

Department of Agricultural and Environmental Engineering
Obafemi Awolowo University, Ile-Ife, Nigeria
www.oauife.edu.ng



HANDBOOK

May, 2013

HISTORY OF THE UNIVERSITY

The history of university education in modern Nigeria dates from 1948, when the University College, Ibadan was established. For more than a decade that College remained the only University in Nigeria. Although the Eastern Nigeria Government had enacted a Law establishing the University of Nigeria, Nsukka in 1955, it was not until 1961 that that University came into existence.

In April 1959, the Federal Government appointed a commission under the chairmanship of Sir Eric Ashby, Master of Clare College, Cambridge, to survey the needs of post-secondary and higher education in Nigeria over the following twenty years. The Commission submitted its report to the Federal Government in September 1960. One of the most lasting results of the Commission was the establishment of three Universities in Nigeria between 1961 and 1962. One of these Universities was the University of Ife, now Obafemi Awolowo University, Ile-Ife. The Government of Western Nigeria first announced in 1960 its intention to establish, as soon as possible, a University in Western Nigeria that would be of the highest standard. Its policy would be to open its doors to students from all parts of the Federation and of the world.

The planning of the Obafemi Awolowo University was entrusted to two committees. The first was the University Planning Committee, comprising persons qualified to advise on the planning of a new University, and which in effect undertook the preparatory work involved in the establishment of the University pending the setting up of a Provisional Council. The other was a University Parliamentary Committee, which was advisory to the Minister of Education. On June 8, 1961 the Law providing for the establishment of the Provisional Council of the University was enacted, and the Council was formally inaugurated under the Chairmanship of Chief Rotimi Williams.

On June 11, 1970, the Government of the Western State, to replace the Provisional Council Law of June 8, 1961, promulgated the University of Ife Edict, 1970. This Edict was later amended by the Obafemi Awolowo University, Ile-Ife (Amended) Edict No. 11 of 1975 (Transitional Provisions). This new Edict effected a take over of the Obafemi Awolowo University by the Federal Military Government and established a Provisional Council as an interim governing body of the University which, subject to the general direction of the Head of the Federal Government, was to control the policies and finances of the University and manage its affairs. A Governing Council has since replaced this Provisional Council.

The site selected for the University was at Ile-Ife, a town about 80 kilometres northeast of Ibadan, in the Osun State, with a population of about 130,000. Ife is famous as the centre of an ancient civilisation and home of the Museum, which contains the renowned Ife heads. It was intended that temporary buildings should be put up on the site to enable teaching to commence in October, 1962, while the permanent buildings were being planned and erected. However, when the Federal Government transferred the Ibadan Branch of the Nigerian College of Arts, Science and Technology to the University, it was decided that it would not be necessary to put up temporary buildings at Ile-Ife and the University was temporarily located on the site of the Ibadan branch of the College.

Teaching began in October 1962 with an initial enrolment of 244 students. At that time, the teaching, administrative and technical staff, who had either transferred from the Nigerian College or were newly recruited from abroad, numbered about eighty.

The University started with five Faculties - Agriculture, Arts, Economics and Social Studies (now Social Sciences), Law and Science. New faculties have since been added, namely the Faculty of Education, established on October 1, 1967, the Faculty of Pharmacy established on October 1, 1969, the Faculty of Technology, established in 1970, and the Faculty of Administration which replaced the former Institute of Administration with effect from October 1, 1979. The Faculty of Health Sciences (now College of Health Sciences) was established on October 1, 1970 and the Faculty of Environmental Design and Management was established on April 6, 1982

In 1992, the University established a Collegiate System with five Colleges. The system did not function effectively and was abandoned after two years. However, the Postgraduate College and the College of Health Sciences were retained. The College of Health Sciences now comprises of the Faculties of Basic Medical Sciences, Clinical Sciences and Dentistry.

The Adeyemi College of Education located in Ondo and the Institute of Agricultural Research and Training in Ibadan were initially integral parts of the University. Although, the Adeyemi College was separated from the University in 1995, however, there is still a close relationship between the two institutions. The College offers the degree programmes of the University under a system that is closely monitored by the University Senate.

The Institute of Agricultural Research and Training, Ibadan, with a branch at Akure in Ondo State, used to be fully superintended by the Obafemi Awolowo University until its disarticulation from the University in 1991. However, the Akure branch and the College of Animal Science of the Institute continued to report to the Federal Government through the Director of the Institute. In terms of funding, the Institute of Agricultural Research and Training now relates to the Federal Ministry of Agriculture while the University still has administrative responsibility for the Research and Administrative staff of the Institution. The Director and the Secretary of the Institute are responsible to the University through the Vice-Chancellor and the Registrar respectively. The Vice-Chancellor is the Chairman of the Institute's Governing Board.

The following other institutes and major units exist in the University:

- The Natural History Museum
- The Institute of Ecology and Environmental Studies
- The Centre for Gender and Social Policy Studies
- The Centre for Industrial Research and Development
- The Institute of Public Health
- The Institute of Cultural Studies
- The Technology Planning and Development Unit
- The Computer Centre
- The Drug Research and Production Unit
- The Equipment Maintenance and Development Centre
- The Central Technological Laboratory Workshop
- The Central Science Laboratory
- The Distance Learning Centre

Finally, some other agencies over which the University has no direct, or, in some cases, limited control, have premises within the University:

- The Regional Centre for Training in Aerospace Surveys
- The National Centre for Technology Management
- The Centre for Energy Research and Development
- The African Regional Centre for Space Science and Education in English

MISSION, VISION, OBJECTIVES OF THE UNIVERSITY

i) Mission

To create a teaching and learning community for imparting appropriate skills and knowledge, behavior and attitude; advance frontiers of knowledge that are relevant to national and global development; engender a sense of selfless public service; and promote and nurture the African culture and tradition.

ii) Vision

The vision is of a top rated University in Africa, ranked among the best in the world, whose products occupy leadership positions in the public and private sectors of the Nigerian and global economy, that has harnessed modern technology, social, economic and financial strategies, built strong partnerships and linkages within and outside Nigeria and whose research contributes a substantial proportion of innovations to the Nigerian economy.

iii) Objectives

- (a) to provide facilities for learning, and to give instruction and training in such branches of knowledge as the University may desire to foster and in doing so to enable students to obtain the advantage of a liberal education;
- (b) to promote by research and other means the advancement of knowledge and its practical application to social, cultural, economic, scientific and technological problems;
- (c) to stimulate, particularly through teaching and research, interest in and appreciation of African culture and heritage;
- (d) to undertake any other activities appropriate for a University.

Members of the University

1. The Members of the University are –
 - (a) the Officers of the University;
 - (b) the members of the Council;
 - (c) the members of the Senate;
 - (d) the members of the academic staff;
 - (e) the graduates;
 - (f) the students; and
 - (g) such other persons as may by Statute be granted the status of members.
2. A person shall remain a Member of the University only so long as he is qualified for such membership under any of the sub-paragraphs of paragraph 1 of this Statute.

The Officers of the University

The Officers of the University are –

- (a) the Chancellor;
- (b) the Pro-Chancellor;
- (c) the Vice-Chancellor;
- (d) the Deputy Vice-Chancellor;
- (e) the Registrar;
- (f) the Librarian;
- (g) the Bursar; and
- (h) such other persons as may by Statute be granted the status of Officers.

The University Council (as amended by Decree No. 11 of 1993 and Decree 25 of 1996)

The Council consists of the following members.

- (a) the Pro-Chancellor
- (b) the Vice-Chancellor
- (c) the Deputy Vice-Chancellor
- (d) one person from the Federal Ministry responsible for Education;
- (e) nine persons representing a variety of interests and broadly representative of the whole Federation to be appointed by the National Council of Ministers;
- (f) four members of the Senate appointed by the Senate;
- (g) two members of the Congregation appointed by the Congregation
- (h) one member of the Graduates Association elected by the Graduates Association.

Establishment and Functions of the Council

- (1) There is hereby established for the University a Council to be known as the Council of the Obafemi Awolowo University Ile-Ife, the constitution and procedure of which shall, subject to the provisions of this Law, be in accordance with such provisions as may be made by Statute in that behalf.
- (2) The Council shall be the governing authority of the University and shall have

the custody, control and disposition of all the property and finances of the University and, except as may otherwise be provided in this Law and the Statutes, shall manage and superintend generally the affairs of the University and, in any matter concerning the University not provided for by or under this Law, the Council may act in such manner as appears to the best calculated to promote the interests, objects and purposes of the University.

- (3) Without limiting the generality of the provisions of sub-section (2) of this section, the Council, subject to the provisions of this law and the Statutes, shall have the following functions:-
- (a) to participate in the making, amendment or revocation of Statutes pursuant to the provisions of this law;
 - (b) to make, amend or revoke Ordinances pursuant to the provisions of this Edict.
 - (c) to govern, manage and regulate the finances, accounts, investments, property, business and all other similar affairs whatsoever of the University, and for that purpose to appoint bankers, solicitors and any other persons or agents as the Council may deem expedient, and to cause proper books of accounts to be kept of all sums of money received and expended by the University and of the assets and liabilities of the University in such manner as shall give a true and fair view of the state of affairs of the University and explain its transactions from time to time;
 - (d) to borrow money on behalf of the University;
 - (e) to invest any moneys belonging or appertaining to the University and not for the time being required to be expended for any of its purposes;
 - (f) to sell, buy, exchange, lease or accept leases or otherwise dispose of any real or personal property on behalf of the University;
 - (g) to provide and maintain the buildings, libraries, laboratories, premises, furniture, apparatus and other means needed for carrying out the work of the University;
 - (h) to enter into, vary, perform and cancel contracts on behalf of the University;
 - (i) to enter into agreements for the incorporation in the University of any other institution and for taking over its rights, property and liabilities and for any other purpose not inconsistent with any of the provisions of this law;
 - (j) to determine, in consultation with the Senate, all University fees;
 - (k) to establish, after considering the recommendation of the Senate in that behalf, Faculties, Institutes, Schools, Boards, Departments, and other units of learning and research; to prescribe their organisation, constitution and functions and to modify or revise the same;
 - (l) to authorise, after considering the recommendation of the Senate in that behalf, the establishments for the academic staff in the University, and, with the approval of the Senate, to suspend or abolish any academic post except a post created by this law or the Statutes;
 - (m) to authorise the establishments for the administrative staff and other staff in the University and to suspend or abolish any such posts other than posts created by this law or the Statutes;
 - (n) to make the appointments authorised by this law and the Statutes;
 - (o) to regulate the salaries and to determine the conditions of service of all staff employed by the University; provided that the salaries and conditions of service of the academic staff shall be regulated and determined in accordance with the recommendation of the Senate;
 - (p) to exercise powers of removal from office and other disciplinary control over the academic staff, the administrative staff and all other staff in the University;
 - (q) to institute, in consultation with the Senate, and subject to any such conditions as may be specified by the Council or the founders, as the case may be, Fellowships, Studentships, Scholarships, Bursaries, Prizes, Medals and other endowments and aids to study and research;

- (r) to promote and to make provision for research within the University.
 - (s) to call for reports from the Senate on any matter relating to instruction or teaching or any other academic matter within the University;
 - (t) to award Honorary Degrees and other distinctions in accordance with such provisions as may be made by Statute in that behalf;
 - (u) to supervise and control the residence and discipline of students of the University and to make arrangements for their health and general welfare;
 - (v) to provide for the welfare of all persons employed by the University and the wives, widows and dependants of such persons, including the payment to them of money, pensions or other retirement benefits and to subscribe to benevolent, superannuation or other similar funds for the benefit of such persons; their wives, widows and dependants;
 - (w) to perform all such other functions as are or may be conferred or imposed on the Council by this law, or by the Statutes, Ordinances and Regulations and to carry this law, the Statutes, Ordinances and Regulations into effect so far as they may concern the Council.
- (4) The Council may constitute boards, committees or other bodies for the purpose of making recommendations to the Council in respect of any of its functions conferred or imposed under or by virtue of this law.
- (5) The Council may delegate any of its functions conferred or imposed under or by virtue of this law to the Chairman or any other member or members thereof or to any body comprising such member or members and such other persons as the council may appoint:
Provided that:-
- (a) any such delegation shall be revocable at will and shall not preclude the council from exercising any of its functions under or by virtue of this law;
 - (b) the Council shall not so delegate its powers to participate in the making, amending or revocation of Statutes or to make, amend or revoke Ordinances.

The Senate

The University Senate consists of the following members –

- (a) the Vice-chancellor, who shall be the Chairman
- (b) the Deputy Vice-Chancellor;
- (c) the Professors of the University;
- (d) the Librarian of the University;
- (e) the persons for the time being holding such appointments on the academic staff of the University as may be specified by the Vice-Chancellor;
- (f) Twelve-full-time members of the academic staff of the University, other than those mentioned in sub-paragraphs (a) to (e) of this paragraph; elected by the Congregation.

Establishment and Functions of the Senate

- (1) There is hereby established for the University a Senate, the constitution and procedure of which shall, subject to the provisions of this Law, be in accordance with such provisions as may be made by Statute in that behalf.
- (2) The Senate shall, subject to the provisions of this Law and subject also to the powers reserved to the Council in all matters affecting the finances of the University, be the supreme academic authority of the University and be responsible for all academic matters in the University, and shall organise, control and direct the academic work of the University, both in teaching and research, and shall take such measures and act in such a manner as it thinks proper for the advancement of the University as a place of education, learning and research.
- (3) Without limiting the generality of the provisions of sub-section (2) of this section, the Senate, subject to the provisions of this Law and the Statutes, shall have the following functions:-

- (a) to formulate and establish the academic policy of the University and to advise the Council on the provision of facilities to carry out that policy;
- (b) to appoint the Deans of the Faculties in accordance with such provisions as may be made by Statute in that behalf;
- (c) to direct and regulate, after considering the views of the Boards of the Faculties concerned respectively, the instruction, teaching and courses of study within the University;
- (d) to regulate all University examinations, and after considering the recommendations of the Boards of the Faculties concerned respectively, to appoint University and External Examiners;
- (e) to regulate the admission of persons to the University and to courses of study in the University and their continuance or discontinuance in such courses and the conditions qualifying for matriculation and for admission to the various titles, degrees, distinctions and other awards offered by the University;
- (f) to award Degrees (other than Honorary Degrees) Diplomas, Certificates and other academic titles and distinctions to persons who shall have pursued in the University such courses of study as may be approved by the Senate and shall have passed such examinations of the University and satisfied such other conditions as may be prescribed by Regulations of the University;
- (g) to recommend to the Council, subject to the procedure prescribed by Senate, the names of persons for the award of Honorary Degrees or other University distinctions;
- (h) to determine what formalities shall attach to the conferment of degrees and other distinctions;
- (i) to determine, after considering the views of the Boards of the Faculties concerned respectively, what examinations and courses of study in other Universities or places of learning shall be deemed equivalent to examinations and courses of study in the University;
- (j) to formulate, modify or revise schemes for the organisation of the existing Faculties, Institutes, Schools, Boards, Departments or other units of learning and research in the University and to assign to them their respective subjects of study and also to make establishment at any time of other Faculties, Institutes, Schools, Boards, Departments or other units of learning and research or of abolishing, combining or sub-dividing any of them.
- (k) to review, refer back, control, amend or disallow any act of any Faculty, Institute, School, Board, Department or other academic body of the University and to give directions to any such body;
- (l) to recommend to the Council, subject to any such conditions as the Senate may wish to specify, or as may be laid down by the founders, as the case may be, the institution of Fellowships, Scholarships, Studentship, Bursaries, Prizes, Medals and other awards and to prescribe the mode of competition for, and to award, the same;
- (m) to promote research within the University and to require reports from time to time on such research;
- (n) to prepare estimates of expenditure required to carry out the academic work of the University and to submit them to the Council for approval;
- (o) to make recommendations to the Council on the establishments for the academic staff in the University and on the suspension or abolition of any posts in such establishments other than posts created by this Law and the Statutes;
- (p) to review from time to time the duties of all members of the academic staff and to make recommendations to the Council on their terms and conditions of service;
- (q) to be generally responsible for the administration of the University Library;
- (r) to promote and administer the extra-mural work of the University
- (s) to make recommendations to the Council concerning all University fees;

- (t) to require a student on academic grounds to withdraw from the University;
 - (u) to prescribe the academic dress to be worn by the various Officers or Members of the University, and the occasions on which it shall be worn;
 - (v) except as otherwise provided, to appoint representatives of the University on other bodies;
 - (w) to discuss and to declare an opinion on any matter whatsoever relating to the University and to report to the council on any matter referred to it by the council;
 - (x) to make, amend or revoke Regulations, and to participate in the making, amendment or revocation of Statutes and Ordinances;
 - (y) to exercise all such other functions as are or may be conferred or imposed on the Senate by this Law or by the Statutes, ordinances or Regulations and to carry this Law, the Statutes, Ordinances and Regulations into effect so far as they may concern the Senate.
- (4) The Senate may constitute boards, committees or other bodies for the purpose of making recommendations to the Senate in respect of any of its functions conferred or imposed under or by virtue of this Law.
- (5) The Senate may delegate any of its functions conferred or imposed under or by virtue of this Law to any member or members thereof or to any body comprising such member or members and such other persons as the Senate may appoint;
Provided that-
- (a) any such delegation shall be revocable at will and shall not preclude the Senate from exercising any of its functions under or by virtue of this Laws;
 - (b) the Senate shall not delegate its powers to participate in the making, amendment or revocation of Statutes or Ordinances or to make, amend or revoke Regulations, or to award Degrees, Diplomas, Certificates, fellowships, Scholarships, Exhibitions, Bursaries, Medals, Prizes, and other similar titles or distinctions.

THE FACULTIES

- (1) The University comprises of the following Faculties-
- (a) Faculty of Administration;
 - (b) Faculty of Agriculture;
 - (c) Faculty of Arts;
 - (d) Faculty of Education;
 - (e) Faculty of Environmental Design and Management
 - (f) Faculty of Law;
 - (g) Faculty of Pharmacy;
 - (h) Faculty of Science;
 - (i) Faculty of Social Sciences;
 - (j) Faculty of Technology
 - (k) Faculty of Basic Medical Sciences
 - (l) Faculty of Clinical Sciences
 - (m) Faculty of Dentistry
- (2) The Senate shall prescribe which Departments and subjects of study shall form part or be the responsibility of each of the Faculties. A Department or subject of study may, if the Senate so directs, form part or be the responsibility of more than one Faculty.
- (3) The membership of each Faculty Board consists of the following –
- (a) the Vice-Chancellor;
 - (b) the Deputy Vice-Chancellor;
 - (c) the Dean of the Faculty;
 - (d) the Professors and Heads of the Departments comprising the Faculty;

- (e) such other full-time members of the academic staff of the Departments comprising the Faculty as the Senate may determine after considering the recommendation of the Faculty Board;
- (f) such other Professors and other Heads of Departments as the Senate may determine after considering the recommendation of the Faculty Board;
- (g) such other persons within or outside the University as the Senate may appoint after considering the recommendation of the Faculty Board.

ORGANIZATION AND ADMINISTRATION OF THE UNIVERSITY

The Vice-Chancellor is the Chief Executive Officer of the University and five other Principal Officers of the University, namely; the Deputy Vice-chancellors (2), the Registrar, the University Librarian and the Bursar report to him. The University Librarian is in charge of the University Library while the Bursar takes charge of the University finances. The Registrar is the Secretary to Council and the Chief Administrative officer of the University and he assists the Vice-chancellor in the day-to-day administration of the University. He is also the Secretary to Senate and heads the Registry, comprising the Directorate of Academic Affairs, the Directorate of Council Affairs, Division of Corporate Services and the Director of Personnel Affairs. The Planning, Budgeting, Monitoring/Management Information System Unit takes care of the academic planning, budgeting and monitoring needs of the University and is under the Vice-Chancellor's Office.

The University Central Administration also includes some Units providing common services. They are Medical and Health Services, the Division of Maintenance Services, the Physical Planning and Development Unit and the Computer Centre, Heads of these units report to the Vice-Chancellor.

THE CONGREGATION

1. The Congregation comprises of :-
 - (a) the Vice-Chancellor, who shall be the Chairman;
 - (b) the Deputy Vice-Chancellor;
 - (c) all full time members of the academic staff;
 - (d) the Registrar;
 - (e) the Bursar;
 - (f) every member of the administrative staff who holds a Degree of any university, recognised for the purposes of this Statute by the Vice-Chancellor, not being an Honorary Degree.
2. It shall be the functions of Congregation:-
 - (a) to discuss and declare an opinion on any matter whatsoever relating to the University, including any matters referred to it by the Council or the Senate;
 - (b) to communicate directly with the Council or the Senate on any matter affecting the university;
 to receive information from time to time on the state of the University from the Vice-Chancellor.

INFORMATION ON FACILITIES

HEZEKIAH OLUWASANMI LIBRARY

Plan of the Library

The Library consists of the North and South wings, which are connected by walkways on two levels.

Membership

Membership of the Library is available, on completion of a registration card, to all students, members of the senior staff of the University and such other persons as may be determined by the Library Committee or the University Librarian on behalf of it.

Students are required to renew their registration at the beginning of each academic year. Library Cards and Borrower's Tickets are not transferable; books issued on them remain the responsibility of the person whose name appears on them.

A lost Library Card or Borrower's Ticket may be replaced on submission of a written application.

The Library Collection

Hezekiah Oluwasanmi Library now contains over 380,000 volumes. It consists of two main areas:

- (i) The Undergraduate Areas and
- (ii) The Research Areas.

1. Serials Collection

The Serials Collection consists of:

Current journals, the most current issues of which are shelved in the display section of the Serials Room.

- a) Latest backfile i.e. the latest 10 years of journals which are on open access to registered senior staff and postgraduate students.
- b) Older backfiles i.e. journals older than ten years are on closed access to all categories of readers who must obtain and complete request forms at the serials hatch.

2. Africana Special Collection

The Africana Special Collection is a collection of rare and other books of primary interest to people whose fields of interest are in African Studies. Staff publications and theses submitted for higher degrees of the University as well as of other Universities are also housed there. The Collection is closed access.

3. Documents Collection

The Documents Collection includes official publications of the Federal Government of Nigeria, the old regional governments, the present state governments and the Federal Capital Territory. It also includes publications of other African governments and international organizations.

4. Reference Collection

Dictionaries, encyclopedia, handbooks, directories, atlases, University Calendars, etc. are shelved in the Reference Room. Bibliographies, indexes and abstracts are available in the Bibliography Room. Reference books do not ordinarily circulate. A newspaper clippings file (post-October, 1985) and a vertical file of reprints and other pamphlet type materials are kept in the Reference Room.

5. Reserve Collection

i) Day reserve collection

Multiple copies of textbooks, particularly some of those recommended for specific courses, are shelved in the Reserve Books Room on Floor 3 North Wing East.

ii) Two-Hour Reserve

Some other materials, periodical articles in particular, are placed on 2-hour reserve. These may be obtained on request (signature and seat number required) and retained for a period of two hours at a time, subject to renewal, provided other readers have not demanded the materials.

6. Recent Acquisitions

A selection of books added to the Library stock is normally displayed for several days before being put in the main collection. The books may not be borrowed while on display but may be reserved at the Loans Desk.

Catalogues

A library catalogue is a finding list of books and other materials available in the Library. The following catalogues can be found in the Catalogue Hall:

- (i) The Author/Title Catalogue
- (ii) The Subject Catalogue
- (iii) The Shelf List
- (iv) The Serials Catalogue
- (v) The Documents Catalogue

How to Borrow a Book

When you have found the book you want to borrow, you will be required to sign your name and address on the book card provided in duplicate. You must surrender a Borrower's Ticket for each book borrowed. When you return a book, you must ensure that you received your Borrower's Ticket back immediately.

Reservation

A book can be reserved by filling a reservation slip; in which case, it will not be renewed for the present borrower when returned, and, if it is already overdue, it will be recalled at once.

Inter-Library Loan

If the book you require is not in stock, it is often possible to borrow it from another library. This service is dependent on goodwill and co-operation between libraries, and readers who benefit from it are required to observe the regulations applying to each loan.

Photocopying Services

Within the limitations imposed by copyright, the library is able to supply readers with photocopies of periodical articles and parts of books at moderate charges.

Penalties for Overdue or Lost Books

Penalties for overdue books will be imposed as follows:-

- a) N5,00 per day for the first 30 days, thereafter, all loan privileges will stop.
- b) Books specially recalled by the University Librarian will attract a fine of N10,00 per day after the third day from the date of recall.
- c) Books lost or damaged will attract a fine five times the current cost of the books.
- d) No student will be allowed to attend the Graduation Ceremony or receive his/her certificate without a clearance certificate from the University Library to the effect that no book or fine is outstanding against him or her.

DIVISION OF STUDENTS' AFFAIRS

1. Guidance and Counselling Unit:

The Division of Student Affairs has Professional Counsellors who are committed to helping students grow in self-understanding in the process of integrating their personal and academic experiences. The services are free to students and are confidential (i.e. not used as part of his/her other University records). The services include personal counselling, group counseling, study skills improvement, tests anxiety reduction, personal crisis intervention, psychological testing, career and occupational counseling and settlement of grievances between students. Where necessary, consultations are made with campus organizations, specialist and academic Departments, to ensure that students' problems are resolved satisfactorily.

The Counsellors can be contacted at the Division of Student Affairs between 10.00 a.m. and 2.00 p.m. Monday to Friday.

2. Scholarship and Financial Assistance:

The Division of Students' Affairs serves as a link between students and sponsoring authorities, both within and outside Nigeria. Students are advised to check the Notice Boards in their respective faculties as well as those at the Division of Student Affairs Building for advertisements and other relevant information. Liaison is also maintained between students and governments at various levels for scholarship and bursaries.

EXAMINATION RULES AND REGULATIONS

Registration for University Examinations

- a) A candidate for a University examination must have registered for the courses in the prescribed format not later than the closing date prescribed for registration for such courses. Any candidate who fails to register for courses at the appropriate time as prescribed by Senate will not be allowed to take any examination in such courses. Any candidate who fails to register for courses at the appropriate time as prescribed by Senate will not be allowed to take any examination in such courses. Any examination taken without course registration shall be null and void.
- b) Students who register for courses are committed to the number of units registered for and are expected to take examinations in such courses. If a student failed to take an examination he would be scored 'OF' for the number of units he had registered for and in which he had failed to take the prescribed examination.
- c) Any student who does not have any course or courses to offer in a particular semester should apply for leave of absence.
- d) A candidate who has less than 15 units in a particular semester to graduate should apply to his/her Faculty Board for permission to register for less than 15 units. Failure to do so constitutes a breach of regulation which may result in the non-processing of the candidate's results.
- e) A candidate who cannot register for courses during the prescribed period for registration because of an illness, must ensure that medical report on his illness is forwarded by him or his parents/sponsors to reach the Dean of his Faculty not later than four weeks after the end of the normal registration period as scheduled in the University Calendar. Such a medical report should be forwarded for authentication by the Director of Medical and Health Services for it to be considered valid. Such a candidate shall be exempted from the penalties of late registration. All applications should be routed through the Head of Department.
- f) Students must attend a minimum of 75% of course instructions including lectures, tutorials and practicals where required to qualify to sit for examination in any course.
- g) A candidate for a university examination in a particular degree programme should not be a regular candidate for another degree in this or any other university concurrently. Any candidate so discovered shall forfeit his/her studentship.

Absence from Examination

Candidates must present themselves at such University examinations for which they have registered. Candidates who fail to do so for reason other than illness or accident shall be bound by the following regulations:

- a) Any student who fails to register for courses during one semester without permission should be deemed to have scored "0F" in the minimum number of units required for full time student (i.e. 15 units.)
- b) Candidates who registered for courses, attended classes regularly, did all practicals and tests but did not take required Semester examinations should be given a continuous assessment grade in each of the affected courses and a grade of "O" in the examination which they should have taken, but which they did not take.
- c) Candidates who have less than 15 units to graduate but who fail to take the required examinations should be deemed to have scored "0F" in the outstanding courses only provided such candidates are permitted to register for less than 15 units.
- d) Any candidate who on account of illness, is absent from a University examination may be permitted by the Senate on the recommendation from the appropriate Faculty Board, to present himself for such examination at the next available opportunity provided.
- e) A full-time student in the University shall report any case of illness to the University Health Centre at all times.
- f) When a student falls ill during examination he should first report to the Director, Medical and Health services before attending any hospital outside the University. A report of sickness should be made to the Registrar within a week and a medical certificate for validation of his illness within three weeks.
- g) When a student falls ill before an examination he shall be under an obligation to send a medical report countersigned by the Director, Medical Health Services within one week of such illness. Any time outside this period, shall be considered on its own merit.
- h) The Director of Medical and Health Services should, within 48 hours, submit a medical report on a candidate who is ill during an examination and is taken to the Health Centre or referred by it to the hospital for treatment.
- i) A candidate applying for leave of absence on medical grounds must forward his application together with a medical report to the Dean of his Faculty through his Head of Department. The Medical report must be countersigned by the Director of Medical and Health Services. All applications for Leave of Absence must be taken by the appropriate Faculty Board.

EXAMINATION OFFENCES AND PENALTIES

i) Examination Offences

- (a) A candidate shall not be allowed during an examination to communicate by word or otherwise with any other candidates nor shall he leave his place except with the consent of an invigilator. Should a candidate act in such a way as to disturb or inconvenience other candidates, he shall be warned and if he persists he may, at the discretion of the invigilator, be excluded from the examination room. Such an action by the invigilator must also be

reported in writing through the Head of Department to the Vice-Chancellor within 24 hours.

- (b) It shall be an examination offence for any student, staff or any person whatsoever to impersonate a candidate in any University examination. Any student or staff of the University found guilty under this regulation shall be subjected to disciplinary action by the appropriate authority of the University. The candidate impersonated shall also be liable of an infraction of this regulation where it is established directly from circumstantial evidence that the impersonation is with his knowledge or connivance.
- (c) No candidate shall take into an examination room, or have in his possession during an examination any book or paper or printed or written documents, whether relevant to the examination or not, unless specifically authorized to do so. An invigilator has authority to confiscate such documents.
- (d) Mobile phones are not allowed in examination halls.
- (e) A candidate shall not remove from an examination room any papers, used or unused, except the question paper and such book and papers, if any, as he is authorized to take into the examination room.
- (f) Candidates shall comply with all “direction to candidates” set out on an examination answer book or other examination materials supplied to them. They shall also comply with direction given to them by an Invigilator.
- (g) Candidates shall not write on any paper other than the examination answer books. All rough work must be done in the answer books, and crossed out neatly. Supplementary answer books, even if they contain only rough work must be tied inside the main answer books.
- (h) When leaving the examination room, even if temporarily, a candidate shall not leave his written work on the desk but he shall hand it over to an invigilator. Candidates are responsible for the proper return of their written work.
- (i) Smoking shall not be permitted in examination room during examination sessions.
- (j) Any candidate or staff who attempts in any way to unlawfully have or give pre - knowledge of an examination question or to influence the marking of scripts or the award of marks by the University Examiner shall be subjected to disciplinary action by the appropriate authority of the University.
- (k) If any candidate is suspected of cheating, receiving assistance assisting other candidates or of infringing any other examination regulation, a written report of the circumstance shall be submitted by the invigilator to the Vice-Chancellor within 24 hours of the examination session. The candidate concerned shall be allowed to continue with the examination.
- (l) Any candidate suspected of examination malpractice shall be required to submit to the invigilator a written report immediately after the paper. Failure to make a report shall be regarded as a breach of discipline. Such report should be forwarded along with the invigilator’s report to the Vice-Chancellor.

- (m) Where a Head of Department fails to forward a report on examination malpractice to the Vice-Chancellor such action would be considered as misconduct.
- (n) Where the Vice-Chancellor is satisfied on the basis of the reports forwarded to him that any candidate has a case to answer, he shall refer the case to the Central Committee on Examination Malpractice.

ii) Penalties for Examination Malpractice and Other Offences

- (a) Any examination offence would attract appropriate penalty including outright dismissal from the University.
- (b) Where the Vice-Chancellor has reason to believe that the nature of any question or the content of any paper may have become known before the date and time of the examination to any persons other than the examiners of the paper, the Board of Examiners, and any official of the University authorized to handle the paper, he may order the suspension of the examination or the cancellation of the paper or setting of a new paper and shall report the matter to the senate. The Vice-Chancellor shall also take any disciplinary measure against any student or students involved, as he may deem appropriate.
- (c) If in the opinion of an invigilator, circumstances arise which render the examination unfair to any candidate he must report the matter to the Vice-Chancellor within 24 hours after the examination. Where such matter is reported to the Vice-Chancellor he may take such action as he deems fit. If he directs that another examination be held, that examination shall be the examination for the purpose of this regulation.
- (d) Any candidate or member of staff may complain to the Vice-Chancellor that an examination has been improperly conducted. The Vice-Chancellor shall investigate the complaint and report the result of his investigation to the Senate which shall take such action as it may deem appropriate, including with-holding a result or deprivation of the award of a degree, diploma etc as laid down in Statue 17. However where it is shown to the satisfaction of the Committee of Deans that any alteration or amendment of a University regulation involving a change in a course or study or in examination requirements has caused hardship to a candidate in any examination, the Committee of Deans shall make such provisions as it thinks fit for the relief of each hardship and report same to Senate.

THE COURSE UNIT SYSTEM AND COMPUTATION OF GRADE POINT AVERAGE (CGPA)

Levels of Performance

i. A candidate shall be recorded as having attained in a course a level of achievement graded as follows:

I	-	Incomplete	
A	-	Excellent	70-100%
B	-	Very good	60-69%
C	-	Good	50-59%
D	-	Satisfactory	45-49%
E	-	Adequate	40-45%
F	-	Failure	39% and below
W	-	Withdrawal	

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

A	-	5 credit points per unit
B	-	4 credit points per unit
C	-	3 credit points per unit
D	-	2 credit points per unit
E	-	1 credit point per unit
F	-	0 credit point per unit

The grade point average is the total number of credit points divided by the total number of units for all courses taken during a particular semester.

HISTORY OF THE FACULTY OF TECHNOLOGY

The Faculty of Technology was established in 1970 with the following Departments:

- i. Department of Agricultural Engineering
- ii. Department of Chemical Engineering
- iii. Department of Computer Science
- iv. Department of Electronic and Electrical Engineering
- v. Department of Food Science and Technology

The growth of the Faculty during the first ten years of its life may appear tremendous on cursory examination. It is therefore necessary to explain the philosophy and the need for the growth. At the time the Faculty of Technology at Ife came into existence, the University set itself the goal of developing areas of Engineering and Technology that were not adequately covered by existing University programmes in the country. This was why it started by first developing programmes in Agricultural Engineering, Chemical Engineering, Computer Science, Electronic Engineering, Food Science and Technology and Estate Management.

It was however realized from the beginning that by the time the programme in Agricultural Engineering is fully developed, considerable amount of equipment would have been accumulated for teaching the science and practice of Civil and Mechanical Engineering. Furthermore for the development of postgraduate courses in Agricultural Engineering, it is necessary to have well developed Department of Mechanical and Civil Engineering. It thus became clear that these traditional areas of Engineering needed to be developed. In 1977 the University decided to nurture Civil Engineering in the Department of Agricultural Engineering and Mechanical Engineering in the Department of Chemical Engineering.

The Department of Electronic and Electrical Engineering offered initially a programme in Electronic Engineering. It was decided that in order to strengthen this programme it is necessary to develop the heavy current Electrical Engineering programme.

The demand for Metallurgical Engineers and Scientists in the country has increased tremendously in the last few years due to the very rapid growth of the metallurgical and allied industries and the progress in the industrialization of the country. Also, the search for minerals in various parts of the country has gained momentum in recent years and the need for local expertise in the evaluation and exploitation of minerals has become very urgent. These needs informed the establishment of the Department of Metallurgical and Materials Engineering in 1978. The Department cooperates with other Departments in the teaching and research on building materials and electrical/electronic materials.

The Technology Planning and Development Unit was established in 1974 primarily to conduct policy research on how to harness Science and Technology for Economic Development. Its establishment underscored the critical need for research capability and advisory capacity to assist government and other policy making-bodies in reaching decisions about the allocation and monitoring of resources for the development of scientific and technological capabilities in Nigeria

and in other less developed countries. By 1981/82 the then Department of Estate Management was developed into a separate Faculty of Environmental Design and Management, leaving the Faculty since then to be consisted of the following Departments and Unit:

- (i) Department of Agricultural Engineering
- (ii) Department of Chemical Engineering
- (iii) Department of Civil Engineering
- (iv) Department of Computer Science and Engineering
- (v) Department of Electronic and Electrical Engineering
- (vi) Department of Food Science and Technology
- (vii) Department of Mechanical Engineering
- (viii) Department of Metallurgical and Materials Engineering
- (ix) Technology Planning and Development Unit.

The entire Departments have now revised their programmes in line with current needs of the nation and global challenges.

HISTORY OF AGRICULTURAL ENGINEERING

The Department:

The Department of Agricultural Engineering at the Obafemi Awolowo University is part of the Faculty of Technology, which comprises nine departments with staff strength of over 100 academics. The Department collaborates closely in teaching and research with other Departments in the Faculty and with the Faculty of Agriculture. On the whole, the Department teaches two faculty courses in the Faculty of technology and services seven courses in the Faculty of Agriculture. The Department has workshop and laboratory facilities, which have helped to establish it as a foremost Department of Agricultural Engineering in Nigeria. Facilities for field experimentation and testing of agricultural implements exist at the University's Teaching and Research Farm, which is also on campus.

The Department is one of the five pioneer Departments of the Faculty established in 1970. Undergraduate teaching commenced immediately, under a five-year B.Sc. programme, while the postgraduate programme leading to either M.Sc. or Ph.D degrees was added in 1979. The foundation staffs of the department were employed in the Department of Plant Science (Faculty of Agriculture) until the creation of the Faculty of Technology.

The Department has close links with farmers, governmental and private agricultural establishments, agricultural and industrial research institutions, industry and fellow institutions. Our students normally undergo a total period of 6 months industrial training in these establishments during long vacations. This has enabled staff and students to keep abreast of current developments in agricultural engineering both in Nigeria and abroad. The Department is in the process of strengthening its computing and computer-aided learning facilities as well as capabilities in microelectronics studies. This is to enable the programmes give the students the required familiarity with a range of computer and microprocessor based techniques which are now essential for the modern agricultural engineer.

The current undergraduate student population of the Department stands at 160, with a postgraduate student population of 25, including 6 on the Ph.D degree programme. The undergraduate programme has since undergone several reviews with the most recent being in 1990 and 1996 when the present programme was put in place in line with the NUC Approved Minimum Academic Standard.

Philosophy of the Department

The desire of the department of Agricultural Engineering is to create a teaching and research environment for imparting appropriate skill and knowledge in Agricultural, food and rural

development in an environmental friendly and sustainable manner; conduct cutting edge researches that will advance frontiers of knowledge; contribute a substantial proportion of innovations and inventions in Nigerian agricultural system and pursuit of academic excellence to foster the development of food and agro-allied industries in Nigeria.

The mission of the Department in pursuit of its vision is to be among the top rated Agricultural Engineering Department in Nigeria and World at large; to imbibe in our students the right ethic, attitude and behaviour required of Engineers; to empower them academically and professionally for the creative and effective practice of Engineering in self employment, food and agro-allied industries, Government and other agencies involved in the management and regulation of agricultural, food and natural resources.

The Department has undergone several reviews which led to a change in the name of the Department from Department of Agricultural Engineering to the Department of Agricultural and Environmental Engineering with effect from 2010/2011 Academic Session. An upgraded and improved curriculum was also approved in addition to this name change.

The Undergraduate Programme:

Objectives

The objectives of the B.Sc. degree programme in Agricultural Engineering are:

- (a) To train engineers capable of applying engineering principles to agricultural mechanisation, crop production, preservation and storage, farm and agricultural business management, irrigation, farm structures and rural electrification.
- (b) To train engineers for the economic selection, optimum utilization, operation, maintenance and repair of labour saving equipment that are used in agriculture with the objective of maximizing the benefits derived from them.
- (c) To train engineers who can relate their activities to the needs of the society in general and to develop in them a sense of responsibility that is required for their professional work.
- (d) To identify the limitation of our students and to make a real effort to provide compensating measures.
- (e) To make continuing reappraisal of our curriculum to ensure its consistency with the goal of training the most productive agricultural engineer that the given parameters of time and financial outlay will permit.

The undergraduate programme in the Department of Agricultural Engineering covers the broad spectrum of the Agricultural Engineering field of practice. The graduate programme is a logical complement to the undergraduate programme with emphasis on specialisation in specific areas.

The undergraduate programme is broad-based and prepares the students for a wide range of opportunities in agriculture and all agricultural engineering-related industries. The students have two possible options in the final year namely, the Farm Machinery/Crop Processing and Storage; and the Farm Structures and Environment/Soil and Water Engineering options. Each student undertakes a Design and Research project, in his/her final year, which emphasises the creative nature of agricultural engineering, challenges their individual industry and originality and draws the whole course together by utilizing the taught material. It is the combination of fundamental engineering analyses, knowledge of challenges of tropical agriculture, practical awareness, creativity and familiarity with new emerging technologies that gives our programme its distinctiveness and makes our graduates attractive to prospective employers.

Admission Requirements

(a) U.M.E. Entry

The minimum requirements for admission to courses leading to a B.Sc. Degree in the Department of Agricultural Engineering are those for entry into the Faculty of Technology. Candidates are required

to have credits in five subjects at SSS or WASC level (or at GCE "O" Level) including Mathematics, Physics, Chemistry and English Language.

(b) **DIRECT Entry**

Admission to Part II is possible for candidates who in addition to meeting the Faculty General Admission Requirements, have good passes in two Advanced Level of the GCE (or equivalent) in Physics, Pure Mathematics or Applied Mathematics or Chemistry, or approved equivalent qualifications; such as the Ordinary National Diploma (Upper Credit) in relevant fields. HND holders may be admitted to Part III.

Graduation Requirements

To be eligible for a degree, a student must satisfactorily complete a minimum of 198 units including the following:

- (i) 12 units of Special Electives.
- (ii) 32 units of Part I Physics, Chemistry and Mathematics courses comprising MTH 101, MTH 102, MTH 104, PHY 101, PHY 102, PHY 107, PHY 108, CHM 101 and CHM 102.
- (iii) 68 units of Agricultural Engineering courses, excluding Industrial Training.
- (iv) 9 units of Chemical Engineering courses comprising CHE 201, CHE 305 and CHE 306.
- (v) 5 units of Civil Engineering courses comprising CVE 202, CVE 401.
- (vi) 5 units of Computer Science courses comprising CSC. 201 and CSC. 208.
- (vii) 6 units of Electronics and Electrical Engineering courses comprising EEE 201, EEE 202, EEE 291 and EEE 292.
- (viii) 8 units of Part II Mathematics courses comprising MTH 201 and MTH 202.
- (ix) 19 units of Mechanical Engineering courses, comprising MEE 203, MEE 204, MEE 205, MEE 206, MEE 303, MEE 305, MEE 306, MEE 395 and MEE 396.
- (x) 6 units of Materials Science and Engineering courses, comprising MSE 201 and MSE 305.
- (xi) 7 units of Technology Planning and Development courses, comprising TPD 101, TPD 501, TPD 502 and TPD 503.
- (xii) 15 units of Industrial Training courses, comprising AGE 200, AGE 300 and AGE 400.
- (xiii) 6 units of Faculty of Agriculture courses, comprising PSC. 305, ANS 306 and AXR 509.

The Postgraduate Programme:

Objectives

The postgraduate programme is designed to be a logical complement to the undergraduate programme with emphasis on specialisation in specific areas. Specifically, the postgraduate programme is designed for Agricultural Engineering graduates or graduates of other engineering fields who wish to re-orientate their specialisation and are prepared to make up for deficiencies as their former training may not include relevant agricultural engineering subjects.

The programme which is normally by course work and research project is designed to equip the agricultural engineer with the necessary tools to deal with the problems of modernising Nigerian agriculture by giving him professional and academic expertise in one of the following areas:

- (a) Farm Power and Machinery
- (b) Post-Harvest Engineering
- (c) Soil and Water Resources Engineering
- (d) Farm Structures and Environmental Engineering.

Degrees

The Department of Agricultural Engineering offers an M.Sc. and a Ph.D degree programme. Each programme is based on course work and research:

- (i) M.Sc. Degree Programme:

- M.Sc. programmes will not take less than two semesters.
- (ii) M.Phil. Programme:
 - (iii) PhD. Programme:
The minimum period of duration of study for the PhD. degree shall be four semesters after M.Sc.

Admission Requirements

- (i) Candidates for the M.Sc. programme must have at least a B.Sc. Second Class (Honours) Lower Division degree in Agricultural Engineering. Candidates with Second Class B.Sc. Honours degree in other fields of engineering may be considered for admission and such candidates will be required to make up for any deficiencies in their preparation. Candidates with Third Class will be admitted to the M.Sc. programme subject to passing a written examination in two B.Sc. courses in the relevant field into which M.Sc. admission is being sought.
- (ii) Candidates who have successfully completed the Postgraduate Diploma Programme in Obafemi Awolowo University with an average cumulative grade of B and above may be admitted into the M.Sc. programme. However, a candidate registered for the M.Phil. who has shown exceptional ability may at the beginning of the third semester be transferred to candidature for the Ph.D. according to the postgraduate regulations.
- (iii) Normally, only candidates who have obtained the degree of M.Sc. of this University in Agricultural Engineering may be registered for the Ph.D. programme.

Examinations

Examinations of all Agricultural Engineering subjects delivered as semester courses will consist of 3-hour papers. The candidates will sit for the examinations at the end of the respective semester.

- (a) Course work required for M.Sc. programme is a minimum of 21 course units including 4 core courses: AGE 601, AGE 602, AGE 603 and AGE 604, and at least 3 electives chosen in respective field of specialization.
- (b) Course work required for Ph.D. programme is a minimum of 30 units including whatever might have been taken earlier at M.Sc. level. The courses should include AGE 601, AGE 602, AGE 603 and AGE 604, and at least three courses in their chosen field of specialization. M.Sc. as well as Ph.D theses should be submitted at the end of the course.

An assessment of a thesis taken together with the performance of the candidate at an oral examination will be taken into account in recommending the award of the degree. Each candidate is required to give a Departmental seminar before graduation.

Research

The Department places considerable emphasis on research in tropical agriculture involving a wide range of work from long term fundamental research to equipment and systems development and testing especially for small-farmer agriculture and industry. Research laboratory, workshops, equipment and field facilities are available for carrying out research into the different aspects of agricultural engineering and related fields. The Department is equipped with instrumentation for mechanical, hydraulic, flow, thermal and other measurements. Metal and wood fabrication workshop facilities are available for building prototypes of machines and research rigs. Land is available on the University Research Farm for field experiments and the University Computer Centre equipped with modern high-speed computers facilitates data processing.

Current research work includes:

Planting and harvesting machinery for agricultural crops

Properties, processing and storage of tropical crops
Extraction of oil from oil-bearing seeds
Development of local farm structures materials
Modeling crop water use
Agricultural Wastes Management and the Environment

Students have the opportunity to work with staff in these areas through their projects. Staff publications on these subjects can be found in several Nigerian and International Journals.

LIST OF ACADEMIC STAFF

S/No	Name	Area of Specialisation, Qualification and COREN Status	Grade/Position
1.	Dr. O. K. Owolarafe	Farm Machinery and Processing B.Sc. (1989), MSc. (1999), Ph.D. (2007), MNIAE, MASAE, MNSE, Reg Eng R-7820, 1998	Reader & HOD
2.	Prof. G. A. Makanjuola	Farm power and Machine design B.Sc. (1962), Ph.D. (1967) FNSE, Reg. Engr. COREN R-0345, 1973	Professor Emeritus
3.	Prof. M. T. Ige	Farm Power and Crop Processing B.Sc. (1969), M.Sc. (1973), Ph.D. (1975) FNSE, FASAE, Reg Engr. COREN R-0966, 1977	Professor
4.	Prof. M. O. Faborode	Bioprocess Engineering and Machine Design B.Sc. (1978), M.Sc. (1983), Ph.D. (1986) FNIAE, FNSE, Reg Engr. COREN R-2204, 1984	Professor
5.	Prof. J. A. Osunade	Farm Structures and Environmental Engineering B.Sc. (1981) M.Sc. (1985), Ph.D. (1992) MNIAE, MNSE, Reg Engr. COREN R-2984, 1988	Professor
6.	Prof. O.A. Ajayi	Farm Machinery and Crop Processing B.Sc. (1976) Ph.D. (1983) MNIAE, MNSE, Reg Engr. COREN R-2425, 1985	Professor
7.	Prof. K. O. Adekalu	Soil and Water Resources Engineering B.Sc. (1983), M.Sc. (1988), Ph.D. (2001) MNIAE, MNSE, Reg Engr. COREN R-5545, 1993	Professor
8.	Prof. O. B. Aluko	Soil-Machine Dynamics/Interaction B.Sc. (1983), Ph.D (1989) MNIAE, MNSE, Reg Engr. COREN R-9533, 2002	Professor
9.	Dr. J. A. Osunbitan	Soil and Water Resources Engineering B.Sc. (1992), M.Sc. (1999), Ph.D. (2007) MNIAE, MNSE, Reg Engr. COREN R- 8145, 2000	Reader
10.	Dr. L. A. O. Ogunjimi	Farm Structures and Environmental Engineering B.Sc. (1976), M.Sc. (1984), Ph.D. (2007) MNIAE, MNIM, MNSE, Reg Engr. COREN R-4975, 1992	Senior Lecturer
11.	Mr. L. A. Sanni	Farm Machinery and Processing B. Sc. (1989), M.Sc. (1999), MBA (2001), MNIAE, MASAE, MNSE, Reg Engr. COREN R-9238, 2002	Senior Lecturer
12.	Dr. O. A. Aregbesola	Food Processing and Storage B.Sc. (1994), M.Sc. (2001), Ph.D. (2011) MNIAE, MASAE, MNSE, Reg Engr. COREN R- 9534, 2002	Senior Lecturer
13.	Mr. D. A. Okunade	Soil and Water Engineering B.Sc. (1995), M.Sc. (2004) MNIAE, MNSE, Reg Engr. COREN R-8997, 2002	Senior Lecturer

14. Dr. B. S. Oguinsina	Farm Power and Processing B.Sc. (1992), M.Sc. (1997), Ph.D. (2010) MNIAE, MNSE, Reg. Engr. COREN R-10264, 2004	Senior Lecturer
15. Dr. G. A. Ogunwande	Farm Structures and Environmental Engineering B.Sc. (1997), M.Sc. (2004), M.Sc. (2007), Ph.D. (2010) MNIAE, MNSE, AWMgr, Reg. Engr. COREN R- 12741, 2006	Lecturer I
16. Mr. O.B. Adeboye	Soil and Water Engineering B. Eng. (2001), M. Eng. (2005), MNIAE, Reg. Engr. COREN R- 16861, 2009	Lecturer I
17. Mr. A.O. Adegbenjo	Post Harvest Engineering B.Sc. (2002), MNIAE, M.Sc. (2012) MNIAE, Reg. Engr. COREN R- 23445, 2012	Lecturer II
18. Mr. G.A. Olatunde	Post harvest Engineering B.Sc. (2006), M.Sc. (2011)	Assistant Lecturer

LIST OF TECHNICAL STAFF

S/No	Name	Qualification	Grade/Position
1.	Mr. J. O. Ogunseeyin	HND (1988), PGD (2005)	Chief Technologist
2.	Mr. R.O. Ibrahim	Fed Craft Cert (1994), WAEC Tech Welding Craft Cert Part I (1993), OND (2001), HND (2004)	Higher Technical Officer

LIST OF ADMINISTRATIVE STAFF

S/No	Name	Qualification	Grade/Position
1.	Mrs. C. M. Ogundare	Sec. Mod. III Cert. (1975) Adv. Typing Cert. (50 wpm) (1985) Tech. Diploma (1980), EDP (2002)	Chief Typist

LIST OF ACADEMIC STAFF & RESEARCH FOCUS

1. **O. K. Owolarafe (Reader & Head of Department)**

Specialisation: Farm Machinery and Processing

Qualification: B.Sc. (1989), MSc. (1999), Ph.D. (2007)

MNSE, MASAE, MNIAE, Reg. Eng R-7820, 1998

Research Focus/Interest:

- (i) Investigation into the mechanics of palm oil expression.
- (ii) Development of appropriate palm fruit processing technologies for small and medium scale processors
- (iii) Development of a juice extractor for spondias mombiu
- (iv) Development of locust bean processing technologies
- (v) Development of an appropriate processing technologies for Okro
- (vi) Development of palm bunch harvester

E-mail: ooowolara@oauife.edu.ng, owolarafe@yahoo.com

2. **G. A. Makanjuola (Professor Emeritus)**

Specialisation: Farm Power and Machine Design

Qualification: B.Sc. (1962), Ph.D. (1967)

MNIAE, FNSE, Reg. Engr. COREN R-0345, 1973

Research Focus/Interest:

- (i) Mechanisation of cassava production
- (ii) Studies of some of the mechanical properties of cassava stems and roots
- (iii) Development of a machine for weeding overgrown cocoa plantations
- (iv) Development of machine for pruning palm fronds and for harvesting palm fruit bunches.
- (v) Processing and storage of roots and tuber crops

Significant Inventions and Innovations:

- Patents**
- (i) Differential Gear Devices British Patent No. 1,400,372
 - (ii) A machine for Mashing Food (Yam Pounding Machine) British Patent No. 1,401,508
 - (iii) A device for Planting Stem Cuttings British Patent No. 1,591,025

Machines Design and Development

- (i) A Machine for Preparing Pounded Yam and Similar Foods.
- (ii) A Chain Differential Unit
- (iii) A Machine for Shelling Melon Seeds and for Pre-cleaning the Cotyledons
- (iv) A Low Cost Machine for Decorticating Kenaf and Similar Fibre Crops.
- (v) A Mechanical Device for Lifting Cassava Roots
- (vi) A machine for Simultaneous Ridging and Planting of Cassava Stem Cuttings on the Ridge
- (vii) A machine for Cracking Conophur Nuts and Separating the Cotyledons from the Shells.

E-Mail: gmakanju@oauife.edu.ng

3. **M. T. Ige (Professor)**

Specialisation: Farm Power and Crop Processing

Qualification: B.Sc. (1969), M.Sc. (1973), Ph.D (1975)

MNIAE, FNSE, Reg. Engr. COREN R-0966, 1977

Research Focus/Interest:

- (i) Research in processing, handling and storage of local produce, such as yam tuber for storage yam into flow, palm oil, cassava and rice.
- (ii) Mechanization of some local crops.
- (iii) Studies into the physical and mechanical properties of some local varieties of tomatoes

Significant Inventions and Innovations:

Patents: M.T. Ige 1981, British Patent No 1,591,016 on Portable Planter

E-mail: mige@oauife.edu.ng

4. M. O. Faborode (Professor)

Specialisation: Bioprocess Engineering and Machine Design

Qualification: B.Sc. (1978), M.Sc. (1983), Ph.D (1986)

FNIAE, FNSE, Reg. Engr. COREN R-2204, 1984

Research Focus/Interest:

- (i) Biomaterial Properties and Bioprocess Engineering; with emphasis on the deformation mechanics of biomaterials, thermo-physical properties and conservation drying of tropical crops and products, and Machine design.
- (ii) Agricultural Technology Policy; with emphasis on machine commercialisation and diffusion of innovation, innovation and technical change in agriculture, environmental impact of agricultural mechanization.

E-mail: mfaborod@oauife.edu.ng, mfaborod@yahoo.co.uk

5. J. A. Osunade (Professor)

Specialisation: Farm Structures and Environmental Engineering

Qualification: B.Sc. (1981) M.Sc. (1985), Ph.D (1992)

MNIAE, MNSE, Reg. Engr. COREN R-2984, 1988

Research Focus/Interest: (i) Use of Lateritic Soils in Building and Allied Industries.
(ii) Thermal comfort in Livestock Housing

E-mail: jasunade@oauife.edu.ng

6. O. A. Ajayi (Professor)

Specialisation: Farm Machinery and Crop Processing

Qualification: B.Sc. (1976) Ph.D. (1983)

MNIAE, MNSE, Reg. Engr. COREN R-2425, 1985

Research Focus/Interest:

- (i) Investigation into the processing properties of the plantain
- (ii) Strength Characteristics of Melon Seeds.
- (iii) Investigation into the Processing Characteristics of the Cola Nut.
- (iv) Development of Low cost Incubator
- (v) Development of Sawdust fired Oven

E-mail: oajavi@oauife.edu.ng, oajavi2002@yahoo.co.uk

7. K. O. Adekalu (Professor)

Specialisation: Soil and Water Resources Engineering

Qualification: B.Sc. (1983), M.Sc. (1988), Ph.D. (2001)

MNIAE, MNSE, Reg. Engr. COREN R-5545, 1993

Research Focus/Interest:

- (i) Hydrology of Agricultural Watershed
- (ii) Investigation into the effect of organic matter on the compaction and soil-water properties of some Nigerian soils.
- (iii) Modelling of crop-yield under different soil, water, and field conditions
- (iv) Wastewater irrigation of some horticultural crops

E-mail: koadekalu2002@yahoo.co.uk

8. O. B. Aluko (Professor)

Specialisation: Soil Tillage and Agricultural Mechanization

Qualification: B.Sc. (1983), Ph.D. (1989)

MNSE, MNIAE, Reg. Engr. COREN R-9533, 2002

Research Focus/Interest:

(i) The mechanics of failure of brittle agricultural soils under different conditions of loading.

(ii) The design and development equipment for mechanizing traditional yam sets cultivation.

(iii) Investigation of hardwearing materials for use in the maintenance of oilseed Screw press components

E-mail: oaluko@oauife.edu.ng

9. J. A. Osunbitan (Reader)

Specialisation: Soil and Water Resources Engineering

Qualification: B.Sc. (1992), M.Sc. (1999), Ph.D. (2007)

MNSE, MNIAE, Reg. Engr. COREN R- 8145, 2000

Research Focus/Interest:

(i) Studies on the impact of agric. effluents on soil and ground water

(ii) Studies on nutrient uptake by plants

(iii) Studies on soil and groundwater contamination

iv) Investigation into the effects of Pesticides on soil and groundwater

(v) Solute transport in the soil environment.

E-mail: josunbit@oauife.edu.ng,

10. L. A. O. Ogunjimi (Senior Lecturer)

Specialisation: Farm Structures and Environmental Engineering

Qualification: B.Sc. (1976), M.Sc. (1984), Ph.D. (2007)

MNIAE, MNIM, MNSE, Reg. Engr. COREN R-4975, 1992

Research Focus/Interest:

(i) Materials of Construction

(ii) Livestock production structure and environment

(iii) Rural Infrastructure development

(iv) Waste and Wastewater management

(v) Storage of agricultural products

(vi) Solar energy use in livestock production and grain processing and storage

(vii) Environmental engineering

E-Mail: laogunjimi@yahoo.com.

11. L. A. Sanni (Senior Lecturer)

Specialisation: Bioprocess Engineering and Machine Design

Qualification: B.Sc. (1989), M.Sc. (1999), MBA (2001),

MNIAE, MASAE, MNSE, Reg. Engr. COREN R-9238, 2002

Research Focus/Interest:

(i) Determination of the physical, mechanical and aero-dynamic properties of tropical agricultural materials

(ii) Design and development of agro-processing equipment

- (iii) Automation of mechanical systems for optimizing agro-processing plants
 - (iv) Study of traditional/cultural practices in rural agro-processing.
 - (v) Development of cassava pellet processing extruder
 - (vii) Comparative evaluation of some properties of cassava chips and pellets
- E-mail:** lsanni@oauife.edu.ng, ldsanni@yahoo.com

12. O. A. Aregbesola. Mrs (Senior Lecturer)

Specialisation: Food Processing and Storage

Qualification: B.Sc. (1994), M.Sc. (2001), Ph.D. (2011)

MNIAE, MASAE, MNSE, Reg. Engr. COREN R- 9534, 2002

Research Focus/Interest:

- (i) Studies on processing, handling and storage of indigenous agricultural products (e.g. cassava, rice, sorghum, Roselle calyxes, Indian Almond kernels)
- (ii) Studies on drying/evaluating drying process of indigenous agricultural products.
- (iii) Studies relating to heat and mass transfer of agricultural products.

E-mail: tttaregbs@yahoo.com

13. D. A. Okunade (Senior Lecturer)

Specialisation: Soil and Water Resources Engineering

Qualification: B.Sc. (1995), M.Sc. (2004)

MNIAE, MNSE, Reg. Engr. COREN R- 8997, 2002

Research Focus/Interest:

- (i) Studies on the impact of cassava effluents on soil and groundwater
- (ii) Water Quality in Agro-processing Environment
- (iii) Water Quality in slaughterhouses and abattoirs

E-mail: dokunade@oauife.edu.ng, okunade2001@yahoo.com

14. B. S. Ogunsina (Senior Lecturer)

Specialisation: Farm Machinery and Processing

Qualification: B.Sc. (1992), M.Sc. (1997), Ph.D. (2010),

MNIAE, MNSE, Reg. Engr. COREN R-10264, 2004

Research Focus/Interest:

- (i) Studies on Cashew nut processing technology
- (ii) Studies on the properties of tropical crops and oil seeds
- (iii) Development of appropriate technologies for crop processing
- (iv) Application of Information Technology in Agriculture

E-mail: babsina@oauife.edu.ng, bsogunsina@yahoo.com

15. G. A. Ogunwande (Lecturer I)

Specialisation: Farm Structures and Environmental Engineering

Qualification: B.Sc. (1997), M.Sc. (2004), M.Sc. (2007), Ph.D. (2010),

MNIAE, MNSE, AWMgr, Reg. Engr. COREN R- 12741, 2006

Research Focus/Interest:

- (i) Solid waste management (treatment and disposal)
- (ii) Compost and biogas production techniques
- (iii) Farmstead planning and development
- (iv) Design and construction of poultry eggs incubators

E-mail: gbolawande@oauife.edu.ng; gbolawande@yahoo.com

16. **O.B. Adeboye (Lecturer I)**
Specialisation: Soil and Water Engineering
Qualification: B. Eng. (2001), M. Eng. (2005),
MNIAE, Reg. Engr. COREN R- 16,861, 2009
Research Focus/Interest:
(i) Agricultural water management
(ii) Water resources management and efficient utilization
(iii) Hydrological data simulation
E-mail: adeboyeob@oauife.edu.ng, adeboyeomotayo@yahoo.com
17. **A. O. Adegbenjo (Lecturer II)**
Specialisation: Post Harvest Engineering
Qualification: B.Sc. (2002), M.Sc. (2012),
MNIAE, Reg. Engr. COREN R- 23445, 2012
Research Focus/Interest:
(i) Studies of engineering properties of agricultural products
(ii) Design and development of size reduction and separation machines
E-mail: yemitoyin@yahoo.com
18. **G. A. Olatunde (Assistant Lecturer)**
Specialisation: Post Harvest Engineering
Qualification: B.Sc. (2006), MSc. (2011)
Research Focus/Interest:
(i) Studies on cashew nut processing technology
E-mail: olatunde.gbenga@gmail.com

SCHEDULE OF COURSES

(a) Undergraduate

PART I

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 101	Elementary Mathematics I	-	4 1 0	5
PHY 101	General Physics I	-	3 1 0	4
PHY 107	Experimental Physics 1A	-	0 0 3	1
CHM 101	Introductory Chemistry I	-	3 1 3	5
TPD 101	Technology and Society	-	1 0 0	1
SE	Special Elective	-	2 0 0	2
SE	Special Elective	-	2 0 0	2
SE	Special Elective	-	2 0 0	2
	Total		17 3 6	22

RAIN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 102	Elementary Mathematics II	-	4 1 0	5
MTH 104	Vectors and Applied Mathematics	-	2 0 0	2
PHY 102	General Physics II	-	3 1 0	4
PHY 108	Experimental Physics IB	-	0 0 3	1
CHM 102	Introductory Chemistry II	-	2 0 0	5
SE	Special Elective	-	2 0 0	2
SE	Special Elective	-	2 0 0	2
	Total		16 3 6	21

PART II

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 201	Mathematical Methods I	MTH 102	3 1 0	4
MEE 203	Engineering Drawing I	-	1 0 3	2
MEE 205	Engineering Mechanics I	-	2 1 0	3
CSC. 201	Computer Programming I	-	2 0 3	3
CHE 201	Introduction to Thermodynamics	-	2 1 0	3
EEE 201	Applied Electricity	PHY 102	2 0 0	2
EEE 291	Applied Electricity Laboratory I	-	0 0 3	1
MSE 201	Engineering Materials	-	2 0 3	3
SE	Special Electives	-	2 0 0	2
	Total		16 3 12	23

RAIN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 202	Mathematical Methods II	MTH 201	3 1 0	4
MEE 204	Engineering Drawing II	MEE 203	1 0 3	2
MEE 206	Engineering Mechanics II	MEE 205	2 1 0	3
CVE 202	Strength of Materials	MEE 205	2 0 3	3
CSC. 208	Computer Technology	CSC. 201	1 0 3	2
EEE 202	Applied Electricity II	EEE 201	2 0 0	2
EEE 292	Applied Electricity Laboratory II	EEE 291	0 0 3	1
AGE 202	Workshop Practice	-	1 0 3	2
SE	Special Elective	-	2 0 0	2
	Total		14 2 15	21

LONG VACATION

Course No.	Title of Course	Pre-Requisite/ Co-Requisite	L T P	Units
AGE 200	Students Workshop Experience Programme	-	0 0 9	3
	Total		0 0 9	3

PART III:

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MEE 303	Fluid Mechanics I	MEE 205/206	2 0 3	3
MSE 305	Mechanics of Materials	CVE 202	2 0 3	3
MEE 305	Mechanics of Machines I	MEE 206	2 0 0	2
MEE 395	Mechanics of Machines Laboratory I	MEE 206	0 0 3	1
AGE 307	Farm Electrification	EEE 202	2 0 3	3
AGE 305	Engineering Thermodynamics I	CHE 201	1 0 3	2
MEE 307				
PSC. 305	Crop Sc.ience		2 0 0	2
CHE 305	Engineering Analysis I	MTH 202	2 1 0	3
SE	Special Electives	-	2 0 0	2
	Total		15 1 15	21

RAIN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MEE 306	Mechanics of Machines II	MEE 305	2 0 0	2
MEE 396	Mechanics of Machines Laboratory II	MEE 395	0 0 3	1
AGE 302	Statistics for Engineers	-	2 0 0	2
AGE 304	Basic Soil Mechanics	MEE 303	2 0 3	3
AGE 306	Engineering Thermodynamics II	AGE 305	2 0 3	3
AGE 308	Agricultural Surveying	-	1 0 3	2
AGE 310	Farm Mechanics	-	1 0 0	1
ANS 306	General Animal Husbandry	CHE 305	2 0 0	2
CHE 306	Engineering Analysis II	-	2 1 0	3
SE	Special Elective		2 0 0	2
	Total		16 1 12	21

LONG VACATION

Course Code	Title of Course	Pre-requisite/ Co-requisite Course	LTP	Unit
AGE 300	Students Industrial Work Experience Scheme I	AGE 200	0 0 9	3
	Total		0 0 9	3

PART IV

HARMATTAN SEMESTER

Course Code	Course Title0	Pre-Requisite/ Co-Requisite	L T P	Units
AGE 401	Properties and Processing of Agricultural Materials	AGE 306	2 0 3	3
AGE 403	Hydraulics Engineering	MEE 303	2 0 3	3
AGE 405	Hydrology	MEE 303	2 0 3	3
AGE 407	Design of Agricultural and Food Processing Machines I	CVE 202	2 0 3	3
AGE 411	Introduction to Agricultural Structures Design	MEE 303	2 0 3	3
AXR 509	Introducing Technological change to	-	2 0 0	2
CVE 401	Agriculture	-	2 0 0	2
SE	Technical Report Writing Special Electives	-	2 0 0	2
	Total		16 0 15	21

RAIN SEMESTER AND LONG VACATION

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AGE 400	Students Industrial Work Experience Sc.heme II	AGE 300	0 0 27	9
CVE 410	Engineering Valuation		2 0 0	2
	Total		2 0 27	11

PART V

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AGE 501	Farm Machinery I		2 0 3	3
AGE 503	Design of Agricultural and Food Processing Machines II	AGE 407	2 0 3	3
AGE 505	Farm Structures Planning	AGE 411	2 1 0	3
AGE 507	Soil & Water Conservation	AGE 405	2 0 3	3
AGE 525	Design and Research Project I	-	0 0 6	2
AGE 509	Farm Power I	-	2 0 3	3
TPD 501	Industrial Economics	-	2 0 0	2
TPD 503	Industrial Law Management	-	2 0 0	2
	Total		14 1 18	21

RAIN SEMESTER (OPTION A)

Course Code	Course Title	Pre-Requisite/ Co-Requisite	<u>L T P</u>	Units
AGE 502	Farm Machinery II	AGE 501	2 0 3	3
AGE 504	Handling Agricultural Materials	AGE 401	2 0 3	3
AGE 510	Farm Power I	AGE 509	2 0 3	3
AGE 526*	Design & Research Project II	AGE 525	0 0 12	4
TPD 502	Technology Policy	-	2 0 0	2
	Any of the following Restricted Elective:			
	AGE 512 – Heat Transfer)			
	AGE 518 – Mechanical Systems)			
	Analysis)			
	AGE 520 – Automatic Control)		2 1 0	3
	AGE 522 – Hydraulic and)			
	Pneumatic Systems)			
	AGE 528 - Applied and Soil)			
	Mechanics)			
	AGE 530 - Energy in Agriculture)			
	Total		10 1 21	18

RAIN SEMESTER (OPTION B)

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AGE 504	Handling Agricultural Materials	AGE 401	2 0 3	3
AGE 506	Design of Environmental Control Structures	AGE 411	2 0 3	3
AGE 508	Irrigation and Drainage	AGE 507	2 0 3	3
AGE 526	Design & Research Projects II	AGE 525	0 0 12	4
TPD 502	Technology Policy	-	2 0 0	2
	Any of the following Restricted Electives:			
	AGE 514: Water Resource)			
	Development)			
	AGE 516: Water & Waste-Water)			
	Management)		2 0 0	3
	AGE 512: Heat Transfer)			

	AGE 528: Applied Soil Mechanics) AGE 530: Energy in Agriculture)			
	Total		10 0 21	18

PROGRAMME/DISCIPLINE/SUB-DISCIPLINE WORKLOAD BY STUDENT

RAIN SEMESTER

Grouping	Course No/Level	Course Subject	Pre-requisite
(b) Core/Compulsory Courses	AGE 202	Work Practice	-
	AGE 200	Students Work Experience Sc.heme	-
	AGE 302	Statistics for Engineers	-
	AGE 304	Basic Soil Mechanics	MEE 303
	AGE 306	Engineering Thermodynamics II	AGE 305
	AGE 308	Agricultural Surveying	-
	AGE 310	Farm Mechanics	-
	CVE 410	Engineering evaluation	-
	AGE 508	Irrigation and drainage	AGE 507
	AGE 502	Farm Machinery II	AGE 501
	AGE 504	Handling agricultural materials	AGE 401
	AGE 506	Design of environmental control structures	AGE 411
	AGE 510	Farm Power II	AGE 509
	AGE 526	Design and Research Project II	AGE 525
Electives/Optional Courses	AGE 512	Heat Transfer	-
	AGE 528	Applied Soil Mechanics	-
	AGE 518	Mechanical Systems analysis	-
	AGE 520	Automatic Control	-
	AGE 522	Hydraulic and pneumatic systems	-
	AGE 516	Water & Waste-water management	-
	AGE 528	Applied and Soil Mechanics	-
	AGE 530	Energy in Agriculture	-
AGE 514	Water resource development	-	

HARMATTAN SEMESTER

Grouping	Course No/Level	Course Subject	Pre-requisite
Core/Compulsory courses	AGE 305/ MEE 307	Engineering Thermodynamics	CHE 201
	AGE 307	Farm Electrification	EEE 202
	AGE 401	Properties and Processing of Agricultural materials	AGE 306
	AGE 403	Hydraulics Engineering	MEE 303
	AGE 405	Hydrology	MEE 303
	AGE 411	Introduction to Agricultural Structures Design	MEE 303
	AGE 407	Design of Agric and food processing machines I	CVE 202
	AGE 501	Farm Machinery I	-
	AGE 503	Design of Agric and food Processing Machines II	AGE 407
	AGE 505	Farm Structure Planning	AGE 411
	AGE 507	Soil and Water Conservation	AGE 405
	AGE 525	Design and research project I	-
	AGE 509	Farm Power I	-

(b) Postgraduate

All courses are of one semester duration.

CORE COURSES

Code	Course Title	Units
AGE 601	Design of Experiments in Agricultural Engineering	3
AGE 602	Instrumentation in Agricultural Engineering Research	3
AGE 603	Engineering Analysis	3
AGE 604	Systems Engineering	3

SPECIALISATION A: FARM MACHINERY

Code	Course Title	Units
AGE 611	Agricultural Machine Analysis and Design (Compulsory)	3
AGE 612	Advanced Farm Power and Machinery (Compulsory)	3
AGE 613	Production Techniques	3

Also as additional options, AGE 621 to AGE 626 from specialization B, AGE 631 from specialization C and AGE 644 from specialization D.

SPECIALISATION B: POST-HARVEST ENGINEERING

Code	Course Title	Units
AGE 621	Momentum, Heat and Mass Transfer (Compulsory)	3
AGE 622	Advanced Physical and Mechanical Properties of Agricultural Products (Compulsory)	3
AGE 623	Handling of Agricultural Materials and Processing Plants	3
AGE 624	Food Process Engineering	3
AGE 625	Storage Methods and Systems	3
AGE 626	Solar Engineering in Agricultural Processes	3
AGE 627	Advanced Heat Transfer	3
AGE 628	Refrigeration and Air Conditioning	3

Also as additional option, AGE 611, AGE 612, AGE 613 from specialization A and AGE 643, AGE 645 from specialization D.

SPECIALISATION C: SOIL AND WATER ENGINEERING

Code	Course Title	Units
AGE 631	Design and Operation of Irrigation Systems (Compulsory)	3
AGE 632	Drainage Principles and Design (Compulsory)	3
AGE 633	Hydraulic Design of Soil and Water Control Systems	3
AGE 634/ GLY 605/ CEG 643	Groundwater System Design	3
AGE 635	Water Resources Planning and System Analysis	3
AGE 636/ CEG 641	Agricultural Water-shed Management and Analysis	3
AGE 637/ CEG 642	Design of Dams	3
AGE 638/ CEG 655	Special Topics in Water Resources Engineering	3

SPECIALISATION D: FARM STRUCTURES AND ENVIRONMENTAL ENGINEERING

Code	Course Title	Units
AGE 641	Elements of Structural Analysis I (Compulsory)	3
AGE 642	Elements of Structural Analysis II (Compulsory)	3
AGE 643	Engineering Properties of Materials of Construction	3
AGE 644	Building Construction and Surveying	3
AGE 645	Farmstead Planning and Building Environment	3
AGE 646	Buildings and Environments for Crop Production	3
AGE 647	Buildings and Environments for Animal Production	3
AGE 648	Public Health Engineering	3

Also AGE 635 and AGE 633 from Specialization C and AGE 625 from Specialization B as additional options.

COURSE CONTENT

(a) Undergraduate

AGE 200: STUDENTS WORK EXPERIENCE PROGRAMME (0 0 9 = 3 unit)

To include an Introduction to Agricultural Engineering; definitions and scope of Agricultural Engineering. The importance of Agricultural Engineering, its relation to the agricultural industry and to the engineering profession. Aims and problems of Farm Mechanization.

AGE 202: WORKSHOP PRACTICE (1 0 3 = 2 units)

Workshop safety measures, Introduction to Workshop hand and powered tools emphasizing safety measures to be taken during operation. Workshop materials, various gauges and measuring devices. Tolerance of products. General description of the function and capabilities of grinding machines. Practice in grinding tools and drills. Function and capabilities of drilling machines, lathe machines, milling machines and shaping machines. Jigs, Fixtures, Practice in the use of the machines.

AGE 302: STATISTICS FOR ENGINEERS (2 0 0 = 2 units)

Statistical concepts, Normal distribution, Hypothesis testing. Analysis of Variance, Factorial experiments, Regression Analysis.

AGE 304: BASIC SOIL MECHANICS (2 0 3 = 3 units)

Introduction. Determination of index properties of soils. Soil water pressure (effective stress). Compaction of soils. Hydraulic and mechanical properties of soils. Shear and loading capability of soils. Slope stability and retaining walls.

AGE 305: ENGINEERING THERMODYNAMICS I (2 0 3 = 3 units)

Gaseous mixtures, combustion, Internal combustion, availability of power and refrigeration cycles. Internal combustion engines, compressors. Other methods of energy conversion, e.g. Fuel cells, thermoelectric generators.

AGE 306: ENGINEERING THERMODYNAMICS II (2 0 3 = 3 units)

Psychrometry, heating and cooling of moist air, dehumidification of moist air by sorbent materials. Principles of heat and mass transfer. Principles and practice of refrigeration and air conditioning.

AGE 307: FARM ELECTRIFICATION (2 0 3 = 3 units)

The use of electricity as a power source for lighting, comfort in living, farm production and processing. Planning the Farmstead Distribution system:- Demand load for Farm Buildings, Central Metering and distribution, Capacity of main service, selecting feeder conductors. Electrical and circuit protection. Electric motors: Motor rating and selection, measurement of motor characteristics. Stand by Power Units: Purpose and importance, stand - by generator type selection, maintenance and operation.

AGE 308; AGRICULTURAL SURVEYING (1 0 3 = 2units)

Types of surveys, classes of surveys, Instruments and care, measurement of distances - pacing, stadia, taping, electronic and photographic methods. Leveling - elevations. Earth's curvature and atmospheric refraction. The engineer's telescope, bubble tube, dumpy level, land level, level rods, automatic level, Field notes. Errors and corrections. Angles and directions - bearings and azimuths, magnetic compass and earth's magnetic field. Changes in declination, land surveying, topographic maps, introduction to photogrammetry.

AGE 310: FARM MECHANICS (1 0 0 = 1unit)

Shop tool selection, sharpening, care and their use. Wood working, concrete and masonry, iron working, black-smithing, welding, cutting and brazing. Glazing and sheet metal work. Repair and maintenance of tractors and farm machinery.

Building of equipment adaptable to farm shop construction.

AGE 401: PROPERTIES AND PROCESSING OF AGRICULTURAL MATERIALS (2 0 3 = 3units)

Physical and mechanical properties of agricultural materials. Thermal properties of agricultural materials. Moisture equilibration. Air movement. Drying (theory, thin layer, deep bed). Storage principles and practice. Class project.

AGE 403: HYDRAULICS ENGINEERING (2 0 3 = 3 units)

Fundamentals of fluid flow. Hydraulics of flow in close conduits, flow in open channels (including transitions and controls, also water measurements, hydraulic jumps). Hydraulic Model studies.

AGE 405: HYDROLOGY (2 0 3 = 3units)

Scope of hydrology, hydrologic cycle weather elements including precipitation, humidity, temperature and winds. Analysis of hydrologic data including statistical inferences. Infiltration and evapotranspiration. Stream flow, run off and hydrography analysis, routing in channels and reservoirs, Multipurpose dams and storage reservoirs. Groundwater analysis, water flow in soil and porous media.

AGE 407: DESIGN OF AGRICULTURAL AND FOOD PROCESSING MACHINES I (2 0 3 = 3units)

Philosophy of design. Components of design. Agricultural Machines: Types and functional requirements. Engineering materials. Stress and deflection analysis. Theories of failure. Design against failure. Detachable fasteners. Power screws. Shafting design. Design project.

AGE 411: INTRODUCTION TO AGRICULTURAL STRUCTURES DESIGN (2 0 3 = 3units)

Introduction to Agricultural Structures. Selection of materials in relation to use - wood concrete and masonry. Types of structural frames. Estimating loads; stress analysis. Introduction to structural design - philosophy of design, elastic and plastic design concepts. Reinforced concrete design. Design for axial loadings, design of beams and slab design of connections and joints. For all designs, wood steel and concrete are to be considered. Design project.

AGE 501: FARM MACHINERY I (2 0 3 = 3units)

Introduction, Types of farm machinery. Machine performance, costs of use of agricultural machinery. Farm operations: tillage, planting, cultivation, fertilizer and insecticide application, harvesting. Safe operation of agricultural machinery.

AGE 502: FARM MACHINERY II (2 0 3 = 3units)

The agricultural tractor: types, the P.T.O. drive, the Hooke d joint, hitch analysis, the effect of hitched implement on the tractor, implement penetration theory. Constructional features, force analysis and design considerations of various agricultural machinery used for tillage. Spraying and dusting, harvesting, etc. Class project.

AGE 503: DESIGN OF AGRICULTURAL AND FOOD PROCESSING MACHINES II (2 0 3 = 3units)

Mechanical power transmission: gear drives, belt drives, chain drives, ropes and hoists, springs, Bearings, Welding, Brakes, Clutches and Couplings: Vibrations. Design Project.

AGE 504: HANDLING AGRICULTURAL MATERIALS (2 0 3 = 3units)

Particle characteristic, size reduction separation, cleaning and sorting of agricultural produce. Maceration as applied to agricultural materials. Methods and equipment for handling of small and large lots of agricultural products. Design principles and materials for equipment construction/selection to include: elevators cranes, fork lifts, trucks, carts, etc. Class project

AGE 505: FARM STRUCTURES AND ENVIRONMENTAL CONTROL (2 1 0 = 3units)

Farmstead Planning and layout: Family housing, Livestock housing, Structures for farm products and food storage etc. Environmental Control and Structural requirements of crops and livestock. Water supply and sewage disposal.

AGE 506: Design of Environmental Control Structure (2 0 3 = 3 Units)

Review of basic structural components. Elementary structural analysis and design. Design of Environmental systems for plant and animal production. Determination and design for the environmental needs in farm building ventilation and refrigeration solar heat load, humidity control. Design of unit operation and processes in water and waste water treatment.

AGE 507: SOIL AND WATER CONSERVATION (2 0 3 = 3 Units)

Definition, ethics and scope of soil and water conservation. Classes, types, forms and significance of soil erosion. Classification, processes, factors, analysis and measurements of water erosion and wind erosion. Contouring, strip cropping, mulching and tillage practices - principles, design, efficiency and limitations. Principles, classification, design, construction, operation, maintenance, efficiency and limitations of terraces, vegetated water - courses, selected mechanical conservation structures, windbreaks and shelter belts. Principles, significance and classification of irrigation and drainage.

AGE 508: IRRIGATION AND DRAINAGE (2 0 3 = 3 Units)

Irrigation planning criteria. Design, construction, operation and maintenance of surface, sprinkler and trickle irrigation systems. Drainage planning criteria, Design, construction operation and maintenance of open channel and closed drainage systems.

AGE 509: FARM POWER I (2 0 3 = 3 Units)

Development of the tractor. Internal combustion engine cycles, efficiencies and operation. Fuels and combustion of fuels. Constructional features and operation of tractor engines - spark ignition systems, air/fuel systems, lubrication and lubricating systems. Engine cooling and cooling systems. Design of spark ignition and compression ignition engines

AGE 510: FARM POWER II (2 0 3 = 3 Units)

The tractor power transmission system, tractor stability analysis/mechanics of farm tractor chassis. Traction theory, human factors in tractor design and utilization, the tractor hydraulic system. Tractor testing, tractor selection, utilization and preventive maintenance. Tractor Power cost estimation.

AGE 512: HEAT TRANSFER (2 1 0 = 3 Units)

Modes of heat transfer, heat conduction equation in Cartesian, cylindrical and spherical coordinates. Steady state in one dimension. Thermal convection. Heat exchangers. Thermal radiation.

AGE 514: WATER RESOURCES DEVELOPMENT (2 1 0 = 3 Units)

Definition and scope of water resources development. Occurrence, uses, supply and demand. Methods of increasing availability. Flood control, navigation, water power, irrigation, water supply and recreation. Design, construction, operation and maintenance of farm ponds and reservoirs.

AGE 516: WATER AND WASTE-WATER MANAGEMENT (2 1 0 = 3 Units)

Water and wastewater inter-relationship, water and health-water-borne diseases. Elements of water chemistry, treatment processes for surface water and for groundwater design, fundamentals of water treatment systems and water distribution systems including storage, pumping and piping, Application of Hardy-Cross Analysis. Sources of wastewaters - industrial and domestic. Elements of wastewater microbiology. Wastewater collection, treatment, disinfections and disposal. A follow-through of a typical water (or wastewater) engineering project.

AGE 518: MECHANICAL SYSTEMS ANALYSIS (2 1 0 = 3Units)

Analysis of systems with single and multiple degrees of freedom. Three dimensional analysis, formulations and solutions of equations of motion of mechanical systems. Exact solutions to systems motion.

AGE 520: AUTOMATIC CONTROL (2 1 0 = 3Units)

Basic automatic control system. Servomechanism. Block diagram. Linear systems. Open and closed loop transfer functions. Measuring instruments and transducers.

AGE 522: HYDRAULIC AND PNEUMATIC SYSTEMS (2 1 0 = 3Units)

Design of hydraulic, and pneumatic systems for powering, sensing and controlling machine functions. Characteristics of hydraulic fluids, pumps, motors control valves, fluidic devices and servomechanisms. Testing of component and system performance.

AGE 528: APPLIED SOIL MECHANICS (2 1 0 = 3Units)

The soil-machine interface. Stress analysis in Coulomb material. Theory of soil cutting blades and tines, soil wedge formation. Bearing capacity. The compressible soil. Critical state soil mechanics.

AGE 530: ENERGY IN AGRICULTURE (2 1 0 = 3 Units)

Energy - Basic definitions and Classifications. Energy balance, management and evaluation of alternatives. Energy from Solar, Biomass, Wind, Thermal and Hydraulics and their applications in Agriculture.

SERVICE COURSES FOR THE FACULTY OF AGRICULTURE

AGE 350: HOME ENGINEERING AND FARM ENVIRONMENT (2 1 0 = 3 Units)

Housing for livestock and machinery. Electrical safety at home. Farm and environment. Household equipment for food processing and household utilities - operating principles, maintenance and repairs, Crop Storage facilities. Soil and water conservation at home and farm levels.

AGE 352: AGRICULTURAL ENGINEERING I (2 0 3 = 3 Units)

Introduction. Engine power systems. Fuel combustion systems Lubrication systems. Cooling systems. Electrical systems Power transmission. Application and control of engine power. Equipment for land clearing. Tillage operations. Planting. Cultivation. Fertilizer application.

AGE 408: REPORT WRITING IN AGRICULTURAL ENGINEERING (0 0 3 = 1 Unit)

Introduction – characteristics of technical writing, common deficiencies in writing. Standard report formats – layout, mechanical accuracy, usage of abbreviations, numbers, punctuations and capitalisation. Literature referencing – reviewing, citing, listing. Tabular, graphic and pictorial aids in report writing – classification of graphic aids, preparation, placement and discussion. The main elements of a report – table of contents, abstracts, introductions, literature reviews, methodologies, results and discussions, conclusions and recommendations, outlines.

AGE 401: AGRICULTURAL SURVEYING (0 0 6 = 2 Units)

Introduction to surveying- types of surveys, classes of surveys, instruments and care. Measurement of distances- errors and corrections, land area measurements. Levelling- tripod level, hand level and clinometers. Angles, bearings and coordinates. Global positioning system and electronic distance measurement.

AGE 402: FARM MECHANIZATION PRACTICES (0 0 3 = 2 Units)

Introduction. Farm machinery: tractors (working systems, operation and maintenance), tillage operations and implements- primary and secondary tillage. Farm systems- operations and management. Post-harvest implements. Marketing strategies.

AGE 544: LIVESTOCK HOUSING (2 1 0 = 3Units)

Basic Planning tools. Materials of Construction. Environmental considerations. Housing and production systems. Rural water supply. Waste management in the rural environment.

AGE 552: PRINCIPLES OF SOIL AND WATER CONSERVATION (2 1 0 = 3 Units)

Definition and scope of soil and water conservation. Water erosion and control practices. Principles and practice of irrigation. Flood mitigation practices. Drainage methods. Fundamental of water resources development.

AGE 553: AGRICULTURAL ENGINEERING II (2 0 3 = 3Units)

Introduction. Grain drying. Grain storage. Grain processing. Soil erosion. Drainage. Irrigation. Floods and flood control. Water resources and their development. Farm construction materials, structures and agricultural waste management.

AGE 558: PRINCIPLES OF FARM MACHINERY (2 0 3 = 3 Units)

Introduction. Types of Agricultural tractors. Sizes of agricultural tractors. Farm implements. Machine performance. Cost of use of agricultural equipment. Cost factors. Power sources for machinery. Elements of mechanical power transmission. Farm operations. Planting. Cultivation. Fertilizer and insecticide application. Harvesting Safety.

AGE 560: FARM POWER (2 0 3 = 3Units)

Introduction. Basic thermodynamics of engine cycles. Engine power transmission systems. Hydraulic control, hitching and steering. Elementary traction theory. Tractor selection; application and maintenance. Economics of tractor utilization.

(b) Postgraduate

AGE 601: Design of Experiments in Agricultural Engineering

Planning and designing experimental programme in Agricultural Engineering. Statistical methods, their application to laboratory and field experiments. Introduction to automatic data processing. Theory of models. **3 units**

AGE 602: Instrumentation for Agricultural Engineering Research

Theory of measurements, error analysis. Methods and instruments for measuring temperature, flow, pressure, force, torque, displacement and stress, moisture content in biological materials. Basic electrical characteristics of associated transducer, electronic amplifiers and recorders. Automatic control elements and systems. **3 units**

AGE 603: Engineering Analysis

Advanced calculus in engineering. Numerical analysis and methods. Engineering applications of Fourier and Laplace transform. Solution of partial differential equations. **3 units**

AGE 604: Systems Engineering

Review of the production function and marginal analysis. Analysis and optimization of systems for agricultural production and processes. Linear programming and sensitivity analysis. Integer, goal and dynamic programming and search techniques for agricultural processes. Transportation system and Resource allocation models. Simulation by mathematical models of discrete and continuous systems. Single server queuing, **3 units**

AGE 611: Agricultural Machines Analysis and Design

Mechanical and experimental analysis of selected mechanisms used in agricultural machines. Advanced kinematics and dynamics of motion in 3 dimensions. Vibration absorption and isolation. Critical analysis of working forces and stress on components of agricultural machines. Stress-strain relationship of soils under dynamic loads. Mechanics and design of traction and transport devices. Hydraulic control. **3 units**

AGE 612: Advanced Farm Power and Machinery

Recent research trends in the field of farm power and machinery with particular reference to the functional requirements of machines for tillage, seeding, cultivation, weeding and harvesting illustrated with selected examples like vibratory tillage, distribution patterns of seeds, fertilizers, herbicides, electrostatic dusting, vibratory harvesting of fruits and vegetables, dynamic shear cutting, gathering, threshing and separation of grains. Effects of crop maturity, condition and environment on harvesting efficiency. Selection of power units for mechanized farming. Present situation and future trends and problems in farm mechanization. **3 units**

AGE 613: Production Techniques

Organization for production, production control, forecasting and inventory control. Sheet metal fabrication by forming and stamping. Influence of material parameters on formability and die design. Techniques in moulding and casting. Metal machining, machine-tools and instruments. Jigs and fixtures. Materials, equipment and processes for fabrication of plastics. Theory and applications of welding processes; factors affecting weldability; considerations in the design of welded components. Workshop metrology. Equipment and planning in Agricultural Machinery maintenance and service plants. **3 units**

AGE 621: Momentum, Heat and Mass Transfer

Fundamentals of momentum, heat and mass transfer. Applications to food processing. **3 units**

AGE 622: Advanced Physical and Mechanical Properties of Agricultural Products

Water - material interaction in agricultural materials. Visco-elastic properties of Agricultural materials. Viscometry and mixing. Mechanical damage to agricultural materials during processing. Aero and hydrodynamic characteristics. Frictional properties. **3 units**

AGE 623: Handling of Agricultural Materials and Processing Plant

Principles, design and selection of material handling systems and processing plants. Techniques, equipment and management practices in drying systems. Refrigerated storage. Equipment, planning and evaluation of processing plants. Conveying and elevating equipment. Size reduction equipment. Project organisation and development. Block diagram, flowsheet and layout. Critical Path Analysis. **3 units**

AGE 624: Food Processing Engineering

Calendering and Extrusion, Preservation Processes. Thermal process calculation. Reaction kinetics. Pasturization. Commercial sterilisation, Fermentation Cooling, Freezing, and Thawing, Drying, Freeze drying, Spray drying, Drum drying. **3 units**

AGE 625: Storage Methods and Systems

Design of storage bins and silos. Other storage facilities, classes of pests, rodents and fungi that attack products, Pest/Product relationships, Methods of control (fumigants, insecticides), storage inspection method, quality control, losses, etc. **3 units**

AGE 626: Solar Engineering in Agricultural Processes

Rationale for utilization of solar energy, Solar radiation. Flat and concentrating collectors, solar heating systems. Solar cooling systems, energy application in agricultural processes (drying, air-conditioning, refrigeration), Solar distillation, Solar process economics. **3 units**

AGE 627: Advanced Heat Transfer

Review of heat transfer principles, conduction, radiation, convection, heat exchanger theory and design, thermal stresses, mass transfer, boilers. **3 units**

AGE 628: Refrigeration and Air Conditioning

Load calculation, duct and pipe sizing, systems and design calculation, microbiology, diseases, and deterioration of foods, food refrigeration, refrigerated warehouse design. **3 units**

AGE 629: Size Reduction and Separation Processes

Milling of grains, effect of crop properties on milling characteristics, shelling of grains size analysis centrifugation, filtration, dewatering, precipitation, coagulation, pneumatic separation, grain cleaning, and separation processes. **3 units**

AGE 631: Design and Operation of Irrigation Systems

Advanced soil-water-plant relationships, crop water requirements; Farm pumps. Surface irrigation hydraulics and design; sprinkler fluid dynamics, design and operation. Design and operation of trickle (drip) systems. **3 units**

AGE 632: Drainage Principles and Design

Drainage theory, soil water potentials, Darcy's law, Dupuit - Forcheimer, anisotropy, homogeneity, design equations and their assumptions. Engineering investigation, design, specifications, contracts cost estimation of surface and sub-surface drains for water logging and salinity control in agricultural soils. Reclamation of saline and sodic soils. **3 units**

AGE 633: Hydraulic Design of Soil and Water Control Systems

Energy and momentum analyses in open channel flow - steady, uniform and non-uniform flow, backwater curves, gradually varied and unsteady flow. Analysis of flow profiles. Hydraulic design of transitions, drops, chutes, spillways, culverts, checks, headgates and other structures for water conveyance systems. Design of canals, flumes and pipelines. **3 units**

AGE 634: Groundwater System Design/GLY 605: Hydrology

Flow of fluids through porous media - steady and unsteady flows through saturated and unsaturated porous materials. Groundwater occurrence, distribution, movement exploration and recharge, water wells drilling methods, design criteria hydraulics and specifications. Planning, development and management of groundwater, safe yield. Conjunctive use of surface and groundwater. **3 units**

AGE 635: Water Resources Planning and Systems Analysis

Planning concepts, economic and financial analysis, multiobjective planning, techniques of operation research and system analysis - linear, integer, mixed integer and dynamic programming - applied to water resources and water quality problems. **3 units**

AGE 636: Agricultural Watershed Management and Analysis

Hydrology of agricultural lands typical problems, data for hydrologic analyses, determination of runoff from precipitation. determination of peak rates of runoff, hydrographs, field applications. land classification as a basis for soil and water conservation. major conservation practices recommended for irrigated, non-irrigated and other land uses. erosion control for agricultural watersheds. **3 units**

AGE 637: Design of Dams

Detailed consideration of different types of dams. location of dams. design of dam embankment and spillway. selection of materials. construction principles and methods. special design problems. **3 units**

AGE 638: Special Topics in Water Resources Engineering

Study of advanced concepts and experimental techniques used in solving water resources engineering problems. Application of simulation methods, mathematical models and advanced research methods in areas of hydrology, hydraulics of water control facilities and water resources development. **3 units**

AGE 641: Elements of Structural Analysis I

Direct and shear stresses and strains, compound stress and strain. Shear and bending moment, stresses in beams, trusses and plane frameworks, graphic statics, deflections of trusses, deflection of beams, cylinders and spheres, circular plates. **3 units**

AGE 642: Elements of Structural Analysis II

Long span structures, statically indeterminate structures. Approximate analysis and stress analysis of statically indeterminate structures. Influence lines, plastic behaviour of structures, deflections, matrix and computer methods of structural analysis. Introduction to advanced structural mechanics. **3 units**

AGE 643: Engineering Properties of Materials of Construction

Types of materials, steels, wood, concrete rubber, plastics, etc. used in construction materials will be treated in terms of storage. Stress strain and allowable stresses in various materials, material selection concrete properties and mix-design. **3 units**

AGE 644: Building Construction and Surveying

Survey instruments, horizontal distances measurements levelling. Measurement of horizontal and vertical angles field survey, setting batter boards, soil investigation, design of simple foundation and footings walls, roofs, structural design and simple frame work, selection of building materials, calculation of quantities, Introduction to CMP. Design of storage buildings, storage inspection methods and quality control and losses. Packaging, etc. **3 units**

AGE 645: Farmstead Planning and Building Environment

Concept of a modern farm set-up. The village environment and social arrangements. Type of structures needed in an efficient farmstead. The family house its layout and design. Structures for machinery storage and maintenance. The farm office and its functions. Thermodynamics of buildings - heat flow characteristics in buildings, heat exchange, ventilation, solar heat and control. Mechanical ventilation. Environmental parameters and their measurements. **3 units**

AGE 646: Buildings and Environments for Crop Production

Green houses, glass houses and related structures - construction, layout and needed controls. Plant growth characteristics as related to the environment. **3 units**

AGE 647: Buildings for Animal Production

Environmental requirements for animals: heat exchange characteristics between animals and their surroundings, environmental factors and effects on reproduction and growth. Heat stress on animals in a tropical environment. Relationship between animal physical requirements and buildings to house them. Waste collection as part of housing design. Automatic feeding systems. Other specialized facilities. **3 units**

AGE 648: Public Health Engineering

The role of the engineer in the control of the environment; considerations of the total environment the (Ecosystem). Communicable and non-communicable disease; epidemiology and vital statistics. Role and control of insects and rodents in disease transmission. Water supply and wastewater problems; fundamentals of designs of water and wastewater treatment facilities. Solid waste (refuse) handling and disposal. Air pollution and control. **3 units.**

DEPARTMENT OF AGRICULTURAL AND ENVIRONMENTAL ENGINEERING

HIGHLIGHTS OF THE NEW PROGRAMME

COURSE CODES AND TITLES

New Departmental code: AEE

<u>OLD COURSE</u>	<u>NEW COURSE</u>	<u>REMARKS</u>
AGE 202 Workshop Practice	AEE 202 Workshop Practice	Faculty Course. Content and title remain the same
-	AEE 204 Introduction to Agricultural Mechanization and Agro-Environmental Engineering	New Course
AGE 302 Statistics for Engineers	AEE 302 Statistics for Engineers	Faculty Course. Content and title remain the same
AGE 304 Basic Soil Mechanics	AEE 304 Basic Soil Mechanics & Conservation	Modified to include Soil Conservation
AGE 305 Engineering Thermodynamics I	AEE 305 Applied Engineering Thermodynamics I	Course content and title the same
AGE 306 Engineering Thermodynamics II	AEE 306 Applied Engineering Thermodynamics II	“
AGE 307 Farm Electrification	AEE 307 Farm Electrification	“
AGE 308 Agricultural Surveying	AEE 308 Agricultural Land Surveying Sensing	Modified to include, Mapping , Aerial Survey and Remote
AGE 310 Farm Mechanics	AEE 310 Farm Mechanics	Course content and title remain the same
-	AEE 312 Basic Concepts In Environmental Engineering	New Course
AGE 401 Properties and Processing of Agricultural Materials	AEE 401 Properties and Processing of Agricultural Materials	Course content and title remain the same
AGE 403 Hydraulic Engineering	AEE 403 Hydraulic Engineering	“
AGE 405 Agricultural Hydrology	AEE 405 Agricultural Hydrology	Modified to include Nutrient and Soil Transport
AGE 407 Design of Agric. and Food Processing Machines	AEE 407 Design of Agric. and Food Processing Machine	Modified to include Computer Aided Design
AGE 411 Introduction to Agricultural Structures Design	AEE 411 Introduction to Agricultural Structures Design	Modified to include Computer Aided Design
-	AEE 413/URP625,627	New Course

	Treatment and Disposal of Wastes	
AGE 501 Farm Machinery I	AEE 501 Farm Machinery I	Modified to include Impact of Tillage on Environment
AGE 502 Farm Machinery II	AEE 502 Farm Machinery II	Modified to include the effects of farm operations on the environment
AGE 503 Design of Agric. and Food Processing Machines II	AEE 503 Design of Agric. and Food Processing Machines II	“
AGE 504 Handling of Agric. Materials	AEE 504 Handling of Agric. Materials	Modified to include Environmental Issues in Food Processing and Handling
AGE 505 Farm Structures and Environmental Planning	AEE 505 Farm Structures and Environmental Control Engineering.	Modified to include Environmental Issues, Gas Emission and Odour Control
AGE 506 Design of Environmental Control Structures	AEE 506 Design of Environmental Control Structures	Modified to include Processes in Water and Waste Water Management
AGE 507 Soil and Water Conservation Engineering	AEE 507 Soil and Water Conservation Engineering	Modified to include Soil Pollution and Water Quality Management
AGE 508 Irrigation and Drainage Engineering	AEE 508 Irrigation & Drainage Engineering	Modified to include Environmental Impact of Irrigation and Drainage
AGE 509 Farm Power I	AEE 509 Farm Power I	Course content and title remain the same
AGE 510 Farm Power II	AEE 510 Farm Power II	“
AGE 512 Heat Transfer	AEE 512 Heat Transfer in Agricultural Processing	“
AGE 514 Water Resources Development	AEE 514 Water Resources Development	Modified to include Fish Ponds and Conjunctive Use of Water
AGE 516 Water and Waste-Water Management	AEE 516 Bioprocess Waste and Effluent Management	New Course
AGE 518 Mechanical Systems Analysis	AEE 518 Mechanical Systems Analysis	Modified to include Vibration Isolation and Dynamic Stability
-	AEE 520	New Course

	Automatic Control and Robotics	
-	AEE 522 Hydraulic and Pneumatic System	New Course
-	AEE 524 Design of Hydraulic Control Structures	New Course
AGE 525 & 526 Student Projects	AEE 525 & 526 Student Projects	Course content and title remain the same
AGE 528 Applied Soil Mechanics	AEE 528 Applied Soil Mechanics	Course Content and title remain the same
-	AEE 530 Energy in Agriculture	New Course
-	AEE 532 Livestock Housing	New Course
-	AEE 534 Rural Infrastructures Engineering	New Course
-	AEE 536 Crop and Food Preservation	New Course
-	AEE 538 Crop and Food Storage Technology	New Course
-	AEE 540/FST 514 Agricultural Biotechnology	New Course
-	AEE 542 Machine Production Technology	New Course

New Courses

The Following new courses are introduced and the final year is divided into two areas of specialization as detailed below.

AEE 204	Introduction to Agric. Mechanization and Environmental Engineering
AEE 312	Basic Concept in Environmental Engineering
AEE 413	Treatment and Disposal of Wastes
AEE 516	Bioprocess Waste and Effluent Management
AEE 520	Automatic Control and Robotics.
AEE 524	Design of Hydraulic Control Structures
AEE 530	Energy in Agriculture
AEE 532	Livestock Housing
AEE 534	Rural Infrastructures Engineering
AEE 536	Crop Preservation
AEE 538	Crop Storage Technology
AEE 540	Agricultural Biotechnology
AEE 542	Machine Production Technology

DEPARTMENT OF AGRICULTURAL AND ENVIRONMENTAL ENGINEERING

Final Year **Options** in B.Sc. (Agricultural & Environmental Engineering)

- (A) **Agricultural Machinery/Post Harvest Engineering**
- Farm Power and Machines for Crop Production
 - Machine Design and Production Engineering
 - Energy in Agriculture/ Rural Electrification
 - Automatic Control
 - Environmental Impact of Agricultural Mechanization
 - Rural Infrastructures Management
 - Agricultural Systems Measurements & Valuation
 - Food and Crop Processing and Preservation
 - Food Process Engineering
 - Biomaterial Engineering and Biotechnology
- (B) **Soil and Water/ Farm Structures and Environmental Engineering**
- Soil and Water Conservation Engineering
 - Hydraulics and Hydrology
 - Bioremediation Engineering
 - Environmental Resource Conservation
 - Energy Conservation
 - Waste Water Engineering and Bioprocess Effluent Management
 - Agricultural Systems Measurements & Valuation
 - Farmstead Systems Engineering
 - Structural Analysis and Farm Structures Design
 - Farm Animal Environmental Planning
 - Rural Infrastructures Planning

REGULATION FOR THE B.Sc. HONOURS DEGREE IN AGRICULTURAL AND ENVIRONMENTAL ENGINEERING

1. OBJECTIVES

The objectives of the B.Sc. degree programme in Agricultural and Environmental Engineering are to

- (a) train engineers capable of applying engineering principles to agricultural mechanisation, crop and food production, preservation and storage, farm and agricultural business management, irrigation, farm structures, rural electrification, waste water and effluent management and environmental planning and management.
- (b) train engineers for the economic selection, optimum utilization, operation, maintenance and repair of labour saving equipment that are used in agriculture and environmental management with the objective of maximising the benefits derived from them.
- (c) train engineers who can relate their activities to the needs of the society in general and to develop in them a sense of responsibility that is required for their professional work.
- (d) identify the limitation of our students and to make a real effort to provide compensating measures.
- (e) make continuing reappraisal of our curriculum to ensure its consistency with the goal of training the most productive agricultural engineer that the given parameters of time and financial outlay will permit.

Philosophy of the Department

The desire of the department of Agricultural and Environmental Engineering is to create a teaching and research environment for imparting appropriate skill and knowledge in Agricultural, food and rural development in an environmental friendly and sustainable manner; conduct cutting edge researches that will advance frontiers of knowledge; contribute a substantial proportion of mutation and inventions in Nigerian agricultural system and pursuit of academic excellence to foster the development of food and agro-allied industries in Nigeria.

The mission of the department in pursuit of its vision is to be among the top rated Agricultural and Environmental Engineering Department in Nigeria and World at large; to imbibe in our students the right ethic, attitude and behaviour request of Engineers; to empower them academically and professionally for the creative and

effective practice of Engineering in self employment, food and agro-allied industries, Government and other agencies involved in the management and regulation of agricultural, food and natural resources.

2. **ADMISSION REQUIREMENTS**

(a) **U.M.E. ENTRY**

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

(b) **DIRECT ENTRY**

Admission to Part II is possible for candidates who in addition to meeting the Faculty General Admission Requirements, have good passes in two Advanced Level of the GCE (or equivalent) in Physics, Pure Mathematics or Applied Mathematics and Chemistry, or approved equivalent qualifications; such as the Ordinary National Diploma (Upper Credit) in relevant fields.

3. **GRADUATION REQUIREMENTS**

To be eligible for a degree, a student must satisfactorily complete a minimum of 198 units¹ including the following:

- (i) 12 units of Special Electives.
- (ii) 32 units of Part I Physics, Chemistry and Mathematics courses comprising MTH 101, MTH 102, MTH 104, PHY 101, PHY 102, PHY 107, PHY 108, CHM 101, CHM 102, CHM 103, and CHM 105.
- (iii) 68 units of Agricultural and Environmental Engineering courses, excluding Industrial Training.
- (iv) 9 units of Chemical Engineering courses comprising CHE 201, CHE 305 and CHE 306.
- (v) 5 units of Civil Engineering courses comprising CVE 202, CVE 401.
- (vi) 5 units of Computer Science & Engineering courses comprising CSC 201 and CSC 208.
- (vii) 3 units of Electronic and Electrical Engineering courses comprising EEE 201 and EEE 291.
- (viii) 8 units of Part II Mathematics courses comprising MTH 201 and MTH 202.
- (ix) 19 units of Mechanical Engineering courses, comprising MEE 203, MEE 204, MEE 205, MEE 206, MEE 303, MEE 305, MEE 306, MEE 395 and MEE 396.
- (x) 6 units of Materials Science Engineering courses, comprising MSE 201 and MSE 305.
- (xi) 7 units of Technology Planning and Development courses, comprising TPD 101, TPD 401, TPD 502 and TPD 503.
- (xii) 15 units of Industrial Training courses, comprising AEE 200, AEE 300 and AEE 400.
- (xiii) 6 units of Faculty of Agriculture courses, comprising CPP 305, ANS 306 and AXR 309.

¹ It is possible for a candidate to exceed the stated minimum number of units by electing courses of his/her choice provided that prior approval of the Head of Department (or his appointed representative) is obtained.

SCHEDULE OF COURSES

PART I

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 101	Elementary Mathematics I	-	4 1 0	5
PHY 101	General Physics I	-	3 1 0	4
PHY 107	Experimental Physics 1A	-	0 0 3	1
CHM 101	Introductory Chemistry I	-	3 1 0	4
CHM 103	Introductory Chemistry Practical I	-	0 0 3	1
TPD 101	Engineers in Society	-	1 0 0	1
SE	Special Elective	-	2 0 0	2
SE	Special Elective	-	2 0 0	2
Total			15 3 6	20

RAIN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 102	Elementary Mathematics II	-	4 1 0	5
MTH 104	Vectors	-	2 0 0	2
PHY 102	General Physics II	-	3 1 0	4
PHY 108	Experimental Physics IB	-	0 0 3	1
CHM 102	Introductory Chemistry II	-	3 1 0	4
CHM 104	Introductory Chemistry Practical II	-	0 0 3	1
SE	Special Electives	-	2 0 0	2
SE	Special Electives	-	2 0 0	2
Total			16 3 6	21

PART II

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 201	Mathematical Methods I	MTH 101	3 1 0	4
MEE 203	Engineering Drawing I	-	1 0 3	2
MEE 205	Engineering Mechanics I	-	2 1 0	3
CSC 201	Computer Programming I	-	2 0 3	3
CHE 201	Introduction to Thermodynamics	-	2 1 0	3
EEE 201	Applied Electricity	PHY 102	2 0 0	2
EEE 291	Applied Electricity Laboratory I	-	0 0 3	1
MSE 201	Elements of Engineering Materials	-	2 0 3	3
	Total		14 3 12	21

RAIN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MTH 202	Mathematical Methods II	MTH 102	3 1 0	4
MEE 204	Engineering Drawing II	MEE 203	1 0 3	2
MEE 206	Engineering Mechanics II	MEE 205	2 1 0	3
CVE 202	Strength of Materials	MEE 205	2 0 3	3
CSC 202	Computer Technology	CSC 201	1 0 3	2
AEE 202	Workshop Practice	-	1 0 3	2
AEE 204	Introduction to Agricultural Mechanisation and Environmental Engineering	-	2 0 0	2
SE	Special Elective		2 0 0	2
	Total		14 2 12	20

LONG VACATION

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AEE 200	Students Workshop Experience Programme	-	0 0 9	3
	Total		0 0 9	3

PART III

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MEE 303	Fluid Mechanics I	MEE 205/206	2 0 3	3
MSE 305	Mechanics of Materials	CVE 202	2 0 3	3
MEE 305	Mechanics of Machines I	MEE 206	2 0 0	2
MEE 395	Mechanics of Machines Laboratory I	MEE 206	0 0 3	1
AEE 305	Applied Engineering Thermodynamics I Farm Electrification	CHE 202	2 0 3	3
AEE 307	Crop Science	EEE 201	2 0 3	3
CPP 305	Engineering Analysis I		2 0 0	2
CHE 305	Introducing Technology Change to	MTH 202	2 1 0	3
AXR 309	Agriculture			
		-	2 0 0	2
	Total		16 1 15	22

RAIN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
MEE 306	Mechanics of Machines II	MEE 305	2 0 0	2
MEE 396	Mechanics of Machines Laboratory II	MEE 395	0 0 3	1
AEE 302	Statistics for Engineers	-	2 0 0	2
AEE 304	Basic Agricultural Soil Mechanics	MEE 303	2 0 3	2
AEE 306	Applied Engineering Thermodynamics II Agricultural Land Surveying	AEE 305	2 0 3	3
AEE 308	Farm Mechanics	-	1 0 3	2
AEE 310	Basic Concepts in Environmental	-	0 0 3	1
AEE 312	Engineering			
	Animal Science	-	3 0 0	3
ANS 306	Engineering Analysis II	-	2 0 0	2
CHE 306		CHE 305	2 1 0	3
	Total		15 1 15	21

LONG VACATION

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AEE 300	Students Industrial Work Experience Scheme I	AEE 200	0 0 9	3
	Total		0 0 9	3

PART IV

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AEE 401	Properties and Processing of Agricultural Materials	AEE 306	2 0 3	3
AEE 403	Hydraulic Engineering	MEE 303	1 0 3	2
AEE 405	Agricultural Hydrology	MEE 303	2 0 3	3
AEE 407	Design of Agricultural and Food Processing Machines I	CVE 202	2 0 3	3
AEE 411	Introduction to Agricultural Structures Design	MEE 303	2 0 3	3
AEE 413	Treatment and Disposal of Solid Wastes	-	2 0 3	3
TPD 401	Engineering Economics and Valuation	-	2 1 0	3
CVE 401	Technical Report Writing	-	2 0 0	2
	Total		15 1 18	22

RAIN SEMESTER AND LONG VACATION

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AEE 400	Students Industrial Work Experience Scheme II	AEE 300	2 0 21	9
	Total		2 0 21	9

PART V

HARMATTAN SEMESTER

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AEE 501	Farm Machinery I		2 0 3	3
AEE 503	Design of Agricultural and Food Processing Machines II	AEE 407	2 0 3	3
AEE 505	Farm Structures and Environmental Control Engineering	AEE 411	2 1 0	3
AEE 507	Soil and Water Conservation Engineering	AEE 405	2 0 3	3
AEE 509	Farm Power I			
AEE 509	Design and Research Project I	-	2 0 3	3
AEE 525	Industrial Law Processing and Operation	-	0 0 6	2
TPD 503	Management	-	2 0 0	2
	Total		12 1 18	19

RAIN SEMESTER

OPTION A: AGRICULTURAL MACHINERY AND POST-HARVEST ENGINEERING

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AEE 502	Farm Machinery II	AEE 501	2 0 3	3
AEE 510	Farm Power II	AEE 509	2 0 3	3
AEE 526	Design & Research Project II	AEE 525	0 0 12	4
AEE 504	Handling of Agric. Materials	AEE 401	2 0 3	3
AEE 536	Crop and Food Preservation		2 0 3	3
TPD 502	Technology Policy	-	2 0 0	2
	ny of the following Restricted Electives:			
	AEE 512 – Heat Transfer			
	AEE 518 – Mechanical Systems Analysis	AEE 520 –		
	Automatic Control and Robotics		2 1 0	3
	AEE 522 – Hydraulic and Pneumatic Systems			
	AEE 528 – Applied Soil Mechanics			
	AEE 530- Energy in Agriculture			
	AEE 540/FST 514: Agricultural Biotechnology	AEE 306		
	AEE 542: Machine Production Technology	AGE 503		
	Total		12 1 24	21

OPTION B: SOIL AND WATER/ FARM STRUCTURES AND ENVIRONMENTAL ENGINEERING

Course Code	Course Title	Pre-Requisite/ Co-Requisite	L T P	Units
AEE 506	Design of Environmental Control Structures Irrigation and Drainage	AEE 411	2 0 3	3
AEE 508	Bioprocess Waste and Effluent Management	AEE 507	2 0 3	3
AEE 516	Design and Research Projects II Rural Infrastructures Engineering	AEE 413	2 1 0	3
AEE 526	Technology Policy	AEE 525	0 0 12	4
AEE 534	Any of the following Restricted Electives:	-	2 0 3	3
TPD 502	AEE 512: Heat Transfer	-	2 0 0	2
	AEE 514: Water Resources Development			
	AEE 524: Design of Water Canal and Hydraulic Control Structures		2 1 0	3
	AEE 528: Applied Soil Mechanics			
	AEE 530: Energy in Agriculture			
	AEE 532: Livestock Housing	AEE 403		
	AEE 538: Crop and Food Storage Technology	AEE 505		
	Total		12 2 21	21

APPENDIX

COURSE CONTENT

AEE 200: STUDENTS WORK EXPERIENCE PROGRAMME (0 0 9 = 3 unit)

Introduction to agricultural engineering; definitions and scope of agricultural engineering. The importance of agricultural engineering, its relation to the agricultural industry and to the engineering profession. Aims and problems of farm mechanization. Computer aided design.

AEE 202: WORKSHOP PRACTICE (1 0 3 = 2 units)

Workshop safety measures, Introduction to workshop hand and powered tools emphasizing safety measures to be taken during operation. Workshop materials, various gauges and measuring devices. Tolerance of products. Bench work; marking out, scribing, punching, cutting, drilling, riveting, tapping, dieing, etc. General description of the function and capabilities of grinding machines. Practice in grinding tools and drills. Function and capabilities of drilling machines, lathe machines, milling machines and shaping machines. Jigs, fixtures, practice in the use of the machines. Theory and practice of forming metals together, soldering, brazing, welding. Computer aided manufacturing.

AEE 204: INTRODUCTION TO AGRICULTURAL MECHANIZATION AND ENVIRONMENTAL ENGINEERING (2 0 0 = 2 units)

Overview of agricultural mechanization and agricultural mechanization policy, tillage systems in tropical agriculture, women and mechanization, the challenges of food security; Food process engineering and national development; Energy in agriculture. Agricultural engineering and the environment; plant-soil-water systems, irrigation and drainage systems, environmental impact of tillage activities. Agricultural technology transfer, rural industrialization, entrepreneurship and competitiveness; exploiting information and communication technologies in agro-business.

AEE 302: STATISTICS FOR ENGINEERS (2 0 0 = 2 units)

Statistical concepts, probability and distribution functions, normal distribution. Tests of hypotheses and significance testing of means, independent and paired/correlated samples studies, confidence interval. Completely randomised design (one-way ANOVA), Completely randomised block design (two-way ANOVA). Factorial experimental design.

AEE 304: BASIC SOIL MECHANICS AND CONSERVATION (2 0 3 = 3 units)

Introduction. Soil constituents, origin, occurrence and composition. Clay mineralogy. Particle size analysis. Engineering classification of soils. Plasticity of fine-grained soils and determination of soil index properties. Phase relationships. Compaction of soils. Water in soils. Soil water pressure (effective stress). Rudiments of permeability and seepage. Mechanical properties (shear strength and loading capability of soils) and stress-strain characteristics of soil.

AEE 305: APPLIED ENGINEERING THERMODYNAMICS I (2 0 3 = 3 units)

Gaseous mixtures, combustion and availability Internal combustion engines, compressors. Other methods of energy conversion, e.g. Fuel cells, Thermoelectric generators. Effect of combustion on environment. Application to tractors and equipment.

AEE 306: APPLIED ENGINEERING THERMODYNAMICS II (2 0 3 = 3 units)

Psychrometric, heating and cooling of moist air, dehumidification of moist air by sorbent materials. Principles of heat and mass transfer. Power and refrigeration cycle. Principles and practice of refrigeration and air conditioning.

AEE 307: FARM ELECTRIFICATION (2 0 3 = 3 units)

The use of electricity as a power source for lighting, comfort in living, farm production and processing. Design and on-farm use of electric equipment and systems. Planning the farmstead distribution system:- Demand load for farm buildings, Central metering and distribution, Capacity of main service. Selecting feeder conductors. Electric central and circuit protection. Electric motors: Motor rating and selection, measurement of motor characteristics. Stand-by power units: Purpose and importance, stand - by generator type, selection, maintenance and operation. The peculiar nature of farm electrification. The Nigerian rural environment.

AEE 308: AGRICULTURAL LAND SURVEYING (1 0 3 = 2 units)

Types of surveys, classes of surveys, Instruments and care, measurement of distances - pacing, stadia, taping, electronic and photographic methods. Levelling - elevations. Earth's curvature and atmospheric refraction. The engineer's telescope, bubble tube, dumpy level, land level, level rods, automatic level, Field notes. Errors and corrections. Angles and directions - bearings and azimuths, magnetic compass and earth's magnetic field. Changes in declination, aerial surveying, topographic maps, introduction to photogrammetry. Remote Sensing and GIS.

AEE 310: FARM MECHANICS (0 0 3 = 1 unit)

Selection, operation, sharpening, care and uses of shop tools and equipment. Wood working, concrete and masonry, iron working, black-smithing, welding, cutting and brazing. Glazing and sheet metal work. Repair and maintenance of tractors and farm machinery. Building of equipment adaptable to farm shop construction. Fabrication, maintenance and repair of farm field processing machines.

AEE 312: BASIC CONCEPTS IN ENVIRONMENTAL ENGINEERING**(3 0 0 = 3 units)**

Soil and water conservation. Farm structures and environmental control. Pollution of water, air and land. Disposal, treatment and conversion of agric. and bio-waste. Post harvest Engineering and storage. Farm machinery and mechanisation. Environmental impact assessment of agric. processes and operations.

AEE 401: PROPERTIES AND PROCESSING OF AGRICULTURAL MATERIALS**(2 0 3 = 3 units)**

Properties of agricultural materials (physical, mechanical, thermal, electrical, optical etc. Moisture equilibration. Air movement. Drying theory - thin layer and deep bed drying. Design of drying systems. Storage principles and practice. Principles and applications of the rheology of foods. Group project.

AEE 403: HYDRAULIC ENGINEERING (1 0 3 = 2 units)

Fundamentals of fluid flow. Water pressure and Pressure forces. Hydraulics of flow in closed conduits, flow in open channels (including transitions and controls of hydraulic jumps). Water measurements. Hydraulic structures, pumps and hydraulic model studies.

AEE 405: AGRICULTURAL HYDROLOGY (2 0 3 = 3 units)

Scope of hydrology, hydrologic cycle. Weather elements including precipitation, humidity, temperature and winds. Analysis of hydrologic data including statistical inferences. Infiltration and evapo-transpiration. Streamflow, runoff and hydrographic measurement and analysis, routing in channels and reservoirs. Groundwater analysis.

AEE 407: DESIGN OF AGRICULTURAL AND FOOD PROCESSING MACHINES I**(2 0 3 = 3 units)**

Philosophy of design. Components of design.. Agricultural Machines: Types and functional requirements. Engineering materials. Stress and deflection analysis. Theories of failure. Design against failure. Detachable fasteners. Power screws. Shafting design. Element of food processing machines. Computer Aided Design (CAD). Design project.

AEE 411: INTRODUCTION TO AGRICULTURAL STRUCTURES DESIGN**(2 0 3 = 3 units)**

Introduction to Agricultural Structures. Selection of materials in relation to use – steel, wood, concrete and masonry. Types of structural frames. Estimating loads; stress analysis. Introduction to structural design - philosophy of design, elastic and plastic design concepts. Reinforced concrete design. Design for axial loadings. Design of beams. Types of Foundation, Design of simple foundation, slab, connections, and joints. Computer concept for improved analysis and design. Design project. Introduction to AutoCad.

AEE 413: TREATMENT AND DISPOSAL OF WASTES (2 0 3 = 3 units)

Waste management methods: Disposal methods – Land disposal (Landfill), Thermal disposal (Incineration). Recycling methods – Physico-chemical reprocessing, Biological reprocessing – composting and anaerobic digestion. Energy recovery – waste-to-energy. Avoidance and reduction methods – waste minimization. Waste handling and transport. Waste management concepts. Group project.

AEE 501: FARM MACHINERY I (2 0 3 = 3 units)

Types of farm machinery and their field management requirements. Mechanisation (benefits and criticisms). Machine performance, costs of use of agricultural machinery. Farm cultural operations: tillage, planting, cultivation, fertilizer and insecticide application, harvesting. Safe operation of agricultural machinery. Selection of suitable machinery to suit the performance requirements of various agricultural operations. Impact of tillage on environment.

AEE 502: FARM MACHINERY II (2 0 3 = 3 units)

The agricultural tractor: types, the P.T.O. drive, the Hooks joint, hitch analysis, the effect of hitched implement on the tractor, implement penetration theory. Constructional features, force analysis and design considerations of various agricultural machinery used for tillage. Spraying and dusting, harvesting, etc. Impact of farm operations on the environment. Group project.

AEE 503: DESIGN OF AGRICULTURAL AND FOOD PROCESSING MACHINES II**(2 0 3 = 3 units)**

Mechanical power transmission: gear drives, belt drives, chain drives, ropes and hoists, springs, bearings. Welding, Brakes, Clutches and Couplings. Vibrations. Design of machines for unit operation in food processing including concentration and dehydration. Introductory Computer Aided Design (CAD). Food policy. Design Project.

AEE 504: HANDLING OF AGRICULTURAL MATERIALS (2 0 3 = 3 units)

Particle characteristics, size reduction separation, cleaning and sorting of agricultural produce. Maceration as applied to agricultural materials. Methods and equipment for the handling of small and large lots of agricultural products. Selection and application of agricultural produce handling equipment such as elevators, cranes, fork lifts, trucks, carts, etc. Agricultural industry layout. Environmental issues in food processing and handling. Group project.

AEE 505: FARM STRUCTURES AND ENVIRONMENTAL CONTROL ENGINEERING**(2 1 0 = 3 units)**

Farmstead planning and layout: Family housing, Livestock housing, Structures for farm products and food storage etc. Environmental control and structural requirements of crops and livestock. Techniques and methods in collection, analysis, and presentation of environmental data Numerical methods in environmental analysis and designs. Types of environmental hazards and their control. Determination of gas and odour emission in livestock, farm houses and agro-processing industry and their control.

AEE 506: DESIGN OF ENVIRONMENTAL CONTROL STRUCTURES (2 0 3 = 3 units)

Environmental requirements for man, plants and animals and their control. Solar heat load, Temperature and humidity as they affect heat stress in farm buildings. Design of Environmental systems for plant and animal production. Determination and design for the environmental needs in farm building. Ventilation and refrigeration. Solar heat load. Humidity and temperature control. Insulation and ventilation for environmental control. Introduction to processes in water and waste water management.

AEE 507: SOIL AND WATER CONSERVATION ENGINEERING (2 0 3 = 3 units)

Definition, ethics and scope of soil and water conservation. Classes, types, forms and significance of soil erosion. Classifications, factors, analysis and measurements of water and wind erosion. Erosion control. Contouring, strip cropping, terracing, mulching and tillage practices - principles, design, efficiency and limitations. Principles, classification, design, construction, operation, maintenance, efficiency and limitations of terrace, vegetated water – courses. Selected mechanical conservation structures, windbreaks and shelter belts. Principles, significance and classification of irrigation and drainage systems. Soil pollution and water quality management.

AEE 508: IRRIGATION AND DRAINAGE (2 0 3 = 3 units)

Irrigation planning criteria. Irrigation water distribution systems design, construction, operation and maintenance of surface, sprinkler and trickle irrigation systems. Engineering principles applied to surface and sub-surface drainage problems. Drainage planning criteria. Design, construction operation and maintenance of open channel and closed drainage systems. Drainage and water table control systems. Environmental impact of irrigation and drainage systems.

AEE 509: FARM POWER I (2 0 3 = 3 units)

Power sources on the farm. Development of the tractor. Internal combustion engine cycles, efficiencies and operation. Fuels and combustion of fuels. Constructional features and operation of tractor engines - spark ignition and diesel engine systems, air/fuel systems, lubrication and lubricating systems. Engine cooling and cooling systems. Design of spark ignition and compression ignition engines. Engine electrical systems.

AEE 510: FARM POWER II (2 0 3 = 3 units)

The tractor power transmission system, tractor constructional features, stability analysis/mechanics of farm tractor chassis. Traction theory, human factors in tractor design and utilization, the tractor hydraulic system. Performance, operation and testing of agricultural power units. Tractor selection, utilization and preventive maintenance. Tractor Power cost estimation.

AEE 512: HEAT TRANSFER (2 1 0 = 3 units)

Modes of heat transfer, heat conduction equation in cartesian, cylindrical and spherical coordinates. Steady state in one dimension. Thermal convection. Heat exchangers. Thermal radiation. Heat transfer in building.

AEE 514: WATER RESOURCES DEVELOPMENT (2 1 0 = 3 units)

Definition and scope of water resources development. Occurrence, uses, supply and demand. Methods of increasing availability. Flood control, water power, irrigation, water supply and recreation. Design, construction, operation and maintenance of farm ponds, reservoirs and fish pond. Conjunctive use of water resources and water right. Water quality management.

AEE 516: BIOPROCESS WASTE AND EFFLUENT MANAGEMENT (2 1 0 = 3 units)

Types, characteristics, chemistry and microbiology of biological waste and effluent. Collection, treatment and disposal of biological waste and effluent. Design, operation and construction of operational and maintenance facilities. Effect of bio-effluent discharge on river/soil ecology and pollution. Conversion, recycling and potential use of biological wastes.

AEE 518: MECHANICAL SYSTEMS ANALYSIS (2 1 0 = 3 units)

Dynamic analysis (Distributed and lumped parameter systems). Equation of motions for simple physical systems. Dynamic response of elementary systems. Vibration isolation. Dynamic stability. Introduction to non-linear and time varying systems.

AEE 520: AUTOMATIC CONTROL (2 1 0 = 3 units)

Significance of automatic control. Basic automatic control systems. Input signals and responses. Servomechanism. Block diagram. Linear systems. Open and closed loop transfer functions. Measuring instruments and transducers. Robotics technology

AEE 522: HYDRAULIC AND PNEUMATIC SYSTEMS (2 1 0 = 3 units)

Design of hydraulic, and pneumatic systems for powering, sensing and controlling machine functions. Characteristics of hydraulic fluids, pumps, motors control valves, fluidic devices and servomechanisms. Testing of component and system performance.

AEE 524: DESIGN OF WATER CANAL AND HYDRAULIC CONTROL STRUCTURES (2 1 0 = 3 units)

General requirement and design considerations for conveyance, regulating, water measurement and protective structures in water delivering systems. Energy dissipation, transitions and erosion protection along canals. Pipe and pipe appurtenances, Safety features in canals.

AEE 528: APPLIED SOIL MECHANICS (2 1 0 = 3 units)

The soil-machine interface. Stress analysis in coulomb material. Theory of soil cutting blades and tines, soil wedge formation. Bearing capacity. The compressible soil. Critical state soil mechanics.

AEE 530: ENERGY IN AGRICULTURE (2 1 0 = 3 units)

Energy - Basic definitions and classifications. Energy balance, management and evaluation of alternatives. Energy from solar, biomass, wind, thermal and hydraulics and their applications in agriculture. Solar energy conversion efficiency. Principle of solar collectors. Group project.

AEE 532: LIVESTOCK HOUSING (2 1 0 = 3 units)

Animal behaviour. Environmental requirements. Effect of temperature and humidity on the environment of a livestock house. Temperature and humidity stress in a confinement. Heat and moisture production in livestock. Animals housing (cattle, swine, poultry, sheep and goat, rabbit). Environmental control of livestock housing. Slaughter slabs and slaughter houses.

AEE 534: RURAL INFRASTRUCTURES ENGINEERING (2 0 3 = 3 units)

Concept of integrated rural development (planning and implementation). Overview of the problems of rural infrastructures. Rural road network. Rural roads development, construction and maintenance. Rural water supplies. Rural Sanitation.

AEE 536: CROP AND FOOD PRESERVATION (2 0 3 = 3 units)

Principles and methods of food preservation – high and low temperature methods, drying, preservatives, radiation. Preservation of tuber crops, grains & cereals, vegetables and fruits. Qualities of food produce as influenced by crop preservation method.

AEE 538: CROP AND FOOD STORAGE TECHNOLOGY (2 1 0 = 3 units)

Basic principle of crop storage and preservation. Type of storage structures – Traditional and Improved Systems. Pest and insect infestation in stored products and their control. Maintenance of storage products and storage structures. Storage structures for grains, semi-perishable crops (e.g. potatoes, yams, etc.) and perishable crops (e.g. fruits and vegetables). Strategic food reserves.

AEE 540: AGRICULTURAL BIOTECHNOLOGY (2 1 0 = 3 units)

The emergence of biotechnology and its application in basic and applied science disciplines. Genetical modification of microorganisms, plant and animal cells: gene mapping, gene transfer, recombinant DNA techniques, protoplasm

fusion, etc. Biotechnology as applied to food related problems, e.g. fermentation, post-harvest technology, unit operations and food processing, food product development.

AEE 542: MACHINE PRODUCTION TECHNOLOGY (2 1 0 = 3 units)

Engineering materials. Metal cutting and joining. Metal forming. Casting and moulding. Machining processes. Production planning and work scheduling. Quality assurance and control, Production dimensioning and specifications, limits and fits, tolerance build up, measurements, production standardization, inspection, acceptance sampling, interchangeability, sub-assemblies and assemblies, production surface protective and decorative treatment. Computer aided manufacture. Process in the commercialization of engineering design and machine innovation.

SERVICE COURSES FOR THE FACULTY OF AGRICULTURE

AEE 352: AGRICULTURAL ENGINEERING I (2 0 3 = 3 units)

Introduction. Engine power systems. Fuel combustion systems Lubrication systems. Cooling systems. Electrical systems Power transmission. Application and control of engine power. Equipment for land clearing. Tillage operations. Planting. Cultivation. Fertilizer application.

AEE 402: FARM MECHANIZATION PRACTICES (0 0 3 = 2 units)

Introduction. Farm machinery: tractors (working systems, operation and maintenance), tillage operations and implements- primary and secondary tillage. Farm systems- operations and management. Post-harvest implements. Marketing strategies.

AEE 408 REPORT WRITING IN AGRIC ENGINEERING (1 0 0 = 1 unit)

Introduction – characteristics of technical writing, common deficiencies in writing. Standard report formats – layout, mechanical accuracy, usage of abbreviations, numbers, punctuations and capitalisation. Types of reports. The main elements of a report – prefatory section, main body and appendix. Report outlines. Literature referencing – reviewing, citing, listing. Tabular, graphic and pictorial aids in report writing – classification of graphic aids, preparation, placement and discussion. Formal communication – business letter and memorandum.

AEE 409: AGRICULTURAL SURVEYING (0 0 3 = 2 units)

Introduction to surveying- types of surveys, classes of surveys, instruments and care. Measurement of distances- errors and corrections, land area measurements. Levelling- tripod level, hand level and clinometers. Angles, bearings and coordinates. Global positioning system and electronic distance measurement.

AEE 552: PRINCIPLES OF SOIL AND WATER CONSERVATION (2 1 0 = 3 units)

Definition and scope of soil and water conservation. Water erosion and control practices. Principles and practice of irrigation. Flood irrigation practices. Drainage methods. Fundamental of water resources development.

AEE 553: AGRICULTURAL ENGINEERING II (2 0 3 = 3 units)

Grain drying. Grain storage. Grain processing. Soil erosion. Drainage. Irrigation. Floods and flood control. Water resources and their development. Farmstead planning. Construction materials. Solid waste disposal.

AEE 554: BASIC LIVESTOCK HOUSING (2 1 0 = 3 units)

Basic Planning tools. Materials of Construction. Environmental considerations for animals housing. Housing and production systems for animals (Beef and Dairy Cattle, Pigs, Sheep and Goat, Poultry etc.). Rural water supply. Waste management in the rural environment.

AEE 558: PRINCIPLES OF FARM MACHINERY (2 0 3 = 3 units)

Introduction. Types of Agricultural tractors. Sizes of agricultural tractors. Farm implements. Machine performance. Cost of use of agricultural equipment. Cost factors. Power sources for machinery. Elements of mechanical power transmission. Farm operations. Planting. Cultivation. Fertilizer and insecticide application. Harvesting. Safety.

AEE 560: FARM POWER (2 0 3 = 3Units)

Basic thermodynamics of engine cycles. Engine power transmission systems. Hydraulic control, hitching and steering. Elementary traction theory. Tractor selection; application and maintenance. Economics of tractor utilization.