepts in database systems, inverted file structure; query formulation and language; data structure to minimize access time; construction of a database management systems; survey of typical data base management systems. Commercial programming languages. COBOL and RPG II file description and record processing; file manipulations programme preparation. Coding forms file maintenance, backup and protection.

CPE503 Computer Architecture

Design and synthesis techniques for digital computers. Principle and characteristic features of computer structure and design. Processor and CPU definition. Memory organization consideration for computer- computer communication, I/O devices, multiple CPU systems.

CPE504 VLSI Design

An overview of VLSI technologies. MOS transistor theory. Inverter circuits. Data and control flow. MOS processing and design rules. Integration and system fabrication. Logic design with MOS. Architecture and design of system fabrication. Logic with MOS, architecture and design of systems controllers, system timing. Highly concurrent systems and their suitability for VLSI implementation,

Signal processing using MUS VLSI technology, system, computational aspects of VLSI.

CPE505 Information Theory and Coding

Concept of amount of information, entropy, Shannon's theorem, channel capacity, source encoding. Error correcting codes. BCH, Reed-Solomon and Golay codes. Forward error control.

CPE506 Assembly/ Machine Language Programming

Programming of microcomputers, minicomputers and large scale computers in machine and assembly language. Number systems and codes. Architecture of various digital computers. Methods of addressing and machine control for fixed and variable word length computers. Programming on a stack architecture computer. I/O control. Timing and bench-marking techniques.

CPE507 Systems Programming I

Concepts and uses of macro-assemblers and conditional assembly. Use of access methods control for I/O devices. Job control languages and file structures. File and storage management. Use of linkers and loaders in load modules creation.

CPE508 Systems Programming II

Operating systems, monitors, dispatchers, initiators and control programs. Task, job stream and secondary storage control. Memory management, interrupt handling, device management and scheduling algorithms. Concurrent processes performance evaluation in a multi-programmed environment.

CPE509: Digital Computer Design

Logic and electronic design of functional digital units, computer subsystems design, information and logical flow diagrams in timing and control signals. Design of binary and decimal serial and parallel arithmetic units. Memory subsystems, I/O and storage subsystem design. Control unit design for digital computers. Design of a small digital computer.

CPE510 Computer Networks

Communications within computer systems, addressing modes and databases. CPU Memory I/O device communications. Inter-system communications. Host-Host and Host-Slave relationships. Synchronization and handshaking protocols, serial and parallel and communications terminals, MODEMS

multiplexers and concentrators. Message and control processors. Communication equipping and carriers software. Elements of computer networks host operating systems. Message and packet switching network structures: star, ring and hierarchical networks.

CPE511 Power Systems for Computer Engineering

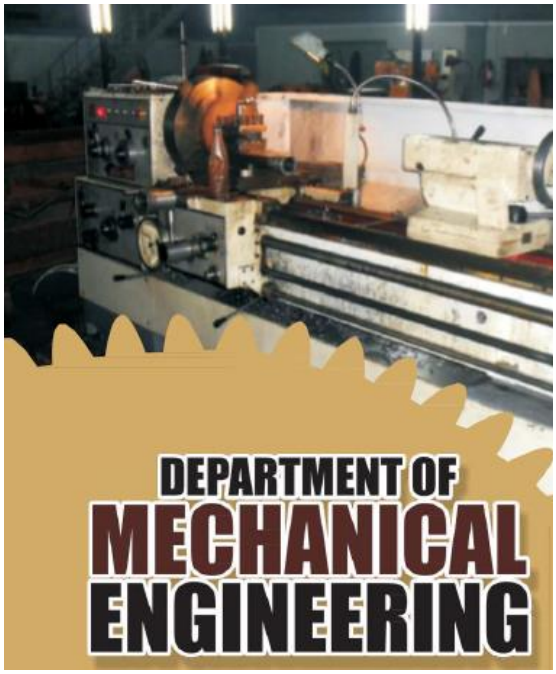
Introducing power transmission and distribution techniques, line equators, analytical and graphical networks of solution of long and short lines. 3 faults, symmetrical components theory and unbalanced fault analysis. Power systems used in the computer environment.

CPE51 Microprogramming and Structure

Discrete structures and data structures in computing. Application of tree structures, arrays, files list, stacks and linked structures, scrutiny searching, hashing and merging of data files. List as string processing languages.

CPE514 Digital Signal Processing

Discrete signals and Z-transform DFT and FFT. Low pass filter synthesis. Spectral transforms and their applications in synthesis of high-pass and band-pass filters. Digital filtering; filtering synthesis.



Dr. K. T. Ajayi
B.Sc., M.Sc.(ABU), Ph.D.(Nurnberg)
Ag. Head

3.4.1 History of the Programme

The University of Lagos was established in 1962. The faculty of engineering was established in the second phase of the establishment of the University in 1964. The department of Mechanical Engineering was among the pioneer departments of the faculty of engineering established in 1964. The aim was to provide the much needed skilled and technical manpower to pilot the affairs of the emerging engineering companies in Nigeria. The department has since them grown and strengthened, turning out graduates who have become seasoned professionals in the field of engineering.

Engineering is the art based primarily upon training in mathematics and physical sciences, the economic utilization of the forces and materials of nature to the benefit of man. Mechanical Engineering basically deals with objects in motion e.g. machines and power generation. It covers analysis (load and extension), design, construction/fabrication, production/manufacturing of machine parts, research and development of new techniques and materials.

Department of Mechanical Engineering was one of the foundation Departments of the Faculty of Engineering at the University in 1964 through UNESCO assistance with teaching experts and facilities.

The programme has been of international standard right from the inception of the Department. To maintain the standard whilst abreast with modern trends, there has been constant review of the curriculum of the programme, effective maintenance of existing laboratory equipment and gradual replacement of laboratory equipment and teaching facilities with latest models. In the past decade, the curriculum has been reviewed about three times. The latest review includes courses like Mechatronics and Advanced CAD and CAM with special emphasis on operation and design of latest technologies in different fields of Mechanical Engineering.

These have made our graduates over the years to meet up with the challenges of the industry and quickly rise to the top echelon of the industry and academic world.

3.4.2 Philosophy and Objectives of the Programme

The Department of Mechanical Engineering at the University of Lagos was established because of its economic benefit to Lagos as the center for engineering activity in Nigeria. Therefore, it is an ideal training center for Engineers.

The objective of the Department is to produce well-qualified graduates with relevant knowledge and skills to operate and develop public services and the industrial sector of the national economy, to initiate and carry out engineering research and design, to engage in industrial management and to apply research and development in solving the engineering problems of Nigeria.

At the end of their training, our graduates are expected to be well versed in analytical, computational and practical aspects of mechanical engineering. They should be capable of taking on full professional responsibilities at any level in the industry and academic circles.

3.4.3 Couse Structure

100 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite.
GEG 101	Eng. Pure Maths. I	3	-	-
GEG 103	Eng. Applied Maths I	3	-	-
MEG 101	Workshop Practice I	1	1	-
GST 102	Intro. To Logic and Philosophy	2	-	-
GST 105	Use of English	2	-	-
FSC 102	Introduction to Chemistry I	2	1	-
FSC 105	Intro. to Physics	2	1	-
		15	3	
Total		18		

100 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite.
GEG 102	Eng. Pure Maths. I	2	-	GEG 101
GEG 104	Eng. Applied Maths I	2	-	GEG 103
MEG 102	Workshop Practice II	1	1	-
MEG 104	Engineering Drawing	1	1	-
PHS 101	Intro. to Physics I	2	-	-
PHS 102	Intro. to Physics II	3	-	-
PHS 103	Physics Practicals	-	2	-
CHM 101	Intro. to Chemistry II	4	-	-
GST 106	Use of English II	2	-	-
		17	4	
Total		21		

200 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite.
GEG 201	Engineering Mathematics I	3	-	GEG 102
EEG 201	Fund. of Electrical Engr. I	3	-	-
MEG 201	Fund. of Thermodynamics	2	-	-
MEG 203	Mechanical Measurements and Mechatronics	2	-	-

MEG 205	Engineering Mechanics I (Statics)	2	-	GEG 103
MEG 207	Machine Drawing	1	1	MEG 104
GAS 201	General African Studies I	2	-	-
CSC 202	Intro. to Computer Programming	2	-	-
		17	1	
Total		18		

200 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite.
GEG 202	Eng. Statistics & Comp. Systems	3	-	-
EEG 202	Fund. of Electrical Engr. II	3	-	-
MEG 202	Fluid Mechanics	2	-	-
MEG 204	Mechanical Engr. Lab. I	-	2	-
MEG 208	Eng. Mechanics II (Dynamics)	2	-	GEG 104
MEG 210	Strength & Testing of Materials	2	-	-
GAS 202	General African Studies II	2	-	-
SSG 208	Engineer in Society	2	-	-
		16	2	
Total		18		

300 Level: First Semester

Course Code	Course Title	Lect.ure Units	Lab. Units	Pre- Requisite.
CEG 311	Civil Engr. Technology	2	1	-
GEG 301	Engineering Maths II	2	-	GEG 201
MEG 301	Fund. of Thermodynamics	2	-	MEG 201
MEG 303	Mechanical Engr. Lab. II	-	2	-
MEG 307	Advanced Comp. Aided Drawing	1	1	MEG 207
MME 309	Science of Materials	3	-	-
MME 311	Intro. to Corrosion	3	-	-
GST 307	Entrepreneurship and Corporate Governance I	2	-	-
		18	4	
Total		22		

300 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite.
GEG 302	Operational Methods	2	-	GEG 301
MEG 302	Design of Machine Elements	1	1	MEG 210
MEG 304	Mechanical Engr. Lab. II	-	2	MEG 303
Meg	Compressible Flow	2	-	MEG 202
MEG 308	Mechanics of Material I	3	-	MEG 210
MEG 310	Mechanics of Machines	3	-	MEG 208
EEG 320	Electrical Engr. Technology	3	-	-

MEG 312	Manufacturing Processes	3	-	-
GST 308	Entrepreneurship and Corporate Governance II	2	-	-
		19	3	
Total		**22**		

400 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite.
GEG 401	Technical Communications	1	-	-
GEG 402	Numerical Methods in Engr.	2	-	-
GEG 403	Fund. of Thermodynamics	2	-	MEG 201
MEG 401	Turbomachinery	2	-	MEG 301
MEG 403	Refrigeration & Air-conditioning I	2	-	MEG 201
MEG 405	Mechanical Engr. Lab. IV	-	2	MEG 304
MEG 407	Mechanics of Materials II	2	-	MEG 308
MEG 409	Mechanical Vibrations	2	-	MEG 208
MEG 411	Mechanical Engr. Design	2	1	MEG 302
MEG 413	Industrial Engineering	3	-	-
		18	3	
Total		21		

400 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SIW 400	Industrial Training	6	-	-
Total		6	0	

500 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite.
GEG 501	Engineering Economics	2	-	-
MEG 503	Heat Transfer I	2	-	-
MEG 505	Thermal Engines	2	-	MEG 401
MEG 507	Production Engineering I	2	-	MEG 314
MEG 509	Engineering Elasticity & Plasticity	3	-	MEG 407
MEG 513	Vibration Tech. and Control	2	-	MEG 409
MEG 523	Operations Research & Technology Policy	2	-	-
MEG 521	Project	-	3	-

Electives:

SSG 503	Artificial Intelligence	2	-	-
SSG 513	Tech. of Planning & Scheduling	2	-	-
	Total	15	3	
Total		18		

500 Level: Second Semester

Course Code	Course Title	Lect. Units	Lab. Units	Pre- Requisite.
GEG 502	Law and Management	2	-	-
MEG 504	Refrigeration & Air Conditioning II	2	-	MEG 403
MEG 506	Mechanics of Metal forming	2	-	MEG 314
MEG 508	Production Engineering II	2	-	-
MEG 510	Viscous Flow Theory	3	-	MEG 305
MEG 512	Automatic Control	2	-	MEG 409
MEG 526	Heat Transfer II	2	-	MEG 305
MEG 528	Energy Sources & Utilization	2	-	-
MEG 522	Project	-	3	-
Electives:				
SSG 502	Engineering Systems Analysis	2	-	-
SSG 504	Automated Reasoning	1	1	-
SSG 508	Manufacturing Systems Automation	2	-	-
SSG 514	Facility Planning	2	-	-
		17	3	
Total		20		

3.4.4 Course Outline

MEG 101 Workshop Practice I.(1,1)

Introduction to basic equipment in wood, machine, fitting and welding workshops. Element of safety practice with the various tools used in the workshops. Discussion on general safety precautions. General principles governing the various workshop machines. Selection and use of tools for specific operations in the various workshops. Practical demonstrations of use of tools and machines in performing basic workshop processes.

MEG 102 Workshop Practice II (1,1)

Introduction to more advanced machinery and equipment in the workshops. Introduction to sketching and labeling of machine parts and tools. Emphasis is laid on the ability of students to be able to competently handle standard workshop equipment. Machining: Practical works on machines for the purpose of carrying out individual projects. Detection of faults in work pieces. Fitting: Shaping and finishing of metallic objects. Welding: Preparation of pieces for welding visual examination of welds, etc. Woodwork: Introduction to constructional technique of woodwork joints. Simple individual projects in different aspects of workshop practice.

MEG 104 Engineering Drawing (1,1)

Introduction to drawing instruments and their proper use. Use of scales, linework, lettering and dimensioning. Geometrical constructions including tangents, normal, polygons, etc. Loci, including paths of point of simple mechanisms and cam profiles. Orthographic projections of simple objects in first and third angles. Isometric and oblique projections. Isometric projections from orthographic projects.

GEG 101 Engineering Pure Mathematics (3,0)

Axiomatic Set theory, Operations on Set Boolean Algebra, Switching circuits, logic circuits and propositional logic, Transfinite induction and recursion. Consequences of axioms of choice Sequences, Monotonic sequences and Convergence Cauchy criteria. Series, Power series, Tests for convergence Taylor's series, Operations on power series. Limits continuity and Differentiability. Mean Value theorems Techniques and applications of Differentiation. The definite Integral fundamental theorems of

Integral Calculus. Techniques and applications of Integral Calculus. Improper Integrals.

GEG 102 Engineering Pure Mathematics II (2,0)

The real and the complex number systems. Mathematical Induction Matrices and determinants. Complex numbers: representations and algebra Complex functions. Roots of Unity. De-Moivres theorem and applications. Basic Matrix theory an algebra. Systems of linear equations: elementary row reduction, types and methods of solution echelon form. Applications of matrices, Introduction to systems of inequalities an linear programming.

GEG 103 Engineering Applied Mathematics I (3,0)

Representation of vectors: Resultant of several vectors. Vectors in Euclidean space: lines, places and spheres. The dot and cross products. Direction cosines. Differentiation of vector functions. Lami's theorem. Polygon of forces. Condition of equilibrium of coplanar forces. Newton's laws of motion. Analytical treatment of static equilibrium of particles and rigid bodies. Distributed forces. Centroids and centres of gravity, Moments of Inertia. Analysis of Structures and trusses Forces in beams and tables, Friction.

GEG 104 Engineering Applied Mathematics II (2,0)

An introduction to kinematics an kinetics of a particle, systems of particles and rigid bodies. Energy and momentum methods. Application, Impulsive motions. Motion of rigid body (i) about a fixed axis (ii) in a plane. Equations of motion.

FSC 102 Introductory Chemistry I (2,1)

Measurement and Precision Hypothesis. Theory and Law with appropriate illustration. Nature of matter – the states of matter, atomic structure electronic energy levels and orbital as per classification of elements and its relationship to their electronic configurations. Mole concept and calculations based on it, including application to titrimetry balancing of equation by electron transfer method. Types and chemical reactions stoichiometric calculations. Different methods of expressing concentrations of solutions. Chemical kinetics and equilibria, and related simple calculations, important applications of equilibria like pH, solubility product and solubility of ionic solids. Thermochemistry and simple calculations based on Hess' law. Electrochemistry and working of various cells. Brief mention of corrosion. Organic Chemistry. Simple reactions of hydrocarbons alcohols and acids. Petroleum chemistry. Oils and Fats. Hydrogenation of oils. Polyment and biologically important molecules.

FSC 105 Introduction Physics I.(3,0)

Physical qualities, standards and units, Kinematics: Uniform velocity motion, uniform acceleration motion. Dynamics: Newton's laws of motion. Newton's universal law of gravitation. Work, energy, conservation laws. Concept of mechanical equilibrium. Center of mass and center of gravity. Moment of a force. Rotational motion, angular momentum and torque. Total mechanical energy, elasticity. Hooke's law; Young's shear and bulk modulus. Hydrostatics; Pressure, Buoyancy, Archimedes's principle. Elements of hydrodynamics. Molecular properties of fluids, viscosity, surface tension, adhesion, cohesion, capillarity.

CHM 101Introductory Chemistry II (4,0)

Chemical bonding: ionic, covalent, coordinate, metallic, hydrogen and vander waals forces. Bond energy and bond angle. Shapes of simple covalent molecules. Gaseous states – ideal and non-ideal behaviours. Solutions – types of solution, solubility and vapour pressure. Simple treatment of chemical thermodynamics: Internal energy change ΔU, enthalpy change, ΔH; enthropy change ΔS and free energy change ΔG and the relationship between them ($\Delta G = \Delta H - T\Delta S$) and applications of the equation. Trends in the physical and chemical properties of elements and their compounds (oxides, hydrides, hydroxides and chlorides) in periods of the periodic table. Transition metals – first row only. Characteristic properties of the elements and their ions. Introducgory radioactivity. Organic Chemistry – alcohols, acids, esters, aldehydes, ketones (aliphatic and aromatic), polymers and biologically important molecules.

PHS 101 Introductory Physics II (3,0)

Geometrical optics: law of reflection and refraction. Location of images. Plane and curved mirrors. Converging an diverging thin lenses. Aberrations. The eye Optical instruments Simple Harmonic Motion. Waves. Polarization of transverse waves. Atomic structure. Production and properties of X-rays. Radioactivity. Photoelectric emission.

PHS 102 Introductorty Physics II (3,0)

Electrostatics, potential and capacitance dieletrics, production and measurement of static electricity, Current, Ohm's law, resistance and resistivity. Heating. Galvanometers, Voltmeters and Ammeters. D. C. circuits, sources of emf an currents, Kirchhoff's law, Electrochemistry. The Earth's magnetic field. Magnetic fields and induction. Faraday's and Lenz's laws. Forces on a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules. Motor and generator.

PHS 103 Introductory Practical Physics (2,0)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 and PHS 102 theoretical courses.

MEG 201 Fundamental of Thermodynamics (2,0)

Introductory survey of thermodynamics. What is Thermodynamics? Historical background, scope of thermodynamics, dimensions and units. Fundamental concepts: systems, control volume, properties and states, processes, heat and work, pressure, temperature and the zeroth law. Elementary form of the continuity equation. The first law of thermodynamics and its corollaries: conservation of energy, internal energy, enthalpy, thermodynamic properties of pure substances: P-V-T relations and diagrams, the ideal gas property tables and charts. The second law of thermodynamics and its corollaries: Reversibility, Irreversibility, Efficiency and thermodynamic temperature scale. Clausius inequality, heat engines and het pumps.

MEG 202 Fluid Mechanics (2,0)

Fundamental concepts and properties of fluids. Development, scope and significance of fluid mechanics, physical characteristics of fluids, properties of fluids. Fluids at rest. Pressure at a point, Pascal's law, pressure variation with elevation, pressure measurements, hydrostatic forces on curved surface. Buoyancy and equilibrium: Archimedes' principle, stability of submerged and floating bodies, stability of fluid itself, liquids in relative equilibrium. Kinematics of the flow field: Definitions of pathline, streamline, control volume, system, etc. Uniformity and steadiness of flow, conservation of mass, fluid element in general state of motion. Bernoulli Equation.

MEG 203 Mechanical Measurements and Mechatronics (2,0)

Basic principles of measurements. Techniques and devices for measuring mechanical quantities such as mass, linear and angular displacement, velocity, acceleration, force, torque, power, fluid flow, pressure, temperature, strain and stress. Use of micrometer, screw gauge, Vernier calipers, tachometer. Accuracy and error analysis Measurement statistics. Elements of instrument systems. Sensors. Analog and digital measurements. Instrument selection and calibration. Signal processing. Data presentation and curve fitting. Introduction to mechatronics.

MEG 204 Mechanical Engineering Laboratory I (0,2)

Reynold's experiment on laminar flow, Forced vortex flow, flow around objects, Stability of floating bodies, Smoke tunnel experiment. Experiments on Marcet boiler, Axle Friction, Simple Harmonic Motion: Simple pendulum, compound pendulum and connecting rod. Static friction: inclined plane, horizontal plane and sliding friction. Frictional effects on an inclined plane. Hardness test, tensile test and torsion of bars experiment.

MEG 205 Engineering Mechanics I: Statics (2,0)

Fundamentals of mechanics. Forces in space equipment systems, equilibrium of rigid bodies, distributed forces, centroid, center of mass, internal actions, analysis of simple structures and machine parts, principle of virtual work.

Prerequisite: GEG 103

MEG 207 Machine Drawing (1,1)

Application of principles of orthographic projection of points and lines, surfaces and solids in space. Auxiliary views. Interpenetration curves. Developments, Sectioning, Limits and fits; Fasteners and locking devices. Conventional representation of materials. Part and assembly drawing (exploded view only). Reading and interpretation of manufacturer's drawing of equipment. Freehand sketching

Prerequisite: MEG 104

MEG 208 Engineering Mechanics Il : Dynamics (2,0)

Kinematics of a particle, systems of particles and rigid bodies, Kinetics of particles, rotating co-ordinate system, energy and momentum methods. Applications: Lagrange's and Hamilton's equations, simple harmonic motion, the simple spring-mass system in free undamped vibration.

Prerequisite: GEG 104

MEG 210 Strength and Testing Of Materials (2,0)

Analysis of stresses and deflections in simple structures under tension, compression, shear, torsion and banding, buckling; theories of failure; time-dependent behavior. Experimental mechanics, testing of materials for strength, impact, hardness; and fatigue; non-destructive testing.

GEG 201 Engineering Mathematics I (3,0)

Elementary Vector Space Theory: Linear vector spaces and Matrices; dimensionality of space; summation convention Matrices and linear Transformations. Elementary Complex Analysis: Logarithmic, Exponential and Circular complex functions. Mapping by elementary complex functions; Limit, Continuity and Differentiability of complex functions: Cauchy-Reinman's Equations; Line integrals. Integration of function of Complex Variables. Cauchy's integral theorem; Cauchy's integral formula; Residue theorem. Introduction to Differential Equations; Classification of Ordinary Differential Equations; Order, Degree and linearity. Types and Techniques of solution of first order ODEs; Picard' iterative method; Types and Techniques of solution of second order ODEs. System of Linear ODEs. Engineering Applications of ODEs.

GEG 202 Introductory Engineering Statistics (3,0)

Introduction to statistics: Fundamentals of probability theory; random variables and expectations. Discrete and continuous distributions. Probability and relative frequency. Independent trials. The Laplace-De-Moivre's limit theorem. Poisson's law. Concepts used in statistics: Expectation of a sum, variance, covariance and correlations. Theory of errors. Estimation of Variance and correlation. Linear regression. Random events. Frequency analysis. Data reduction techniques. Distributions and density functions. Expectation and other moments.

EEG 201 Fundamentals Of Electrical Engineering (3,0)

Circuit Law: Kirchoff's Law. Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Milllman's Theorem, Rosen's Theorem. Network problems arising in Energy distribution. Methods of analysis suitable for the problems in Network Theory in terms of currents, voltages, energy/voltage amperes, Loop and Nodal analysis. Resistors, Electric Fields and capacitors, Magnetic fields and inductance, Energy stored in capacitors and inductors. Electromagnetic induction and magnetic forces, self and mutual inductance. Electrochemical power sources.

EEG 202 Fundamentals Of Electrical Engineering II (3,0)

Emf. Generation, Single phase; rms, mean, form factor, peak factor, phase and phase diagram, Series and parallel resonance circuit; Resonance, Q-factor, impedance and power P, S, and Q 3 phase, delta and star conversion line and phase voltages. Complex Notation and its Applications to RLC circuits, Resonance, Q-factor, impedance and power P, S, and Q.3 phase, delta and star conversion line and phase voltages. Complex Notation and its Application to RLC circuits, Resonance, a-factor, impedance and admittance power, P,S,G, Delta-Star transformation.

SSG 208 Engineer In Society

Philosophy of Science. History of Engineering technology. Safety in Engineering and introduction to risk analysis. The role of Engineers in nation building. Invited lectures from Professionals.

GST 201 General African Studies I (2,0)

Library studies. Early History of Sudanese (West African) states

GST 202 General African Studies II (2,0)

Society and Culture. African literature and languages. African music and dance. Geography of Africa. Traditional medicine in Africa.

MEG 301 Applied Thermodynamics (2,0)

Review of first law of thermodynamics. Second law of thermodynamics. Application to flow and non-flow processes. Thermodynamics property relations: Basic relations, exact differentials, Maxwell's relations, Claudius Clapeyron equation, heat capacities, principle of corresponding states and the generalized equation of state. Mixture of non-reacting gases. Dalton's law, mixture of perfect gases. Vapour Power cycles: Carnot, Rankine, superheat and regenerative cycles. Gas Power cycles: Air Standard cycle; intercooling, reheating and regenerative cycles.

Prerequisite: MEG 201

MEG 302 Design Of Machine Elements (1,1)

Design concept. Materials selection. Simple load-stress analysis. Applicatiosn to the design of simple machine components. Design of fasteners and locking devices, couplings, clutches, brakes, springs, seals, bearings, shaft and flexible mechanical elements. Design of plastic parts. Computer Aided Design.

Pre-requisite: MEG 210

MEG 303 Mechanical Engineering Laboratory II (0,2)

Experiments on flow visualization. Throttling and separating calorimeter, exhaust gas analysis; performance of mechanical heat pump; work measurements. Continous combustion, principles of psychometry. Belt friction, torsional vibration, centrifugal force, bench gyroscope. Stress-strain tests for round and flat bars. Ultimate tensile test using tensiometer. Impact test.

Prerequisite: MEG 204

MEG 304 Mechanical Engineering Laboratory III (0,2)

Dynamic balancing. Linear and torsional vibration experiments using the universal vibration rig. Governor experiment. Engine vibration: two-cylinder and four-cylinder-in-line balancing. Whirling of shaft experiment.

Prerequisite: MEG 303

MEG 305 Incompressible Fluid Dynamics (3,0)

Dynamic of the flow field: Forces in fluids, substantial or total derivatives, equations of motion in Cartesian and polar coordinates, integration of Euler's equation, integral form of momentum equation. Flow measurements: pressure, velocity and volume flow rate. Dimensional analysis and similitude: The Buckigham Pi Theorem. Geometric, dynamic and kinematic similarities. Dimensionless parameters and their significance. Viscous effects in fluid flows. Simple boundary layer flows. Laminar and turbulent flow in pipes and conduits. Introduction to the concept of friction factor. Ideal fluid flow: Irrotational flow, velocity potential, stream functions. Flow nets and their uses. Two dimensional flow and elements of airfoil theory.

Prerequisite: MEG 202

MEG 306 Compressible Flow (2,0)

Fundamentals of compressible flow; one dimensional flow, continuity and momentum equations, non-superposition of compressible flows. Thermodynamics of fluid flow: First and second laws applied to flow processes. Isentropic flow: stagnation conditions, Mach number relations, phenomenon of chocking. Normal and oblique shocks: Normal shock relation, comparison of oblique with normal chocks. Flow in ducts: Flow through confinement, jet action, pipe flow, the Pilot tube. Adiabatic flow in pipes with friction, frictional flow in long pipes with

heat addition, Fanno and Rayleigh lines. Principles of acoustics.

MEG 307 Advanced Computer Aided Drawing (1,1)

Part listing and Assembly drawing of complex machines. Preparation of working drawings for manufacture in accordance to standards. Drawing for installation layout. Production of 2-D and 3-D drawing using CAD packages.

Prerequisite: MEG 207

MEG 308 Mechanics Of Materials I (3,0)

Three-dimensional stress and strain. Stress-strain relationships for general dimensional case for special cases. Graphical determination of stresses and strains using the Mohr's circle. Theories of failure. Stress concentration and relief of stress concentration. Moments and products of inertia and area. Unsymmetrical bending, shear centers in curved beams. Torsion of circular and non-circular cross-section.

Prerequisite: MEG 210

MEG 310 Mechanics of Machines (3,0)

Power transmission by screw threads, friction clutches and belt drives. Analytical and graphical kinematics of two dimensional motion of points in mechanism. Crank effort diagrams. Cams, gears and gear trains, gyroscopes, governors. Vibration and balancing of rotating and reciprocating machines. Introduction to tribology.

Prerequisite: MEG 208

MEG 312 Manufacturing Processes (3,0)

Principles of metal cutting. Tool design and tool economics. Forming and shaping processes: rolling, forging, extrusion, drawing, sheet-metal forming and casting methods. Material removal processes. Fundamentals of cutting, cutting tool material and cutting fluids. Traditional and non-traditional machining processes.

CEG 311 Civil Engineering Technology (3,0)

Steel Design: Steel section. Introduction to B. S. 499 Simple Beam Design, column design, Simple and Eccentric Loading, Reinforced Concrete Design: Concrete technology, Introduction to C. P. 114 or Nigerian Code. Simple Beam design elastic analysis. Short and long columns. Design of slabs. Detailing Timber Design: Simple and composition beams. Design criteria in bending shear and deflection.

Surveying: Chain surveying, triangulation. Levelling.

CEG 301 Engineering Mathematics II (3,0)

Calculus of several variables: Limits and continuity. Partial derivatives of first and higher orders. Total differential of a function. Jacobians. Higher order partial and total derivaties and gradient of a function Integrations of total differentials with applications to mechanics. Introduction to vector fields – divergence and curl. Generalized Taylor's Series; the extremum of a functions of several variables. Differentiation under the integral sign. The Calculus of variations. Line integral with applications on computation of areas and volumes.

Functions of complex variables. Cauchy-Reinmann Equations, analytical functions. Mapping by elementary functions.

GEG 302 Science of Materials (3,0)

Fourier series: Periodic functions; Dirichlet conditions; odd and even functions; half-range Fourier sine and cosine series. Parseval's identity. Differentiation and integration of Fourier series. Boundary value problems. The Laplace transform and applications (excluding the use of inversion integral and convolution theorem).

MME 309 Science of Materials (3,0)

Atomic structure Mass number an isotopy. The physical model of the atom. Electron notation of atoms including valency model of the atom. Valency and inert gasses and inertness Excitation, ionization energy. Structure and properties of atomic nuclei Radioactivity, inter atomic bonding. Crystal structure. Stacking sequence an stacking faults. Miller indices. Interplanar distance, Crystal imperfections. Atomic movements, phases, equilibrium diagrams and alloys. Solid state transformations. Survey of occurrence and extraction of metals. Non-crystalline and multiphase solids including

polymers. Ceramics and composite materials, fibre-reinforced materials, dispersion strengthened materials and cermets.

MME 312 Introduction To Corrosion Of Metals (3,0)

Introduction to the Thermodynamics and kinetics of electrochemical corrosion of metals and alloys. Description of metallurgical factors, effect of applied stress (stress corrosion cracking and corrosion fatigues) and passivity. Description of methods of corrosion control and prevention. Moulding alloy selection of inhibitors, design rules, anodic and cathodic protection. Treatment of environmental degradation of non-metals (Ceramics, concrete and silicate glasses). Discussion of current materials degradation problems in marine environments the petroleum industry, energy conversion and generating systems.

MEG 401 Turbomachinery (2,0)

Fuel types. Combustion processes & dissociation. Thermodynamics of turbo-machines, compressible and incompressible types. Pumps, fans, Compressors and turbines. Air compressors and steam engines. Axial flow turbines. Turbine and compressor synchronization.

Prerequisite: MEG 301

MEG 403 Refrigeration and Airconditioning I (2,0)

Heat pump and refrigeration cycles: types and measures of efficiency. Vapour compression system, absorption system and selection of fluids. Vapour absorption refrigeration – basic concepts, coefficient of performance and cycle efficiency. Refrigeration: Plant components and types. Purpose of Air Conditioning. Air-water vapour mixture, psychometry and psychometric charts.Prerequisite: MEG 201

MEG 405 Mechanical Engineering Laboratory IV (0,2)

Experiments on engine performance tests: refrigeration units; convective heat transfer; fan tests, lubrication; friction losses in pipes and fittings, unsteady flows: vertical and radial jets. Experiments on cutting forces and velocities in turning, surface finish in turning, alignment tests on the Lathe, hardness test for determining type of cutting tool. Photoelasticity.

MEG 407 Mechanics of Materials II (2,0)

Elastic instability of struts and columns – Euler's Theory. Equilibrium and compatibility equation: Applications to beams and thick – walled cylinders. Lame's equations. Elementary plasticity consideration of material as elastic – perfectly plastic and work – hardening, application to plastic bending and torsion. Plastic yielding of thick cylinder and yield criteria.

Prerequisite: MEG 308

MEG 409 Mechanical Vibrations (2,0)

Oscillatory Motion: A general description of the to-and-fro motion and the classifications. Harmonic motion as projection of a point moving on a circle, and the relation to the motion of a mass suspended on a light spring. Periodic and random vibrations exist. Free Vibration of Single Degree of Freedom Systems: Free undamped vibration of simple systems in translation and torsion. Energy dissipation mechanisms. Detailed analysis of free vibration with viscous damping. Applications utilizing critical damping and over-damping. Forced Vibration of Single Degree-of-Freedom Systems: Equations of motion by Newton's Law. Vector relationship of forces. Detailed analysis of the frequency response. Excitation by rotating unbalance and support motion. Introductory vibration isolation. Sharpness of resonance convenient for measurement of damping. Energy dissipation by viscous damping. Introduction to structural damping and the concept of complex stiffness. Two Degrees-of-Freedom Systems: Examples of systems that possess more than one degree of freedom in translation and torsion. The string in tranverse motion as an example of infinite number of degrees of freedom. Equations of motion by Newton's law for free undamped systems. Reduction to equations of amplitudes. Hence the characteristic equation and the natural frequencies and corresponding mode shapes. Arrangement into matrix format. Coordinates leading to static and dynamic coupling.

Prerequisite: MEG 208

MEG 411 Mechanical Engineering Design (2,1)

Concepts of machine design. Machine design process. Production processes and drafting Design for safety and optimization. Cost considerations. Management of design process and concurrent engineering practice. Design of power transmission systems, hydraulic and pneumatic system design. Individual design projects based on CAD packages.

Prerequisite: MEG 306

MEG 413 – Industrial Engineering (3,0)

Basic concepts of economic analysis. Cost concepts, interest equations and time value of money. Salvage value, capitalized cost equation, present worth, amortization, depreciation, discounted cash flow analysis and measures of profitability. Methods for evaluation of alternatives. Annual cost comparisons. Internal rate of return, present worth and premium work comparison, etc. Linear programming. Simplex methods, sensitivity analysis, shadow prices, reduced cost, etc. and duality in linear programming. Elementary statistical concepts: Probability and frequency distribution, mean, variance and standard deviation. Time series analysis, regression and correlation analysis – test and t-statistics.

GEG 401 Technical Communication (1,0)

Introduction to the techniques of scientific report writing. Uses of language in report writing. Formats and types of report presentation – oral written.

GEG 402 Numerical Methods in Engineering (2,0)

Solution of algebraic and transcendental equation by iteration. Finite Differences. Difference equations. Interpolation splines. Numerical solutions of systems of linear equations methods. Ill-conditioning Matrix analysis: Methods of matrix inversion. Numerical evaluation of eigenvalues. Numerical integration applied to the Error function and Elliptic integrals.

GEG 403 ENGINEERING STATISTICS (2,0)

Some aspects of probability theory. Random events, Frequency analysis, Data reduction techniques Roman variables Distribution and density function, Expectation and other moments Discrete distributions. Binomial, Poisson, Multinomial Distribution. Continuous Distributions: Normal, Chi-square, t-F-, and Gamma Distributions. Sampling theory, Estimation of population parameters and Statistical Test. Regression analysis and Analysis of Variance.

MEG 503 Heat Transfer I (2,0)

Heat transfer modes.Combined mechanisms of heat transfer.

Conduction: One dimensional heat conduction with or without internal heat generation to include plane and cylindrical composite walls and fins. Two-dimensional heat conduction: Steady and Unsteady state solutions by method of separation of variables. Numerical and graphical methods of solution. Convection: Concepts from hydrodynamic boundary layer, the thermal boundary layer, heat transfer in turbulent flow, energy and momentum transfer analogies. Forced and natural convection. Heat transfer with phase change – Boiling and condensation.

MEG 504 Refrigeration And Air-Conditioning II (2,0)

Heat gains, solar, heat and water vapour flow through structures, infiltration and ventilation. Internal system heat gains. Cooling load calculation: cooling and heat gains, offset reheat, use ob by-passed air, double duct cooling etc. Applied psychometrics. Equipment selection, sizing and controls. Comfort and industrial air-conditioning systems design and control. Design of refrigeration systems. Noise reduction techniques.

Prerequisite: MEG 403

MEG 505 Thermal Engines (2,0)

Combustion processes in engines. Analysis of cycles and performance evaluation of real systems. Propulsive devices. Performance

evaluation of real systems. Propulsive devices. Aircraft jet engines, turboprop, turbofan, by pass, turbojet, ramjet and rocket engines. Gas turbines power joints plants for electricity and industrial power generation. Thermal plants using steam turbines and boilers. Combined steam and gas turbine plants for great efficiency and power. Pollution control in engines.

Prerequisite: MEG 401

MEG 506 Mechanics of Metal Forming (2,0)

Mechanics of some forming processes: Open and closed die forging in plane strain, bar or wire drawing and strip drawing; various techniques of tube making. Deep drawing, rolling, Metal-forming friction and Lubrication. Principle of metal-forming friction. Hydrodynamic lubrication. Boundary layer lubrication, extreme pressure lubrication, and solid phase lubrication.

Prerequisite: MEG 312

MEG 507 Production Engineering I (2,0)

Technology of manufacturing design for production. Metrology. Economics of metal removal. Tool geometry and materials. Manufacturing properties of metals, metal cutting processes. Tribology.

Prerequisite: MEG 312

MEG 508 Production Engienering II (2,0)

Design of manufacturing facilities. The use of human and physical resources. Economics, maintenance. Manufacturing Automation. Production control. Computer-aided manufacturing (CAM).

MEG 509 Engineering Elasticity and Plasticity (3,0)

Introduction to elasticity. Stress-strain relations of elasticity. Basic equations of the plane theory of elasticity. Plane elasticity in polar and rectangular coordinates. Two-dimensional problems. Photoelasticity. Introduction to plasticity. Stress-strain yield criteria of metals. Stress-strain equations. Principle of the upper bound theory. Application of upper bound theory to plane stain indentation, extrusion and forging. Application to compression, bending and torsion. Introduction to finite element technique.

Prerequisite: MEG 407

MEG 510 Viscous Flow Theory (3,0)

Stresses in fluids. Derivation of tehNavier-Stokes equations. Some exact solutions of the Navier-Stokes equations. Prandtl's boundary layer hypothesis. Derivation of the boundary layer equations for a flat plate. Blasius solution of the boundary layer equations. Von Karman's integral relations of the boundary layer problem and Polhausen's approximate solution method. Numerical methods in boundary layer problems. Lubrication mechanics: hydrostatic and hydrodynamic lubrication applied to journal bearing.

Prerequisite: MEG 305

MEG 512 Automatic Control (2,0)

Introduction of automatic control. Control engineering concepts. Control system elements. Simple servomechanism. Stability criteria. Transforms and sampled data control systems. Laplace transforms and transfer functions in simple and multiloop control systems. Control system design and compensation. Transducers.

Prerequisite: MEG 409

MEG 513 Vibration Technology And Control (2,0)

Transmission and Isolation of Vibration: Classification of vibration isolation:-active and passive isolation in steady-state one degree-of-freedom.

Vibration Control: Reducing vibration at source by balancing of rotating and reciprocating machines. Detail analysis of static balancing for rotors of the rigid disc type. Other methods of control –adjustment of natural frequencies, introduction of damping (viscous, viscoelastic), use of vibration isolators, addition of auxiliary mass neutralizer or vibration absorber.

Measuring Vibration: Why measuring. Vibration terminology – peak value, average value, rms value, the decibel. Vibration measurement scheme. Transducers and pickups.

Details of the underlying principles of the vibrometer, velocimeter and the accelerometer. Principles of the vibration exciter.

Multiple Degrees of Freedom Systems: Most systems in reality possess more than one degree of freedom. Continuous systems as an example of infinite number of degrees of freedom. Determination of the elements of the flexibility and stiffness matrices by directly deforming the system. Significance of the elements of the matrices, which can also be represented diagrammatically. Reciprocity theorem. Stiffness for beam elements. Derivation of the equations of motion by Newton's law, and by Lagrange energy method for free undamped systems. Arrangement into matrix format. Solution for natural frequencies by direct expansion of the characteristic determinant. Determination of mode shapes by direct substitution of natural frequencies into the equations of amplitudes. An appreciation of the significance of eigenvalues and eigenvectors. Forced harmonic vibration – the vibration absorber damped and undamped.

Prerequisite: MEG 409

MEG 521 & MEG 522 Project (3,0)

Individual final-year projects to be supervised by members of the Academic Staff.

MEG 523 Operations Research and Technology Policy (2,0)

Formulation and optimization of mathematic models. Some techniques of operations research. Mathematical programming genuine theory, inventory models, replacement techniques applied to production control and inventory control. Practical problems of data collection and problem formulation. Productivity and economic development. Method study and Work measurement. Technology development policy.

MEG 526 Heat Transfer II (2,0)

Radiation: Black body radiation, radiative heat exchange between surfaces, radiation shielding, radiation through gaseous media.

Heat exchangers: Types of heat exchangers. Single-pass heat exchanger analysis; the log-mean temperature difference. Multi-tube per pass and multi-tube pass systems. Heat exchanger effectiveness. Number-of-transfer-units (NTU) method of heat exchanger analysis and design. Comprehensive heat exchanger design methods.

Introduction to mass transfer. Analogy between heat and mass transfer.

Prerequisite: MEG 305

MEG 528 Energy Sources and Utilization (2,0)

Fossil fuel: Their processing and utilization. Renewable source of energy. Solar energy utilization. Flat plate collector Design. Economics of solar energy equipment and their operation. Wind energy. Wind mill Design. Geothermal energy. Its recovery and utilization. Environmental consequences of geothermal energy exploitation. Biomass. Tidal waves. Principles of operation of nuclear reactors. Safety problems in nuclear reactors.

GEG 501 Engineering Economics (2,0)

Project development and financial analysis. Market analysis and demand estimation. Investigation and technical aspect of project development and financial analysis. Criteria for project choice. Project financing. Determination of economic and social profitability.

GEG 502 Engineering Management and Law (2,0)

Part I: Contract Law – definition of a contract. Classification of a contract. Ingredient of a valid contract. Elements of a contract consideration. Intention to create legal relation. Capacity of a contract. Consent of a party. Concept of brevity of a contract amd its exceptions. Mistake of a contract. Duress in a contract. Undue influence in a contract. Misrepresentation in a contract. Illegality in a contract. Discharge of a contract. Remedies for breach of a contract.

Part II: Management – Introduction to Management. Decision Analysis. How to model, a decision situation. Quantitative techniques for situations for uncertainty. Decision tree. Project Management. Project evaluation and review techniques. Concept of motivation. Theories of motivation. Hertzberg 2 factor theory. Transportation management Model.

SSG 502 Engineering System Analysis (2,0)

Fundamental concepts: Dynamic system variables. Fundamental postulates of systems analysis. The concept of information, signal and feedback. System model representation. Relationship between model system variables. Formulation of equations for dynamical mode networks. Analytical solution of system equations. Solution of free and forced response of linear systems.

SSG 504 Automated Reasoning (1,1)

Representing and reasoning with knowledge. The case for logics. Introduction to logic – programming. PROLOG, LISP, Introduction to some AI applications of logic programming. Expert systems and their implementation, Planning. Natural language processing. Machine learning.

SSG 508 Manufacturing Systems Automation (2,0)

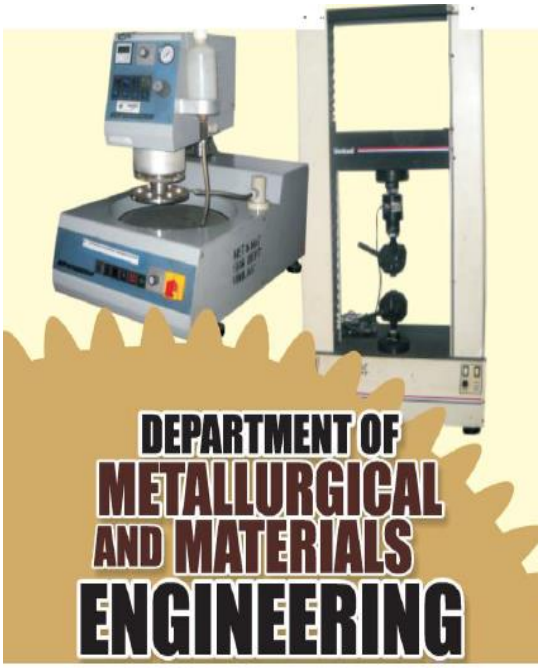
Computer assisted manufacturing system: NC, CNC, DNC, robotic, materials handling, group technology, flexible manufacturing systems, process planning and control Computer Integral Manufacturing (CIM).

SSG 513 Techniques of Planing and Scheduling (2,0)

Project definition and work breakdown structure, scheduling and control model and techniques such as AOA, AON, Bar charting, line of balance and time & location. Allocation of resources. Optimal schedules. Documentation and reporting services. Time and cost control, Progress monitoring evaluation. Computer applications.

SSG 514 Facility Planning

Basic theory of facility location. Facility layout and material handling systems design with emphasis on applications in a wide variety of industries. Design principles and analytical solution procedures presented with emphasis on modern practice including computerized approaches.



Professor G. I. Lawal
M.Sc. Ph.D. (Leeds)
Head

3.5.1. History of The Department

The teaching of Metallurgy and Materials in the University of Lagos began in 1967 with the introduction of a course in Materials Science for all year one students of the then 3-year B.Sc. Engineering degree programme.

When the Nigerian Steel Development Authority (NSDA) began to recruit metallurgical engineers for the proposed Iron and Steel project in 1971, it became obvious that there was a dearth of such professionals in the country. The NSDA solved the problem by giving graduates of various science disciplines conversion training in metallurgy in institutions in Asia and Europe at very high cost to the nation.

The then Department of Mechanical Engineering considered that the conversion exercise could be done locally at a much lower cost to the nation in a Postgraduate Diploma programme in collaboration with NSDA. The proposals were accepted and the programme took off in October 1978 with eighteen students, fourteen of whom were from the NSDA. A hundred and two (102) metallurgists were trained on the programme before it was suspended in 1983 because of shortage of staff.

In 1985, Senate approved a B.Sc. degree programme in Metallurgical and Materials Engineering to be run in the Department of Mechanical Engineering. The programme commenced in 1990. Five sets of graduates were produced before the programme was moved to a new department.

The new Department of Metallurgical and Materials Engineering which was formally established on January 20, 2000, graduated its eleventh set of students at the end of the 2011/2012 academic session. It currently has staff strength of twenty three academic staff, six administrative staff and four technical staff.

The Department runs Postgraduate programmes at the Diploma, Masters and Doctoral Levels.

The department since inception has had the following as the head;

- *Prof. S.A Balogun – Feburary 2000 to July 31st 2006.*
- *Dr. G.I. Lawal – August 1st, 2006 to July 31st 2008.*
- *Prof. D.E Esezobor – August 1st , 2008 to July 31st 2012*
- *Prof. G.I. Lawal- August 1st, 2012 to date.*

3.5.2. Undergraduate Programme

3.5.2.1 Admission Requirements

The main entry requirement into the degree programmes in the Faculty of Engineering is the Senior Secondary Certificate (SSC) or its equivalent, with credit level passes in five subjects including English Language, Chemistry, Physics, Mathematics and Further Mathematics.

An acceptable level of performance in the Joint Matriculation Examination (JME) is required for admission into the 100 - level.

An acceptable level of passes at the 'A' Level or its equivalent in Mathematics (Pure and Applied Mathematics), Physics and Chemistry are required for admission into the 200 – level.

Only holders of OND and HND (OND at distinction level, HND at a minimum of upper credit level) are eligible for consideration for admission into the 200 and 300 Levels, respectively, and these applicants are expected to make up their deficiencies in Engineering Mathematics, the physical sciences, etc on entry.

3.5.2.2 Graduation Requirements

To be eligible for the award of a degree, a student must pass a minimum total number of units in a five year programme, inclusive of the university course requirements as follows:

- University Requirements

General Studies (GST, GAS) 8 Units

- Faculty Requirement 55 Units
- Departmental Requirement 121 Units
- Industrial Experience 6 Units

Total **192 Units**

Satisfactory completion of two period of approved work industrial experience is required for the award of degree. These will be accomplished in two periods with the first not less than 10 weeks during the long vacation following year 3 (MME 300) and a second period of not less than 24 weeks during the second semester of year IV and during the long vacation (MME 400) following 10 units are granted for industrial experience (vis MME 300 – 4 units and MME 400 – 6 units) and it will attract a grade.

3.5.3. Cousre Structure

100 Level: Second Semester

Course Code	Course Title	Lecture unit	Lab. unit	Pre--Requisite
CHM 101	Introductory Chemistry II	4	-	-
CHM 102	Chemistry Practical	-	2	-
GEG 102	Engineering Pure Mathematics II	2	-	GEG 101
GEG 104	Engineering Applied Mathematics II	2	-	GEG 103
MME 102	Basic Computer Science & Programming	2	-	-
MEG 102	Workshop Practice II	1	1	-
MEG 104	Technical Drawing II	1	1	-
PHS 101	Introductory Physics I	2	-	-
PHS 102	Introductory Physics II	3	-	-
PHS 103	Physics Practical	-	2	-
		17	6	
Total		23		

200 Level: First Semester

Course Code	Course Title	Lecture unit	Lab. Unit	Pre- requisite
CHM 203	Organic Chemistry	4	-	-
EEG 201	Fundamentals of Electrical Engineering I	2	-	-
EEG 209	Fundamentals of Electrical Engineering Lab.	-	1	
GST 201	General African Studies I	2	-	-
GEG 201	Engineering Mathematics I	3	-	GEG 101 GEG 102
MME 201	Materials in Engineering	1	-	-
MEG 201	Thermodynamics	2	-	-
MEG 203	Mechanical measurements and Mechatronics	2	-	-
MEG 205	Mechanics Statics	2	-	GEG 103 GEG 104
MEG 207	Engineering Graphics	1	1	-
		19	2	
Total		21		

200 Level: Second Semester

Course Code	Course Title	Lecture unit	Lab. unit	Pre- requisite
CHM 202	Physical Chemistry II	4	-	-
EEG 202	Fundamentals of Electrical Engineering II	2	-	-
EEG 210	Fundamentals of Electrical Engineering lab. II	-	1	
GST 202	General African Studies II	2	-	-
GEG 202	Introductory Engineering Statistics	3	-	GEG 102 GEG 104
MEG 202	Fluid Mechanics	2		-
MEG 204	Mechanical Engineering Lab. I	-	2	MEG 102
MEG 210	Strength & Testing of Materials	2	-	-
		15	3	
Total		18		

300 Level: First Semester

Course Code	Course Title	Lecture unit	Lab. unit	Pre- requisite
CHG 203	Chemical Engr. Process Analysis 1	2	-	-
GST 307	Entrepreneurship and Corporate Governance	2	-	-
GEG 301	Engineering Mathematics II	2	-	GEG 201
MME 301	Thermodynamics of Materials	3	-	-
MME 305	Physical Metallurgy I	2	1	-
MEG 305	Incompressible Fluid Dynamics	3	-	-
MME 307	Materials Laboratory I	2	1	-
MME 309	Science of Materials	3	-	-
MME 311	Electrochemistry and Corrosion	3	-	-
		22	2	
Total		24		

300 Level: Second Semester

Course Code	Course Title	Lecture unit	Lab. unit	Pre-requisite
GEG 302	Operational Methods	2	-	GEG 301
CHG 202	Introductory Chemical Engineering Operation	2	-	-
CHG 204	Chemical Engineering Process Analysis II	2		CHG 203
MME 316	Industrial Engineering I	2	-	-
MME 302	Properties of Materials	3	-	-
MME 304	Crystallography	2	1	-
MME 306	Materials Processing I	2	1	-
MME 300	Indusrial Training (During Vacation)	-	-	-
		15	2	
Total		17		

400 Level: First Semester

Course Code	Course Title	Lecture unit	Lab unit	Pre- requisite
GEG 401	Technical communication	1	-	-
GEG 402	Numerical Methods in Engineering	2	-	-
GEG 403	Engineering Statistics	2	-	-
MME 401	Chemical Metallurgy	3	-	-
MME 403	Materials Laboratory II	-	1	-
MME 405	Physical Metallurgy II	3	-	-
MME 407	Mineral Processing Technology	3	-	-
MME 409	Entrepreneurship for Materials Engineers	2	-	-
MME 413	Industrial Engineering II	3	-	-
		19	1	
Total		20		

400 Level: Second Semester

Course Code	Course Title	Lecture Unit	Lab unit	Pre- requisite
MME 400	Industrial Training	-	6	-
Total		-	6	-

Course Code	Course Title	Lecture unit	Lab unit	Pre-Requisite
GEG 502	Engineering Law & Management	2	-	-
MME 504	Materials Processing II	2	-	-
MME 506	Mechanics of Metal-forming	2	-	-
MME 508	Non Ferrous Extractive Metallurgy	3	-	-
MME 510	Solidification & Foundry Technology	2	-	-
MME 512	Polymeric Materials	3	-	-
MME514/SSG 502	Engineering Systems Analysis	2	-	-
MME 516	Failure & Material Selection Analysis	2	-	-
MME 522	Project	-	3	-
		18	3	
Total		21		

500

Level: First Semester

Course Code	Course Title	Lecture unit	Lab unit	Pre-Requisite
GEG 501	Engineering Economics	2	-	-
MME 503	Deformation & Fracture Mechanics	3	-	-
MME 505	Transport Phenomena in Material processing	3	-	-
MME 507	Iron-steel Technology	3	-	-
MME 509	Engineering Plasticity	3	-	-
MME 511	Fuels, Furnaces & Refractories	2	-	-
MME 513	Metallurgical Process & Plant Design	2	-	-
MME 515	Industrial & Entrepreneurial Seminar	1	-	-
MME 521	Project	-	3	-
Total		19	3	

500 Level: Second Semester

3.5.4. Course Outline

MME 101 Basic Information Technology (2,0)

Introduction to computer technology, hardware, software and other terminologies, primary operating systems, DOS – windows, word processing, data base, presentation software, graphics and scientific visualizations, computer networks, INTERNET and INTRANET, internet applications, e-mail, WWW(URL) HTML, JAVA.

MME 102 Basic Computer Science & Programming (2,0)

Introduction to computer science, foundations of programming, coding techniques, basic data structures, general coding – coding in pseudo code. Algorithm design. Miscellaneous languages such as visual basic, C^{++}, JAVA, Fortran, etc.

MME 201 Materials In Engineering Development (1,0)

The Engineering materials family, materials of early and non-industrial societies, materials of industrial societies. Some recent material groupings, ceramics, polymers, composites, semi conductors and bio-materials. Materials processing techniques: Conventional and modern materials processing techniques. Historical contribution of materials development and utilization to the course of technology – transportation, (railways, road, air, sea transport), building construction, medicine and dentistry, electronic, telecommunication and information, Electronic/Magnetic optical materials, ceramics, polymers, ceramics, polymers, composites, Bio-materials, Nano-materials. Environmental Impact Survey (EIS) of Materials Exploration. Relevant audio-visual aids.

MME 301 Thermodynamics of Materials (3,0)

Introduction. Basic concepts in thermodynamics. Objectives and limitations of classical thermodynamics. Zeroth law of thermodynamics. First law of thermodynamics. Internal energy and work. Calculation of work for various thermodynamics. Processes. Heat capacities. Thermochemistry. Hess's law. Kirchoff's law. Second law of thermodynamics. Efficiency of cyclic process. Carnot cycle. Entropy. Thermodynamic. Equation of state. Statistical interpretation of entropy. Free energy functions. Gibbs-Helmbioltz equation. Maxwell's relations. Third law of thermodynamics. Fugacity, activity and equilibrium constant.

Van Hoff's isotherm. Variation of equilibrium constant with temperature. Clausius - Clapeyron's equation.

Ellingham diagrams and application. Thermodynamic solutions. Raoult's law. Henry's law. Sievert's law. Properties of ideal solutions.

Chemical potentials. Partial Molar properties and their inter-relations. Gibbs - Duhem equation and its integration. Actual solutions. Regular solutions. Excess thermodynamic properties. Application to phase diagrams. Derivation of phase rule.

Thermodynamics of Electrochemical cells. Nernst equation. Emf method of measurement of Thermodynamic properties. Transport number, conductance, non-mobility and their interpretation. Kinetics of Metallurgical reactions. Collision theory of Absolute reaction rates. Order and molecularity of reactions. Determination of order. Catalysis and chemical reactions.

MME 302 Properties of Materials (3,0)

Deformation and Elasticity:

Condensed states of matter, Deformation of Solids and Liquids; displacement, strain rotation. Stress, Hooke's Law for isotropic materials, Elastic constants and the relations between them. Measurement of Elastic Constants: Plastic Properties: Stress - strain Curves, yield stress, proof stress, ultimate tensile strength, ductility. True Stress, true strain, work hardening. Fracture, toughness, hardness, recovery and recrystallization, Creep, fatigue.

Thermal Properties: thermal energy, specific heat, thermal expansion. Thermal shock. Effects of thermal properties on material behaviour.

Electrical, optical and Magnetic Materials and Devices. Introduction to electronic, optical and magnetic properties of materials in terms of their electronic structure, chemical composition and bonding. Properties of metals, semi conductors and insulators including electrical conduction, thermoelectric power. Hall effect, optical absorption and reflection, luminescence, para - and ferromagnetism - effects of micro - structure and impurity content. Texture effect.

MME 304 Crystallography I (2,1)

External morphology of crystals. Law of constant angle.

Representation by directions of ace normals.

Hardy regular internal parking, the crystalline state. Law of rational indices. Miller indices and Miller-Bravis. Reference axes, parametral plane Sterographic projections. External symmetry, crystal systems,

crystal classes. Primitive and non primitive cells. Mathematical crystallography for orthogonal reference axes. Angles between planes and directions. Pacing of plane.

Crystal Chemistry - lonic, Covalent, metalic and van der Wall's bonded crystals, Structures of true metals, geometry of regular packing of spheres. lonic crystals. NaCl, CaCl, CsCl, lonic Radii. Covalent crystal-diamond. Zim's rule, sub group metals, solid solution, atomic radii. Intermetallic differently bonded crystal X-ray Crystallography:

Production and properties of X-rays:

X-ray tubes, spectral intensity curves, absorption filters, interpretation of characteristic lines, absorption edges. Health hazard, Fluorescence radiography. Principles of Diffraction, atomic Scattering, Bragg's equation, missing reflections. Laue photographs - powder Cameras, appearance of photographs resolution of doublet. Indexing of pattern ($SIN^2\ \theta$ vs log methods). Appearance of patterns from PIF structures. Indexing hexagonal, tetragonal patterns.

Deformation of Lattice Parameters:

Nelson-Piley Plots, Accuracy attainable. Foccusion cameras A.S.T.M index, phase diagrams, superlattice stress analysis of mixtures. Pole figures, fibre texture: charts.

MME 305 Physical Metallurgy I (2,1)

Introduction to metals and metal alloy systems. The metallic bond and structure of metals. Solidification of pure metals, effect of variables on structure solidification as a nucleation and growth process. Solidification of non-crystalline materials. Preparation of materials to reveal structure, use of microscope Annealing of metals, grain growth, surface energy and shapes of crystals. Deformation, slip, twinning, effect of microstructure, viscous flow. Annealing of deformed metals. Effect of variables. Binary Equilibria - Alloying, solid solutions. Equilibrium of phase diagrams, complete solubility, Cu/Ni type, Lever rule. Effect of cooling changes in solid, heterogeneous Equilibria, Claudius - Chaperon, on vapour pressure, phase rule, definitions and proof. Introducing activity and potential P-T diagrams, condensed systems. Peritectics, More complex equilibrium diagrams with maxima, minima Compounds, etc. Iron - Iron carbide diagram, Hysteresis, allotropy.

Applications-Cast Steel, Wrought steels, Effect of Cooling on structure of steels. Martensite. Quenching, T.T.T. curves, hardenability. Bainite, Alloying. Tempering properties and structure. Surface hardening. High alloy steels, cast irons, stability Fe_3C, Iron-graphite equilibrium. Copper, Copper - Zinc alloys as an example of different strengthening processes.

MME 306 Materials Processing I (2,1)

Joining of metals. Brazing: Principles of bonding. Welding methods, principles and metallurgy of welds. Casting methods; Sand Casting: Billet casting methods: Zublin: Erical; Durvile and continuous casting and other forms of casting. Fundamentals of solidification and structural developments in casting

Electrodeposition: Growth of electrodeposits: addition of agents, principles illustrated with cyanide baths, nickel and chromium.

MME 307 Materials Laboratory (2,1)

Introduction to study of materials by light and x-ray. Examination of structure and relationship of structure to mode of fabrication. Fundamentals of metals forming and heat-treatment operations, Metallography. Physical tests: tensile, creep, hardness and fracture.

MME 309 Science Of Materials (3,0)

Atomic structure, Mass number and Isotopy. The physical model of the atom. Electron notation of atoms including valency model of the atom. Valency and inert gasses and inertness. Excitation, ionization energy. Structure and

properties of atomic nuclei. Radioactivity. Inter atomic bonding. Crystal structure. Stacking sequence and stacking faults. Miller indices. Interplanar distance, Crystal imperfections. Atomic movements. Phases. Equilibrium diagrams and alloys. Solid state transformations. Survey of occurrence and extraction of metals. Non - crystalline and multiphase solids including polymers. Ceramics and composite materials, fibre - reinforced materials, dispersion strengthened materials and cermets.

MME 311 Electro Chemistry and Corrosion (3,0)

Basic concept of corrosion and socio-economic implication. Introduction to the thermodynamics and kinetics of Electro chemical corrosion of metals and alloys.

Corrosion - Theoretical Aspects, Electrolysis. Principles. Faradays laws and their application. Current Efficiency. Energy efficiency. Ion conductivity, Equivalent and Molar conductivity. Ionic mobilities and Transport Numbers. Electode potential, Equilibrium potentials-EMF series. Polarization. Over Voltage / Over Potential. Activation. Concentration. Ohmic Polarization. Effect of Polarization on Electrode processes. Corrosion as an irreversible electrode process. Tafels Equation. Tafels slopes. Effect of Temperature, composition and concentration of the Corrosive media. Kinetics of electrode processes (briefly). Passivity.

Galvanic cells with solid electrolytes. Oxidation - metal rate laws. Wanger's theory of parabolic oxidation. Application to oxidation of copper, zinc and sulphidaton or silver oxidation kinetics - low temperature and high temperature.

Electrode processes. Cathodic. Technical processes. Brief classification. Anodic Technical process. Corrosion-Electrochemical aspects of Corrosion. Corrosion Cells/Electrochemical cells. Concentration Cells. Temperature Cells. Determination of Electrode potential. Thermodynamic aspects-Nernst Equation. Helmholtz equation. Galvanic series. Displacement equilibrium and its significance in Corrosion processes. Potential-pH, Fe-H_2O diagram. E-I diagrams for prediction of Corrosion currents. Polarization Resistance Linear Polarization technique for evaluation of Corrosion - Practical Aspects. Importance. Direct and Indirect losses. Types and Forms of Corrosion. Uniform Corrosion. Pitting Corrosion. Galvanic Corrosion, and Intergranular Corrosion. Stress Corrosion Cracking. Cavitation Erosion. Erosion Corrosion. Corrosion Fatigue.

Differential aeration Corrosion. Corrosion Rate expressions. Testing Methods. Effect of velocity, flow-rate. Concentration, temperature and inhibitors and corrosion rates. Corrosion rate calculations.

Corrosion prevention. 1) Design aspects 2) Alteration of Environment -inhibitors 3) Alteration of the Materials-Pure metals-alloys, Non-metallic as structural materials - Reinforcement of the material for reducing Corrosion rates. 4) Surface protection. Electroplating Principles - Throwing power and its evaluation. Commercial plating of Cu, Ni, Cr, Cd. Zn. Ag. Au. Electrodeposition of alloys plating structure of electrodeposits and testing of deposits. 5) Anodic oxidation of Aluminium and its alloys. Commercial anodizing process. Faults in the Anodic coatings and the remedies. Treatment after anodizing. 6) Cathodic and Anodic Protection.

Treatment of environmental degradation of non-metals (ceramics, concrete, wood, polymer and silicate glasses). Discussion of current materials degradation problems in marine environments, the petroleum industry, aviation and automobile industries; Energy conversion and generating system.

MME 401 Chemical Metallurgy (3,0)

Application of chemical and thermodynamic methods and principles of the treatment of importance metallurgical processes. Classification of extractive metallurgy processes. Gas-solid reaction, slag-metal reaction, oxide reduction, segregation, distribution, vacuum degassing. Examples taken from metallurgy of common metals.

Thermodynamics and kinetics of hydrometallurgical processes; leaching and solvent extraction.

MME 403 Materials Laboratory II (1,0)

Composition determination and materials characterization, casting, casting defects, moulding sand constituents formulation and testing, joining processes – welding & brazing, non – destructive evaluation of integrity of weld, - dye penetrant, magnetic particle inspection, corrosion testing etc.

MME 405: Physical Metallurgy II (3,0)

Classification of Transformation: Order of transformation, classification by structural and kinetics features. Generalized approach to a reaction equation. Free energy consideration and the equilibrium diagram. **Nucleation:** Random, non-random, site-saturation, measurement. Growth morphology of particles, lamellar growth. Partitioning, coalescence, measurement.

Hardening Mechanism & Heat Treatment: precipitation hardening, dispersion hardening, solid solution, decomposition of solid solutions. Entected transformation. Decomposition of austenite on continuous cooling and isothermally, hardenability. Theory of martensitic transformation, microstructure of martensite and tempered martensites, massive and baintic transformation.

Tempering: Effects of alloying elements in special steels, secondary hardening, controlled transformation in steels, physical metallurgy of alloy steel. Metallurgy of maraging steels. Temper brittleness, overheating and burning of steels, superplasticity.

Carburizing: mathematical treatment of carburizing.

MME 407 Mineral Processing Technology (3,0)

Objectives and scopes, classification of minerals – liquids and solids. Occurrence and sources of solid minerals. A survey of Nigeria's solid mineral reserves. Quality issues in solid mineral processing. concept of liberations. Communition (ore preparation), study of primary and secondary crushing and grinding units (jaw, gyratory, reduction gyratory and roll crushers). Theory of ball mill operation, treatment of crushing and grinding laws: e.g. Rittinger's Kick's and Bond's law.

Laboratory sizing units: screening, elutriation, sedimentation, representation of size analysis data, sizing equipment used in industry, elementary concepts of movements of solid in fluids. Stokes and Newton's laws. Reynolds number free and hindered settling. Classification and its application in mineral dressing. Some separation techniques; tabling, jigging, magnetic and electrostatic separation, flotation, surface tension, surface energy and contact angle. Floatability, frothers, collectors and modifying agents. Solution chemistry and surface chemistry. Differential flotation, flotation circuits. Dewatering techniques (sedimentation - filtration – drying). Treatment of sample flow sheets for beneficiation of some industrial minerals e.g. Fe, Mn, Cr, Cu, Pb, Zn, Ta. Beach sands, gypsum, limestone, clays etc. Review of solid mineral development in Nigeria. Economics and environmental issues in solid mineral processing.

MME 409 Entrepreneurship for Materials Engineers (2,0)

Technology and Development; productivity and wealth creation. The features of an entrepreneur. Basic skills of entrepreneurship, generating business ideas and leadership (management). Business environment and organization for technical enterprise.

Human resources, ethics in business management and business law, intellectual property issues. Innovation and appropriate technologies. Technology commercialization and prototyping. The business plan; contents and importance of business plans; formats of business plans, packaging business plans. Government regulations, marketing and marketing strategies: pricing and analyzing market characteristics. Entrepreneurial finance analysis, element of financial plan (venture capital). E-business, feasibility studies.

MME 503 Deformation and Fracture Mechanics (3,0)

Fundamentals of materials science and solid mechanics applied to selected subjects in fracture, major topics include linear-elastic, elastic-plastic, and fully plastic fracture mechanics, fatigue, creep rupture and creep crack

growth and environmentally assited fracture. Emphasis shall be placed on relating the microscopic (continuum) characterizations.

MME 504 Materials Processing II (2,0)

Powder metallurgy – preparation, pressing. Sintering and principles. One-phase and two-phase systems. Applications of powder metallurgy, advantages and limitations, sintered carbide.

- *Ceramics, Glass & Wood forming techniques & equipment. Composite technology – principles and types*
- *Economic and environmental aspect of materials processing. e.g. service requirement, source of information, case instances.*

MME 505 Transport Phenomena in Materials Processing (3,0)

Introduction to momentum, heat and mass transfer with examples from process metallurgy. Molecular transport properties: viscosity, thermal conductivity and mass diffusivity. Simple overall mechanical energy balances, elements of laminar flow and turbulent flow. Steady and unsteady conduction problems, forced and natural convection, heat transfer coefficient and radiative heat transfer. Definition of binary diffusivity, definition of binary diffusivity, convection mass transfer and mass transfer coefficient. Solution techniques will include digital computer methods.

MME 506 Mechanics of Metal Forming (2,0)

Mechanics of some forming processes: Open and closed die forging in plane strain: bar or wire drawing and strip drawing, various techniques of tube making: deep drawing, rolling metal – forming friction.

Lubrication: principle of metal – forming friction. Hydrodynamic lubrication: boundary layer lubrication: extreme pressure, and solid phase lubrication.

MME 507 Iron and Steel Technology (3,0)

Review of global production profile and price variation and economic importance of ferrous alloys.

Raw materials; occurrence, distribution and classification of iron ores in Nigeria. Evaluation of raw materials, preparation of iron ores, concentration: agglomeration techniques. Sintering principles – sinter machine and its efficiency. Types of sinter. Raw materials requirement. Pelletizing, bonding mechanism.

Blast furnace and accessories, description of modern blast furnace. Design of blast furnace, stoves, gas cleaning systems, charging system. Blast furnace instruments and Refractories. Distribution of burden in blast furnace.

Physical Chemistry and Chemistry Reaction and Ellignam Diagram. Distribution of elements in molten metal and slag. Constitution of blast furnace slags, properties and uses. Blast furnace operations, irregularities and corrections. Modern developments in blast furnace practice and methods of increasing production. Alternate routes of production of pig iron; electric process, low shaft furnace, production of sponge iron by Hyl process. SL/RN Process, midrex process, kiln process; corex, fast melt, etc uses of sponge iron. Production of wrought iron.

Early steel making processes – cementation and crucible processes. Chemistry and principles of steel making processes. Theories of slag. Oxidation of Si, Mn and C. Desulphurisation, dephosphorisation and deoxidation. Survey of modern steel making processes; converter steel making process: LD, LD-AC, Kaldo, Rotor, Q-BOP and electric furnace steel making their advantages and limitations. Brief EAF process, construction, lining and operation. Brief outline of manufacture of alloy steel – production of ferrous alloys- Fe- Si, Fe-Mn, Fe-V, Fe-W Quality steel making; Vacuum degassing of metals. Secondary steel making. Casting process. Pit-side process and teeming methods. Ingot moulds. Solidification of steel, ingot defect and remedies. Continuous casting of steels.

MME 508 Non-Ferrous Extractive Metallurgy (3,0)

Introduction, review of Non-ferrous Mineral wealth of Nigeria. Primary and Secondary metal wining: General methods of Extraction: Pyrometallurgy, Roasting, types of roasting equipment and methods. Smelting, smelting

furnaces. Principles of refining. Use of vacuum. Zone refining, vacuum refining – and remelting, electro beam melting, electro slag refining. Hydrometallurgy, advantages and disadvantages. Principles of leaching, leaching kinetics and factors affecting leaching. Electrometallurgy, classification of process, cementation, electro refining, and electro deposition.

Treatment of Extraction of some Important Non-Ferrous Metals:

Aluminum: uses, ores, bayer's process of aluminum production. Hall-Heroult process. Cryoxite and carbon electrode manufacture. Hapes process of refining. ALCOA processes. New processes.

Copper uses: Pyro-metallurgical processes. New processes. Flashing melting. WOCRA and Noranda processes. Hydrometallurgy of copper.

Lead: Uses: ore treatment and production of metal.

Zinc: Uses: Pyrometallurgical and Hydro-metallurgical extraction methods. Imperial smelting.

Nickel: Brief description of Ni extraction from surphide ores, treatment of light structural metals e.g. magnesium. Ores, uses, concentration, smelting and refining.

Uranium: Extraction of uranium, production flow sheet of zuriconium. Titanium, thorium, plutonium etc.

Production flow sheet for the extraction of gold and silver.

Nuclear reactor technology. Fuel for nuclear reactions. Basic components of a reactor.

Characteristic and requirements. Types of reactors. Environmental and economic consideration in choice of production methods.

MME 509 Engineering Plasticity (3,0)

Yield Criteria: Tresca's maximum shear and Von Mises maximum shear-strain energy Criteria: relationship between tensile yield stress of yielding. Slip-line Field Theory: Stress evaluation using slip-line field; Hencky equations and determination of Stress and slip-line at the free boundary surface. Frictionless boundary interface, Boundary interface with Coulomb friction and boundary interface with fullsticking or maximum friction. Plan and Hill slip-line field evaluations: Derivation of Geringer's velocity equations. Principles of the upper Bound theorem. Upper bound analysis of simple upsetting using an admissible parallel velocity upper boundary principle under plane strain conditions; Application of Upper bound theory to plane strain conditions; Application of Upper bound theory to plane strain indentation, extrusion and forging.

MME 510 Solidification and Foundry Technology (2,0)

Processes of freezing: Nucleation and growth of solid phase: plannar and dendritic growth freezing of alloys; constitutional supercooling. Solidification of two-phase alloy; structure of cast alloy; effect of cast structure on properties; segregation in ingots. Casting techniques and finishing operations; defects in casting.

MME 511 Fuels, Furnaces and Refractories (3,0)

Types of fuels – solids, liquids and gaseous.

Fuel classification and characteristic

- *Solid fuels – classification: theories of formation of coal. Types and properties of coal. Proximate and ultimate analysis of coal, carburization of coal (coke and by products). Testing and properties.*
- *Liquid Fuels: classification. Theories of formation of petroleum, petroleum refining, distillation, synthetic petrol. Bergius process, fisher process and trospech. Coal tar fuels. Testing and properties.*
- *Gaseous fuels: classification. Production of PG, WG, CWG, LD Gas, Coke oven and gas and BF gas. Industrial gasification processes. Lurgi, Winklers, and kopper Totzek processes, properties and testing.*
- *Liquid and gaseous fuel burners. Combustion problem.*

Refractories: definition, raw materials, properties, classification and general description. Manufacturing of Refractories: Manufacture, properties, application and economy, of alumino-

silicate, silica, magnesite, dolomite, chrome-magnesite, chromite, carbon Refractories, changes during drying and firing, significance of phase diagrams. Behaviour of Refractories in services, including mechanism of thermal and other modes of spalling and attack. Properties and casting of Refractories.

Refractory materials made from pure oxides:- Al_20_3, MgO, CaO, BeO, ZnO and Cermets.

Furnaces: Classification of furnaces and their uses in steady state conduction, convection and radiation.

Heat utilization in furnaces, available heat, factors affecting available heat. Heat losses in furnace and furnace efficiency. Heat balance and sankey diagrams.

Principles of waste heat recovery. Recuperators and regenerators.

Types and applicability. Protective atmosphere and their applications. Treatment of some basic furnaces.

MME 512\ Polymeric Materials (2,0)

Chemistry – polymerization process – condensation polymerization, addition polymerization. Epoxide Co-polymerization (fibre glass, carbon, fibres materials) synthetic rubbers. Styrenebutadine rubber. Thermoplastics and thermosetting plastic technology – polymerization systems. Molecular weight and melt flow index mould techniques – including seam – mould for expanded polystyrene, compression moulding. Injection mould, extrusion moulding, calendaring, solid state forming.

Solidification:

i. Melt-Chain configuration and flow processes on cooling.
ii. The glass transition (amorphous polymers). The temperature/time superposition principles and the WLF equation.
iii. Rubber and rubber requirements for crystallization X-ray evidence and unit cell. Theory of spherulite growth.

Mechanical properties

Visco – elasticity. Stress – strain curves. Stiffness, creep environmental stress cracking of polymers. Modern plastic – epoxy resins etc.

MME 513 Process and Plant Design (2,0)

Metallurgical process synthesis (process sequence and layout), plant design, principles of plant design, process equipment design and specifications, economic analysis of alternative processes, computer aided process design and simulation, application of optimization principles to specific metallurgical engineering problems, design case studies – application of scientific and engineering knowledge to practical design problems, safety aspects of plant design. Environment issues in process and plant design.

MME 514/SSG 502 Engineering Systems Analysis (2,0)

Introduction to major concepts and techniques of systems analysis as an approach to engineering problem solving. Calculus of various maximum principle, dynamic programming. Optimization and optimum seeking methods. Project analysis of metallurgical processing systems. Methods of estimating process costs and profitability. Regression analysis and statistical testing. Application to real problems in planning and design of metallurgical systems shall be stressed throughout.

MME 515 Industrial & Entrepreneurial Seminar (1,0)

Case studies, review of business plans. Appraisal of existing business concerns (SME & blue chip companies). Presentation on current industrial practice in the Metallurgical & Materials industries. Entrepreneurial opportunities in metal based Industries in Nigeria – Foundry, metal fabrication, metal finishing, solid minerals, materials recycling, corrosion, merchandise etc.

MME 516 Failure Analysis & Material Selection (2,0)

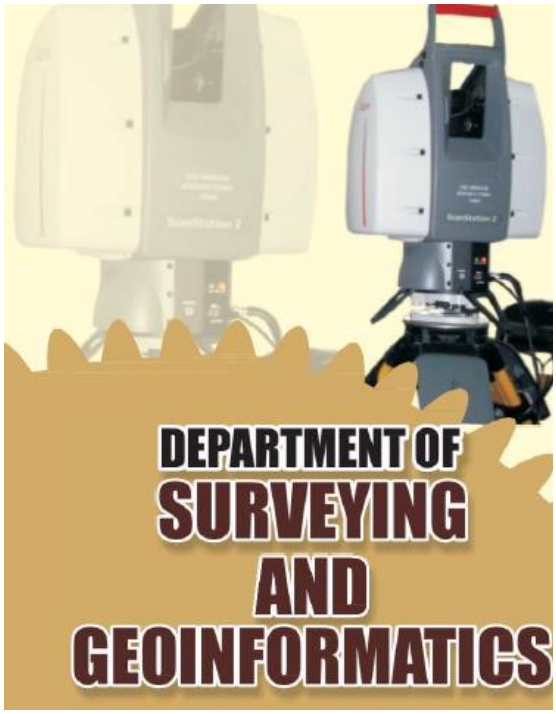
- Introduction to concept of failure in materials, common causes of failures – Design errors, improper material, improper heat treatments, manufacturing defects, inadequate quality assurance, inadequate

environmental protection/control, assembly errors, misuse or abuse.

- Failure mechanisms – fatigue, creep and stress rupture, corrosion/stress corrosion cracking, ductile and brittle fractures, hydrogen embrittlement, liquid metal embrittlement.
- Basic sequence in failure analysis: forensic metallurgy, failure analysis methods – destructive evaluation and non destructive evaluation.
- Litigation arising from failure of plants/process.
- Selection of materials for engineering systems based on constitutive functional requirements and materials property. The role and implication of processing in material selection.
- Case studies**.**

MME 521 & 522 Project (6)

Individual final – year projects to be supervised by members of the academic staff.



Dr. O. T. Badejo
BSc, M.Sc. Ph.D. (Lagos)
Ag. Head

3.6.1. History of The Department

The Department of Surveying and Geoinformatics (Formerly known as Department of Surveying), started as a sub-department of Civil; Engineering Department in 1970. The initial programme of the sub-department at the time was a two-year postgraduate course of studies and research leading to an M.Sc. (Surveying) degree. Graduates in field's cognate to surveying were admitted into the programme.

In October 1973, a full-fledged Department of Surveying was established. The first set of undergraduate students in surveying were admitted in October 1974. Today,, the Department also runs postgraduate programmes leading to the M.Sc. M.Phil and Ph.D degrees in Surveying and Geoinformatics as well as Master of Geoinformatics (Executive programme).

Prior to the establishment of the sub-department, four final year students, who in September 1966 withdrew by the Department of Civil Engineering to complete their degree programme in surveying by special arrangement with the Federal Surveys Department the students graduated with B.Sc. Degree in Surveying in 1967.

The discipline of Surveying has grown rapidly in the last half of this century. First, it was the surveying and mapping requirements of the Second World War which led to the development of aerial survey techniques, known as photogrammetry, which in turn revolutionized mapping methods. There was, also, the tremendous development in the field of electronics, which made possible a revolution in distance measuring methods leading to the introduction of a new family of equipment. And recently, particularly in the last 15-20 years, the advances made in computer and information technology as well as space techniques have again greatly influenced survey methods, both in data acquisition, processing and management. New instrumentation such as the total station, digital levelling equipment, electronic field books, the global positioning system (GPS), the analytical plotters and digital mapping equipment, etc have emerged. When the new instrumentation in surveying is combined with the availability of fast speed computers with large storage capacities, new processing and management methods have emerged, making geoinformatics. Remote Sensing techniques and digital Mapping methods increasingly important and popular. These developments dictate the direction of growth of the science of Surveying and Geoinformatics shifting the emphasis from

mere data acquisition to include data storage, retrieval, manipulation and management.

In view of the above, it became incumbent on the department to review its programme in order to align its curriculum with the new developments in the Surveying field. The trend elsewhere is that may any Department of Surveying overseas, have not only reviewed their programmes, but had also changed the names of their departments to Geomatics, Geoinformatics or Geomatic Engineering as the case may be, so as to reflect these developments.

The need to change the name of the department which it had been identified with for many years, is partly due to the very narrow interpretation given the term "surveying" by the general public and the resulting difficulties in student recruitment, and partly to reflect the tremendous impact the advances in technology and modern "techniques has had on the surveying profession. The first concerted effort at realizing this goal was made at a Faculty Board of Studies meeting in 1996/97 session, in which many names were proposed.

At several department meetings, this issue was hotly debated. Members often suggested names in line with their leanings. However, the department was able to arrive at a unanimous decision on this issue at a departmental meeting held on 15th January 1998. The name adopted is: "Surveying and Geoinformatics". The name Surveying and Geoinformatics portrays a discipline that deals with acquisition, analysis, storage, distribution, management and application of spatially-referenced data.

The Surveyor, as defined and produced at the University of Lagos is a professional and a geoscientist well equipped to provide spatial and other environmental information necessary for designing and planning of engineering works as well as in the location and exploitation of natural resources. His excellent background in computer science, mathematics and physics, gives him added confidence to tackle problems of diverse nature. He is given comprehensive training in Geomatics which include inter alia Land Surveying. Geodesy, Hydrography, Photogrammetry. Remote Sensing, Cartography and Geoinformatics.

3.6.2. Course Structue

100 Level: First Semester

Course Code	Course Title	Lecture Units	Lab Units	Pre- Requisite
SVY 101	History of Surveying	1	0	
GEG 101	Engr. Pure Maths. 1	3	-	
GEG 103	Engr. Applied Maths 1	3	-	
FSC 105	Intro. Physics 1	3	0	
MEG 101	Workshop Practice	0	2	
MEG 103	Technical Drawing I	0	1	
GST 102	Intro. To Logic & Philosophy	2	-	
GST 105	Use of English	1	-	
		13	3	
Total		16		

100 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 102	Basic Surveying I	1	0	
GEG 102	Engr. Pure Maths II	2	-	
GEG 104	Engr. Applied Maths II	2	-	
MEG 102	Workshop Practice II	0	1	

MEG 104	Engineering Drawing	0	2
PHS 101	Intro. Physics II	2	-
PHS 102	Intro. Physics III	2	1
PHS 103	Physics Practical	0	2
GST 104	History & Philosophy of Science	2	
GST 106	Use of English	1	-
		12	6
Total		18	

200 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 201	Basic Surveying II	2	1	
GRY 203	Cartography	2	1	
GEG 201	Eng. Maths 1	3	-	GEG 101, GEG 102
EEG 201	Fund. of Elect. Engr. I	2	1	
PHS 201	Classical Mechanics I	2	-	
PHS 219	Practical Physics I	0	1	
PHS 261	Geophysics I	1	1	
GST 201	General African Studies 1	(2)		
PHS 207	Optics	1	1	
		15	6	
Total		21		

200 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 202	Engineering Surveying	2	1	
GEG 202	Intro. Engineering Statistics	3	-	
PHS 208	Intro. to Astrophysics	2	-	
SVY 210	Photogrammetry I	2	1	
PHS 220	Practical Physics II	0	1	
SVY 204	Remote Sensing I	2	1	
SVY 206	Computer Applications in Surveying I	1	1	
GST 202	General African Studies 11	(2)	-	
		14	6	
Total		20		

300 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 305	Cadastral Surveying	2	1	
SVY 307	Spherical and Field Astronomy	2	1	
ESM 351	Applied Town Planning	2	0	
SVY 309	Adjustment Comp. I	2	1	
SVY 311	Hydrographic Surveying I	2	1	

SVY 313	Principles of Geo Information Systems I	2	1	
PHS 301	Classical Mechanics	2	0	
		14	5	
Total		19		

Elective

PHS 207	Introduction to Swimming I	0	1	

300 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 302	Geodetic Surveying	2	1	
SVY 306	Cadastral Surveying II	2	1	
SVY 308	Geodetic Astronomy	2	1	
SVY 310	Electronic Surveying	2	1	
SVY 312	Computer Application in Surveying II	2	1	
SVY 314	Principles of Geo Information System II	2	1	
SVY 316	Digital Mapping I	2	0	
	TOTAL	14	6	20

Electives: Plus at least 2 units of below

GEG 302	Operational Methods	2	0	
PHE 207	Introduction to Swimming II	0	1	
CEG 304	Engineering Geology	2	1	

400 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 401	Map Projection	2	1	
SVY 413	Photogrammetry and Remote Sensing I	2	1	
SVY 415	Geodesy I	2	1	
SVY 417	Digital Mapping	2	-	
GEG 401	Technical Communication	1	-	
GEG 402	Numerical Methods in Engr. OR	2	1	
GEG 403	Advanced Engr. Statistics	2	-	
Total		13	4	17

Plus at least 5 units of Electives from below

SVY 405	Mining and Underground Survey	2	1
SVY 409	Potential Theory and Spherical Harmonics	2	-
SVY 411	Special Surveys	2	1

400 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SIW 400	Industrial Training	-	6	6
Total			6	

300 Level: First Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 501	Adjustment Comp. II	2	1	
SVY 505	Survey Laws and Regulation	2	-	
GEG 501	Engineering Economics	2	-	
SVY 511	Project	0	3	
		13	5	
Total		18		

Elctive: Plus at least 2 units from these options

SVY 503	Special Studies in Digital Remote Sensing	2	1
SVY 509	Geometric Geodesy	2	1
SVY 517	Photogrammetry and Remote Sensing II	2	1
SVY 523	Introduction to Coastal Mapping and Management	2	-
GEG 503	Surface Water Hydraulics	2	-
GEG 519	River Engineering	2	-
SVY 519	Mathematical Geodesy	2	-

500 Level: Second Semester

Course Code	Course Title	Lecture Units	Lab. Units	Pre- Requisite
SVY 502	Adjustment Computation III	2	1	
SVY 506	Professional Practice and ethics	2	1	
SVY 512	Project	0	3	
GEG 502	Engr. Law & Mgt.	2	-	
		13	4	17
Total				

Plus at least 9 units from these options

SVY 510	Physical Geodesy	2	1
SVY 508	Hydrographic Survey	2	1
SVY 516	Marine Surveying	2	-
CEG 504	Ground Water Hydrology	2	-
SVY 504	Special Studies in Analytical and Digital Photogrametry	2	1
SVY 513	Satellite Geodesy	2	1
SVY 515	Applied Geophysics	2	-
SVY 528	Close Range Photogrammetry	2	1

3.6.3. Course Description

SVY 101 History of Surveying (1,0)

General history of Surveying from Greek to the modern era. Definition, principles and uses of Surveying. Fields of study in Surveying. Surveying instruments. Units of measurement. Vernier systems; construction and use of vernier in surveying instruments. Care of instruments. Practice of surveying. Qualities of a Surveyor. History of surveying in Nigeria. Important figures in the history of surveying. National and international organisations.

SVY 102 Basic Surveying I (1,0)

Design, adjustment, care and use of surveying instruments including modern levels, theodolites tachometers. Chain surveying. Chains, Steel bands/tapes, linen tapes, surface taping, off-sets, sources of error, accuracy, corrections. Theodolite and compass traversing, computations and adjustment. Principles of levelling, sources of error. Horizontal and vertical staff systems. Tacheometery and telemetery, subtence bar and its uses. Preparation of large scale plans, grid levelling, contouring, plan revision.

FSC 105 Introductory Physics I (3,0)

Physical quantities, standards and units, Kinematics: uniform velocity motion, uniform acceleration motion. Dynamics: Newton's laws of motion. Newton's universal law of gravitation. Work, energy, conservation laws. Concept of mechanical equilibrium. Centre of mass and centre of gravity. Moment of a force. Rotational motion, angular momentum and torque. Total mechanical energy; elasticity, Hooke's laws, Young's, shear and bulk modulus Hydrostatics; Pressure, buoyancy, Archimedes' principle. Elements of hydrodynamics. Molecular properties of fluids, viscosity, surface tension, adhesion, cohesion, capillarity, drops and bubbles. Temperature and Zeroth law of thermodynamics. Quantity of heat. Heat transfer. Gas laws. First and second laws of thermodynamics. Application to kinetic theory of gases.

PHS 101 Introductory Physics I. (3,0)

Geometrical optics; law of reflection and refraction. Location of images. Plane and curved mirrors. Converging and diverging thin lenses. Aberrations. The eye. Optical instruments. Simple Harmonic Motion. Wave motion and wave types. Dispersion. Production of sound in strings and pipes resonance; applications. Simple description of diffraction and interference, applications to both light and sound waves. Polarization of transverse waves. Atomic structure. Production and properties of X-rays. Radioactivity. Photoelectric emission.

Prerequisites: FSC 105 or Credit in O.L. Physics

PHS 102 Introdutory Physics III (3,0)

Electrostatics, potential and capacitance, dielectrics, production and measurement of static electricity. Current, Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters. D.C. circuits, sources of emf and currents, Kirchhoff's laws. Electrochemistry. The Earth's magnetic field. Magnetic fields and induction. Faraday's and Lenz's laws. Force on

a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators.

Prerequisites: FSC 105 or Credit in O.L. Physics.

PHS 103 Introductory Practical Physics.(2,0)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 and PHS 102 theoretical courses.

SVY 201 Basic Surveying II (3,0)

Location and setting out of works: roads, bridges, railways, tunnels, pipelines, building. Setting out of simple, compound, reverse and Volumes, Sectioning, Longitudinal and cross profiles. Calculation of volumes from contours, spot heights and sections. Curvature correction in earthwork measurements.

Prerequisite: SVY 101, SVY 102

PHS 201 Classical Mechanics (2,0)

Review of coordinate transformations. Particle kinematics and dynamics. Systems of particles, Central orbits – Keplerian case. Elementary motion of rigid bodies. Newtonian gravitation. Conservative forces and potentials. Defects of Newtonian mechanics and the essence of special relativity.

Prerequisites: FSC 105

SVY 202 Engineering SURVEYING (3,0)

Basic principles, use of topographic maps. Methods of obtaining field data for topographic surveys, levelling, barometric heighting. Planning of control surveys, recce, selection of stations, station marking, description and recovery. Field procedures and observations, plane tabling, minor triangulation, trilateration and traversing. Intersection and resection: numerical, graphical and semi-graphical methods. Field completion and detail surveys. Plotting and reproduction of plans/maps

Prerequisite: SVY 102, SVY 101

SVY 204 Remote Sensing I (3,0)

General theory of non-contact mapping methods and their advantages. Electromagnetic radiation and interaction with matter. E-M spectrum especially the optical wave/lengths. Types and design of electromagnetic sensors. The photographic camera, Radiometers, thermal scanners and multispectral scanners. Sensor platforms. Introduction to digital processing. Elements of photo-interpretation.

SVY 206 Computer Applications in Surveying I (2,0)

History of Computers; classification of Computers; Computer configuration; functions and components of the Central Processing Unit (CPU); types of CPU; operating systems (DOS, UNIX VMS); file editing and management; database management systems; spreadsheet.

PHS 207 Optics (2,0)

Geometrical optics; image formation and location in both thin and thick lenses; principal planes, nodal planes, focal planes. Interference, diffraction and polarization. Masers and lasers; holography; dispersion and scattering.

Prerequisites: PHS 101, PHS 102, or A.L. PHYSICS (Attempt)

PHS 208 Intorductory Astrophysics (2,0)

Structure, origin, evolution of stars, galaxies, planets etc.

Prerequisites: MAT 101, MAT 102, and A.L. PHYSICS (Attempt)

SVY 210 Photogrammetry I (3,0)

Definition and general introduction. Photographic principles and optical characteristics. Properties of aerial photograph. Elementary mapping from photographs e.g. Radial line and slotted template methods of producing planimetric maps. Use of the sketchmaster and stereopretts. Preparation of photomosaics. Parallax measurement and heighting procedures. Preparation of thematic maps.

PHS 220 Practical Physics I.(0,1)

PHS 221 Practical Physics II (0,1)

PHS 261 Geophysics I (3,0)

Gravity Methods: Newton's gravitation; applications. Instruments: gravimeters; Zero-length spring. Densities: rocks and ores.

Magnetic Methods: definitions; concepts. Geomagnetism; origin; properties of rocks. Gravity and Magnetic field survey; instruments data processing: interpretations. Field work. The earth internal structure and constitution.

PHS 301 Classical Mechanics (3,0)

Degrees of freedom generalized coordinates; constraints; Lagrange's formulation of mechanics; applications. The calculus of variations and the principle of least action; geodesics. Hamilton's formulation of mechanics; applications. Invariance and conservation laws. Two-body central force problems; moving frames of reference. Forced and coupled oscillations: normal modes. Rigid body motion.

Prerequisites: PHS 201

SVY 302 Geodetic Surveying (3,0)

Higher order surveying instrument: use, care, accuracy. Control surveys. Design of first and second order control surveys. Triangulation, trilateration and traverse networks. Precise levelling, level networks, dynamic and orthometric corrections. Satellite stations. Laplace equations for control of triangulation, trilateration and traverse networks. Sources of errors. Computation of geodetic coordinates. Adjustment of control networks, approximate and precise methods.
Prerequisite: SVY 201

SVY 305 Cadastral Surveying I (3,0)

Field and office methods of property surveys. Principles of subdivision of properties. Physical layout, building lines, utility lines. Origins and corrections. Principles. Cadastral Survey Records. Boundaries, riparian, littoral, inter-state and national. Control Surveys. Location of sequence conveyances and reversion rights. Mining claims and Mining Surveys.

SVY 306 Cadastral Surveying II (3,0)

Organisation and procedure for Cadastral Surveys. Customary land system, interests and Rights in land. Final product, Deeds and Title Registration Systems. Registrable instrument. Deeds registry. Defects of the deed registration system. Title Registration Act, procedure and practice. Registered Land Act and Land Use Act (1978). Comparative cadastral systems: Commonwealth, Africa.

SVY 307 Spherical And Filed Astronomy (3,0)

The nature of Universe and the Solar system. The celestial sphere. Solution of spherical triangles. Astronomical co-ordinate systems. Astronomical triangle. Time systems. star catalogues and charts. Use of "Star Almanac for Surveyor". Solar and Stellar observations. Astronomical and instrumental corrections to observed altitudes and azimuths. Determination of Azimuth: ex-meridian altitudes of sun or star, hour angle of Polaris or Octantis, circumpolar star near elongation. Determination of Longitude: altitude of East-West sun or East-West star. Position Line method. Field procedures, instrumentation and computations. Sources of error and their correction.

Prerequisite: PHS 207, PHS 208

SVY 308 Geodetic Astronomy (3,0)

Coordinate systems and their variations: precession, nutation, polar motion and proper motion. Reduction of star positions. Time systems: sidereal, universal, ephemeris and atomic, Time conversions and variations. Determination of first and second order astronomic positions and azimuths: Theory, instrumentation, computation and analysis of results. Reduction of observations. Geodetic uses of astronomic position. Astrogeodetic geoids.

Prerequisite: PHS 208

SVY 309 Adjustment Computation I (3,0)

Review of matrix operations. Theory of Errors. Least Squares method, Basic and Matrix approaches. Derivation of Condition equations. Observation equations. Statistical analysis. Application

Prerequisite: EAG 102, EAG 202

SVY 310 Electronic Surveying (3,0)

History of electronic surveying. Review of properties of electromagnetic waves, formation, modulation and propagation. Principles of phase comparison. Group velocity. Transmitters, Receivers, Antenna. Electromagnetic Distance Measuring instruments. Microwave systems, electro-optical system, Tellurometer, Geodimeter; e.t.c., operating principles. Laser and infra red systems. Errors; instrumental and atmospheric. Radar ranging. Interferometric methods of baseline measurements.

Prerequisite: EEG 201

SVY 311 Hydrographic Surveying I (3,0)

Introduction to Hydrography, coastal processes - Waves, tides, tidal streams, currents including longshore, river and tidal density, chart and sounding datums. Determination of sea level and mean sea level, tide poles and tide gauges. Two-dimensional positioning at sea, bathymetry, positioning accuracies. Measurement systems, optical and electronic methods, sources of errors. Introduction to satellite navigation and positioning.

SVY 312 Computer Applications in Surveying II (3,0)

Review of Computer Programming Languages, Flow charts. Algorithms. BASIC Language, FORTRAN Language. Development of simple programs and routines for basic surveying operations: traversing, levelling, triangulation, etc. Development of FORTRAN Programs for Least Squares Solution of Photogrammetric, Geodetic and Hydrographic problems. Object-oriented Programming Language e.g. C++.

Prerequisite: SVY 206

SVY 313 Principles of Geographic Information System I (3,0)

Definitions and Basic concepts. Elementary Mathematical concepts (graph theory, set theory and topology). Components of a GIS. Field-based and object-based concepts of real world. Spatial Data Models: 2D, 3D and 4D Model; tessellation data models; vector data models, tessellation versus vector spatial relationships: metric, topologic and spatial order. Data quality aspect: positional accuracy, attribute accuracy, logical consistency, completeness and lineage.

Prerequisite: SVY 206, EAG 202, EAG, 203

SVY 314 Principles of Geographic Information System II (3,0)

Semantic data modelling: entity relationship and extended entity relationship modelling. Conventional database structures (relational, network and hierarchic). Object Oriented data modelling: object, classification, generalization/ specialization, aggregation, association, inheritance, propagation,encapsulation, persistence, polymorphism and overloading. Object-relational data structure. Applications: topographic, cadastral, utility and environmental database.

Prerequisite: SVY 206, EAG 202, EAG 203

SVY 316 Digital Mapping I (2,0)

Elementary computer graphics; Digital representation of graphic objects: Point, line and polygonal elements. Digital representation of Cartographic symbols and name placement. Elementary data structures.

Prerequisite: SVY 201, SVY 202, SVY 206

SVY 401 Map Projections (3,0)

Historical development of maps. Geometry of the ellipsoid. Gaussian Fundamental quantities. Theory of Distortions. Conic, Cylindrical and Azimuthal projections. Transverse Mercator projection, Universal Traverse Mercator System, Nigerian modified system. Concept of conformal projections, use of Cauchy-Rieman's equations. General theory of projection from ellipsoid to sphere.

Prerequisite: EAG 203

SVY 405 Mining and Underground Surveys (3,0)

Definition. Mining and underground surveying Techniques. Design of underground survey networks. Mine orientation, mechanical and optical shaft plumbing, gyroscopic methods, laser, etc. Accuracies. The Gyrotheodolite, operation and accuracy. Sources of error. Volume determination. Survey of boreholes.

Prerequisite: SVY 301

SVY 409 Potential Theory and Spherical Harmonics (2,0)

Potential Theory. Theory of the Potential - gravitational and attractions, rings, annuli, infinite plates; and solid bodies. Laplace equations, Harmonic functions, Sperical harmonics (Spheres and spheroids).

Prerequisite: EAG 104

SVY 411 Project Surveying and Design (3,0)

Project design and analysis - pre-analysis, design, observation and computation, post analysis and interpretation of results. Route Surveys; final measurements; pipeline networks; crustal movements: monitoring of dams, high-rise buildings, flooding, erosion, desertification, sea level changes. Gravity surveys, geophysical surveys. Design of gravity network observation techniques and instrumentation: processing of gravity observations. Practical.

Prerequisite: SVY 302, EAG 202

SVY 413 Photogrammetry and Remote Sensing I (3,0)

Review of non-contact mapping methods. Electro- magnetic sensors and their calibration.. Data collection and data recording techniques. Photogrammetric restitution instruments and procedures. Summary of analogue photogrammetric method. Introduction to analytical photogrammetric methods. Elements of digital data processing. Image correction and classification methods.

Prerequisites: SVY 204, SVY 210, PHS 207

SVY 415 Introduction to Geodesy

Raster and vector graphics, Hardware and software graphic systems. Coordinate transformation for orthogonal and

perspective projections. Data structures for Computer Graphics; 2D graphics; 3D graphics, map analysis.

Perquisites: SVY 316, SVY 313, SVY 312

SVY 501 Adjustment Computation II (3,0)

Introduction to least squares estimation. Linear least squares estimation. Non-linear least squares estimation. Matrices; diagonalization. Review of partitioning of matrices. Least squares adjustment techniques, Condition equations, Observation equations, Combined method, weight estimations. Applications.

Prerequisite: SVY 309, SVY 312

SVY 502 Adjustment Computation III (3,0)

Generalised least squares model. Linear and non-linear models. Solution of Normal Equations. Treatment of large geodetic networks. Addition of observations and parameters. Removal of observations. application of constraints. Quality Control: Statistical analysis, error ellipse and ellipsoid, internal and external reliability. Applications.

Prerequisites: SVY 309, SVY 312

SVY 503 Special Studies in Digital Remote Sensing (3,0)

Sensor Platforms. Geometry of artificial satellite orbits. GPS Positioning, Fundamentals of Pattern recognition; functions. Pattern classifier concepts. Digital image processing. Pre-processing of RS data, Image enhancement techniques, Image Transforms. Filtering. Classification techniques.

Prerequisite: SVY 413

SVY 504 Special Studies In (Analytical and Digital) Photogrammetry (3,0)

Full procedures of mapping by photogrammetric method. Project planning/costing of photogrammetric projects, writing of specifications. Analytical and digital instrumentation. Applications of photogrammetry to engineering problems. Special topics. Photogrammetry and Geographic Information System (GIS).

Prerequisites: SVY 316, SVY 417

SVY 505 Survey Laws and Regulations (3,0)

Property Law. Survey Laws and Regulations. CAP 194 and other relevant Survey legislations and decrees including their amendments.

Surveys Laws in Mining Surveys. Town Planning, etc. The Land Use Etc.

SVY 506 Professional Practice & Ethics (3,0)

Professional practice. Professional Bodies. Code of Ethics Costing of Cadastral, Topographical, Engineering and Hydrographic Surveys. Costing of Mapping projects, proposal writing.

SVY 508 Hydrographic Surveying II (3,0)

Sounding, wave propagation, Mathews chart, vertical beam, Echo Sounder instrumentation, operation, calibration. Acoustic waves. Ports development and port management, Sweeping, side looking sonar, multibeam sonar, electronic sweeping. Elements of Oceanography, tides, currents, temperature, salinity, and Dredging and Channelisation pressure measurement sedimentation, Beach erosion. Modern techniques in Hydrography.

Prerequisite: SVY 313

SVY 509 Geometric Geodesy (3,0)

Geometry of an ellipse. Geodetic, geocentric and reduced latitudes. Computation of latitude differences. Space Rectangular co-ordinates. Radii of curvature and Gaussian Mean Radius. Lengths and Areas on the ellipsoid. Radii of spherical approximations to the ellipsoid. Curves on the ellipsoid, Normal Section, Geodetic. Arc lengths of Normal Sections. Separations between Reciprocal Normal Sections. Special properties of Geodetic. Solutions of the direct and inverse problems on the sphere and ellipsoid. Geodetic datum and use of ellipsoid as a reference surface. Transformations of co-ordinates from one datum to another.

Prerequisite: SVY 415

SVY 510 Physical Geodesy (3,0)

The earth and its gravity field, potentials, gravity anomalies, geoidal undulation and deflections of the vertical. Geopotential numbers, Height systems: orthometric, dynamic and normal height systems. The earth, its size and shape: actual shape; approximations (geoid and other figures of the earth). Gravity observations: absolute and relative gravity reductions and gravity anomalies.

Prerequisite: SVY 409, 415

SVY 513 Satellite Geodesy (2,0)

Review of the basic concepts. Positioning methods: dynamic and geometric observation equations. Error models. TRANSIT and NAVSTAR GPS systems. Integration of satellite data with other geodetic network data. Other applications.

Prerequisite: SVY 415

SVY 515 Applied Geophysics (2,0)

Field observation, evaluation and analysis of Geophysical data as applicable in Seismology gravimetry. Electrical methods, IP resistivity and magnetism.

Prerequisite: PHS 261, EEG 201

SVY 516 Marine Surveying (2,0)

Coastal Engineering, siltation and erosion, coastal zone management, improvement and rectification of channels and fairways, channel marking. Surveys relating to the demarcation of harbour limits. Laws relating to shipping and harbours. Position fixing, large scale Surveys. Special Surveys for dredging, etc. Offshore surveys. Effects of wind and wave on sea bed. Oceanographic equipment. Tidal current measurement on the continental shelf.

Prerequisite: SVY 311

SVY 517 Photogrammetry and Remote Sensing II (3,0)

Special methods in Remote Sensing. Production of DTM from satellite imageries, production of small scale maps. Special applications of RS methods. Terrestrial Photogrammetric methods and their application. Unity of RS and Photogrammetric methods. Applications in route surveying.

Prerequisite: SVY 413, SVY 417

SVY 519 Mathematical Geodesy (3,0)

Mathematical techniques used in geodesy: least squares prediction, approximations, vector analysis, matrix operations, and special functions - spherical harmonics, Fourier and integral transforms.

Prerequisite: SVY 415, EAG 401

SVY 523 Introduction to Coastal Management (2,0)

Basic concepts. Coasts, coastlines, beaches; beach barriers and dunes, beach evolution, beach erosion, measurement and computation. Activities on the coastal area - fishing, construction works, dredging, oil exploration and exploitation etc. Planning for development on the coast. Impacts of development activities on the coast, response measures, basic concepts of environmental impact assessment. Impact of natural processes on the coast.

SVY 525 Gis Tools and Application (3,0)

GIS Subsystems: data collection and input, data storage and retrieval, data manipulation and analysis, visualization and reporting. Structured Query Language (SQL).

Database Management Systems (DBMS): types and functions; Review of some existing GIS Software. Database Design steps and implementation.

Specific study of a topic under one of the following three areas:

(student is required to submit a term paper on the chosen topic e.g):

- *Topographic Information System*
- *Cadastral Information System*
- *Environmental Information System.*

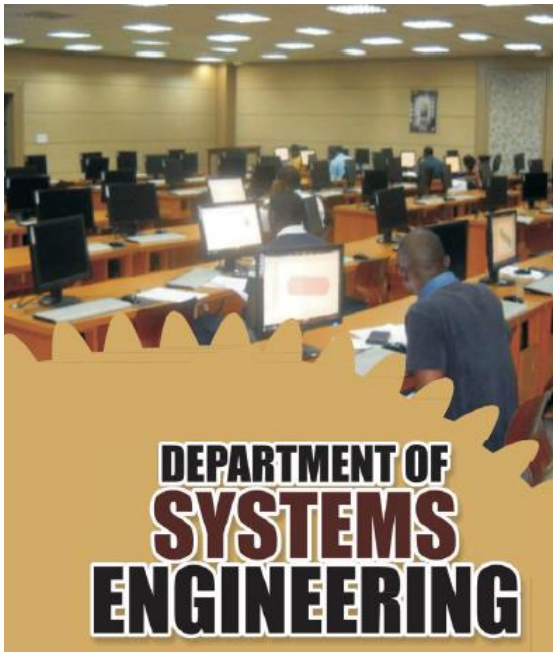
For the chosen area, the study must focus on concept, design considerations (factors and design phases), data requirements and modelling, and selection of implementation hardware and software.

Prerequisite: SVY 302, SVY 413, SVY 303

SVY 528 Close-Range Photogrammetry (3,0)

Close-range cameras and other acquisition systems, such as electron microscope and X-ray equipment, Calibration of close-range acquisition systems. Examples of applications in biometrics, engineering, architecture and traffic accident.

Pre-requisite: SVY 210, SVY 413



Dr. T. A. Fashanu
B.Sc (Ife), M.Sc., Ph.D. (Lagos)
Ag. Head

3.7.1. HOD's Welcome Address

The Systems Engineering Department of the University of Lagos is indeed an extraordinary one in this great institution, known for its academic excellence and beneficial national service.

"Unilag Systems Engineering" is well equipped and poised to disseminate knowledge for technological growth and advancement in this millennium. The department is staffed with competent personnel from the junior technical grade to distinguished academics. We are blessed with renowned Professors of international repute, as well as promising, trail blazing young academics. Our laboratories and facilities are also of standard, and we take advantage of UNILAG's international exchange agreements with other universities for personnel and student development. It is not surprising that we are one of the most sought after departments in the faculty, attracting top students from across the nation even from other engineering disciplines.

I sincerely hope you find time to visit our Faculty and Department, and also visit our website (www.systemsengineeringunilag.com) to learn more about us.

3.7.2. Systems Engineering Vision and Mission

Our mission and vision are same with that of the larger UNILAG institution. We produce versatile and multi-skilled engineers who are ever-ready and willing to contribute to societal development by optimally harnessing available resources.

3.7.3. History of Systems Engineering, University of Lagos

Systems Engineering is a relatively new branch of engineering and is a hybrid that integrate selected materials from the classical engineering programmes in Mechanical and Electrical Engineering as well as Computer Science. Systems Engineering was developed in response to the challenge faced by today's scientific engineering community that require the ability to handle large or complex systems, and capability to skillfully subdivide such complex systems, processes or phenomena into meaningful and intelligible subcomponents and thereafter define, model and study the complex interactions of the organized whole. The discipline of Systems Engineering require interdisciplinary skills and has the objective, like other engineering disciplines, of using advances in science and technology to empower both individuals and the society at large.

The present department of Systems Engineering evolved in year 2000 out of the teaching and research activities of the Engineering Analysis Unit (EAU) which was established early in the 1970/71 session as a sub-unit within the Civil Engineering Department for the study and development of Mathematical Techniques in the modeling and solution of engineering problems. It later became an autonomous service unit within the Faculty in 1975.

To be sure, Cybernetics and Artificial Intelligence has been the hallmark of the engineering profession in the last quarter of the twentieth century. With this development, there has been the evolution of the Systems Engineer who by and large specializes in engineering modeling and the general development of cybernetics and artificial intelligence concepts in the planning, design, operation and management of engineering activities especially in areas such as: Reactor devices and process, Energy systems, Engineering manufacturing processes, Operations, control and monitoring of electro-mechanical devices as well as telecomminication systems.

It is now generally accepted that effective solutions to problems involving both society and technology must be based on broad systems point of view. Such solutions integrate the technical requirements with other increasingly important factors including social, human and political parameters. In fact, when large-scale problems are under study, few people can be expected to be fully knowledgeable in the complete span of factors and parameters, which must be considered. For such cases, inter-disciplinary teams arrive at solutions, where each member contributes his own special expertise. In order to work effectively on such teams, each member needs to be aware of the fundamental systems and design aspects of the problem.

The undergraduate progamme in Systems Engineering provides students with basic training and skills in analysis, design, monitoring and control engineering systems; the programme stresses the importance of humanistic and societal concerns as they shape the designer's approach to solution of problems confronting the modern society. The systems Engineer therefore strives to serve the dual needs of the society for the design of reliable and efficient systems, whilst protecting the overall integrity of the host environment.

Students have three study options within the major: Operations Research/Manufacturing, Robotics and Systems Modeling and Simulation. The Operations Research/Manufacturing and Option combines basic Systems Engineering knowledge with quantified management techniques enabling the Systems Engineer to plan, control, design and manage manufacturing operations. The Robotics option offers the Systems Engineer expertise in the design of functional robots in an engineering environment, while the Systems Modeling and Simulation option provides the Engineer with the modern dynamic expertise of modeling stochastic and deterministic systems by simulation and animation. In all these options, emphasis is laid on computer applications and design of engineering systems. Students shall normally be admitted at 100 level.

3.7.4. Staff Contribution to Engineering and Industry

Many of our staff have contributed and still contributing to engineering and industry in the nation through training of manpower, research into design, operation and maintenance of engineering equipment usable to the industries, and consultancy services. The academic staffs of the Department are outstanding scholars with varied backgrounds who have continually distinguished themselves. For example, the pioneer H.O.D, Emeritus Prof. V.O.S. Olunloyo was a National Merit Award (NNOM) laureate in 1998 and the first person appointed as a Distinguished Professor by UNILAG in 2007 and appointed an emeritus professor in 2012. Emeritus professor Prof. V.O.S. Olunloyo was recently appointed as a member of the National Space Council. Distinguish Professor Oyewusi Ibidapo-Obe, a former Vice-Chancellor of UNILAG (2002-2007) holds the record as the youngest person

appointed as a professor of this University (at 34 years) and a fellow of the Nigerian Academy of Engineering. Professor O. A. Fakinlede was formerly Director of Information Systems at the Energy Commission of Nigeria; Dr. O.S. Asaolu emerged as the nation's best Software Developer in 2001 and as the Inter Academy Panel Young Scientist for 2009 while Dr. T.A. Fashanu won the Nigerian Universities Commission (NUC) Award for best Doctoral Thesis in Engineering for 2005.

3.7.5. Systems Engineering Administration

Name	Period	Designation
Emeritus Professor V.O.S. Olunloyo	2000-2006	HEAD
Dr. O Agbola	2006	Ag Head
Professor O.A Fakinlede	2007-2010	HEAD
Dr. O.S. Asaolu	2010-2012	Ag Head
Dr. T. A. Fashanu	2012-till date	Ag Head
Dr F. O. Ogunwolu	2011-date	PG Coordinator
Dr. O. O. E. Ajibola	2008-date	SIWES Coordinator
Dr. A. M. Ajofoyinbo	2007-2010	Project Coordinator

3.7.6. Philosophy and Objective of Systems Engineering Programme

The Systems Engineer specializes in engineering modelling and the general deployment of cybernetics and artificial intelligence concepts in the planning, design, operation and management of engineering activities especially in areas such as:

Information and Communication Technology

- *Reactor devices and processes*
- *Energy systems*
- *Engineering manufacturing processes*
- *Operations, control and monitoring of electro-mechanical devices and systems*
- *Engineering graphics, simulation and animation*
- *Risk management in engineering systems.*

It is now generally accepted that effective solutions to problems involving both society and technology must be based on broad systems point of view. Such solutions integrate the technical requirements with other increasingly important factors including social, human and political parameters. In fact, when large-scale problems are under study, few people can be expected to be fully knowledgeable in the complete span of factors and parameters, which must be considered. For such cases, inter-disciplinary teams arrive at solutions, where each member contributes his own special expertise. In order to work effectively on such teams, each member needs to be aware of the fundamental systems and design aspects of the problem.

The programme provides students with basic training and skills in analysis, designs, monitoring and control of engineering systems. The programme stresses the importance of humanistic and societal concerns as they shape the designer's approach to solution of problems confronting the modern society. The Systems Engineer therefore strives to serve the dual needs of the society for the design of reliable and efficient systems, whilst protecting the overall integrity of the host environment.

3.7.7. The objectives of the programme are:

i) To bridge the gap between management/decision science and the Engineering profession through the integration of decision Science/Management courses to the traditional engineering discipline

ii) To produce engineers with multidisciplinary skills for today's complex economy,

iii) To impart analytical and cutting-edge computing skills in Engineering training,

iv) To initiate and carry out engineering design, and

v) To engage in management and to pursue research and development

3.7.8. Course Structure

100 Level: First Semester

Course Code	Course Title	Lecture Units	Lab Units	Type	Pre-Requisite
MEG 101	Workshop Practice I	1	1	C	
GEG 101	Engineering Pure Mathematics	3	0	C	
GEG 103	Engineering Applied Mathematics I	3	0	C	
FSC 105	Introductory Physics I	2	1	C	
GST 102	Introductory To Logic & Philosophy	2	0	C	
GST 105	Use of English	2	0	C	
GST 103	Nigeria People History & Culture	2	0	C	
		15	2		
Total		17			

100 Level: Second Semester

Course Code	Course Title	Lecture units	Lab Units	Type	Pre-Requisite.
MEG 102	Workshop Practice II	1	1	C	
GEG 102	Engineering Pure Mathematics II	2	0	C	
GEG 104	Engineering Applied Mathematics II	2	0	C	
PHS 101	Introductory Physics II	3	0	C	
PHS 102	Introductory Physics III	3	0	C	
PHS 103	Physics Practical	0	2	C	
MEG 104	Engineering Drawing II	2	0	C	
		11	5		
Total		16			

200 Level: First Semester

Course Code	Course Title	Lecture units	Lab Units	Type	Pre- Requisite.
GEG 201	Engrr. Maths I	3	0	C	GEG 101, 102
SSG 205	Intro. To Engineering Computing	1	1	C	
SSG 207	Engineering Computer Graphics	1	1	C	
EEG 201	Funds. of Electrical Engr. I	2	1	C	
EEG 203	Signals and Systems	2	0	C	
MEG 201	Engineering Thermodynamics	2	0	C	
MEG 203	Workshop Practice III	0	1	C	
MEG 205	Mechanics (Statics and Dynamics)	3	1	C	
GAS 201	General African Studies	2	0	C	
		16	5		
Total		21			

200 Level: Second Semester

Course Code	Course Title	Lecture units	Lab units	Type	Pre- Requisite.
GEG 202	Intro. to Engr. Statistics	3	0	C	
SSG 204	Differential Equation I	3	0	C	
SSG 206	Numerical Methods I	3	0	C	
SSG 208	Engineer in Society	1	0	C	
EEG 202	Funds of Electrical Engrr. II	2	1	C	
MEG 201	Workshop Practice IV	0	1	C	
MEG 202	Fluid Mechanics	2	1	C	
MEG 208	Mechanics of materials	3	1	C	
GAS 202	General African Studies II	2	0	C	
		19	4		
Total		23			

300 Level: First Semester

Course code	Course Title	Lecture units	Lab Units	Type	Pre- Requisite.
GEG 301	Engr. Maths II	3	0	C	GEG 201
SSG 303	Mathematical Modelling for AI systems	2	0	C	
SSG 305	Special Analytical Techniques	2	0	C	
SSG 307	Operation Research I	3	0	C	
SSG 309	Elements of Games Theory	2	0	C	
SSG 313	Programming Languages	2	1	C	
SSG 314	Engineering Materials I	2	0	C	
EEG 301	Circuit Theory	2	0	C	
SSG 311	Measurement & Instru.	2	0	C	
MEG 311	Mechanical Engr.Tech.	2	0	C	
		22	1	23	
Total		23			

300 Level: Second Semester

Course Code	Course Title	Lec. Units	Lab Units	Type	Pre-Requisite.
SSG 300	Industrial Training	0	4	C	
SSG 302	Operational Methods I	2	0	C	
SSG 304	Statistical Distributions	2	0	C	GEG 202
SSG 306	Differential Equation II	3	0	C	SSG 204
SSG 310	Operations Research I	2	1	C	SSG 307
SSG 310	Rigid Body Dynamics	3	0	C	SSG 205
SSG 312	Control Theory I	2	0	C	
SSG 314	Algorithms and Data Structures	2	0	C	SSG 313
SSG 316	Engineering Materials & The Environment	1	0	C	SSG 315
SSG 318	Industrial Engineering	2	0	C	
		19	5		
Total		24			

400 Level: First Semester

Course code	Course Title	Lecture Units	Lab Units	Type	Pre-Requisite
SSG 401	Numerical methods	3	0	C	SSG 206
SSG 403	Operational Methods II	2	0	E	SSG 302
SSG 405	Mathematical Models of Chemical Engr. Systems	3	0	E	
SSG 407	Mechanics of Robotics Systems I	3	0	C	
SSG 409	Systems Simulation I	2	0	C	
SSG 411	Stochastic Models	2	0	C	
SSG 413	Optimum Systems Control	3	0	C	
GEG 401	Technical Communication I	1	0	C	
EEG 405	Classical Control Systems	2	1	C	
CPE 407	Systems Programming	2	1	C	
Total		20	2	22	

400 Level: Second Semester

Course code	Course Title	Lecture Units	Lab Units	Type	Pre-Requisite
SSG 400	Industrial Training	0	8	C	
Total		0	8	8	

500 Level: First Semester

Course code	Course Title	Lecture Units	Lab Units	Type	Pre-Requisite
SSG 500	Projects in Systems engineering	0	3	C	SSG 312
SSG 501	Control Theory II	2	0	C	SSG 312, SSG413
SSG 503	Artificial Intelligence	2	0	C	SSG 303
SSG 505	Mechanics of Robotics Systems II	2	1	C	SSG 407
SSG 507	Systems Simulation II	2	1	C	SSG 409
SSG 509	Systems Reliability and Maintainability	2	0	C	
SSG 513	Techniques of planning and Scheduling	2	0	C	SSG 307

SSG 515	Chemical Engineering Systems	3	0	E	SSG405
SSG 501	Engineering Economics	2	0	C	
MEG 507	Production Engineering	2	1	E	
		15	7		
Total		22			

500 Level: Second Semester

Course code	Course Title	Lecture Units	Lab Units	Type	Pre-Requisite
SSG 500	Projects in Systems engineering	0	3	C	
SSG 502	Engineering Systems Analysis	2	0	C	
SSG 504	Automated Reasoning	1	1	C	
SSG 506	Systems Animation	1	2	C	
SSG 508	Manufacturing Systems Automation	2	0	E	
SSG 510	Control of robots and human Arms	2	0	E	
SSG 512	Image Processing	2	1	E	
SSG 514	Facility Planning	2	0	E	
GEG 516	Mechanics of the Continua	3	0	E	
GEG 502	Law and management	2	0	C	
MEG 512	Automatic Control	2	0	E	
		19	7		
Total		26			

3.7.9. Course Contents

GEG 101 Engineering Pure Mathematics I (3,0)

Axiomatic Set theory. Operations on Set. Boolean Algebra. Switching circuits, logic circuits and propositional logic. Transfinite induction and recursion. Consequences of axioms of choice. Sequences. Monotonic sequences and Convergence. Cauchy criteria. Series. Power series. Tests for convergence. Taylor's series. Operations on power series. Limits Continuity and Differentiability. Mean Value theorems. Techniques and applications of Differentiation. The definite integral. Fundamental theorems of Integral Calculus. Techniques and applications of Integral Calculus. Improper Integrals.

GEG 102 Engineering Pure Mathematics II (2, 0)

The real and the complex number systems. Mathematical Induction Matrices and determinants. Complex numbers: representations and algebra. Complex functions. Roots of Unity. De-Moivre's theorem and applications. Basic matrix theory and algebra. Systems of linear equations: elementary row-reduction, types and methods

of solution echelon form. Applications of matrices. Introduction to systems of inequalities and linear programming.

GEG 103 Engineering Applied Mathematics I (3, 0)

Representation of vectors: Resultant of several vectors. Vectors in Euclidean space: lines, planes and spheres. The dot and cross products. Direction cosines. Differentiation of vector functions. Lami's theorem. Polygon of forces. Conditions for equilibrium of coplanar forces. Newton's laws of motion. Analytical treatment of static equilibrium of particles and rigid bodies. Distributed forces. Centroids and centres of gravity. Moments of Inertia. Analysis of structures and trusses. Forces in beams and tables. Friction.

GEG 104 Engineering Applied Mathematics II (2,0)

An introduction to kinematics and kinetics of a particle. Systems of particles and rigid bodies. Energy and momentum methods. Applications. Impulsive motions. Motion of a rigid body (i) about a fixed axis (ii) in a plane. Equations of motion.

FSC 105 Introductory Physics 1 (3,0)

Physical qualities, standards and units, Kinematics: uniform velocity motion, uniform acceleration motion, Dynamics: Newton's law of motion. Newton's universal law of gravitation. Work, energy, conservation laws, Concept of mechanical equilibrium, Centre of mass and centre of gravity. Moment of a force. Rotational motion, angular momentum and torque. Total mechanical energy, elasticity. Hooke's law, Young's shear and bulk modulus. Hydrostatics. Pressure, Buoyancy, Archimedes's principle. Elements of hydrodynamics. Molecular properties of fluids, viscosity, surface tension, adhesion cohesion, capillarity, drops and bubbles. Temperature and Zeroth law of thermodynamics. Quantity of heat. Heat transfer, Gas laws. First and second laws of thermodynamics. Application to Kinetic theory of gases.

MEG 101 Workshop Practice I (1, 1)

Introduction to basic equipment in wood, machine, fitting and welding workshops. Element of safety practice with the various tools used in the workshops. Discussion on general safety precaution. General principles governing the various workshop machines. Selection and use of tools for specific operations in the various workshops. Practical demonstration of use of tools and machines in performing basic workshop processes.

MEG 102 Workshop Practice II (1, 1)

Introduction to more advanced machinery and equipment in the workshops. Introduction to sketching and labeling of machines parts and tools. Emphasis is laid on the ability of students to be able to competently handle standard workshop equipment.

Machining: Practical work on machines for the purpose of carrying out individual projects. Detection of faults in work pieces.

Fitting: Shaping and finishing of metallic objects. ***Welding***: Preparation of pieces for welding visual examination of welds, etc.

Woodwork: Introduction to constructional technique of woodwork joints. Simple individual projects in different aspects of workshop practice.

MEG 104 Engineering Drawing (1, 1)

Introduction to drawing instruments and their proper use. Use of scales, line-work, lettering, and dimensioning. Geometrical constructions including tangents, normal, polygons, etc. Loci, including paths of points of simple mechanisms and cam profiles. Orthographic projections of simple objects in first and third angles. Isometric and Oblique projections. Isometric projections from orthographic projects.

PHS 101 Introductory Physics II (3,0)

Geometrical optics: Law of reflection and refraction, Location of images, plane and curved mirrors. Converging and diverging thin lenses. Aberrations. The eye Optical instruments. Simple. Harmonic Motion, Waves. Polarization of transverse waves.

Atomic structure, Production and properties of X- rays. Radioactivity, Photoelectric emission, Prerequisite: FSC 105 or Credit in O/L Physics.

PHS 102 Introductory Physics III (3,0)

Electrostatics, potential and capacitance dielectrics, production and measurement of static electricity, Current, Ohm's laws, resistance and resistivity. Heating, Galvanometers, Voltmeters and Ammeters, D.C. Circuits, sources of emf and currents. Kirchhoff's law. Electrochemistry, The Earth's magnetic field, Magnetic fields and induction. Faraday's and Lenz's laws, Forces on a current carrying conductor. BiotSavart law. Flemming's right and left hand rules. Motor and Generator, Prerequisite: FSC 105 or Credit in O/L Physics.

PHS 103 Introductory Practical Physics (2,0)

Simple experiments illustrating the key topics covered in FSC 105, PHS 101 AND PHS 102 theoretical courses.

GST 105 The Use Of English I

The courses are designed to enable students to acquire improved study skills and better communicative skills in the use of English for general and academic purposes at the university level. The emphasis in GST 105 is on developing through lectures/discussions and weekly exercise students' study skills, listening, reading and comprehension skills: improved knowledge of English grammar and usage; vocabulary development, etc. all of which are needed to provide a smooth transition from the secondary school to the university in terms of the language needs for academic purposes.

GEG 201 Engineering Mathematics I (3,0)

Elementary Vector Space Theory: Linear vector spaces and matrices; dimensionality of space; summation convention. Matrices and Linear transformations.Elementary complex Analysis: Logarithmic, Exponential and Circular complex functions. Mapping by elementary complex functions; Limit, Continuity and Differentiability of Complex functions; Cauchy-Riemman's Equations; Line Integrals. Integration of functions of Complex Variables. Cauchy's Integral Theorem; Cauchy's Integral Formula; Residue Theorem.Introduction to Differential Equations; Classification of Ordinary Differential Equations; Order, Degree and linearity. Types and Techniques of solution of first order ODEs; Picard's iterative method; Types and Techniques of solution of second order ODEs. Systems of Linear ODEs. Engineering Applications of ODEs.

GEG 202 Introductory Engineering Statistics (3, 0)

Introduction to statistics: Fundamentals of probability theory; random variables and expectations. Discrete and continuous distributions. Probability and relative frequency. Independent trials. The Laplace-De-Moivre's limit theorem. Poison's law. Concepts used in statistics: Expectation of a sum, variance, covariance, correlations. Theory of errors. Estimation of variance and correlation. Linear regression. Random events. Frequency analysis. Data reduction techniques. Distribution and density functions. Expectation and other moments.

GEG 203 Surveying Mathematics (3, 0)

Algebra – sets. Geometry – plane, solid, projective. Differential Calculus – partial differentiation. Integral Calculus: infinite, improper and multiple. Functions – single and multiple variables, mappings, Jacobians. Convergence of sequences and series. Introduction to conformal mapping. Spherics and spheroidal trigonometry.

MEG 201 Fundamentals of Thermodynamics (2, 0)

Introduction survey of thermodynamics. What is Thermodynamics? Historical background, Scope of Thermodynamics, dimensions and units. Fundamental concepts: systems, control volume, properties and states, processes, heat and work, pressure, temperature and the zeroth law. Elementary form of the continuity equation. The first law of thermodynamics and its corollaries: conservation of energy, internal energy, enthalpy, thermodynamic properties of

pure substances: P-V-T relations and diagrams, the ideal gas property table and charts. The second law of thermodynamics and its corollaries: reversibility, irreversibility, efficiency and thermodynamic temperature scale. Entropy. Clausius inequality, heat engines and heat pumps.

MEG 202 Fluid Mechanics (2, 0)

Fundamental concepts and properties of fluids. Development, scope and significance of fluid mechanics, physical characteristics of fluids, properties of fluids. Fluids at rest. Pressure at a point, Pascal's law, pressure variation with elevation, pressure measurement, hydrostatic forces on curve surface. Buoyancy and equilibrium: Archimedes' principle, stability of submerged and floating bodies, stability of fluid itself, liquids in relative equilibrium. Kinematics of the flow field: Definitions of pathline, steamline, control volume, system, etc. Uniformity and steadiness of flow, conservation of mass, fluid element in general state of motion. Bernoulli Equation.

EEG 201 Fundamentals Of Electrical Engineering I (2,0)

Circuit Law: Kirchoff's Law, Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Milliman'sTheorem, Rosen's Theorem. Network problems arising in Energy distribution. Methods of analysis suitable for the problems in Network Theory in terms of currents, voltages energy/VoltageAmperes, Loop and Nodal analysis. Resistors, Electric fields and capacitors, Magnetic fields and inductance. Energy stored in capacitors and inductors. Electromagnetic induction and Magnetic forces, self and mutual inductance. Electrochemical power sources.

EEG 202 Fundamentals of Electrical Engineering II (2,0)

Emf: Generation, Single phase; rms means, form factor, peak factor, phasor and phasor diagram. Series and parallel resonance circuit. Resonance, Q- factor, impedance and power P,S, and Q3 phaser, deltaand star conversion line and phase voltages. Complex Notation and its Application to RLC circuits. Resonance, Q-factor, impedance and power P,S, and Q.3 phaser, delta and star conversion line and phaseVoltage.Complex Notation and its Application to RLC circuits Resonance, a-factor, impedance and admittance power P, S,G. Introduction to D.C. Machines, A,C. Machines and Transformers.

EEG 203 Signals and Systems (2)

Continuous and discrete signals, transformations and inverse transformations, spectral analysis of steps, ramps and impulse, signal descriptions by impulse and step functions.The independent variable; Definitions of rise-time setting time, overshoot, period magnitude and duration of a signal.Fourier Analysis, Perseval Theorem.

MEG 203 Mechanical Measurements and Intrumentation (2, 0)

Basic principles of measurements. Techniques and devices for measuring mechanical quantities such as mass, linear and angular displacement, velocity, acceleration, force, torque, power, fluid flow, pressure, temperature, strain and stress. Use of micrometer screw gauge, vernier callipers, tachometer. Accuracy and error analysis. Measurement statistics. Elements of instrument systems. Sensors. Analog and digital measurements. Instrument selection and calibration. Signal processing. Data presentation and curve fitting.

CEG 202 Mechanics of Materials (4)

Three dimensional stress and strain. Stress-strain relationship for general dimensional case for special cases. Graphical determination of stresses and strains using the Mohr's circle. Theories of failure. Stress concentration and relief of stress concentration. Moments and products of inertia and area. Unsymmetrical bending, shear centres in curved beams. Torsion of circular and non-circular cross section.

MEG 205 Engineering Mechanics I: Statics (2, 0)

Fundamentals of mechanics. Forces in space equipment systems, equilibrium of rigid bodies, distributed forces, centroid, centre of mass, internal actions, analysis of simple

structures and machines parts, principle of virtual work. Prerequisite: GEG 103.

SSG 204 Differential Equations I (3, 0)

Linear dependence. Theory and solutions of first order linear equations; physical applications. Theory and solutions of higher order linear equations; physical applications. Ordinary differential equations with constant coefficients: methods of undetermined coefficients, variation of parameters, D-Operator. Linear Differential equations with variable coefficients.

Cauchy-Euler's equations. Systems of linear equations. Properties of linear operations. Series solution. First order non-linear equations: autonomous, equidimensional and scale-invariant.

SSG 205 Introduction to Engineering Computing (1,1)

Introduction to computing systems: hardware & software. Introduction to Microcontrollers: architecture (Harvard, Von Neumann), concepts and programming structure. C++/C-Sharp programming structure including data representation: types, classes, methods, inheritance, variables, etc., program statements, control structures and memory organization. Topics include: Methods, Arrays, Enumerations, Namespaces, Assemblies, Classes, Expressions, Operators and introduction to software libraries. Students will be engaged in practical engineering computing exercises in the Laboratory.

Ssg 206 Numerical Methods in Engineering I (3, 0)

Solution of algebraic and transcendental equations by iteration. Finite differences. Difference equations. Interpolation. Splines. Numerical solutions of systems of linear equations; iteration methods. Ill-conditioning. Matrix analysis: Methods of matrix inversion. Numerical evaluation of eigenvalues. Numerical integration applied to the Error function and Elliptic Integrals.

SSG 207 Engineering Computer Graphics (1,1)

Introduction to Sketching and visualization, Modeling Techniques, CAD and 3D Modeling, Part and Assembly Design. Packages include AUTOCAD, Maya, Solid Edge, etc.

GEG 208 Engineer in Society (1, 0)

Philosophy of Science. History of Engineering technology. Safety in Engineering and introduction to risk analysis. The role of Engineers in nation building. Invited lectures from Professionals.

GEG 301 Engineering Mathematics II (3, 0)

Calculus of several variables: Limits and continuity. Partial derivatives of first and higher orders. Total differential of a function. Jacobians. Higher order partial and total derivatives and gradient of a function. Integration of total differentials with application to mechanics. Introduction to vector fields – divergence and curl. Generalised Taylor's series; the extremum of a function of several variables. Differentiation under the integral sign. The calculus of variations. Line integral with applications on computation of areas and volumes. Functions of complex variables. Cauchy-Riemann Equations. Analytical functions. Mapping by elementary functions.

GEG 302 Operational Methods I (2, 0)

Fourier series: periodic functions; Dirichlet conditions; odd and even functions; half-range Fourier sine and cosine series. Parseval's identity. Differentiation and integration of Fourier series. Boundary value problems. The Laplace transform and applications (excluding the use of inversion integral and convolution theorem).

EEG 301 Circuits and Systems I

Network theorems, circuit graphic. Elementary signals. Dynamic circuit elements. First and second order differential equations. Time domain solution of circuit equations. Impulse response. Network functions. Natural frequencies of networks. Convolution and some of its applications. Network

equivalencies. Introduction to the concept of auto and cross correlation. Sinusoidal steady state analysis.

MEG 311 Mechanical Engineering Technology (3, 0)

Second law of thermodynamics and its application to flow and non-flow processes. Thermodynamic property relations. Elementary heat transfer; steady-state heat conduction, one dimensional heat conduction, conduction through composite walls, electrical analogy; convection as an extension of conduction. Power transmission by screw threads, friction clutches and belt drives. Simple and epicyclic gear trains. Introduction to the thermodynamics and kinetics of corrosion of metals and alloys. Description of methods of corrosion controland prevention. Introduction of metals and metal alloy systems. The metallic bond and structure of alloys.

SSG 303 Mathematical Modeling for Artificial Intelligence Systems (2)

Mathematical Models. Introduction to Artificial Intelligence (AI), Analytical Hierarchy Process, Reasoning under Uncertainty, Expert Systems, Introduction to neural networks; elements of conventional AI search techniques; Cantor set search technique, Introduction to MATLAB software.

SSG 304 Statistical Distributions (2, 0)

Discrete distributions: Binomial, Poison, Multinomial. Continuous distributions: Normal, Chi-Square, t-, F and Gamma Distributions. Sampling theory. Estimation of population parameters and statistical tests. Regression analysis. Analysis of variance.

SSG 305 Special Analytical Techniques (2, 0)

Elements of Fuzzy set and fuzzy logic. Introduction to Graph theory. Methods of fractiles; Heuristic Search Techniques: Tabu Search, Simulated Annealing and Evolutionary Algorithms such as Genetic and Ant-colony algorithms.

SSG 306 Differential Equations II (3, 0)

Classification and characteristics of partial differential equations: Elliptic, parabolic and hyperbolic equations. Cauchy problem; existence, uniqueness and representation of solutions. Methods of solution; Separation of variables, Laplace transforms. The Laplace equation in rectangular, cylindrical and spherical co-ordinates. The Poisson equation. The Navier-Stokes equation, Maxwell equations of Electromagnetism.

SSG 307 Operations Research I (3, 0)

Introduction to operations research. Linear programming models; primal and dual problems; graphical solutions, simplex method; post optimality analysis; special algorithms; trans-shipment and assignment problems. Maximal flow, shortest route, minimum spanning tree; travelling salesman problems. Inventory problems.

SSG 308 Operations Research II (2, 1)

Integer programming; dynamic programming; non-linear programming algorithms: direct search, gradient method, separable programming, complex optimisation method. Sequential unconstrained maximisation algorithm (SUMT).

SSG 309 Elements of Games Theory (2, 0)

Games, strategy and saddle points. Minimax theorem. Methods of solving games. Two person, zero-sum games. Utility Theory. Non co-operation two person games. The axioms of Nash. Three strategy games. Infinite games. Games of timing.

SSG 310 Rigid Body Dynamics (3, 0)

Review of particles dynamics – the three dimensional projectile (as an illustration of moving axes). Motion in general electromagnetic field. Rigid body dynamics. Key theorems. Moments and products of inertia. The inertial tensor. Angular velocity and angular momentum. Systems of particles and rigid bodies. Rate of change of angular momentum and moment of the rate of change of momentum. Rolling. Motion under no

forces. Motion of spins and gyrostats. Leguerre's equation and applications.

SSG 312 Control Theory I (2, 0)

Dynamic systems. Time domain and frequency domain analysis. The exponential matrix. Transfer functions. Discrete time system. Linear control systems. Feedback. Determination of stability and response of linear systems. Lyapunov methods for the investigation of non-linear systems stability. The Pontryagin maximum principle for optimal control.

SSG 313 Programming Languages (2, 1)

One or more of MATLAB, Visual FORTRAN, DELPHI, C++, VISUAL STUDIO IDE. Design and analysis of object-oriented programs. Operators and Overloading, Exceptions and Enumerations, Abstract Data Types such as structures and classes, Inheritance and Interfaces, Delegates and Event oriented programming, Documentation and Deployment. Prerequisite SSG205

SSG 314 Algorithms and Data Structures (2, 0)

Review of elementary algorithm and flow chart; OOP implementation of various data structures (ordered list, sparse matrices, stack, queues and deques, trees and graph). Algorithms and Methods e.g. for Sorting, File I/O. Polymorphism and late binding. Parametrized types such as generics or templates, Iterators and enumerators. Applications to AI, databases, record formats, record blocking and deblocking, etc. Emphasis will be on code reuse and standard libraries in program development. Prerequisite SSG 313

SSG 315 Engineering Materials - Properties and Selection for Use (2,0)

Introduction to the science and structure of engineering materials classified into the following major groups - Metals and alloys, Polymers and Rubber, Ceramics and glasses and composites. Mechanical (i.e strength, toughness and stiffness), chemical (i.e oxidation resistance and corrosion) and physical (i.e. density, thermal conductivity, electrical conductivity and magnetic) properties.

Manufacturing methods, uses and major application of each engineering material. Selection and use of engineering materials - motivation for selection, cost basis for selection and establishment of service requirements and failure analysis. Selection for mechanical properties (i.e static strength, toughness, stiffness, fatigue, creep and temperature resistance), selection for surface durability (i.e. corrosion resistance and resistance to wear). Case studies in materials selection (e.g. materials for gas turbine, bearings, engines and power generation, ship structures, screw driver, hammer, aeroplane design and construction etc.

SSG 316 Engineering Materials and the Environment (1,0)

The influence and impact of the environment on engineering materials and its properties. Degradation of engineering materials and their impact on the environment. International Standards relating to the environment (ISO 14000). Waste generation and handling. Environmental safety and engineering materials. Waste management and recycling. Recycling technology and its economy. The role of genetic engineering in the sourcing of new engineering materials. Current developments in engineering materials (Library/research) - Metals & Alloys. Polymers & Rubber, Ceramics & Glasses and Composites. Visit to at least a manufacturing/processing plant involved in any two of the four major groups of engineering materials (submit a report on the plant and its environment) Environmental impact assessment in Nigeria and its effect on the Nigerian environment. Economic relevance of flue gas (e.g. in the production of Carbon dioxide).

SSG 318 Industrial Engineering (2,0)

Basis concepts of economic analysis. Cost concepts interest equations and time value of money. Salvage value, Capitalized cost equation, present worth, amortization, depreciation, discounted cash flow analysis and measures of profitability. Methods for

evaluation of alternatives. Annual cost comparisons. Internal rate of return, present worth and premium work comparison, etc. Human Factors and Ergonomics, Productions Systems e.g. Design for Manufacturing, Lean Manufacturing Cell. Introduction to Project Management, Maintenance Management, Information Systems e.g. Databases and web technologies, Decision Support Systems. Conclude with Industrial visit / Excursion.

GEG 401 Technical Communications (1,0)

Library Search, Using Web Search Engines such Wikis, Google Scholar, Answers.com, etc. Publication Types; essays, reports, books, etc. Technical Report Writing, Referencing Styles and Ethical Issues, Use of Modern Authoring Tools such as Open Office / MS Office, Adobe Suite (Acrobat, Illustrator & Macromedia), etc. Article Review, Feasibility Studies.

GEG 403 Engineering Statistics

Some aspects of probability theory: Random events, Frequency analysis, Data Reduction techniques, Random variables, Distribution and density functions, Expectation and other moments. Discrete distributions. Binomial, Poisson, Multinomial Distributions. Continuous Distributions: Normal, Chi-Square, t-, F-, and Gamma Distributions. Sampling theory, Estimation of population parameters and Statistical Test. Regression analysis and Analysis of Variance.

CPE 407 Systems Programming I

Concepts and uses of macro-assemblers and conditional assembly. Use of access methods control for 1/0 device. Job control languages and file structures, File and storage management. Use of linkers and loaders in load modules creation. (This course is borrowed as CPE 507 in Computer Engineering).

SSG 413 Classical Control Systems Analysis

Modeling of physical systems, Dynamic equation of mechanical, electrical, thermal and fluid flow systems. Transfer functions of mechanical, electrical and electromechanical control components. Block diagrams Signals flow graphs. Characteristic equations, s-plane roots, and stability, Performance criteria. Roots locus, polar and Bode plats and N-diagrams. Inverse Nyquist plots. State space description of control systems, analogue computer simulation of control systems.

SSG 401 Numerical Methods in Engineering II (3,0)

Numerical Analysis: Multi-variable Newton-Raphson method for solving Simultaneous Non-linear transcendental equations. Numerical analysis with applications to the solution of ordinary and partial differential equations: Interpolation formulae, Finite difference and Finite elements methods. Applications to solution of non-linear equations.

SSG 403 Operational Methods II (2, 0)

Complex function theory: Elementary functions, complex integration. Cauchy's theorem. Cauchy's integral formula. Taylor and Laurent series. Residual Calculus and applications. Convolution theorem and Bromwich integral; Multiplication theorem. Inverse transforms. Properties and applications. Multiple Fourier transforms.

SSG 405 Mathematical Models of Chemical Engineering Systems (3,0)

Fundamental Laws: Continuity Equations, Energy Equations, Equations of Motions, Transport Equations, Equations of state, Equilibrium, Chemical kinetics.

Basic Chemical Engineering Systems: Series of Isothermal CSTR'S, Heated Tanks, Gas-phase, pressurized CSTR, Non-isothermal CSTR, Single-component vaporizer, Multicomponent Flash Drum, Batch Reactor, Reactor with mass transfer, Ideal Binary Distillation Column, Multicomponent non ideal distillation column. Simulation Examples of models: Gravity-Flow Tank, CSTRs in Series, Non isothermal CSTR, Binary Distillation Column, Multicomponent.

SSG 407 Mechanics Of Robotic Systems I (3,0)

The Robot: Definition, Types, Classification and uses. The workspace, coordinates and transformations. Robot Drive systems, Robot sensors, robot-computer interface and programming. Robot Manufacturers and assembly kits.

SSG 409 Systems Simulation I (2,0)

Introduction to systems modeling and simulation, golden rules and principles of simulation, modeling - illustrative examples and problems, systems models, discrete and continuous event simulation, Poisson process, techniques for steady state simulation, systems dynamics, simulation-based optimization techniques, Decisions under uncertainty, techniques for sensitivity analysis, introduction to GPSS/H simulation software and modeling of single-server system. Students are expected to carry out field work which will involve modeling and simulation of real-life industrial operations.

SSG 411 Stochastic Models (2, 0)

Markov chains; The Poisson Process; Memoryless random variables. Replacement models, Continuos-time stochastic processes. General Queuing Systems. Renewal processes.

GEG 501 Engineering Economics

Project development and financial analysis. Market analysis and demand estimation. Investigation and technical aspect of project development and financial analysis, Criteria for Project Choice, Project Financing. Determination of Economic and Social profitability.

GEG 502 Engineering Management

Part I - Contract. (Law)

Definition of a Contract, Classification of a contract, Ingredient of a valid contract, Consideration Intention to create legal relation, Capacity of a contract Consent of a party, Concept of brevity of a contract and its exceptions, Mistakes of a Contract, Duress in a contract, Undue influence in a contract, Misrepresentation a contact, Illegality in a contract, Discharge of a Contract, How does a contract come to an end, Remedies for breach of a contract.

Part 2: Management

Introduction to management, Decision Analysis, How to model a desicion situation. Quantitative techniques for situations of uncertainty. Decision Tree. Project management. Project evaluation and review techniques. Concept of motivation . Theories of motivation.Hertzberg two factor theory. Transportation management model.

SSG 501 Control Theory II (2, 0)

The phase plane portrait. Determination of the qualitative behaviour of non-linear second order systems by Linearisation (Lyapunov's first method). Envelop methods; the Popov and circle criteria. Limit cycles and relaxation oscillations. Liennard's equation. Gradient system decomposition.

SSG 502 Engineering Systems Analysis (2,0)

Introduction to engineering systems, fundamental concepts, fundamental postulates of engineering systems analysis, information, signal & feedback, the design process, systems model representation, relationships between models and systems variable, Lumped-element modeling, first-order systems models, second-order models of systems, state space formulation of systems problems, feedback system, design of controller , PID Control, linearization of nonlinear models, signal flow graphs, frequency and time domain analysis.

SSG 503 Artificial Intelligence (2, 0)

Introduction to search methods in AI problems. Self organising systems, information theory, rational decision making, pattern recognition, parametric and non-parametric training for developing pattern classifiers; problem solving. The Minimax and alpha-beta algorithms and heuristic approaches to state space search problems.

SSG 504 Automated Reasoning (1, 1)

Representing and reasoning with knowledge. The case for logics. Introduction to logic-programming. PROLOG, LISP. Introduction to some AI applications of logic programming. Expert systems and their implementation. Planning. Natural language processing. Machine learning.

SSG 505 Mechanics of Robotics Systems II (2, 1)

Numerical methods for the kinematics inversion of several manipulators. The handling of redundancies and singularities. Kinematics and dynamics of parallel manipulators. Manipulator performance evaluation and optimization; multi-fingered hand grasping and manipulation; robot compliant and constrained motion. Obstacle avoidance.

SSG 506 Systems Animation (1,2)

The course covers procedural modeling, rendering and animation; and relationships between systems simulation and systems animation. The course also covers use of animation software to model and animate processes or problems in different engineering system domains.

SSG 507 Systems Simulation II (1, 1)

Discrete event simulation. Examples in different production and service systems. Principles and computer languages e.g. GPSS/H, SLX, ARENA, PROMODEL, EXTEND. Model Validation. Analysis of Simulation data.

SSG 508 Manufacturing Systems Automation (2,0)

The course covers pneumatic control, electro-pneumatic control and Programmable Logic Control (PLC) systems. The course focuses on design of pneumatic, electro-pneumatic and PLC logic circuits for problems in different manufacturing environments. Ladder diagrams will be used to implement various automation logics. Laboratory exercises, which will be based on standard automation platform, will cover pneumatic and electro-pneumatic control as well as PLC control.

SSG 509 Systems Reliability (2, 0)

Deterministic reliability. Archenius' model. Failure mechanisms. Screening. Statistical reliability: Operational reliability, quantities, derived quantities. Failure distributions: Negative exponential, Normal, Lognormal, Wiebull and Gamma distributions. Life distribution measurements. Reliability models. Non-maintained systems. Maintained systems. Evaluation methods.

SSG 510 Control of Robots And Human Arms. (3,0)

Robot actuation and arm design. Identification of actuator and joint dynamics. Kinetics calibration and inertial parameter estimation. Model-based control for position and force. Human operator dynamics and teleoperation.

SSG 511 Computer Graphics (1, 1)

The study of fundamental mathematical algorithmic and representational issues in graphics: Graphics process, projective geometry; homogenous coordinates; projective transformation, line drawing; surface modeling and object modeling; reflectance models and rendering, texture mapping; polyhedral representations. Procedural modeling. 3D Solid Modeling and Design, Numerical simulation in Engineering Design, visualization and simulation of engineering systems. Packages include AutoDesk& Adobe Products, NASTRAN, ComsolMultiphysics, etc.

SSG 512 Image Processing (2,1)

Psychophysics of vision. Properties of images sampling, digitizing and displaying images; geometric and algebraic processing, spatial filtering; image coding and transmission, binary image analysis, segmentation; description of lines and shapes. Representation. Software and hardware systems. Applications. Scene analysis.

SSG 513 Techniques of Planning and Scheduling (3, 0)

Project definition and work breakdown structure, scheduling and control models and

techniques such as AOA, AON, Bar charting, line of balance and time & location. Allocation of resources. Optimal schedules. Documentation and reporting services. Time and cost control. Progress monitoring evaluation. Computer applications.

SSG 514 Facility Planning (3, 0)

Basic theory of facility location. Facility layout and material handling systems design with emphasis on applications in a wide variety of industries. Design principles and analytical solution procedures presented with emphasis on modern practice including computerised approaches.

SSG 515 Principes of Modelling & Analysis of Chemical Process Systems (3,0)

Classifications & Basic features of Chemical Process Models. Lumped Process Models: Non-reacting Systems, Reacting Systems, and Transport Problems.State wise Processes & Discrete Systems: Stage-wise Processes, Discrete Systems.Distributed Processes: Non-reacting Systems, Reacting Systems, and Transport Problems.Model formulation of reel (Complicated) Systems: A general (master) Model, Using the general Model.Empirical Modelling& Analysis: Strategies for Empirical Modelling, Parameter Estimation by Methods of least squares, Empirical Modelling of Dynamical System.

SSG 516 Mechanics of the Continua (3, 0)

Mechanics of the Continuous media: Introduction to Cartesian tensors. Analysis of stress in a continuum. Analysis of deformation in a continuum. Eulerian forms of the basic physical laws governing the motion of a continuous medium.

SSG 500 Final Year Project

Individual students carry out final projects in groups subject to the directives of the department and the project coordinator (or supervisor).

Foundation Programme

The Programme is being supervised by the Sub-Dean of the Faculty.

Dr. M. A. Bodude
B.Sc., M.Sc., (Ife),
Ph.D. (Akure)
Sub-Dean

Course Outline for First Semester

Course code	Course title	Units
FMAT 101	Introductory Mathematics I	3
FMAT 102	Introductory Mathematics II	3
FCHM 101	Introductory Chemistry I	3
FCHM 102	Introductory Chemistry II	3
FPHS I01	Introductory Physics I	3
FCSC 101	Introductory Computer Science	2
FMEG 101	Workshop Practice I	2
FMEG 103	Technical Drawing I	2
Total		20

Course Outlines for Second Semester

Course code	Course title	Units
FMAT 103	Applied Mathematics I	3
FMAT 104	Applied Mathematics II	3
FCHM 103	Introductory Chemistry III	3
FCHM 104	Practical Chemistry	2
FPHS I02	Introductory Physics II	3
FPHS 103	Introductory Physics III	3
FPHS 104	Introductory Practical Physics	2
FMEG 102	Workshop Practice II	1
FMEG 104	Technical Drawing II	2
Total		22

Course Outline

FMAT 101: Introductory Mathematics I (3,0)

Trigonometry: Circular measure: radian, relationship between degrees and radians; are length and sector area of a circle; general angle (trigonometric ratios of angles of any magnitude); general solution (including the equation a Cos θ + b Sin θ c).

Trigonometric formulae: The addition, multiple and factor formulae. Small angles; trigonometric ratios of small angles. Inverse functions: notation $\sin^{-1}$, $\cos^{-1}$ and $\tan^{-1}$; graphs of inverse functions;

Algebra:

Proportionally: expression of general laws in mathematical form; direct variation, partial variation; linear algebra: set theory, basic algebraic structure; determinants and matrices.

Polynomials: manipulation of polynomial; use of factor theorem; theory of quadratic equations, binomial theorem.

Equations: Solution of algebraic and transcendental equation.

Coordinate Geometry and Graphs:

Coordinate system; introduction to the rectangular Cartesian coordinates in two

dimensions; the use of Cartesian coordinates in plotting points in the plane; distance between two points; coordinates of a point of division of a line-segment; the gradient of the line-segment of joining two points; the angle between two lines; parallel and perpendicular lines.

Graph sketching: familiarity with graph sketching; recognition of forms of graphs of various; functions.

Inequalities: simple inequalities, the use of sketch-graphs to illustrate solutions of equations and inequalities.

The straight line: Determination of the equation of a straight line; the interpretation and use of the general form of a straight line, $ax + by + c = 0$; Miscellaneous problems involving straight lines.

The Circle: elementary treatment of the circle (standard and general equations, tangents and normals and touching circles).

Complex Numbers :

Basic definition and operations; Algebra of complex numbers; Argand diagram; the de Moivre's theorem; Application to trigonometry.

FMAT 102: Introductory Mathematics II (3,0)

Logarithmic and Exponential Functions;

Exponential Functions: Definition of exponential function (a^x); The graph of exponential functions (a^x); The limit and derivative of the exponential functions (a^x);

The Exponential Function: The number e; The exponential function e^x; the graph, limit and derivative of the exponential function (e^x);

The Logarithmic Function: The logarithm of a number to a given base; the relationship between logarithms and indices; change of base; the natural logarithm;

Logarithmic Functions: The relationship between the logarithmic and exponential functions; the graph of the logarithmic function $\log_e x$; the derivative of the logarithmic function.

Calculus

Limits and Continuity: functions of a real variable, graphs, limits and notion of continuity;

Differentiation: Differentiation of algebraic functions, trigonometric functions, composites; function and chain rule, higher order derivatives; derivatives of implicit or parametric functions; Application: tangents and normals to curves, maximum and minimum, rate of change and curve sketching, rectilinear motion and Maclaurin series.

Statistics: Description of Data Set – population and sample; random variables; graphical representation of data (Histogram and Ogive); frequency curve; descriptive measure. (mean, median, standard deviation, coefficient of variation).

Mathematics of Counting: fundamental principle; conditional probability.

Random Variables: probability density function; probability distribution function; Bernoulli, binomial, geometric, and Poisson random variables; Expectation and variance of random variable.

Normal Random Variables: Use of standard normal table; the normal distribution as a model for data; mean and variance.

Significance Testing: testing a hypothesis; errors in hypothesis testing; significance tests using the normal distribution; goodness of fit tests.

Regression & Correlation: linear regression; positively & negatively correlated variables;

Basic Sampling Technique: simple sampling techniques; finite and infinite sampling sizes.

FCHM 101: Introductory Chemistry (3,0)

Measurement and Precision. Hypothesis. Theory and Law with appropriate illustration. Nature of matter – the three states of matter, atomic structure electronic energy levels and orbitals, periodic classification of elements and its relationship to their electronic configurations.

Mole concept and calculations based on it, including application to titrimetry and balancing of equation by electron transfer method. Types and chemical reactions and stoichiometric calculations, different methods of expressing concentrations of solutions.

Chemical kinetics and equilibria, and related simple calculations important applications of equilibria like pH, solubility, product and solubility of ionic solids. Thermochemistry and simple calculations based on Hess's Law. Electrochemistry and working of various cells, brief mention of corrosion. Organic chemistry: simple reactions of hydrocarbons, alcohols and acids, petroleum chemistry, oils and fats hydrogenation of oil, Polymer and biological important molecules.

FCHM 102: Introductory Chemistry II (3,0)

Chemistry bonding; ionic covalent, coordinate metallic hydrogen and vender walls forces. Bond energy and bong angle. Shape of simple covalent molecules. Gaseous State – ideal and non-ideal behaviour solution – types of solution, solubility (vapour pressure).

Simple treatment of Chemical thermodynamics. ($G = \Delta H - T \Delta S$) Trends in the physical and chemical properties of element and their compounds (oxides, hydrides, hydroxides and chlorides) in periods of the periodic table.

FPHS 101: Introductory Physics I (3,0)

Physical quantities, standards and units Kinematics uniform velocity motion, Uniform acceleration motion. Dynamics: Newton's laws of motion. Newton's universal. Law of gravitation. Work, energy, conservation laws.

Concept of mechanical equilibrium. Centre of Mass and center of gravity. Moment of a force. Rotational motion, angular momentum and torque. Total mechanical energy; elasticity, Hooke's laws, Young's shear and bulk modulus. Hydrostatics: Pressure, buoyancy, Archimedes' principles. Elements of hydrodynamics. Molecular properties of fluids, viscosity, surface tension, adhesion, cohesion capillarity, Drops and bubbles. Temperature and Zeroth law of thermodynamics. Quality of heat. Heat transfer. Gas laws. First and second laws of thermodynamics. Application of kinetic theory of gases.

FCSC 101: Introductory Computer Science (2,0)

Hardware: Functional Components; Software: System, Application Packages; Program development; Flowcharting, Program object, BASIC Programming, Computer application areas and technological trends.

FMEG 101: Workshop Practice I (0,2)

Introduction to basic equipment wood, machine and welding workshops. Elements of safety practice with the various tools used in the workshops. Selection of tools for elementary operations in the various workshops.

FMEG 103: Technical Drawing I (2,0)

Introduction to drawing instruments and their proper use. Use of scales, line-work and lettering. Geometrical constructions including tangents, normals, polygons, etc. Loci, including paths of points of simple mechanisms and cam profiles.

FMAT 103: Applied Mathematics I (3,0)

VECTORS: Introduction: scalar and vector quantities, types of vectors, representation and naming of vectors; Vector Algebra: addition, subtraction and scalar multiplication, commutative and associativity, linear dependence and co-linearity, application to geometry; Vector in three dimensions: the rectangular unit vectors i, j and k, representation of vectors in terms of rectangular coordinates, scalar and vector products, direction cosines, applications; Vector Functions: vector functions, differentiation of vector functions, integration of vector functions.

Kinematics of Motion in a Straight Line: position vector, speed, velocity and acceleration, units; Rectilinear Motion: rectilinear motion with uniform acceleration, vertical motion under gravity, graphical methods; Motion in a plane: rectangular components of velocity and acceleration, resultant velocity, relative velocity, relative path;

Newtonian Mechanics: Force and motion: momentum; Newton's laws of motion; units of force; different kinds of forces (gravitational, reactions, tension, thrust); motion of connected particles; the Atwood's machine; motion of a particle on an incline plane.

Forces and equilibrium: Force, parallel forces, couples, moments and application of vectors in statics. Friction, smooth bodies, tension and

thrust, bodies in equilibrium (rough, horizontal and inclined planes). Centre of gravity.

Equilibrium of a rigid body: Moment of inertia, radius of gyration, parallel axes and perpendicular axes theorems, kinetics energy of a body rotating about a fixed axis.

FMAT 104: Applied Mathematics II (3,0)

Calculus; Integration; Integration as inverse of differentiation; Definite integral; Techniques of integration; Applications; areas, volumes and moment of inertial.

Differential Equations; formation of simple first order differential equations; solution when the variables are separable; solution when equation is homogeneous; solution when equation is linear; use of an initial condition; geometric applications; the exponential growth and decay problems; homogeneous second order differential equations.

Newtonian Mechanics: Collision of Bodies; impulse; impulse and momentum; impacts; direct collision, oblique collision, water jets; Newton's laws of restitution, impulsive tension;

Motion of a Projectile; equations governing the motion; horizontal range and time of flight; projecting from elevated points; trajectories.

Hooke's Law: elastic strings, elastic limit; modulus of elasticity, Hooke's law; springs, work done in stretching a spring.

Work, Power and Energy: Work; definition and units work done by a force; work done in lifting a body; work done by a couple. Power; definition and units of power; miscellaneous example; efficiency. Energy: Definition and units of kinetic energy; miscellaneous example; kinetic energy and power; definition and units of potential energy; the energy equation;

Simple Harmonic motion: Amplitude, period, frequency, the simple pendulum, elastic strings and springs, second pendulum.

Motion in a Resisting Medium: Vertical motion under gravity, with resistance proportional to speed and to square of speed. Damped, harmonic motion, projectiles in resisting medium, variable mass motion.

Dynamics of a Rigid Body: Product of inertia, principle axes the momental ellipse, virtual work and D'Alembert's principle.

FCHM 103: Introductory Chemistry III (3,0)

Survey of properties and the trends in groups i, ii, iv, vi & viii of the periodic table. Transition metals – first row only, Characteristic properties of the elements and their ions.

Organic Chemistry – bonding polarity in organic compounds, their isolation purification, analysis, empirical, molecular and structural formulae, nomenclature and isomerism, esters aldehyde, ketone, benzene and its derivatives.

FCHM 104: Practical Chemistry (2,0)

Simple practice in inorganic and organic chemistry

[A] *Inorganic Practical*: Two main sections.

Qualitative and quantitative.

Qualitative inorganic practical consists of identification of ions (anions and cations) in solution, cation identification is by systematic group analysis.

Quantitative inorganic practical is only by volumetric analysis. Practice in volumetric analysis includes acid, base, redox and precipitation titration.

[B] Organic Practical involves reactions of simple functional groups, simple preparations, recrystallisation and determination of m. pt of organic compounds.

FPHS 102: Introductory Physics II (3,0)

Geometrical Optics: law of reflection and refraction, location of images. Plane and curved mirrors. Converging and diverging thin lenses. Aberrations. The eye optical instruments. Simple Harmonic motion. Wave motion and wave types. Dispersion. Production of sound in strings and pipes resonance; applications. Simple description of diffraction and interference, applications to both light and sound waves. Atomic structure. Production and properties of X-rays. Radioactivity. Photoelectric emission.

FPHS 103: Introductory Physics III (3,0)

Electrostatics, potential and capacitance, dielectrics, production and measurement of static electricity. Current, Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters.

D.C. circuits, sources of emf and current, Kirchhoff's laws. Electrochemistry. The Earth's magnetic field, Magnetic fields and induction. Faraday's and Lenz's law. Force on a current carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators.

FPHS 104: Introductory Practical Physics (2,0)

Simple experiments illustration the key topics covered in DPHS 101, DPHS 102 and DPHS 103, all theoretical courses.

FMEG 102: Workshop Practice II (1,0)

Introduction to more advanced machinery and equipment in the workshops. Practical demonstration of use of tools and machines in performing basic workshop processes. Introduction to sketching and labeling of machine parts and tools.

FMEG 104: Technical Drawing II (2,0)

Orthographic projections of simple objects in first and third angles. Application of principles or orthographic projection of points and lines, surfaces and solids in space. Traces, true lengths, intersections, etc. Isometric and oblique projections. Isometric projections from orthographic projections

Faculty Academic Staff

The following is the list of academis staff in 2013/2014 academic session. The bolded alphabets “S” and “D”on each staff name are the Areas of Specialization and Department for that staff. While “AL”, “LII”, “LI”. “SL”, “AP”, “AdLI” and “AdP” stand for Assistant Lecturer. Lecturer Two, Lecturer One, Senior Lecturer, Assocate Professor, Adjunct Lecturer I and Adjunct Professor respectively.

Abdulsalam, Mrs. K. A.
B.Sc., M.Sc. (Ife) MNSE, R.Engr.
S: Computer Engineering and Energy Modelling
D: Electrical & Electronics Engineering

Abhulimen, Dr. K.
B.Sc. (Ife), M.Sc. (Benin), Ph.D. (Lagos), R.Engr.
S: Fluid Dynamics, Petroleum Engineering
D: (SL) Chemical Engineering

Abiodun, Mr. O. E.
B.Sc, MSc (Lagos)
S: Digital Mapping Remote, Sensing & Land Use Modelling
D: (LII) Surveying & Geoinformatics

Adebisi, Mr. A. O.
B.Sc., MSc, (Lagos)
S: Goedesy & GIS Engineering Surveying, Spatial Data infratruture (SDI).
D: (LII) Surveying & Geoinformatics

Adeboje, Mr. A. O.
B.Tech (Ogbomoso), M.Sc. (Lagos), MNSE.
S: Highway & Traffic Engineering, Transportation Engineering.
D: (LII) Civil & Environmental Engineering

Adeboye, Mr. Y. B.
B.Sc. (Ibadan)**,** B.Tech (Rivers)**,** M.Sc. (Ife)
S: Well & Reservoir Engineering
D: Chemical Engineering

Adegbenro, Prof. O.
B.Sc. (Lagos), M.Eng. (Alberta), Dr.Eng. (Tohoku) FNSE, MIEICE (Japan)
S: Digital Signal Processing, Energy Conservation and Efficiency.
D: Electrical & Electronics Engineering

Adegbola, Dr
B.Sc. (Lagos), M.Sc. (Swansea), Ph.D. (Ibadan)
S: Artificial Intelligence
D: (SL) Systems Engineering

Adelabu, Mr. M. A. K.
M.Sc. (Wroclaw), PGD (Lagos), FNSE, MIEEE, FLI, R.Engr.
S: Electronic Circuits, Telecommunication Systems.
D: Electrical & Electronics Engineering

Adelaja, Dr. A. O.
B. Sc., (Ife),M.Sc., (Ibadan), Ph.D. (Lagos), MNSE, R. Engr.
S: (SL) Thermo-fluids, Energy Systems & Management
D: Mechanical Engineering

Adeleye, Mr. O. A.
B.Eng (Akure), M.Sc. (Lagos), ASME, R.Engr.
S: Computational Mechanics & Engineering Analysis
D: (LII) Systems Engineering

Adeniyi, Dr. V. O.
B.Sc.(Ibadan), MASc. Ph.D. (Waterloo), MNSChE
S: Process Analysis, Process Control, Process Optimization
D: (SL) Chemical Engineering

Adeosun, Dr. S. O.
B.Sc. (Ife), M.Sc.(Ibadan), Ph.D. (Lagos), MNTAD, MMSN, R.Engr.
S: Mechanical Industrial Metallurgy
D: (AP) Metallurgical & Material Engineering

Adeoye, Mr. S. A.
B.Sc. (Lond.), M.Sc. (Lagos), MNSE, R. Engr.
S: Applied Mechanics
D: (LII) Mechanical Engineering

Aderibigbe, Prof D. A.
B.Sc.(Hons) (Lagos), Sc.D.(MIT)
S: Power Plant Development, Materials Processing, Maintenance Management Systems.
D: (Mechanical Engineering

Adetona, Dr. O. S.
ND, B.Sc. (Hons.), M.Sc., Ph.D.(Lagos)
S: Modelling and Simulation of Power Systems, Application of photovoltaics for Rural Area Development
D:(LI) Electrical & Electronics Engineering

Adewunmi, Mrs. O.
B.Eng (Ado-Ekiti), M.Sc. (Lagos)
S: Thermo-fluids
D: (LII) Mechanical Engineering

Adeyanju, Mr. O. A
B. Sc., M. Sc. (Ibadan), MNSE, R. Engr.
S: Oil & Gas Reservoir Eng., Production Technology
D: (LII) Chemical Engineering

Afolabi, Mr. O. A.
B.Sc. M.Sc. (Lagos) MNSE. Analysis and Material Research Structural Foundation.
D: (LII) Civil & Environmental Engineering

Agbeleye, Mr. M
B.Sc., M.Sc. (Lagos), MNSE, R.Engr.
S: Surface Engineering (Wear)
D: (LII) Metallurgical & Materials Engineering

Agunsoye, Dr. J. O.
B.Eng. (Zaria), M.Sc., Ph.D. (Lagos), MNSE, MMSN, MFAN
Industrial Metallurgy
D: (SL) Metallurgical & Materials Engineering

Aiyesimoju, Dr. K. O.
B.Sc. (Lagos) M.Sc., Ph.D. (Berkeley), P.E.
S: Hydraulics, Hydrology, Coastal Engineering.
D: (AP) Civil & Environmental Engineering

Ajayi, Dr. A. B.
B.Sc., M.Sc. (Lagos), Ph.D. (Lagos)
S: Biomechanics
D: (LI) Mechanical Engineering

Ajayi, Dr. K. T.
B.Sc, M.Sc. (Zaria), Ph.D. (Germany), R. Engr
S: Thermo-Fluids
D: (SL) Mechanical Engineering

Ajayi, Dr. T. O.
B.Sc. (Ife), Ph.D. (Lagos), FNSChE, MNSE, MIChemE, R.Engr.
S: Process Control, Environmental Eng., Engineering Education
D: (SL) Chemical Engineering

Ajibola, Dr. O. O. E.
B.Sc (Ibadan), M.Sc., Ph.D. (Lagos), MMAN, MNSA, MSESN
S: Artificial Intelligence
D: (SL) Systems Engineering

Ajiboye, Dr. J. S.
B.Eng., M.Eng, Ph.D. (Ilorin), MNSE, R. Engr.
S: Solid Mechanics
D: (AP) Mechanical Engineering

Ajofoyinbo, Dr. A. M.
B.Sc. (Ibadan), M.Sc., Ph.D. (Lagos), AMNSE, MIEEE, MNES
S: Intelligent control & automation; Telecommunication Systems
D: (SL) Systems Engineering

Ajose, Prof SO, BSc (Lagos) MSc, PhD (London), FNSE
S: Electronics, Communications.
D: Electrical & Computer Engineering

Akanmu, Dr. J. O.
B.Sc. (Ibadan), M.Sc., Ph.D. (Lagos) MASCE, MNIM,FNSE,
Flood Studies, Dam/Reservoir Hydro and Hydraulic Water/Waste Management, Environmental Assessment, Water quality Management, Materials Renovate Energy.
D: (SL) Civil & Environmental Engineering

Akano, Dr. T. T.
B.Eng (Owerri), M.Sc., Ph.D. (Lagos), MNSE, MNIMech, R.Engr.
S: Computational & Applied Mechanics, Engineering Analysis, Solid Modelling
D: (LII) Systems Engineering

Akiije, Dr. I.
B.Sc. (Lagos), M.Sc. (Lagos) Ph.D. (Lagos), FNIStr.E, MNSE.
S: An Analytical and Autographics Method for Highway Geometric Design (Computer Based Approach). Transportation Engineering: Planning, Design & Construction of Highways & Drainage.
D: (SL) Civil & Environmental Engineering

Akinbulire, Dr. T. O.
B.Sc., M.Phil., Ph.D. (Lagos), MNSE, R.Engr..
D: (AP) Electrical & Electronics Engineering

Akinola, Dr. A.
B.Sc., M.Phil., Ph.D. (Lagos),

MNSE, R.Engr.
D: (LI) Chemical Engineering

Alademomi, Mr. A. S.
ND, HND, B.Sc, M.Sc. (Lagos)
S: Hydrography and Coastal Hydrodynmics
D: (A/L) Surveying & Geoinformatics

Alayande, Mr. A. S.
B.Tech.(Hon) (Ogbomosho), M.Sc. (Lagos)
S: Power Systems Analysis, Protection, Reliability, Security and Estimation
D: (AL) Electrical & Electronics Engineering

Alozie, Mr. S. I. B.Eng. (Owerri), M.Sc. (Lagos), MBA (Nigeria)
S: Thermo-fluids
D: (LII) Mechanical Engineering

Amuda, Dr. M. O. H.
B.Sc. (Ife), M.Sc. (Lagos), Ph.D.(Malaysia),MNSE, MNICA, MMSN MAWS
S: Production Metallurgy, Materials Welding, Welding Metallurgy, Physical Metallurgy & Selection for Services
D: (SL) Metallurgical & Materials Engineering

Aribike, Prof. D. S.
B.Sc., M.Sc., Ph.D. (Lagos), MNSChE
S: Chemical Kinetics & Reaction Eng., Environmental Eng., Computer Applications in Chemical Eng.
D: Chemical Engineering

Asaolu, Dr. O. S.
B.Sc, M.Sc., Ph.D. (Lagos), FIOR, MGYA, MNYA, MNCS, MIIE, MNSE, R.Engr.
S: Artificial Intelligence, Software Engineering, Systems Modelling& Analysis
D: (SL) Systems Engineering

Ayeni, Mrs. A. M.
ND BSc, M.Phil (Lagos)
S: Geodesy & GIS
D: (A/L) Surveying & Geoinformatics

Ayo, Dr. D. B.
B.Sc. Ph.D. (Lagos) FNSE, FNSChE, R. Engr
S: Reaction Engineering Process Plant Engineering,
D: (SL) Chemical Engineering

Ayodele, Mr. E. G
BSc, MSc (Lagos)
S: Remote, Sensing & Land Use Modelling, Geodesy
D: (AL) Surveying & Geoinformatics

Ayomoh, Dr. M. K. O
B.Eng. (Ilorin), M.Sc. (UI), Ph.D.(Lagos), MNSE, R.Engr.
S: Artificial Intelligence (Robotics
D: (SL) Systems Engineering

Ayoola, Mr. W. A.
B.Eng. (Akure), M.Sc. (Lagos), MNSE, R.Engr.
S: Mechanical Metallurgy
D: (LII) Material & metallurgical Engineering

Ayorinde, Dr. A. A.
B.Sc., M.Sc., Ph.D. (Lagos), MIEEE, MNSE, R.Engr.
S: Telecommunications
D: (SL) Electrical & Electronics Engineering

Babalola, Dr. F. U.
B.Eng. (Uniben), M.Sc., Ph.D. (Lagos), MNSChE, R.Engr
S: Stability Studies of complex Systems, Energy Thermodynamics
D: (SL) Chemical Engineering

Badejo, Dr. O. T.
B.Sc., M.Sc. (Lagos), PGD (Ogbomoso) Ph.D. (Lagos)
S: Hydrographic Surveying, Geoinformatics
D: (SL) Surveying & Geoinformatics

Balogun, Dr. A. O.
B.Sc. (Hons.), M.Sc., Ph.D.(Lagos)
S: Power Electronics, Electric Machines, Electric Drive, Renewable Energy Conversion Systems
D: (LI) Electrical & Electronics Engineering

Balogun-Adeleye, Mr. R. M.
B.Sc., M.Sc. (Lagos)
S: Environmental Engineering.
D: (AL) Civil & Environmental Engineering

Bello, Prof. R. A.
B.Sc. (Ife), M.A.Sc., Ph.D. (Waterloo), FAEng, FNSChE, R.Engr.
S: Transport Phenomenon, Biochemical Engineering
D: Chemical Engineering

Bodude, Dr. M. A.
B.Sc. M.Sc., Ph.D. (Akure), MNSE, MNMS, R.Engr.
S: Corrosion
D: (SL) Metallurgical & Materials Engineering

Durowaye, Mr. S. I.
B.Eng. (Ilorin), M.Sc. (Lagos), MNSE, R.Engr.
S: Materials Engineering
D: (LII) Metallurgical & Materials Engineering

Esezobor, Prof. D. E.
Dip. Edu, M.Sc., M.Phil, Ph.D. (Donetsk), MNSE, MMSN, MASM Int, MNICA, MIMS, MHRS. R.Engr.
S: Extractive Metallurgy and Materials Engineering
D: Metallurgical & Materials Engineering

Bolashodun, Dr. B. O
B.Sc.(Lagos), M.Sc., Ph.D. (Manchester)
S: Polymers, Polymer Composites
D: (LII) Metallurgical & Materials Engineering

Echeta, Dr. C. B.
B.Eng (Zaria), M.Sc., DIC Ph.D. (Imperial College) FNI Struct.
S: Structural Behaviour of New Structural Materials for Road Sub-grades.
D: (SL) Civil & Environmental Engineering

Evwierhoma, Dr. E. T.
B.Eng. (Port Harcourt), M. Sc., Ph.D. (Lagos)
S: Chemical Reaction, Separation
D: Chemical Engineering

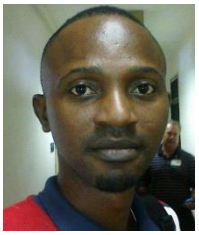
Denloye, Prof. A. O.
B.Sc., Ph.D.(Birm),C.Eng., MIChemE, FNSChE, R.Engr.
S: Separation, Fluidization Engineering
D: Chemical Engineering

Epuh, Mr. E. E.
B.Sc., MSc. Lagos
S: Geodesy/Geophysics
D: (LII) Surveying & Geoinformatics

Fakinlede, Prof. O. A.
B.Sc. (Lagos), Ph.D. (Alberta), R.Engr.
S: Computational Mechanics, Software Engineering
D: Systems Engineering

Falade, Prof. F. A.
Dipl. (Q.S.) M.Sc. (Moscow) Ph.D. (Lagos) FNSE, MASCE.
S: Structural behaviour of innovate construction materials. Project Management Strategies and Engineering Education
D: Civil & Environmental Engineering

Fashanu, Dr. T. A.
B.Sc (Ife), M.Sc., Ph.D. (Lagos), MAGU, MISEE, MASABE, MTMS, MNSE
S: Computational Visualisation Environmental Fluid Mechanics
D: (SL) Systems Engineering



Fatoba, Mr. S. O.
B.Tech. Mech. (Ogbomoso), M.Sc. (Lagos), MNSE, R.Engr.
S: Surface Engineering
D: (LII) Metallurgical & Materials Engineering

Gbenebor, Mr. O. P.
B.Sc., M.Sc. (Lagos), R.Engr.
S: Composite Materials
D: (LII) Metallurgical & Materials Engineering

Gbenga-Ilori, Dr. A. O.
B.Sc., M.Eng., Ph.D. (Ilorin), MNSE, R.Engr.
S: Digital Telecommunications
D: (SL) Electrical & Electronics Engineering

Hamid-Mosaku, Mr. A.I.
B.Sc. M.Sc. (Lagos)
S: Hydrographic Surveying & Geoinformatics
D: (AL) Surveying & Geoinformatics

Hassan, Prof. S.B.
B.Eng., M.Eng., Ph.D. (Zaria), MNSE, MMS, MSN, R.Engr.
S: Physical Metallurgy, Ceramic Science & Engineering, Composite Materials
D: Material & Metallurgical Engineering

Ibidapo-Obe, Distinguished Prof. O.
B.Sc. (Lagos), M.Maths, Ph.D. (Waterloo), ASCE, FAAS, FAS, FAEng, OFR
S: Stochastic Processes, Artificial Intelligence, Simulation
D: Systems Engineering

Ikponmwosa, Dr. E. E.
M.Sc., Ph.D. (USSR), MNSE.
S: Structural Behaviour of innovative Construction Materials, Steel Structures & Traffic Eng.
D: (AP) Civil & Environmental Engineering

Ipinnimo, Mr. O.
B.Eng (Ado-Ekiti), M.Sc. (Lagos), MNSE, R.Engr.
S: Electrical/ Electronics
D: (LII) Systems Engineering

Ismail, Mr. S. O.
B.Engr., M.Sc. (Lagos), R.Engr.
S: Design and Production
D: (LII) Mechanical Engineering

Jaiyeola, Dr. A.
B.Sc., M.Sc., Ph.D. (Lagos)
S: Chemical Kinetics & Catalysis
D: (SL) Chemical Engineering

Kamiyo, Dr. O. M.
B.Sc., M.Sc. Ph.D. (Lagos), R,Engr. MNSE, MASHARE
S: Heat Transfer, Energy Management Refrigeration & Air-conditioning
D: (SL) Mechanical Engineering

Kehinde, Prof. A. J.
B.Sc.(Ife), M.A.Sc., Ph.D. (Waterloo), MAIChE, MNSE, FNSChE, R.Engr.
S: Chem. Reaction Eng., Environmental Eng., Energy Studies
D: Chemical Engineering

Kuforiji, Mr. C. U.
B. Eng. Mech (Ekpoma), M.Sc. (Lagos), MNSE, R.Engr.
S: Nanotechnology
D: (LII) Metallurgical & Materials Engineering

Lawal, Mrs. J. T.
B. Eng. Mining (Akure), M.Sc. (Lagos), MNSE, R.Engr.
S: Surface Engineering, Corrosion Engineering
D: (LII) Material & metallurgical Engineering

Lawal, Mr. S. A.
B.Tech. (Ogbomoso), MBA (Sunderland), M.Sc., (Newcastle)
S: Process Control
D: (LII) Chemical Engineering

Lawal, Prof. G. I.
M.Sc. Met., Ph.D. Mech. Met. (Leeds), MNSE, MNMS, R.Engr.
S: Industrial Metallurgy
D: Metallurgical & Materials Engineering

Longe, Prof. E. O.
M.Sc. (Ife) D.E.A. Ph.D., (L.U.S.T.L. Montpellier), AMNSE, MNMGS.
S: Environmental Engineering – Ground Water Hydraulics, Water Supply, Waste Water, Solid Waste Engineering.
D: Civil & Environmental Engineering

Mgbemere, Dr. H.E
B.Eng. (Owerri), M.Sc. (Hamburg, Germany)
S: Advanced Ceramics
D: (LI) Material & Metallurgical Engineering

Mowete, Prof. A.I.
B.Sc., M.Sc., Ph.D. (Lagos), MIEEE, MNSE, R.Eng.
S: Electromagnetic/ Numerical Methods, Circuit Theory, Antennas and Propagation
D: Electrical & Electronics Engineering

Muhammed, Mr. H. A.
B.Eng. (Hons), M.Sc.(Maiduguri)
D: (LII) Electrical & Electronics Engineering

Noah, Mr. O. O.
B.Sc M.Engr. (Benin)
S: Thermal Power Engineering
D: (AL) Mechanical Engineering

Nwalor, Dr. J. U.
B.Sc., M.Sc. (MIT), Ph.D. (Pitts), FNSChE, MNSE
S: Catalysis, Thermodynamics, Environmental Engineering
D: (SL) Chemical Engineering

Nwilo, Prof. P. C.
B.Sc., MSc, (Lagos) Ph.D. (Salford), MNIS
Hydrographic Surveying, Engineering/ Coastal Management & GIS
D: Surveying & Geoinformatics

Obaji, Mr. N. O.
B.Sc., M.Sc. (Lagos) PGD (Computer Science).
S: Geotechnical and Foundation Engineering Deep

soil Improvement for Structural Foundation Pilling (Cored and Driven) for Structural Foundations, Solid Waste Management Refine Landfill.
D: (LII) Civil & Environmental Engineering

Obidiegwu, Mrs. E. O.
B.Sc.(Awka), M.Sc. (Lagos), MNSE, R.Engr.
S: Materials Engineering
D: (LII) Metallurgical & Materials Engineering

Ochulor, Mr. E. F.
B.Sc. (Owerri), M.Sc. (Lagos), MNSE. R.Engr.
S: Extractive Metallurgy, Materials Development
D: (LII) Metallurgical & Materials Engineering

Odekunle, Mr. M.
B.Sc., M.Sc. (Lagos), NCE
S: Power Systems Analysis & Reliability
D: (LII) Electrical & Electronics Engineering

Ogbemhe, Mr. J. A.
B.Eng (FUTA), M.Sc. (Lagos), MNSE, R.Engr.
S: Artificial Intelligence (Robotics)
D: (LII) Systems Engineering

Ogbonnaya, Mrs. M.
B. Eng. (Nsukka), NSC (Lagos), R.Engr
S: Thermo-Fluid
D: (LII) Mechanical Engineering

Ogedengbe, Dr. E.O.B
B. Sc., (Ife), M.Sc, (Ibadan), Ph.D. (Manitoba), MNSE, P.Eng, R. Engr.
S: Computational Thermo-fluids, Energy Conversion & Conservation
D: (SL) Mechanical Engineering

Ogunbayo, Dr. A. O.
B.Sc., (Ife), M.Sc.(Birm), Ph.D. FNSChE, R.Engr.
S: Biochemical Engineering
D: (SL) Chemical Engineering

Ogundalu, Mr. A.O
B.Sc., M.Sc. (Lagos)
S: Civil Engineering
D: Civil & Environmental Engineering

Ogunmola, Dr. O. Y.
B.Sc., M.Sc. (Lagos), Ph.D. MNSE, R. Engr.

S: Thermofluids
D: (LI) Civil & Environmental Engineering

Ogunwolu, Dr. F. O.
B.Sc, M.Sc., Ph.D. (Lagos), FIOR
S: Modelling& Simulation, Optimization Techniques, Discrete Systems Engineering.
D: (LI) Systems Engineering

Ojolo, Dr. S. J.
B.Sc. (Ife), M.Sc., Ph.D. (Ibadan), MNSE MNIAE, MASABE, R. Engr.
S: Machine Design and Production Engineering
D: (SL) Mechanical Engineering

Okafor, Prof. F. N.
B.Sc.(Eng), M.Phil., Ph.D. (Lagos), FNSE, MIEEE, VDE R.Engr.
S: Power System Control, Power Quality Management, High Power Engineering & HNDC Systems. Evaluation of Power Equipment.
D: Electrical & Electronics Engineering

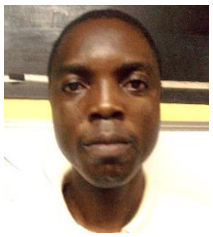
Oke, Dr. S. A.
B.Sc., M.Sc., Ph.D. (Ibadan), MNSE, R.Engr.
S: Industrial Engineering
D: (SL) Mechanical Engineering

Okewole, Mr. F. O.
B.Tech.(Ogbomoso), M.Sc.(Lagos)
S: Electromagnetic, Antennas & Propagation, Circuit Theory, Numerical Methods
D: (LII) Electrical & Electronics Engineering

Okwananke, Mr. A. O.
B.Tech. (Ogbomoso), M. Sc. (Ibadan), MNSE, R.Engr.
S: Reservoir Engineering
D: Chemical Engineering

Oladoye, Mr. A. M.
B.Sc. M.Sc. Met & Matl's. (Lagos), MNSE.
S: Materials Engineering
D: (LII) Metallurgical & Materials Engineering

Olafadehan, Dr. O. A.
B.Sc., M.Sc., Ph.D.(Lagos), MNSChE, MNSE,MACS, R.Engr.
S: Transport, Separation, Chemical Kinetics & Reaction Eng., Modelling & Simulation of Chemical /Biochemical Systems
D: (AP) Chemical Engineering



Olakoyejo, Dr. O. T.
B.Sc (Ife), M.Sc. (Ibadan), Ph.D. (Pretoria)
S: Thermo-fluids
D: (LI) Mechanical Engineering

Olaleye, Prof. J. B.
BSc, MSc, (Lagos), Ph.D. (New Brunswick), MNIS
S: Digital Mapping & GIS
D: Surveying & Geoinformatics

Olanipekun, Mr. O. O.
B.Eng (Zaria), M.Sc. (Ife)
S:Biochemical Engineering and Biotechnology
D: (AL)Chemical Engineering

Olatunde, Mr. A. O.
B.Sc (Ife), M.Sc (Lagos)
S: Reaction Engineering, Modelling and Simulation, Industrial Automation and Process Control, Flow Assurance and Base Fluid Production**.**
D: (LII) Chemical Engineering

Olayinka, Dr. D. N.
B.Sc., MSc (Lagos) Ph.D. (Lancaster)
S: Remote sensing/ GIS, Digital Mapping, Flood Modelling
D: Surveying & Geoinformatics

Olobaniyi, Mrs. F. A.
B.Sc. (Benin), M.Sc. (Lagos)
S: Power Systems and Machines
D: (LII) Electrical & Electronics Engineering

Olufemi, Dr. B. A.
B. Eng. (Benin), M.Sc., Ph.D. (Lagos), MNSChE, MNSE, MIAENG, R.Engr.
S: Electrochemical Synthesis, Reaction Eng., Environmental Eng., Simulation.
D: (SL) Chemical Engineering

Olunloyo, Emeritus Prof. VOS.
B.Sc. Ph.D. (Cornell), FAEng, FAS, NNOM
S: Computational Fluid Mechanics
D: Systems Engineering

Oluseyi, Dr. P. O.
B.Eng (Nsukka), M.Sc., Ph.D. (Lagos), MNSE, R.Engr.
S: Electric Power System Planning, Optimization and Economics, Energy Efficiency, Demand-Side Management

and Electricity Market Deregulation and modelling
D: (LI) Electrical & Electronics Engineering

Olusina, Dr. J. O.
B.Sc, M.Sc., Ph.D. (Lagos)
S: GIS, Transportation, Management, Engineering Surveying, Navigation
D: (SL) Surveying & Geoinformatics

Olutaiwo, Dr. A.O.
B.Sc. M.Sc., Ph.D. (Lagos)
S: Pavement Design (Mix and Structural), Highway Geometrical, Pavement Information and Maintenance Systems, Quality Assurance in Roadworks
D: (LI) Civil & Environmental Engineering

Oluwasuji, Mr. O. I.
B.Sc,(Ogbomoso), M.Sc. (Newcastle)
S: Automation and Control
D: (AL) Systems Engineering

Oluwatusin, Mr. O. O
B.Sc, M.Sc. (Lagos), MNSE, R. Engr.
S: Thermo-Fluids
D: Mechanical Engineering

Oluwo, Mr. A. A
B.Sc (Ife), M.Sc. (Ibadan)
S: Mechatronics
D: Mechanical Engineering

Omogunloye, Dr. O. G.
BSc, MSc, (Lagos)
S: Geodesy/ Photogrammetry/ Remote Sensing
D: (SL) Surveying & Geoinformatics

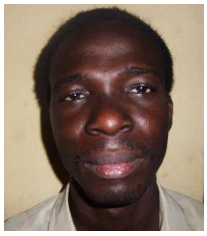
Onitiri, Dr. M. A.
B.Eng., M.Eng., Ph.D. (Ilorin), MNSE, R. Engr.
S: Production and Solid Mechanics
D: (LII) Mechanical Engineering

Onoroh, Mr. F.
OND (Lagos), B.Eng (Benin), M.Eng (Awka)
S: Thermo-Fluid
D: (AL) Mechanical Engineering

Onovo, Mr. H. O
B.Sc., M.Sc., R.Engr.
S: Materials Engineering
D: (LII) Metallurgical & Materials Engineering

Onyedikam, Mr. C.
B.Sc., M.Sc. (Lagos), AMIOR
S: Transportation Modelling and Planning, Optimization techniques, Systems Modelling & Simulation
D: (AL) Systems Engineering

Oribayo, Mr O.
B.Sc, M.Sc. (Lagos)
S: Petroleum Reservoir
D: (LII) Chemical Engineering



Orisaleye, Mr S. I.
B. Tech (Ogbomoso), M.Sc. (Lagos)
S: Design and Production Engineering
D: (AL) Mechanical Engineering

Orolu, Mr. K. O.
B.Sc, M.Sc.,(Lagos)
S: Intelligent control
D: (AL) Systems Engineering

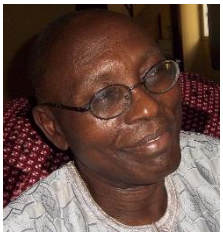
Osheku, Dr. C. A.
B.Sc. (Ife), M.Sc., Ph.D. (Lagos), MNSE, R.Engr.
S: Computational Fluid Mechanics/Aerodynamics
D: (SL) Systems Engineering

Oshode, Mr. S. J
ND, HND, B.Sc. M.Sc. (Lagos)
D: (AL) Surveying & Geoinformatics

Osoba, Dr. L. O.
B.Eng. (Akure), M.Sc. (Lagos), Ph.D. (Manitoba)
S: Microstructure Property Relation in Welded Materials, Development and Characterization of Composite Materials
D: (LI) Metallurgical & Materials Engineering

Osunde, Dr. O. D.
B.Sc. (Hons.), MBA, M.Sc.(Econs), Ph.D. (Lagos), MNSE, AIEE, R.Engr.
S: Power and Drives
D: (LI) Electrical & Electronics Engineering

Owolabi, Mr. R. U.
B.Tech (Ogbomoso), M.Sc. (Lagos)
S: Polymer Synthesis and Reaction Engineering, biofuel and Oil Chemistry
D: (AL) Chemical Engineering



Oyediran, Prof. A. A.
B.Sc. (Lagos), Ph.D. (Cornell)

S: Combustion, Mechanics, Heat Transfer
D: Mechanical Engineering

Oyekan, Prof. G. L.
B.Sc. (Lagos), M.Sc., Ph.D. (Southampton), FNSE, MASCE, PE, FNICE
S: Structural behaviour of construction materials; Concrete & Steel Structures Failure Analysis of Structural Project Management Strategies, System & Engineering Education.
D: Civil & Environmental Engineering

Oyekeye, Mr. M. O.
B.Eng, (Ilorin), M.Sc. (Ibadan), MNSE, MNIMech, R.Engr.
S: Applied Mechanics
D: (LII) Mecahical Engineering

Oyekunle, Prof. L. O.
M.Sc. (Moscow), Ph.D. (Lagos), MNSE MAIChE, MNYAS, FNSChE, R.Engr.
S: Petroleum Refining & Petrochemicals. Gas Tech, Biofuels, Polymer Eng., Thermodynamics
D: Chemical Engineering

Oyelade, Mr. A. O.
B.Sc., M.Sc. (Lagos)
S: Structural Mechanics, Analysis of Telecommunication Structures and Material Research.
D: (LII) Electrical & Electronics Engineering

Philips, Dr. T.
B. Sc., Ph. D. (Penn State), M.Sc. (Texas), SPE.
S: Reservoir and Production Engineering
D: (LII) Chemical Engineering

Popoola, Dr. O. P.
B.Sc., M.Sc. (Ibadan), Ph.D. (China)
Pattern Recognition and Intelligent Systems
D: (LI) Systems Engineering

Rufai, Mrs. I. O.
B.Sc., M.Sc. (Lagos)
S: Composite Materials
D: (AL Metallurgical & Materials Engineering g

Salau, Prof. M. A.
M.Sc. Dipl. Educ. Ph.D. (Odessa), FNSE, FNIStr.E, MNIM, R.Engr.
S: Structural Behaviour of Innovative Materials Investigation and failure

analysis of structural systems; Steel structures; Environment & Impact Assessment; Foundation Failure & Micro Piling.
D: Civil & Environmental Engineering

Sanni, Mr. O. S.
B.Sc. (Ife), M.Sc. (Lagos), MNSE, MNSN, R. Engr.
S: Corrosion Engineering
D: (LII) Material & metallurgical Engineering

Sadiq, Prof. O. M.
M.Sc., Ph.D. (Kiev), C. Eng., FNSE, MIASS, FNIStr.E. R.Engr.
S: Shell Structural Systems, Masts and Towers Analyses; Strength Assessment of Reinforced Concrete Members; Impact Loading on Reinforced and Prestressed Concrete Members.
D: Civil & Environmental Engineering

Sekunowo, Dr. O. I.
B. Tech (Akure), M.Sc., Ph.D. (Lagos), MNSE, R.Engr.
S: Mechanical Metallurgy
D: Metallurgical & Materials Engineering

Sobamowo, Dr. M. G.
B.Sc., M.Sc., Ph.D. (Lagos), MNSE.
S: Thermo-fluids
D: (LII) Mechanical Engineering

Sodamade, Mr. G. A.
B.Sc. (Ife), M.Sc. (Lagos) MNSE, R. Engr.
S: Environmental Engineering, Environmental Pollution and Impact Assessment.
D: (LII) Civil & Environmental Engineering

Sosimi, Mr .A. A.
B.Sc., M.Sc., (Lagos) MNSE, R.Engr.
S: Artificial Intelligence (Computational Linguistics& Natural Language Processing)
D: (LII) Systems Engineering

Susu, Emeritus Prof. A.A.
B.Sc. (Idaho), M.S., Ph.D. (Stanford). NNOM, FAS, FAENG, FNSE, FNSChE, R.Engr
S: Kinetics/ Chemical Reaction Eng., Mechanistic Modelling, Thermodynamics, Biomedical Engineering,
D: Chemical Engineering

Taiwo, Prof. O.
B.Sc (UCL), Ph.D. (UMIST)
S: Process Systems

Engineering
D: Systems Engineering

Usman, Dr. M. A.
B.Eng. (Zaria), M.Sc., Ph.D., (Lagos) MNSChE, R.Engr.

S: Process Integration, Chemical Reaction Eng, Biofuels and Polymer Composite Materials.
D: (SL) Chemical Engineering

Williams, Mr. A. O.
B.Sc (UI), M.Sc. (Lagos), MNSE
S: Applied Mechanics
D: (AL) Mechanical Engineering

Faculty Administrative & Technical Staff

Oloyede, Mrs. C. T. O
B.Sc (Zaria), MPIA (Lagos)
Faculty Officer

Abaleke, Mr. E. O
O.N.D.
P: Senior Lab Assistant

Abidoye, Mr. Sunday
P: Driver

Abiodun, Mrs. M. O.
S.75, WAEC
P: Technical Chief Clerical Officer

Abioye, Mr. O. K
HND, PGD
P: Chief Technologist

Adaramola, D. O.
P: Senior Technical Officer

Adebakin, Mr. R. A
OND
P: Workshop Technician

Adebayo, Mr. E.
OND, Certificate in Desktop Publishing
P: Data Entry Operator

Adedayo, Mr. G. O.
HND, MNSE
P: Assistant Chief Technologist

Adedoyin, Mr. S.
OND, HND
P: Senior. Technical. Officer

Adegboyega, Mr. A. K.
PGD, HND
P: Technologist I

Adegeye, Mr. A.
OND, HND
P: Technologist II

Adekola, Mr. A
ND, HND
P: Technologist I

Adelakun, N. A.
HND
P: Senior Technologist

Adeleke, Mrs M. O.
Adv National Tech. Cert., Adv. Diploma, WAEC/Course B, Fed. Craft Cert
P: Senior Technical Officer

Adewoye, Mrs. S.O.
P: Office Assistant

Adeyemo, Mr. F. A.
HND, MNATE
P: Technologist II

Adeyinka, Mr. J. T.
O'Level WAEC
P: Chief Clerical Officer

Afebioye, Mr. S. A.
FSLC, Professional Driving Licence, Trade Test Mechanic, Driver III,II,&I
P: Senior Transport Officer

Ajagba, Mrs. C.N.
Office Assistant

Ajiboye, Mr. J. A.
OND, HND, B.Sc., M.Sc., MNSE
P: Chief Technologist

Akinleye, Mr. A.
G.C.E., (WAEC Tech) Coll. Diploma Trade Test 1&11 SCC.
P: Chief Technical Officer

Akinyanju, Mr. A. S
B.Tech. (LAUTECH)
P: Technologist II

Akpan, Mr. G. J.
National Diploma, WAEC
P: Technical Officer

Alabi, Mrs A. O.
GCE O'Level, B.A. (Lagos)
P: Chief Clerical Officer

Allinson-Adeniyi, Mrs. S. O.
WAEC O/L
P: Office Assistant

Amaechi, Mr. C. C.
TECH.,Teacher Certificate (Akoka) Full Technological Cert.,(London) B.Sc.
P: Asst. Chief Technologist

Ayandiran, O. A.
P: Technical Officer

Ayeni, Mrs. F. I.
Advanced Diploma in Computer Studies
P: Senior Data Processing Officer

Ayoade, Mrs. F. M.
HND, B, Sc
P: Confidential Secretary

Babafemi, A. O
B.Sc (Lagos)
Senior Typist II

Mr. Babasola, K.
P: Administrative Officer II

Babatunde, Mr. O.A.
HND
P: Chief Technologist

Bamgbelu, Mrs A.A
WASCE, GCE, Certificate in Word Processing B.A.(Lagos)
P: Typist I

Bassey, Mrs. A.
O Level G.C.E
P: Administrative Assistant

Cole, Mr. E. O.
SSCE (WASC), Certificate in Computer studies (Akka)
P: Laboratory Assistant

Dibia, Mr. E. I.
HND
P: Senior Confidential Secretary

Ehizele, Mrs. E. O.
SSCE/GCE
P: Laboratory Assistant

Ekanem, Miss. A.
B.Sc
P: Data Entry Operator

Ekanem, Mr. P. E.
HND
P: Principal Techn. Officer I

Eko, Mrs E.E.
WAEC, GCE, O'Level, Advanced Certificate in Secretarial Studies, B.A (English)
P: Asst. Chief Personnel Secretary

Fagbulu, Mr. O. O.
SSCE
P: Driver Grade III

Fajobi, Mr. O
Senior Lab Assistant

Falope, Mr. O. A.
B.Sc. (Ife.)
P: Technologist II

Farore, Mrs A.O.
Adv. Cert, Dipin Comp ASA, GCE O/L
P: Data Processing officer

Giwa, A. S
P: Technical Staff

Hassan, Mr. S. O.
M.Sc., B.Sc. (Lagos), OCP,OCA, GMNIM
P: Administrative Officer

Idoko, Mrs. F.
P: Office Assistant

Ighoyivwi, M. O.
B.Sc (USA)
P: Senior Executive Officer

Ihediwa, A. M.
B.Sc (Nsukka), HND (Lagos)
Principal Confidential Secretary

Inyang, Mr. G. A.
HND
P: Principal Confidential Secretary

Ipinlaye, Mr. A.
HND, PGD, MNSE
P: Senior Technologist

Jimoh, Mr. M. A.
OND, HND
P: Higher Technical Officer

John, Mrs J.
FSLC
P: Office Assistant IV

Kehinde, Mr. F. O.
HND
P: Technologist II

Kolade, Mr. O. O.
OND, HND, PGD, MNSE.
Snr.Technologist

Lagoke, Mrs A. A.
B. Sc. Dip. CIT.
P: Admin. Officer.

Lasisi, Mr. A. R.
HND
P: Principal Tech. Officer II

Mohammed, Mr. M. A.
OND, HND
P: Technologist I

Moses, Mr. H.
P: Senior Driver II

Mulero, Mr L.
WAEC O/L, Dip IT
P: Admin. Asst. IV

Odedele, Mr. D.
ND,HND,
P: Technologist I

Odeyemi, Mr. B. L
Diploma (Electrical Engr.Maintenance) TradeTest Two/Three School Certificate (NAEC)
P: Laboratory Supervisor

Odinikaeze, Mrs. L. N.
Diploma in Computer Aided
P: Secretariat Administration
Chief Typist

Oduaran, Mr. I. E.
ND. HND, (Idah), MNSE
P: Senior Technologist

Oduntan, Mr. K. O.
HND, MNSE
P: Assistant Chief Technologist

Oduyiga, Mrs. J. F.
PGD, HND, ND
P: Technologist II

Ogunbodede, Mrs. A. M.
OND, HND
P: Technologist I

Ogundero, Mrs. F. A
Diploma in Desktop Publishing & Graphics Designs, 50 w .p.m Typewriting, Govt. Class IV Certificate
P: Chief Typist

Ogunlade, Mr. F. S.
HND
P: Technologist I

Ogunleye, Mr. O. M.
PGD.(LASU), HND (Bida), ND (Ad-Ekiti)
P: Principal Technologist

Ogunsanwo, Mr. G. O
Diploma Elect & Elect Engr. Maintenance
P: Senior Laboratory Supervisor

Ogunsipe, Mr. L. A.
M.E.C.P.PART I & II
P: Senior Technical Officer\

Ojesanmi, Mrs. S. O.
B.Tech (Ogbomoso), M. Sc. (Ibadan)
P: Technologist II

Ojetade, Mr. S. O.
G.C.E., Trade Test 11&111 Cert.
P: Senior Lab. Attendant

Ojewande, Mr. O.
H.N.D.
P: Technologist I

Okocha, Mr. A.P.
HND
P: Technologist I

Okolie, R. U.
B.Sc, M.P.A. (Lagos)
P: Principal Exec. Officer 1

Okorochukwu, Mrs. M. C.
B.A (Unilag)
P: Secretary

Okpei, Mr. J.
HND, PGD
P: Senior Technologist

Oladimeji, Mr. T. D.
HND, ND, SSCE
P: Technologist II

Oladipupo, Mr. O. O
G.C.E/O Level
P: Driver

Olaleye, Mr. S. A.
HND
P: Senior Technologist

Olanrewaju, Mrs. O. O.
B.Ed (G & C), M.Ed (Lagos)
P: Asst Chief. Data Entry Officer

Olaoye, Mr. A. B.
B.Sc., OND, SSCE/WAEC
P: Technical Officer

Olatunji, Mr. M. J
B.Sc.,
P: Research Technologist

Olawale, Mr. J. I
PGD HND
P: Technologist I

Olorunfunmi, Mrs. F. M. E.
Adv. Typewriting Pitman (London), Computer Application
P: Senior Data Processing Officer

Olowosulu, Mr. E. O
B.Sc.
P: System Administrator

Oloyede, Mrs. C. T. O
B.Sc (Zaria), MPIA (Lagos)
P: Faculty Officer

Olufiade, Mr. A. O.
WAEC (Tech.) Trade Test 1&11, 111. Trade Dip., Member Higher Techn. Officer, MNAEC. Higher
P: Technical Officer

Omojowo, Mr. O.
P: Boat Driver

Omoyele, Mrs. A. O.
Advanced Craft Cert.(Electronics) Trade Test Grade I (Electronics) WAEC Technical Cert.(Electronics)
P: Senior Technical Assist.

Onuoha, Miss. B. O.
B.Sc.
P: Research Technologist

Orebiyi, Mr. K. O.
OND, HND.
P: Senior Technologist

Orogbemi, Mr. M. O.
H.N.D, PGD
P: Technologist II

Otong, Mrs. G.P.U
Advanced Typewriting Pitman (NABTEB)
P: Senior Typist I

Otsemeuno, Mrs J. A.
WAEC, ND, Secretarial Studies, Advanced Dip. (Computer)

P: Senior Data Processing Officer

Oyebanji, Mr. L. A.
C & G Cert.
P: Technical Officer

Popoola, A. O.
HND
Senior Technologist

Quadri, Mr. W. S.
P: Senior Transport Officer

Saaka, Mr. Y.
HND
P: Principal Tech. Officer II

Salami, Mr. A. G.
OND, HND, PGD
P: Senior .Technologist

Sanusi, Mrs. S.
Diploma in Corporate Admin. & Registry Mgt
P: Chief Clerical Officer

Shittu, Mrs. R. M.
HND, NSE
P: Principal Technical Officer

Sulaimon, Mrs. K.
P: Office Assistant

Sulyman, Mr. L. A
ND. HND (Ilorin), Cert. in Wear Resistant Castings, (England), MNSE, R. Engr., MBA (Ado-Ekiti)
P: Asst. Chief Technologist

Surakat, Mr. S. A.
SSCE
P: Welding Technician

Taiwo, O. K.
OND, HND
P: Technologist I

Udeh, Mr. P. M.
GCE O/L, 50 WPM
Typewriting
P: Senior Typist I

Ugwuozor, Mr. J. O.
WASC, C&G O' and A Levels, Nig. Railway's Training Certificate
P: Senior Lab. Supervisor

Frequently Asked Questions

(1) How do i register for the new session?

Answer: Click on Student login and enter your username and password. Your username is your Matric No or your JAMB Reg No and your password is your surname for login in for the first time. Your registration for the new session can be done at this interface

(2) How do i make payment for my school fee?

Answer: School Fee payment can be made either by BANK PAYMENT (Go to any of the University's designated banks nation wide to make payment - Zenith, UBA, Wema, Intercontinental, First Bank & Union Bank) or WEB PAYMENT(procurement of an ATM /DEBIT CARD or CASHCARD

(3) What is the Maximum number of Course Units a student can register for in a semester?

Answer: 24 units

(4) Should a student proceed on Leave of Absence from academic activities without permission from the School Authority?

Answer: No. A student seeking to proceed on leave of absence for one reason or the other must write to the Dean through his/her Course Adviser and Head of Department requesting for approval to be away for a stated period of time.

(5) What is the maximum number of years a student can spend for a 5 year

Answer: 14 semesters or 7 sessions.

(6) What is the minimum pass mark for any course?

Answer: 40%

(7) If a student has some outstanding course units but in a 3rd class category, can he/she borrow courses to boost his/her CGPA?

Answer: Yes. The student can borrow approved Elective Courses from other departments.

(8) Is it important for students to attend lectures regularly?

Answer: Yes. A student must have attended at least 65% of lectures to be eligible to write an exam.

(9) What should a student do upon return from his/her approved leave of absence?

Answer: The student should write a letter of application for **Re-absorption** to the Dean through his/her Head of Department.

Note that a copy of the approval for the leave of absence should be attached to the application

(10) What is the procedure for extension of studentship by extra year students?

Answer: The student should write to the Director, Directorate of Academic Affairs Division through his/her Course Adviser, Head of Department and Dean. The application must contain the following information:

- Total course units taken
- Total course units passed
- Outstanding courses
- Current CGPA.

(11) What is the step to be taken by a rusticated student who is back to resume school after serving the rustication penalty?

Answer: The student should apply for re-admission through his/her Head of Department and Dean to the Director, Directorate of Academic Affairs Division.

(12) Who is a bonafide student of the University of Lagos?

Answer: A bonafide student is one who has been fully registered at the Admissions Office, the Faculty and Departmental levels, after which he/she is issued a matriculation number. In other words, without a matriculation number you are not a bonafide student of the University of Lagos.

Answer: Yes. The student can borrow approved Elective Courses from other departments.