



**IGBINEDION UNIVERSITY OKADA, NIGERIA.
DEPARTMENT OF MECHANICAL ENGINEERING
GENERAL ABDULSALAMI A.
COLLEGE OF ENGINEERING**

**MECHANICAL ENGINEERING
PROGRAMME
HANDBOOK**

**FOR UNDERGRADUATE PROGRAMME
IN MECHANICAL ENGINEERING**

2024/2025 - 2027/2028 SESSION

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FORWARD BY THE DEAN

This handbook for the undergraduate programme in Mechanical Engineering provides comprehensive information on the structure, philosophy and operations of the College of Engineering. It also includes extracts from the University's academic regulations governing undergraduate degree programmes.

The handbook presents details on the history, aims, and objectives of the College and the Mechanical Engineering Department as well as other essential academic and administrative matters. It further outlines the course descriptions and expectations of Mechanical Engineering

The College of Engineering offers seven (7) degree programmes under five departments, namely:

- **Chemical/ Petroleum Engineering Department**
- **Civil Engineering Department**
- **Electrical and Computer Engineering Department**
- **Mechanical Engineering Department.**
- **Mechatronics Engineering Department**

All the programmes are fully accredited by both the National Universities Commission (NUC) and Council for the Regulation of Engineering in Nigeria (COREN). This handbook which is periodically reviewed in line with NUC and COREN guidelines will serve as a valuable resource to students, staff and other stakeholders. It is intended to guide students of Mechanical Engineering in understanding the academic and professional standards required for the successful completion of their programme and to provide general information about the College of Engineering as a whole.

Engr. Prof. Rowland. U. Azike
Dean, Gen. A. A. College of Engineering
Igbinedion University Okada.

BRIEF HISTORY OF THE PROGRAMME FROM THE DESK OF THE HEAD OF DEPARTMENT

The Department of Mechanical Engineering programme began in September, 2002 (2002/2003 Session) with an initial student intake of 15, consequently increased to a student population of 163 in the 2009 / 2010 Session and currently has student population of 86 in the just concluded 2024 / 2025 Session. The initial staff strength of two (2) has considerably increased to 18 staff. The Department has eighteen (18) members of staff, (10) are full-time teaching staff; one (1) is a sabbatical lecturer, four (4) are technologists and one (1) a technician and three (3) administrative staff. The present full time staff-student ratio is estimated at 1: 12, which is line with both NUC and COREN recommendation. The Department has produced a total number of graduates of 351 students with B. Eng. Degree from 2006 / 2007 academic session when it graduated the pioneer set. Many of the students are working in reputable engineering companies. Quite a good number are doing their post graduate studies overseas. The Department is making steady and consistent developmental progress. In the past twenty-two years, Mechanical Engineering Department has remarkably progressed in teaching, research, and professional training of both her academic staff, non- academic staff and students. Igbinedion University Mechanical Engineering graduates have distinguished themselves in various sectors of the economy in Nigeria and diaspora. Many of our alumni are gainfully employed in reputable engineering firms, government agencies, Blue chip companies, Manufacturing Industries and research institutions, both within and outside Nigeria, while Our Graduates have advanced into postgraduate studies here in Nigeria and Abroad, with some venturing into entrepreneurial outfits.

The Department is now equipped with basic facilities, namely: office furniture and facilities; classrooms; lecture halls; laboratory/workshop; libraries; IT and Internet facilities, etc. The University is steadily providing more laboratory / workshop facilities, especially, in the following areas of specialization of the department: Applied Energy, Fluid Mechanics; Material science and Metallurgy, Design and Production. The library has Mechanical Engineering E-resources in the E-library with good internet speed as well as many Mechanical Engineering books and journals. Besides, Mechanical Engineering students are very computer literate and exposed to IT and Internet facilities. The students also do their industrial training in reputable engineering based establishments.

The Department is very proud of Mr Onike Ahmed Oladotun who graduated with First Class Honours in 2010/2011 session and Mr. Onabanji Adedamola, Mr. Asuelimmen Edose, Miss. Oremichen El-zom Soma (Female) and Mr Ngene Chisom who also make First Class Honours in the Department of Mechanical Engineering in July, 2013. In 2014, the Department produced another first class student in person of Mr. Onyeaghala Precious and Akpan Samuel in 2017/2018 session. In 2022/2023 academic session, Mr. Favour Oko graduated with a first class as well as Mr Daniel Itohanoghosa Odiase in 2023/2024 academic session. In 2024/2025 academic session, the department graduated three first class students. They are: Egwu Isaac Ugbedeajo with the overall in College of Engineering highest CGPA of 4.98 and best graduating student in the entire university, Mr Omowa Joshua Temitope and Olushola Emmanuel Ayomide.

The new academic curriculum according to the Core Curriculum Minimum Academic Standard (CCMAS) commenced in 2023/2024 academic session and still ongoing until the BMAS fades out. The Mechanical Engineering Department got full National Universities Commission (NUC) Accreditation in November, 2007, March 2015, April 2021 and recently in November 10th 2025. The Department also got full COREN Accreditation in July, 2009, 2014 and 2019. Detail information on the structure of Mechanical engineering programme is contained in the Departmental Handbook for Undergraduate Programmes, which also, includes extracts from the University Regulations Governing First Degree Programmes.

The handbook contains information on the History, aims and objectives, course description in respect of the College and Department of Mechanical Engineering and other relevant matters. The Mechanical Engineering Department has been committed to high academic standards relying on a balanced hands-on practically oriented engineering curriculum aimed at producing graduates with heightened entrepreneurial skills with the potential to become job creators. The student enrolment in the Department for the last twenty-three (23) sessions is summarized.

**Engr.Dr. Mrs. Queeneth Adesuwa Kingsley-Omoyibo,
MNSE, MAPWEN, MNiMechE, MNiSafetyE, COREN.
Ag. Head of Department Mechanical Engineering,
Igbinedion University Okada,Nigeria.
30th November, 2025.**

1. INSTITUTIONAL INFORMATION

1.1. Brief History of Igbinedion University Okada

Igbinedion University Okada Nigeria, has her Proprietor as Sir Chief (Dr.) Gabriel Osawaru Igbinedion, the Esama of Benin Kingdom. The University is a cosmopolitan University where the academic calendar is faithfully run without interruption. On 13th March 1995, a set of distinguished scholars and seasoned University administrators whose responsibilities, amongst others, included the formulation of the Academic Brief for the actualisation of the Igbinedion University project was inaugurated with members of the Committee as: Sir Chief (Dr.) Gabriel Osawaru Igbinedion JP, (proprietor/Chairman), Late Pa S. I. Omorogbe, JP (Vice Chairman), Prof. T. M. Yesufu, Late Amb. (Dr.) A. I. Guobadia, Mr. Frank I. Imouokhome, Late Prof. P. N. Egharevba, Mr. Bright Igbinedion, Late A.O. Eghobamien Esq (Member/Legal Adviser) and Late Prince R. A. Williams JP (Member/Secretary). The Committee's dedication to duty and resolute determination to provide a unique platform for higher education in Nigeria resulted in the presentation of Certificate No. 01, dated 20th April 1999, to Chief Igbinedion on 10th of May 1999 shown in plate 1.1.



Plate 1.1.: Certificate of Operation as a Private University

1.2. Academic History

The University commenced its academic programs in the 1999/2000 session in five Colleges: Arts and Social Sciences, Business and Management Studies, Health Sciences, Law and Natural and Applied Sciences. The foundation students arrived in Okada on Friday, 15th October 1999. Since then, the University has operated without interruption, upheld its resolve to return tertiary education to the internationally accepted calendar of September to June. The College of Engineering commenced its program in the 2002/2003 session. The student population has grown steadily from 111 at inception in the 1999/2000 session to over 5000 in 2022/2023, while the staff strength has increased from 55 in 1999/2000 to 751, made up of 280 Teaching staff and 471 non-teaching staff. Academic programmes in Engineering, which are mature, are re-accredited, from time to time, by the Nigerian Universities Commission and the relevant professional bodies like Council for Regulating Engineering in Nigeria COREN.

1.3. University Vision, Mission and Core Values.

UNIVERSITY VISION

It visualizes itself as becoming a centre of academic excellence through teaching, research and knowledge production in response to contextualized national and global needs by providing the highest quality university education for students.

UNIVERSITY MISSION

To pursue excellence in teaching, research and scholarship through the provision of world class facilities and opportunities for education, training and employment to all those able to benefit without any form of discrimination, to make students stand tall through time and ready to face the challenges of a globalized world.

UNIVERSITY CORE VALUES

CORE VALUES OF THE UNIVERSITY

The core values of Igbinedion University (IUO) are Scholarship, Integrity, Team spirit, Enterprise and Responsiveness (SITER), these values guide the university in its pursuit of academic excellence and its mission to produce graduates who are both knowledgeable and well rounded.

- ✓ **Scholarship:** A Commitment to the pursuit of knowledge through teaching, research and learning.
- ✓ **Integrity:** A dedication to honesty and strong moral principles in all actions and endeavors.
- ✓ **Team spirit:** Fostering a collaborative environment and a sense of unity among staff and students.
- ✓ **Enterprise:** Encouraging an entrepreneurial mindset and initiative within the university community.
- ✓ **Responsiveness:** The ability to adapt and address the evolving needs of both National and global contexts.

MOTTO: KNOWLEDGE AND EXCELLENC

COLLEGE VISION

To be the best engineering college in Nigerian university with National and international acclaim; a college where the advancement of engineering and technology is continuously dynamic, training of environmentally –friendly engineers, required in the public and private sector of the economy for industrialization and development in Nigeria to impact positively on the society in a sustainable and dynamic world.

COLLEGE MISSION

To produce industry ready engineering graduates with high academic standard with adequate practical background and immediate value to Nigeria. To produce self- employed graduates enhancing the reputation of Igbinedion University Okada through academic quality and impact driven frontiers of knowledge by providing excellent environment for research and learning for a strong functional relationship with the industry.

DEPARTMENTAL VISION

The vision of the Department is to be the best Engineering Department in any Nigerian University with national and international acclaim; a Department where the advancement of engineering and technology is continuously dynamic, environment-friendly engineers, required in the public and private sectors of the economy are mid-wifed for the rapid industrialization and development of Nigeria.

DEPARTMENTAL MISSION

The mission is to develop into a national resource that will continue to support the development of Nigeria, its economic diversification to make it responsive to the needs of government, industry and society.

Thus, the Department will provide:

- state-of-the-art technological and Engineering training that prepares the graduates.
- Engage in appropriate research activities, and, hence, produce the most sought-after engineers by all employers of labour, post graduate schools and research institutes.

Establish industry-institution linkages for mutually beneficial relationships and strive to become a Centre of Excellence in Engineering and in the West-African sub-region where expertise and facilities to accelerate the pace is in the Department of Mechanical Engineering of IGBINEDION UNIVERSITY OKADA, NIGERIA which started in 2002/2003 academic session under the College of Engineering. The Mechanical Engineering Department aligns with IGBINEDION UNIVERSITY OKADA NIGERIA's quest for nurturing students aspiring to

obtain a holistic knowledge of their profession in order to develop a high level of critical thinking, adaptability prowess, problem solving tact's, open mindedness, creativity, and entrepreneurial thinking that is required to face the challenges of Nigeria, Africa and the Global space.

The Pioneer Head of Mechanical Engineering Department was **Engr. Paul Okonkwo**. The resource verification took place successfully on the 12th of July 2002 and ever since 2002 till 2025, the department has been waxing stronger. The Department has been committed to high academic standards relying on a balanced hands-on practically oriented engineering curriculum aimed at producing graduates with heightened entrepreneurial skills with the potential to become job creators.

1.4 Smart Campus University

The management of Igbinedion University has signed a Memorandum of Understanding (MOU) with both MTN and GLO. GLO Nigeria who has provided a 155mbps Bandwidth within the Campus. MTN Nigeria was made to provide additional internet Bandwidth of 80 mbps to further improve on the existing Bandwidth making Igbinedion University Okada, Nigeria a smart campus. The University currently has six (6) Information Communication Technology (ICT) Academy that provides various Information Technology (IT) professional training for both staff and students of the University to upskill and be more proficient. These Academy are: Cisco Academy, Huawei Academy, Amazon Cloud Web Services, Mikrotik Academy, Microsoft Imagine Academy and Oracle Database Academy. The University has also fully integrated digital tools for classroom teaching and research and provided more platforms for her students to become globally competitive. The ICT unit has continuously provided training and retraining for academic staff, non-academic staff and Administrative staff to keep them updated with new trends in ICT applications and tools for efficient service delivery. Plate 1.2 is the ICT academy in Igbinedion University Okada, NIGERIA.



Plate 1.2: ICT Academy in Igbinedion University, Okada

1.5. University Founders Day

Sequel from the presentation of the Certificate No.001 that established Igbinedion University Okada Nigeria, to Sir Chief (Dr.) Gabriel Osawaru Igbinedion on 10th May 1999, the date 10th May was statutorily recorded as the University's founder's day. The maiden celebration was marked on 10th May, 2005. Religiously same time every other year, it is marked by the University.



SIR CHIEF (DR.) GABRIEL OSAWARU (PROPRIETOR/FOUNDER)
HONOURABLE CHANCELLOR, IGBINEDION UNIVERSITY OKADA, NIGERIA.

1.6. COLLABORATIONS AND LINKAGES OF IGBINEDION UNIVERSITY OKADA, NIGERIA.

The University is in collaboration and linkage with numerous Industries, Academic, Government and Societies. These include the following:

International

Liverpool John Moores University, UK ,
Manchester Metropolitan University, UK,
Arden University, United Kingdom,
Westminster University, United Kingdom
Lancaster University, United Kingdom
University of Leeds, Leeds, UK ,
East Carolina University, U.S.A.
Howard University, Washington, U.S.A.
University of Missouri, U.S.A.
American Consulate: Window on America Gaia Education,
Findhorn, Forres, Scotland Otto-Von-Guericke
University of Magdeburg, Germany
Newcastle Aerodrome (NA), Ireland
Zurich Elite Business School (ZEB), Zurich
Austria- African Research Network
Delaware State University, Dover, U.S.A.
Ryokuku University, Japan
British Council
African Union- African Scientific
Research Innovation Council (AUASRIC)
Global Partnership for Education, Washington DC
African Research Innovation Partnership (ARIP)
UN Sustainable Solutions Network (SDSN)
V.N. Karazin Kharkiv National University,
Ukraine Ivano-Frankivsk National Technical
University of Oil and Gas, Ukraine
Lviv University of Business & Law, Ukraine

Across Atlantic University, United Kingdom
Hakkaido University,
Japan.Microsoft
Intel, Amazon
CISCO
Mikrotik
HUAWEI Technology Co., Ltd
The Organisation for Women in Science for the Developing World (OWSD)

Continental

Austria-Africa UniNet
All Nations University, Ghana
African Union STRC
University of Sierra-Leone
University of Fort Hare, South Africa,
University of KwaZulu-Natal, South Africa(SA)
Vaal University of Technology, SA
Association of African Universities (AAU) Ghana
University of Mpumalanga, South Africa,
Kenyatta University, Kenya
Coalition for Dialogue on Africa (CoDA) ,
African Development Bank

National

Rosula Foundation, Nigeria

National Water Resources Institute, Kaduna
Chartered Institute of Bankers of Nigeria (CIBN)
Chartered Institute of Taxation (CITN)
Association of National Accountants (ANAN)

Cutix PLC Nnewi Anambra State

GLOBACOM
NigComsat Ltd, Abuja
Natural Eco Capital Ltd, Lagos,

Ehizua Hub Limited, Lagos
Nigerian Communication Commission (NCC)
WootLab Innovations, Abuja
C40, Lagos
Nigerian Army
Safety Signature Limited, Lagos
Edo State Polytechnic, Usen
Federal Ministry of Science, Technology & Innovation, Abuja
Advanced Space Technology Application Laboratory, Uyo
Institute of Chartered Accountants of Nigeria (ICAN)
MEMMCOL-Momas Electricity Meter Manufacturing Company Limited
Federal Institute of Industrial Research, Oshodi (FIIRO)

1.7. Philosophy and Objectives of the University

Igbinedion University Okada was established on 20th April 1999 as the first Private University in Nigeria with a vision “To become a centre of academic excellence through teaching and research activities responsible for communal and global human needs.”

The University has, amongst others, a philosophy encapsulated in its mission statement:

- 1 To be among the best and most successful Universities in the country.
- 2 To provide overall service and good value for money in the University education sector.
- 3 To excel in anticipating, responding quickly and competitively to students’ needs and staff development.
- 4 To maintain a growth that responds to overall global expansion and challenges in teaching and research.
- 5 To provide quality programmes, University graduates whose certificates open all doors to upward economic and social mobility.
- 6 To expand our research activities globally by creating linkages and collaborations amongst leading Universities and research institutions worldwide.
- 7 To regularly seek to maintain the acquisition of knowledge and excellence.

- 8 To operate a competency-driven scheme, which allows staff to acquire new skills, improve knowledge based and remain competitive in their areas of specialisation.
- 9 To regularly survey the environment to identify areas of need with a view to contributing to the community and registering a significant presence nationally and worldwide.

From the vision and mission of Igbinedion University Okada, the following are central University's goal:

1. Best and most successful University.
2. Good value for money in the University education sector
3. Excel in anticipating, responding quickly and competitively to students' needs and staff development.
4. Responsive growth to overall expansion and challenges in teaching and research.
5. Run quality academic programmes and issue certificates that open all doors to upward economic activities
6. Creation of linkages and collaborations network amongst leading Universities and research Institutions.
7. Regular maintenance of the University Motto: "Knowledge and Excellence".
8. A regular survey of the University environment, identification of areas of need and contribution to the University community.
9. Registration of significant presence nationally and worldwide

The Objectives of Igbinedion University are:

1. To train qualified personnel imbued with the spirit of service and development.
2. To offer wide opportunities for higher education to all persons who can benefit from it without distinction of race, religion, sex or political conviction/persuasion.
3. To train scientists, engineers, doctors, teachers, economists, lawyers and other professionals, including specialists in the field of humanities and to conduct research in Science and Technology.

4. To research problems relating to the development of the national economy, sciences and technology and culture, as well as to advance knowledge;
5. To train teachers and academic research staff for the Universities and other higher educational institutions
6. To promote scientific knowledge and disseminate its results for socio-economic benefits
7. To undertake any other activities, appropriate for a university of the highest standard.

1.8. Organisation and Administration of the Igbinedion University Okada.

The organisation and administration of Igbinedion University, Okada, consist of the following bodies;

- a. **The Visitor:** The Chairman of the Board of Regents is the Visitor of the University
- b. **The Board of Regents:** The Board of Regents is the trustees of the University
- c. **The Governing Council:** The Governing Council of the University is responsible for the determination of the policies, the development and governance of the University, subject only to any general directives that may be given by the Board of Regents.
- d. **The University Senate:** The Senate, in addition to all other powers vested in it, regulates and controls (after considering the views of the Colleges concerned) all teaching, courses of study and research and the conditions qualifying for admission into the various degrees and other distinctions of the University.

Chancellor: The Chancellor/Visitor of the University is appointed by the Board of Regents, heads the University and chairs Convocation.

Pro-Chancellor: The Pro-Chancellor is the Chairman of the Governing Council and holds office for three years' subject to a renewal for a final term of three years.

Principal Officers

- a) **Vice Chancellor:** Is the Chief Academic and Executive Officer of the University and who in the absence of the Chancellor, confer degrees and other academic titles and distinctions of the University.

- b) **The Deputy Vice Chancellor:** Assist the Vice Chancellor in his duties and acts in the place of the Vice Chancellor, when the Vice Chancellor is, for any reason, absent or otherwise unable to perform his function as Vice Chancellor.
- c) **The Registrar:** Is the Chief Administrative Officer of the University and is responsible to the Vice Chancellor for the day to day administrative work of the University. The Registrar, by virtue of that office is the Secretary to the Governing Council, the Senate, the Congregation and the Convocation of the University.
- d) **The Bursar:** is the chief Financial Officer of the University and is responsible to the Vice Chancellor for the day to day administrative and control of the financial affairs of the University.
- e) **The University Librarian:** is responsible to the Vice Chancellor for the administration and coordination of the Library services of the University.

The organogram of Igbinedion University Okada in Figure 1.1 is showing the hierarchy of academia and administration.

The organogram of Igbinedion University Okada

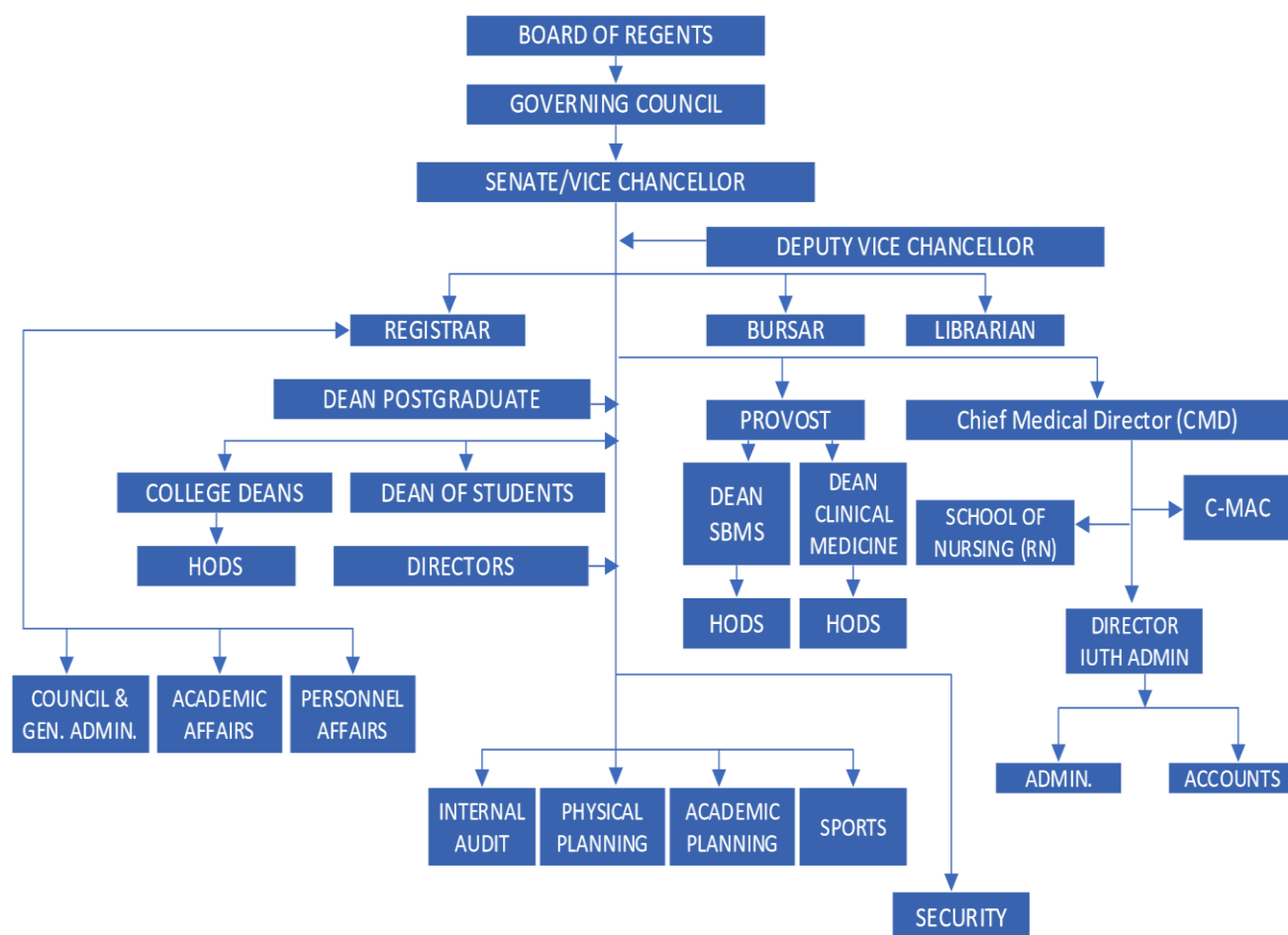


Figure 1.1: Organizational Chart of Igbinedion University Okada.

1.9 Name and Qualification of the Vice Chancellor

Prof. Lawrence Ikechukwu Ezemonye, Ph.D, FAS, FNES, FSESS, FWASOT.
(Professor of Ecotoxicology and Environmental Forensics and
Chairman of the Committee of Vice Chancellors of Nigeria.)

Telephone No: Office: 080 233 538 47

Email address: vc@iuokada.edu.ng

1.10 Address of the University, Contact and University website

Address of the University: Igbinedion University, Okada,
Nigeria.

P.M.B. 0006 Benin City, Edo State, Nigeria

Telephone: 052-2600056; 052-254942

Date Founded: 10th of May 1999

University Website : www.iuokada.edu.ng

1.11 Specific Programmes in the University

The specific programmes in Igbinedion University, Okada are tabulated in Table 1.1.

Table 1.1: Specific undergraduate Programmes in the University.

S/N	SPECIFIC PROGRAMME IN THE UNIVERSITY
COLLEGE OF ARTS & SOCIAL SCIENCES (CASS)	
1	B.Sc. International Relations
2	B.Sc. Mass Communication
3	Geography & Regional Planning
4	B.A English
5	B.A. Theatre Arts
6	B.Sc. Sociology & Anthropology
7	B.Sc. Political Science
8	B.Sc. Economic & Development Studies
COLLEGE OF BUSINESS & MANAGEMENT STUDIES (BMS)	
9	B.Sc. Accounting
10	B.Sc. Banking & Finance
11	B.Sc. Business Administration
COLLEGE OF ENGINEERING	
12	B.Eng. Chemical Engineering
13	B.Eng. Civil Engineering
14	B.Eng. Electrical & Electronic Engineering
15	B.Eng. Mechanical Engineering
16	B.Eng. Petroleum Engineering
17	B.Eng. Computer Engineering
18	B.Eng. Mechatronics Engineering
COLLEGE OF HEALTH SCIENCES	
20	M.B.B.S
21	B.Sc. Medical Physiology
22	B.Sc. Nursing
23	B.Sc. Anatomy
24	B.Sc. Med. Laboratory Science
25	B.Sc. Pharmacology
26	Pharm.D. Pharmacy
COLLEGE OF LAW:	
27	LLB Law
COLLEGE OF NATURAL & APPLIED SCIENCES	
28	B.Sc. Computer Science & Information Technology

29	B.Sc. Microbiology
30	B.Sc. Chemistry
31	B.Sc. Biochemistry
32	B.Sc. Industrial Chemistry
33	B.Sc. Software Engineering
34	B.Sc. Cyber Security

1.12. Institutional Academic Calendar

The institutional academic calendar for the 2024/2025 Academic Session is shown in Table 1.2

Table 1.2: 2024/2025 Academic Calendar



IGBINEDION UNIVERSITY OKADA, NIGERIA. ACADEMIC CALENDAR 2024/2025 SESSION.

DATE	EVENT
FIRST SEMESTER	
Saturday, 28 th September, 2024	Fresh Students Come into Residence
Monday, 30 th September- Friday, 4 th October, 2024	Orientation / One-Stop-Shop Registration for Fresh Students
Tuesday, 1 st October, 2024	National Independence Day/ Public Holiday
Thursday, 3 rd October, 2024	Senate Meeting
Saturday, 5 th October, 2024	Returning Students Come into Residence
Monday, 7 th October, 2024	Lectures Begin for Fresh Students
Monday, 7 th October - Friday, 11 th October, 2024	Registration for Returning Students
Monday, 14 th October, 2024	Lectures Begin for Returning Students
Monday, 21 st October - Monday, 28 th October, 2024	Late Registration Begins for Returning Students
Thursday, 24 th October, 2024	Inaugural Lecture I
Monday, 4 th - Wednesday 6 th November, 2024	Continuous Assessment I
Thursday, 7 th November, 2024	Senate Meeting
Friday, 8 th November, 2024	Students Consultative Forum

Tuesday, 12 th November, 2024	Senior Staff Disciplinary Committee Meeting
Wednesday, 13 th November, 2024	Students Disciplinary Committee
Tuesday, 19 th November, 2024	Inaugural Lecture II
Friday, 29 th November, 2024	Convocation For the Award of First Degrees / Graduation Dinner
Saturday, 30 th November, 2024	Convocation For Award of Higher Degrees/Conferment of Honorary Degrees
Monday, 2 nd December, 2024	Students Consultative Forum
	Deadline for Change of Course
Thursday, 5 th December, 2024	Senate Meeting
Friday, 6 th December, 2024	University Service of Nine Lessons and Carols
Wednesday, 18 th December, 2024	University Closes for Christmas
Monday, 6 th January, 2025	University Reopens/Lectures Resume
Tuesday, 7 th January, 2025	University Day of Prayer
	Senior Staff Disciplinary Committee
Thursday, 9 th January, 2025	Senate Meeting
	Mid-Semester Examinations (This MUST be conducted using the CBT Evaluation System)
Thursday, 16 th January, 2025	University Lecture
Friday, 31 st January, 2025	Submission of the student's Project to Departments (Chapter 1)
Thursday, 6 th February 2025	Senate Meeting
Friday, 14 th February, 2025	Lectures End for the first semester
Monday, 17 th - Friday, 21 st February, 2025	Lecture-free week
Saturday, 22 nd February, 2025	25 th Matriculation Ceremony/Parents Consultative Forum
Monday, 24 th February -Friday 28 th February, 2025	First Semester GST Examinations (Including EPS)
Monday, 3 rd - 14 th March, 2025	First Semester Examination continues
Thursday 6 th March, 2025	Senate Meeting
Friday 14 th March, 2025	First Semester Examination Ends
Monday, 17 th - 21 st March, 2025	One Week Break

SECOND SEMESTER

DATE	EVENT
Saturday, 22 nd March, 2025	Students Return for Second Semester
Monday, 24 th March, 2025	Lectures Begin
Thursday 3 rd April, 2025	Senate Meeting
Monday, 7 th April, 2025	Student Disciplinary Committee

Friday, 18 th April - Monday, 21 st April, 2025	Easter Break
Tuesday, 22 nd April, 2025	Lectures continue
Wednesday, 23 rd April, 2025	Advertisement for Undergraduate/Postgraduate Admissions
	University Lecture
Thursday, 24 th April, 2025	Student Disciplinary Committee
Friday, 25 th April, 2025	Students Consultative Forum
Friday, 25 th April, 2025	Call for Staff Appraisals Exercise
	College Board Meetings
Friday, 25 th April, 2025	Senate Examinations and Ethics Committee on First Semester Examination Results
Thursday, 1 st May, 2025	National Workers Day
Thursday, 8 th May, 2025	Senate Meeting
Monday, 5 th - Friday, 9 th May, 2024	University Inter-Hall Sports
Saturday, 10 th May, 2025	26 th Founder's Day
Monday, 12 th May, 2025 - Friday, 16 th May, 2025	Mid-Semester Examinations CBT (GST, CSP & EPS)
Wednesday, 14 th May, 2025	Briefing of all final year students
	Deadline for Submission of Draft Projects for Similarity Test at IPTTO (All Final Year students)
Tuesday, 20 th May, 2025	Student Disciplinary Committee
Friday, 30 th May, 2025	College Board Meetings
	Deadline for Submission of Final Bound copies of projects to the Departments
Friday, 30 th May, 2025	Second Semester Lectures End
Monday, 2 nd -Friday, 6 th June, 2025	Students Week
Wednesday, 4 th June, 2025	Inaugural Lecture III
Thursday, 5 th June, 2025	Senate Meeting
Monday, 9 th June, 2025 - Monday, 16 th June, 2025	Second Semester GST, EPS & CSP Examinations
Thursday, 12 th June, 2025	Democracy Day/Public Holiday
Tuesday, 17 th June - Monday 30 th June, 2025	Second Semester Examinations for all Colleges (2 weeks)
Monday, 30 th June, 2025	Second Semester Examinations End
Tuesday, 1 st July, 2025	Long Vacation Begins Except for a Category of Students in the College of Health Sciences and Engineering
Thursday, 3 rd July, 2025	Senate Meeting

Monday, 7 th -Friday, 25 th July, 2025	Make-up Examinations Session I
Wednesday, 23 rd July, 2025	College Board Meet to Consider Second Semester Results
Monday, 28 th July 2025 - Friday 15 th August, 2025	Make-up Examinations Session II
Wednesday, 30 th July, 2025	Students Disciplinary Committee
Wednesday, 6 th August, 2025	Senate Exams and Ethics Committee on Sessional Results
Thursday, 7 th August, 2025	Senate Meeting
Monday, 11 th August - Monday, 15 th September, 2025	Industrial Training for Engineering Students
Wednesday, 13 th August, 2025	Senate Meets to Consider Sessional Results
Tuesday, 19 th August, 2025	Students Disciplinary Committee
Thursday, 4 th September, 2025	Special Senate
Tuesday, 9 th September, 2025	Honourable Chancellor's Birthday Lecture
Thursday, 11 th September, 2025	Honourable Chancellor's Birthday
Wednesday, 17 th September, 2025	Senate Exams & Ethics Committee to Consider Make-up Results
Thursday, 18 th September, 2025	Senate Meeting to Consider Make-up Exam Results II
Friday, 19 th September, 2025	University Lecture
Saturday, 27 th September, 2025	Fresh Students come into Residence for the First Semester 2025/2026

NOTES:

1st Semester

15 Weeks of Lecture

3 Weeks of Examination

2nd Semester

15 Weeks of Lecture

3 Weeks of Examinations

4 weeks of Holidays **Key: **** - Tentative Date

GENERAL INFORMATION ON THE COLLEGE AND MECHANICAL ENGINEERING PROGRAMME

2.1 General Information on Mechanical Engineering Programme

The general information about the Mechanical Engineering programme, including the date of establishment of the programme in the university, as provided.

General information about the Mechanical Engineering Programme.

Title of Programme /Sub-Discipline/ Discipline to be Accredited: **Mechanical Engineering**

Name of Faculty/School/College in which the programme/sub-discipline/discipline to be accredited is offered: General Abdulsalami Abubakar College of Engineering, Igbinidion University, Okada.

Date of Establishment of Department: October 2002 (2002/2003 session)

COREN Registration Number of the College Dean: R66,468

Telephone Number of Dean: 08035035446, 08151677871

Name/Qualification(s) of the Head of the Department offering the programme to be accredited:
Engr. Dr. Mrs. Queeneth Adesuwa KINGSLEY-OMOYIBO MNSE, MNiMechE, MNiSafetyE. PhD, Industrial/Production Engineering UNIBEN.

COREN Registration Number of the Head of Department: R33,942

Telephone Number of HOD: +23481 413 914 81

Departmental email address: mechanicalengineering@iuokada.edu.ng

2.2. History of Accreditations (Years of Accreditation)

The Mechanical Engineering Department has consistently got full accreditation for both NUC and COREN Accreditation since its inception in 2002. The programme has been reaccredited in 2009, 2014, and 2019 as stated in Table 2.2.

Table 2.2: Accreditation History of Civil Engineering Programme

S/N	Year of Accreditation	Status of Previous Accreditation
1	2009	Full accreditation
2.	2014	Full accreditation
3.	2019	Full Accreditation

2.3 Brief Background of Mechanical Engineering Department

The Department of Mechanical Engineering programme began in September, 2002 (2002/2003 Session) with an initial student intake of 15, consequently increased to a student population of 163 in the 2009 / 2010 Session and currently has student population of 86 in the just concluded 2024 / 2025 Session. The initial staff strength of two (2) has considerably increased to 18 staff. The Department has eighteen (18) members of staff, (10) are full-time teaching staff; one (1) is a part-time lecturer, four (4) are technologists and three (3) administrative staff.

The present full time staff-student ratio is estimated at 1: 12, which is line with both NUC and COREN recommendation. The Department has produced a total number of graduates of 351

students with B. Eng. Degree from 2006 / 2007 academic session when it graduated the pioneer set. Many of the students are working in reputable engineering companies. Quite a good number are doing their post graduate studies overseas. The Department is making steady and consistent developmental progress.

The Department is now equipped with basic facilities, namely: office furniture and facilities; classrooms; lecture halls; laboratory/workshop; libraries; IT and Internet facilities, etc. The University is steadily providing more laboratory / workshop facilities, especially, in the following areas of specialization of the department: Applied Energy, Fluid Mechanics; Material science and Metallurgy, Design and Production. The library has Mechanical Engineering E-resources in the E-library with good internet speed as well as many Mechanical Engineering books and journals. Besides, Mechanical Engineering students are very computer literate and exposed to IT and Internet facilities. The students also do their industrial training in reputable engineering based establishments.

The staff seriously engage in various developmental and capacity building efforts. They attend and participate in engineering seminars, conferences; publish articles and undertake graduate studies (MEng. and PhD programs). The Department is very proud of Mr Onike Ahmed Oladotun who graduated with First Class Honours in 2010/2011 session and Mr. Onabanji Adedamola, Mr. Asuelimmen Edose, Miss. Oremichen El-zom Soma (Female) and Mr Ngene Chisom who also make First Class Honours in the Department of Mechanical Engineering in July, 2013. In 2014, the Department produced another first class student in person of Mr. Onyeaghala Precious and Akpan Samuel in 2017/2018 session. In 2022/2023 academic session, Mr. Favour Oko graduated with a first class as well as Mr Daniel Itohanoghosa Odiase in 2023/2024 academic session. In 2024/2025 academic session, the department graduated three first class students. They are: Egwu Isaac Ugbedeajo with the overall in College of Engineering and in the entire university with highest CGPA of 4.98, Mr Omowa Joshua Temitope and Olushola Emmanuel Ayomide. These are the three first class for 2024/2025 session.

With effect from 2010/2011 academic session, all existing courses (100- 500 levels) have been revised and updated in compliance with NUC Benchmark Minimum Academic Standards (BMAS). From 2023/2024 session, the Core Curriculum Minimum Academic Standard (CCMAS) took effect. Particularly, ENT 211: Entrepreneurship and innovation (2 credit units) and a 300 level second semester course ENT 312: Venture creation (2 credit units) were introduced. The new academic curriculum according to CCMAS commenced in 2023/2024 academic session and still ongoing until the BMAS fades out. The Mechanical Engineering Department got full National Universities Commission (NUC) Accreditation in November,

2007, March 2015, April 2021 and recently in **November 10th 2025**. The Department also got full COREN Accreditation in July, 2009, 2014 and 2019. There are more ongoing developmental programme aimed at realizing our objectives here in Igbinedion University Okada. Detail information on the structure of Mechanical engineering programme is contained in the Departmental Handbook for Undergraduate Programmes, which also, includes extracts from the University Regulations Governing First Degree Programmes.

The Mechanical Engineering Department has been committed to high academic standards relying on a balanced hands-on practically oriented engineering curriculum aimed at producing graduates with heightened entrepreneurial skills with the potential to become job creators.

2.4. Administration of College and Mechanical Engineering Department

The college administrative head is the Dean, with departmental heads of various programmes. The organizational structures for the college and the Mechanical Engineering Department are shown in Figures 2.1 and 2.2, respectively. Decision-making is usually collective. Departmental Heads of Programmes, college officers, and Dean of the College are members of the Senate Council of the University. Observations, information, and other relevant matters/issues with members of staff are first considered at the departmental level. The college board, comprising all the college staff headed by the Dean, also deliberates on matters brought forward by the departments and then resolves the issues or presents them before the Senate Council for consideration, approval, and expedited actions where necessary.

The Vice-Chancellor and the University management team also schedule meetings with academic and non-academic staff every session for a general discussion concerning the university (called a congregational meeting). Creative and constructive ideas are welcomed by members of staff from time to time. The Deputy Vice-Chancellor also holds meetings with course advisers to discuss trivial matters and possible solutions to students' academic performance. In general, members of staff are involved in administration, decision-making, and policy governing the University.

Other decision-making committees are also established at the college and at the departmental level, which make appropriate recommendations where necessary to the

Senate Council. They include the following committees: Appointment and Promotion Committee, Disciplinary, Finance, Awards and Prizes Committee, Welfare Committee, Sports Committee, Strategic Planning Committee, Curriculum, Examinations Time Table Committee, SIWES / Industrial Training Committee, Students' Advisory Committee, ICT Committee, Research and Publications Committee, Seminar and Project Coordinating Committee etc.

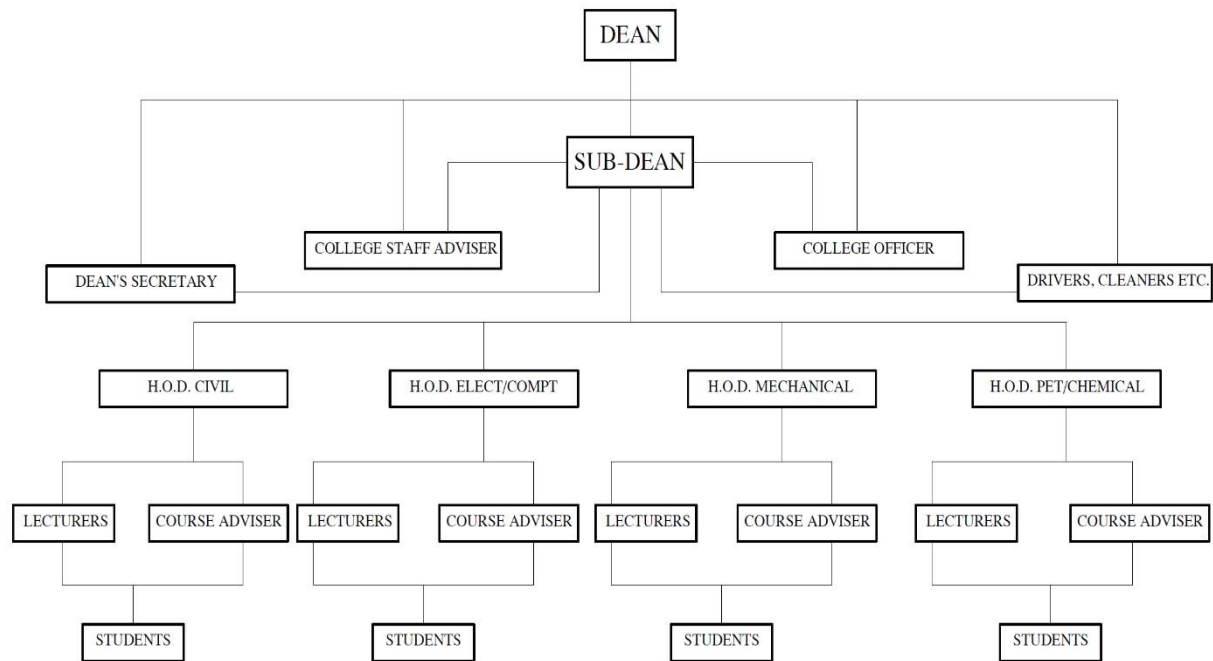


Figure 2.1: Organizational Structure of Gen. Abdulsalami A. College of Engineering.

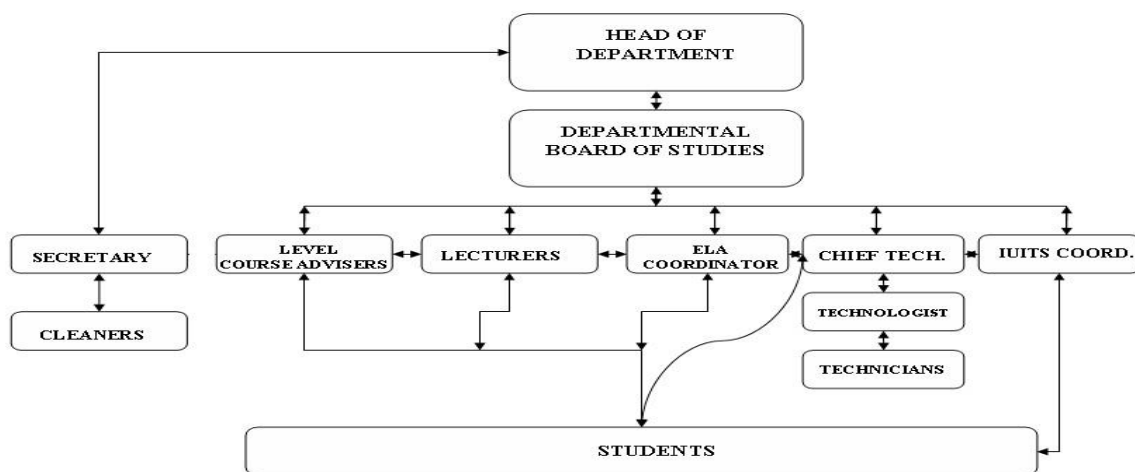


Figure 2.2: Organizational Structure of the Civil Engineering Department

ELA COORDINATOR = Engineering Laboratory Coordinator, CHIEF TECH = Chief Technologist

IUITS COORD = Igbinedion University Industrial Training Scheme Coordinator,

The official head is the Head of Department as shown in figure 2 above. The head of department runs all the administrative activities in the department in conjunction with departmental staff. Decision-making is usually collective; taken at the Departmental Regular meetings and Board of Studies meeting. Members of staff are given the opportunity to air their opinions and other matters at the meetings regarding welfare, progress, complaints etc.,

2.5 Vision and Mission of College and the Department

COLLEGE VISION

To be the best engineering college in Nigerian university with National and international acclaim; a college where the advancement of engineering and technology is continuously dynamic, training of environmentally –friendly engineers, required in the public and private sector of the economy for industrialization and development in Nigeria to impact positively on the society in a sustainable and dynamic world.

COLLEGE MISSION

To produce industry ready engineering graduates with high academic standard with adequate practical background and immediate value to Nigeria. To produce self- employed graduates enhancing the reputation of Igbinedion University Okada through academic quality and impact driven frontiers of knowledge by providing excellent environment for research and learning for a strong functional relationship with the industry.

DEPARTMENTAL VISION

The vision of the Department is to be the best Engineering Department in any Nigerian University with national and international acclaim; a Department where the advancement of engineering and technology is continuously dynamic, environment-friendly engineers, required in the public and private sectors of the economy are mid-wifed for the rapid industrialization and development of Nigeria.

DEPARTMENTAL MISSION

The mission is to develop into a national resource that will continue to support the development

of Nigeria, its economic diversification to make it responsive to the needs of government, industry and society. Thus, the Department will provide:

- state-of-the-art technological and Engineering training that prepares the graduates for responsibility.

- Engage in appropriate research activities, and, hence, produce the most sought-after engineers by all employers of labour, post graduate schools and research institutes.

Establish industry-institution linkages for mutually beneficial relationships and strive to become a Centre of Excellence in Engineering and in the West-African sub-region where expertise and facilities to accelerate the pace is in the Department of Mechanical Engineering of IGBINEDION UNIVERSITY OKADA, NIGERIA which started in 2002/2003 academic session under the College of Engineering.

The Mechanical Engineering Department aligns with IGBINEDION UNIVERSITY OKADA NIGERIA's quest for nurturing students aspiring to obtain a holistic knowledge of their profession in order to develop a high level of critical thinking, adaptability prowess, problem solving tact's, open mindedness, creativity, and entrepreneurial thinking that is required to face the challenges of Nigeria, Africa and the Global space.

2.6 Philosophy, Goals and Objectives of Mechanical Engineering Programme

The general philosophy of Mechanical Engineering Programme is in line with both the Core Curriculum Minimum Academic Standard (CCMAS) set by the National Universities Commission (NUC), which are to produce graduates with high academic standard with adequate practical background and of immediate value to industry in particular and the nation in general; and be self-employable. The programme has four intervening Industrial-Training periods to enable the engineering graduates acquire the necessary skills to solve local/international problems. Pursuant to the general philosophy, therefore, the programme has been designed to incorporate the following features:

1. Common courses at the 100 and 200 levels for all engineering students.
2. 8 weeks' workshop practical at the end of the 2nd semester 100 level examinations for all engineering students.
3. 8 weeks' workshop practical at the end of the 2nd semester 200 level examinations for all engineering students GET 299.

4. Workshop practice up to 300 level (GET 399) and laboratory work for all Engineering students.
5. Industrial Training (GET 499) which last for 24 weeks for all 400 level engineering students.
6. Interaction between students and professionals through regular seminars and workshops.
7. Final year research project where the student works alone under an academic supervisor and co-supervisor.
8. Opportunity to have in-depth study of a specific area of the programme from a wide selection of
 - a. optional courses.
9. Adequate knowledge in engineering management and entrepreneurship program.

2.6.1 Goals and Objectives:

The general goals and objectives of engineering training are expected to be in consonance with the realization of national desires with respect to industrial development and high technology attainment. Consequently, the objectives of the engineering programmes are to:

1. Develop the necessary skills, creative ability, attitudes and expertise consistent with engineering design, communication and construction of engineering works and projects;
2. Adapt and improve on exogenous technology in order to enhance constructive techniques and the proper study and use of local raw materials;
3. Inculcate maintenance culture in the use of engineering artifacts;
4. Inculcate a responsible attitude towards demands made by the practice of engineering and risk implication of design and construction;
5. Install and maintain complex engineering systems to enable them perform optimally in the Nigerian environment;
6. Be able to exercise original thought, have good professional judgment and be able to take responsibility for the direction of important assignments;
7. Be self - employable, and ensure therefore, that engineering graduates from Igbinedion University are resourceful, creative, knowledgeable and capable of carrying out the following functions:
8. To design engineering projects and supervise their construction;
9. To design and make electrical and electronics components, machines, equipment and systems;

10. To design and develop new products and production techniques in industries;
11. To be good manager of people, money, material, plants and machinery.

2.7. The Programme Educational Objectives (PEOs) of Mechanical Engineering Programme in Igbinedion University Okada

Programme Educational Objectives are expected outcomes in terms of knowledge, skills, and attitudes of Mechanical engineering students of Igbinedion University Okada (IUO) 3 – 5 years after graduation. It is what the Mechanical Engineering programme prepares the mechanical engineering graduates of IUO for their careers and professional accomplishments.

The current PEOs of Mechanical Engineering Programme in Igbinedion University Okada are hinged on knowledge and technical expertise, problem solving and critical thinking, communication and collaboration, professionalism and ethics, commitment to sustainable development, lifelong learning and adaptability driven by mission and vision, program goals and objectives, industrial needs and trends, stakeholders' expectation, innovation and research, etc.

The Mechanical Engineering Programme Educational Objectives describes the expectations of our graduates after a few years of work experience by contributing to the society through modern technologies and practices. The Programme Educational Objectives are:

- a) **PEO1** - Be established and recognized as a valued mechanical engineering professional and an effective communicator in industries related to mechanical science, mechanical engineering, as well as related engineering technologies.
- b) **PEO2** - Practice their profession in a collaborative, team-oriented manner that embraces the multidisciplinary & multicultural environment of today's world.
- c) **PEO3** - Engage in lifelong learning and professional development with proficient soft skills via postgraduate education and participation in professional organizations.
- d) **PEO4** - Function as a responsible member of society with willingness to mentor fellow employees and an understanding of the ethical, social and economic impact of their work in a global context.
- e) **PEO5**- Graduates uphold integrity, and adhere to ethical standards in their work, considering the social, environmental, and economic effects and impacts of their projects.

To achieve these aims and program educational objectives, the major areas of focus offered by the Department are

- **Engineering Design and Production,**
- **Thermal -Fluid**
- **Thermal power**

Table 2.3 is the five (5) PEOs of the Mechanical Engineering Programme of Igbinedion University, Okada, and the attributes of graduates from the PEOs.

Table 2.3: PEOs of Mechanical Engineering Programme in Igbinedion University, Okada.

PEO	Description	Attributes from the PEO
PEO1:	Be established and recognized as a valued mechanical engineering professional and an effective communicator in industries related to mechanical science, mechanical engineering, as well as related engineering technologies	Knowledge and Technical Expertise
PEO2:	Practice their profession in a collaborative, team-oriented manner that embraces the multidisciplinary & multicultural environment of today's world for problem solving in the society.	Problem-solving and Critical Thinking
PEO3:	Engage in lifelong learning and professional development with proficient soft skills via postgraduate education and participation in professional organizations.	Lifelong Learning, innovation, and Adaptability
PEO4:	Function as a responsible member of society with willingness to mentor fellow employees and an understanding of the ethical, social and economic impact of their work in a global context	Professionalism and Ethics
PEO5:	Graduates uphold integrity, and adhere to ethical standards in project management, considering the social, environmental, and economic effects and impacts finances of their projects.	Project management and finance:

2.8. Programme Outcomes (POs) of Mechanical Engineering.

Programme Outcomes are the narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills and attitude that the students acquire while progressing through the programme specifically, the programme should demonstrate that the students have acquired the following Graduate Attributes associated with the corresponding POs.

A graduate of an engineering programme is expected to have the following attributes as listed in the Table 2.4 adopted from **OBE COREN BMAS**.

Table 2.4: Description of Programme Outcomes (POs)

PO	DESCRIPTION
PO1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2:	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3:	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7:	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9:	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12:	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2.8.1 Mapping of PROGRAMME OUTCOMES (POs) to PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) - Graduate Attributes

Table2. 4: POs to PEOs Mapping for Mechanical Engineering

Program Outcomes (POs)	Program Educational Objectives (PEOs)			
	PEO1	PEO2	PEO3	PEO4
PO 1: Engineering Knowledge	✓		✓	
PO 2: Problem Analysis	✓		✓	
PO 3: Design / Development of solutions	✓			
PO 4: Investigation	✓		✓	
PO 5: Modern Tool Usage	✓		✓	
PO 6: The Engineer and Society				✓
PO 7: Environment and Sustainability				✓
PO 8: Ethics		✓		✓
PO 9: Communication		✓		✓
PO 10: Individual and Team Work		✓		✓
PO 11: Lifelong Learning			✓	
PO 12: Project Management and Finance		✓		✓

2.8.2 MAPPING OF Courses with POS

Table2. 5: Courses Mapping with POs

Level	Semester	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
100	1st	GST 101	Communication in English		2	2				2				3	
		GET 101	Engineer in Society	1	2		2						2		
		CHM 101	General Chemistry I		2	2	2								
		CHM 107	General Practical Chemistry					2				2		2	
		MTH101	Elementary Maths I		2								2	2	

200		MTH103	Elementary Maths III	1					2	2	1	2	2	2	
		PHY101	General Physics I		2			2		2	1	2	2		
		PHY103	General physics II		2			2		2	1	2	2		
	2 ND	PHY107	General Practical physics 1		1	2	2								
		IUO-MEE101	Intro.to Mech Engineering		2			2		2	1	2	2	2	
		GST113	Use of Library study skills and ICT		2	2								2	
		GST112	Logic,Philosophy and Human Existence	2	2	1	2								
		GST 102	Use of English II	2	2	1	2								2
		GET102	Engineering Graphics and solid Modelling		2			2		2	1	2	2		2
		CHM 102	General Chemistry II	2		3		2							2
		CHM 108	General practical Chemistry II	2	2					3				2	
	1 st	MTH 102	Elementary Mathematics II	2	2	2	1								2
		PHY 108	General Practical physics II	2	3	1					3				
		STA 112	Statistics and Probability	3	2	2				2					
		IUO-EET-102	Engineering Equipment Training	3	2	2			2						
		PHY104	Waves,vibration and optics	2		2		2		2					
		IUO-ELA 209	Igbinedion University Industrial Training Scheme	2	2	2		2							
		GET205	Fundamentals of Fluid Mechanics	2	2	2	1								
		GET209	Engineering Mathematics I	2	3	1									
		ENT 211	Entrepreneurship and Innovation	3	2	1		1		1	1	2			

200	2ND	GET201	Applied Electricity I		1	1			3		2	2	2	2	3
		GET211	Computing and software Engineering	2		2		1		2		2			
		GET207	Applied Mechanics	3	3	1	1	1	2		2	1	1		
		GET213	Engineering Drawing I	2	2	3									
		IUO-ELA201	Engineering laboratory I	3	2	1	1						2		
		IUO-EET 213	Engineering equipment training I	3	2			2		1	2	2		2	
		GET203	Engineering graphics and solid modelling	2	2	1			2		2	1	2	2	3
		GET299	SIWES I	2				2	2	1	2	1	2	1	
	2ND	GST212	Philosophy ,logic and Human Existence	3	3	2		1				1			2
		GET214	Applied Electricity II	3	3	2		1				1			1
		GET202	Engineering Materials	2	2	1		1			2				
		GET204	Student workshop Practice	2	2	3		2							
		GET206	Fundamentals of Thermodynamics	3	2			1		1	2	2	1	1	
		GET208	Strength of Material	3	2			2		1	2	2	2	1	
		IUO-ELA 202	Engineering Laboratory II	3	2			2		1	2	2	2	1	
		GET 299	SIWES I	3	3	2	2	2					1		
		GET210	Engineering Mathematics II	2	3	2									
		IUO-CSP212	Community Service Program	3	3	3		2							3
		GET214	Applied Electricity II	3	3	3		2				2			
		GET212	Engineering Drawing II	3	2	2	2	1							
		IUO-MEE201	Introduction to Energy materials	3	3	3	3	3					2		

		IUO-GST211	Environment and Sustainable development	2		2		2							
300	1ST	GET 301	Engineering Mathematics III	2	2	2		1							
		GET307	Introduction to Artificial Intelligence Machine Learning and convergence technology.	3	2	2	1	1							
		IUO-GET313	Upskill course(I) AUTO CAD	3	3			1		1	2	2	2	1	
		IUO-GET303	Engineering Law and Managerial Economics	3	3			1		1	2	2	2	1	
		IUO-MEE371	Introduction to Emerging Engineering Materials	2	3	2					2	2	3		2
		IUO-MEE391	Weldment design	1	2	3	3	3			2	3	2		
		IUO-ELA 301	Laboratory practical	2					2	1	2		2	1	
300	2ND	GET 305	Engineering Statistics and Data analytics	2	3			2	1	2		2		2	
		GST312	Peace and conflict resolution	2	2	2	1	1							
		ENT312	Venture creation	3	2	2	2	2							
		GET302	Engineering Mths IV	3	3	3							1		
		GET304	Technical writing and communication	2	2			1		1	2	1	2	1	
		GET306	Renewable Energy system and Technology	3	2			2		1	2	1	2	1	
		MEE306	Computer aided design and Manufacture	3	3	2	2	2							
300	2ND	IUO-GET314	Upskill course (DATA ANALYSIS)	3	2	2	2	1					2	2	

		GET399	Student Work Experience Program. (SWEP) II	3	2	2		1							
		IUITS 302	Industrial Training	2	3	2	2								
		IUO-ELA302	Laboratory Practicals	2	3	2									
		IUO-MEE 372	Bronze Casting Technology	2	2	2									
		IUO-CERT 411	Career enhancement and resilience training	2	2	2		2							
		MEE 401	Mechanical (Machine) Engineering design	3	3	3	2	1							
		GET 402	Engineering Project I	3	2	2	2	2			2	2			
		IUO-MEE491	Model analysis of mechanical systems			3	3	2	2	2	3	2	2	2	2
		IUO-MEE481	Failure analysis and prevention	3	3	3	2	2							
		MEE403	Applied (Engineering) Thermodynamics					2	2						3
		MEE404	Applied fluid mechanics	3	2	3		3		3					
		MEE405	Heat and mass transfer	2	2	2		2							
		GET404	Applied fluid mechanics	2	3	3		3							
		MEE407	Advanced mechanics	3	2	2	2	2			2		2	2	
400	2ND	GET 499	SIWES III	2	2	2		2	2			2	2	2	
3500	1ST	MEE500	Project I	2	2	2	2	2	2	2	2	2	2	2	2
		GET501	Engineering Project Mngement	2	3	3	3	3	3	3		3	3		3
		IUO-GET531	Computational material science	2	2	2	2	2	2	2	2	2	2		
		IUO-MEE571	Applied fluid for mechanics	3	3	2	2	2	2		2		2	2	2

			environmental change and renewable energy												
		IUO-MEE581	Engineering logistics planning	2	2	2	2	2	2	2	2	2	2	3	3
		IUO-MEE591	System optimization	3	3	2	2	2	2	2		1	2		
		IUO-MEE561	Design of fluid power systems	2	2	2		2				1	1	2	
		MEE501	Applied design			3	2	2	1	1	2	1	2	2	2
2ND		GET502	Engineering Law					1	2	1	3				
		IUO-MEE582	Engineering Industry soft skills	2	2	2	2	2	2	2	2	2	2	2	2
		IUO-MEE592	Municipal solid waste management	2	2	2		2							
		IUO-MEE542	Materials Technology	3	3	2	2	2							
		MEE 500	Project II	3	3	2		2					2		
		IUO-MEE562	Computational fluid dynamics	3	2	2	2	1			2		1		1
		IUO-MEE522	Computer aided design,manufacturing and Engineering	3	2	2	2	2	2	2		2	2	3	

2.8.3The Process and Tools for Review of PROGRAMME OBJECTIVES (POs).

The process and tools used for POs establishment and reviews shown below were obtained through discussion with stakeholders as shown in the attached minutes of the meeting for the establishment of the PEOs and POs;

Table 2.6: Process for Review of POs

		Evaluation Tool	KPI	Data Collection Frequency	Analysis Frequency
	Student	CLO scores of the student in the mapped course(s)	Each PO must be attained in at least 50% of the respective mapped course(s), with an average score of at least 50%.	Every Semester	Every Semester
	Course	PO scores of all the students in the mapped courses	At least 50% of the students must attain that PO	Every Semester	Every Semester

PO	Programme	- Final PO attainment statistics of all the courses including FYDP - Internship Feedback Form - Exit Survey	At least 50% of the mapped courses must attain the PO and at least 50% of the students must attain a score of 50%.	At graduation	At graduation
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Course closure reports are used for POs reviews at end of each semester. Internship Feedback Form is utilized at the end of the 8th Semester of their programme. Closure reports can be found in the course files of four (4) sampled courses provided. The four courses were selected based on level and different disciplines within the programme. The course files contain evidence of lecturer and student works, grading and reviews that demonstrate the achievement of the POs.

2.8.4 COURSE LEARNING OUTCOMES (CLOS)

Below is the summary of courses from 100 to 500 level for Mechanical Engineering publicised in the programme handbook on the University website. The detailed Course matrices with Course Learning Outcomes (CLOs) can be found in the Course Syllabus in the Appendix. Students of the University shall be required to register for a minimum of fifteen (15) credit units and a maximum of twenty-four (24) credit units per semester. Table 7 shows the detailed course structure per semester including tutorials and practical. L=lecture hour, T=Tutorials, P=Practical.

Table 2.6.1: Course offerings for Students

100 LEVEL							
SEMESTER 1							
No .	Course Code	Course Title	Credit	L	T	P	Total/Week
General Studies Courses							
1	CHM 101	General Chemistry I	2	2			2
2	CHM 107	Practical Chemistry I	1			3	3
3	GST 101	Use of English I	2	2			2
4	MTH 103	Elementary Mathematics II	2	2			2
5	MTH 101	Elementary Mathematics I	2	2			2
6	PHY 101	General Physics I	2	2			2
7	PHY 107	General Practical Physics I	1	1			1
8	GET 101	Engineer in Society	1	1			1

9	IUO-MEE 101	Introduction to Mechanical Engineering	2	2			2
10	GST 113	Use of Library study skills and ICT	1	1			1
11	GST112	Logic ,Philosophy and Human existence	2	2			2
12	PHY 103	General Physics I	2	2		3	
		Total	20				20

L = Lecture; T = Tutorial; P = Practical;

Pr. = Pre-requisite

Note: Three hours of laboratory/Clinical Practical is 1 lecture full time

SEMESTER 2							
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
General Studies Courses							
1	CHM 102	General Chemistry II	2	2			2
2	CHM 108	Practical Chemistry II	1			3	3
3	GST 102	Use of English II	2	2			2
4	MTH 102	General Mathematics	2	2			2
5	PHY 108	General Practical Physics II	1	3			3
6	PHY 104	Waves, vibration and optics	2	2			2
7	STA 112	Statistics and Probability	1			3	3
Core/Compulsory Courses							
8	IUO-ELA 209	Igbinedion University Industrial Training scheme	2	2			2
9	GET 102	Engineering Graphics and solid Modelling	2	2			2
10	IUO-EET 102	Engineering Equipment Training	1				1
		Total	16				22
	1ST	200 LEVEL					
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
1	GET 201	Applied Electricity I	3	3			3
2	GET 209	Engineering Mathematics I	3	3			3
3	GET 203	Engineering graphics and solid modelling	3	3			3
4	GET 207	Applied Mechanics	3	2			2
5	GET 213	Engineering Drawing I	2	1			1
6	GET 205	Fundamentals of Fluid Mechanics	3	3			3
7	GET 211	Computing and software Engineering	3	3			3
8	ENT 211	Entrepreneurship and Innovation	2	2			2
9	IUO-ELA 201	Engineering laboratory I	1	1			1
10	IUO-EET 213	Engineering equipment training I	1	1			1
11	GET 299	Student Industrial Work Experience Scheme(SIWES I)					
		Total	24				32

2ND 200 LEVEL							
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
1	GET 214	Applied Electricity II	2	2			2
2	GET 210	Engineering Mathematics II	2	2			2
3	GET 212	Engineering Drawing II	2	1		2	3
4	GET 208	Strength of Material	3	3			3
5	GET 202	Engineering Materials	2	2			2
6	GET 206	Fundamentals of Thermodynamics	2	2			2
7	GET 204	Student workshop Practice	2	2			2
8	GST 212	Philosophy ,logic and Human Existence	2	2			2
9	GET 299	SIWES I	3				
10	IUO-CSP 212	Community Service Program	1				
11	IUO-ELA 202	Engineering Laboratory II	1	1			1
12	IUO-GST 211	Environment and Sustainable development	1	1			1
13	IUO-MEE201	Introduction to Energy materials	1	1			1
		Total	24				21
1 ST 300 LEVEL							
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
1	GET 301	Engineering Mathematics III	3	3	3		6
2	GET 307	Introduction to Artificial Intelligence Machine Learning and convergence technology.	3	3			3
3	IUO-GET 313	Upskill course(I) AUTO CAD	1	1	1		2
4	IUO-GET 303	Engineering Law and Managerial Economics	3	3			3
5	IUO-MEE 371	Introduction to Emerging Engineering Materials	2	2			2
6	IUO-MEE 391	Weldment design	2			2	2
7	IUO-ELA 301	Laboratory Practicals	3			3	3
8	GET 305	Engineering Statistics and Data analytics	3	3			3
		Total	20				24
2 ND 300LEVEL							
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
1	GST 312	Peace and conflict resolution	2	2			2
2	ENT 312	Venture creation	2	2	2		4
3	GET 302	Engineering Maths IV	3	3			3
4	GET 304	Technical writing and communication	3	3			3

5	GET 306	Renewable Energy system and Technology	3	3			3
6	MEE 306	Computer aided design and Manufacture	1	1			1
7	GET 399	Student Work Experience Program. (SWEP) II					
8	IUO-ELA 302	Laboratory Practical	1	1			1
9	IUO-GET 314	Upskill course (DATA ANALYSIS)	1	1			1
10	IUITS 302	Industrial Training	3	3			3
11	IUO-MEE 372	Bronze Casting Technology	1	1			1
		Total	20				22
1ST 400LEVEL							
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
1	MEE401	Mechanical (Machine) Engineering design	2	2			2
2	GET 402	Engineering Project I	2	2			2
3	IUO-CERT 411	Career enhancement and resilience training	2	2			2
4	IUO MEE 491	Model analysis of mechanical systems	2	2			2
5	IUO MEE 481	Failure analysis and prevention	3	3			3
6	MEE 402	Theory(mechanics) of machines	2	2			2
7	MEE 403	Applied (Engineering) Thermodynamics	2	3			2
8	MEE 404	Applied fluid mechanics	2	2			2
9	MEE 405	Heat and mass transfer	3	3			3
10	GET 404	Engineering valuation and costing	2	2			2
11	M44 407	Advanced mechanics of materials	2	2			2
		Total	24				24
2ND 400LEVEL							
	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
No.	GET 499	SIWES III	6			24	24
		Total	6				24
1ST 500LEVEL							
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
1	MEE 500	Project	3	3			3
2	GET 501	Engineering Project Management	3	3			3
3	IUO-MEE 581	Engineering logistics planning	3	3			3
4	IUO-MEE591	System optimization	3	2			2
5	MEE 501	Applied design	2	2			2
Electives/optional courses							
6	IUO-GET 531	Computational material science	2	2			2

7	IUO-MEE 571	Applied fluid mechanics for environmental change and renewable energy	2	2			2
8	IUO-MEE-561	Design of fluid power systems	2	2			2
		Total	20				20
2ND 500LEVEL							
No.	Course Code	Course Title	Credit	L	T	P	Total/Week
Core/Compulsory Courses							
1	GET 502	Engineering Law	3	3			3
2	IUO-MEE 542	Materials Technology	2	2			2
3	MEE 500	Project II	3	3			3
Electives/Optional Course							
4	IUO MEE 582	Engineering Industry soft skills	2	2			2
5	IUO-MEE 592	Municipal solid waste management	2	2			2
6	IUO-MEE 562	Computational fluid dynamics	2	2			2
7	IUO-MEE-522	Computer aided Design, manufacturing and Engineering	2	2			2
		Total	16				16

Table 2.6: Process for Review of CLOs

		Evaluation Tool	KPI	Data Collection Frequency	Analysis Frequency
CLO	Student	▪ Course work	The student must obtain at least 50% average score from all attempts.	Every Semester	Every Semester
	Course	▪ CLO scores of all students in the course	At least 50% of the students must attain that CLO	Every Semester	Every Semester

Course closure reports are used for CLOs reviews also. Examples of Closure reports can be found in the course files for four (4) sampled courses provided - GET 225 Applied Electricity I, MEE 301 Mechanics of Materials, MEE 303 Engineering Drawing III and MEE 405 Fluid Mechanics II. These four courses were selected based on level, different disciplines, General/Core/Elective Courses within the programme. The course files contain evidence of lecturer and student works, gradings and reviews that demonstrate the achievement of the Course Learning Outcomes.

2.8.5 THE CURRICULUM and learning process

DESIGN OF ENGINEERING CURRICULUM

Table 2.6.5 (Design of Engineering Curriculum) shows the breakdown of different knowledge area - Below Non-Engineering courses are 30.10% while Engineering courses make up 69.90% of the curriculum which falls in-line with COREN/NUC recommendation.

Table 2.6.5: Breakdown of Engineering Curriculum

Domain	Knowledge Area	COREN/NUC Recommended		Institute's Programme Breakup	
		Total	Overall	Total	Overall
		Credits	%	Credits	%
Non-Engineering	Humanities	As per discipline specific COREN BMAS guidelines	25% – 40%	11	32.97%
	Management Sciences			16	
	Natural Sciences			33	
Engineering	Computing	As per discipline specific COREN BMAS guidelines	60% – 75%	7	67.03%
	Engineering Foundation			20	
	Major Based Core (Breadth)			21	
	Major Based Core (Depth)			51	
	Inter-Disciplinary Engineering Breadth (Electives)			6	
	Final Year Design Project	6		6	
	Industrial Training (SIWES)	3		11	
Total		130 – 138	100%	182	

2.9 Students Statistics and Academic Performance.

2.9.1 Student Population in the Department from Inception to Date.

The student population from the inception of the program in 2002 has been summarized in Table 2.5.

Table 2.5: Population of Mechanical Engineering Department from 2002/2003 – 2024/2025 academic sessions.

Academic Year	LEVELS					Full Time Enrolment
	100 level	200 level	300 level	400 level	500 level	
2002/2003	30	-	-	-	-	30
2003/2004	89	22	-	-	-	111
2004/2005	32	30	17	-	-	79

2005/2006	29	32	32	15	-	108
2006/2007	22	19	23	24	9	97
2007/2008	30	42	37	23	34	166
2008/2009	26	30	30	27	23	146
2009/2010	41	26	20	42	50	189
2010/2011	26	26	17	14	20	103
2011/2012	24	28	15	17	21	105
2012/2013	21	24	28	15	17	105
2013/2014	15	26	26	16	24	149
2014/2015	12	17	17	17	8	54
2015/2016	14	12	17	12	17	73
2016/2017	14	18	14	8	20	60
2017/2018	6	12	16	15	12	61
2018/2019	14	7	10	15	15	61
2019/2020	15	15	8	10	16	64
2020/2021	8	16	17	9	15	64
2021/2022	22	8	16	17	9	72
2022/2023	28	22	8	16	17	91
2023/2024	14	27	23	8	16	88
2024/2025	15	14	27	23	7	86
				Total	351	2,165

2.9.2. Graduated Students by Session

The department graduated its first (pioneer) set of students in the 2006/2007 academic session. A summary of graduate number of students over the years is given in Table 2.6. The majority of the graduate students, upon completion of their NYSC, are undergoing their postgraduate studies abroad, while others have clinched good jobs in reputable companies.

Table 2.6: **Graduated number of students per session**

Academic session	Number of Graduates
2006/2007	9
2007/2008	30
2008/2009	28
2009/2010	24
2010/2011	20
2011/2012	21

2012/2013	17
2013/2014	24
2014/2015	14
2015/2016	17
2016/2017	20
2017/2018	12
2018/2019	15
2019/2020	16
2020/2021	15
2021/2022	14
2022/2023	16
2023/2024	16
2024/2025	7
Total	351

Table 2.6.1: Graduated students' various classes of Degrees in 2024/2025 session.

Class of Degree		CGPA	Session	Number of Graduates
First class	1st class	4.50 – 5.00	2024/2025	3
Second class upper	2nd class upper (2 ¹)	3.50 – 4.49	2024/2025	4
Second class lower	2nd class lower (2 ²)	2.40 – 4.49	2024/2025	None
Third class	3rd class	1.50 – 2.39	2024/2025	None
Pass	Pass	1.00 – 1.49	2024/2025	None
Total				7

2.9.3 Distribution of Class of Degrees:

The Distribution of Classes of Degree is given in Table 2.7.

Table 2. 7: Distribution of the Classes of Degrees from inception.

Class of Degree	No. of Graduates
1 st Class	15
2 nd Class Upper	207
2 nd Class Lower	129
3 rd Class	-
Pass	-
Total	351

2.10 About the Mechanical Engineering Profession

Mechanical Engineering is one of the oldest and most fundamental branches of engineering. It is the discipline that uses the principles of math, science and Engineering to Design, analyze, manufacture and maintain mechanical systems and devices. Mechanical Engineers work across industries like automotive, aerospace, energy, robotics and metallurgy to create everything from small components to complex machinery and power systems. Mechanical Engineers:

Design and develop

Analyze and Test

Manufacture

Innovate.

Career in:

Aerospace, Automotive, Energy, Robotics, Biotechnology, Medical field, Ergonomics, Logistics and Planning, Scheduling, Thermal Power, Renewable energy etc.

In Nigeria, the practice of Mechanical Engineering is regulated by the Council for the Regulation of Engineering in Nigeria (COREN), while professional development and networking are promoted through the Nigerian Society of Engineers (NSE) and other specialized professional bodies such as Nigerian Institution of Mechanical Engineers (NIMechE), the Association of Professional Women Engineers of Nigeria (APWEN). Mechanical Engineers are expected to uphold the highest standards of integrity, ethics, and responsibility, ensuring that their designs and decisions prioritize public safety, environmental sustainability, and economic efficiency.

At Igbinedion University, the Department of Mechanical Engineering is committed to training competent, creative, and ethical engineers who can contribute effectively to nation-building, infrastructure development, and environmental stewardship—both within Nigeria and globally. Mechanical Engineers trained in Igbinedion University are equipped with skills such as:

Knowledge of engineering science and technology

Mathematics knowledge

Design skills and knowledge

Team spirit: ability to work with others

Analytical thinking skills

Thorough and pay attention to details

Knowledge of Physics

Innovative, coming up with nouvelle ways of doing things.

As technology advances, the modern Mechanical Engineer must also embrace innovation, digital tools, and sustainable engineering solutions to meet the growing needs of society.

ACADEMIC INFORMATION

3.1. Admission Requirements (UTME and Direct Entry) to Mechanical Engineering Programme,

The basic requirement and process for admission to the Mechanical Engineering programme are as follows:

3.1.1 Admission Requirements for UTME

Candidates seeking 100-level admission into the Mechanical Engineering programme for a Bachelor of Engineering Degree (B. Eng. in Mechanical) should possess passes at the credit level or higher, in the Senior Secondary School Certificate Examination (SSCE) or General Certificate of Education (GCE) 'O' Level in five subjects, including English Language, Mathematics, Physics, Chemistry, and additional subsidiary subject in not more than two sittings plus an acceptable pass in the Universities Matriculation Examinations (UME), where applicable. Equivalent passes in examinations conducted by NECO and NABTEB are also acceptable. Minimum of 5 years for B.Eng. in Mechanical engineering.

3.1.2 Direct Entry Requirement

Candidates are expected to possess five credits, including English Language, Mathematics, Physics, Chemistry, and an additional subsidiary subject. Results at O'level and A'level must be obtained in at least two sittings. National Diploma certificates (OND and HND) from approved universities or colleges of technology or Polytechnics with a minimum grade of upper credit level are eligible for admission to 200L and 300L, respectively. By Direct Entry, minimum of 3/4 years for B.Eng. in Mechanical engineering.

3.2. Policies and Processes for Student transfer and Credit transfer/exemption

The policies and processes in place in Igbinedion University Okada for programmes are in accordance with the basic standards established by NUC and COREN. It ensures a smooth transfer of students from one related programme to another, thereby facilitating their academic progress. Some of the policies and processes are as follows:

3.2.1 Inter-University Programme Transfer policy

Admission can be given to candidates who may wish to transfer from another university but within the same programme at 300L and shall be credited with only those courses deemed relevant to the programme already passed before their transfer. Other relevant credentials approved by the university's senate are also applied. Candidates possessing acceptable transcripts of Diplomas, or Degrees or yet to complete their academic

programmes in other recognised academic institutions are normally transferred or admitted to the 200 level.

3.2.2 Internal University transfer program policies

Students within a related field, such as within an engineering discipline, are also permitted to transfer within the university. However, the application process, including the form and submission of required documents, must be done at the beginning of the session, with approval obtained. The department evaluates the application and either approves or rejects it based on established criteria.

3.2.3 Exemption from courses.

Students are granted exemptions for General Studies (GST) only if there is evidence that the courses have already been taken in a previous institution.

3.6 Academic Standing, Probation and Withdrawal from the Programme

Academic Standing is a measure of a student's overall academic performance at the end of each academic session, determined by the Cumulative Grade Point Average (CGPA). It reflects the extent to which a student has met the minimum academic requirements prescribed by the University. At Igbinedion University, Okada (IUO), academic standing is classified as follows in accordance with the Senate-Approved Academic Regulations of Igbinedion University, Okada.

(a) Good Academic Standing:

A student shall be regarded as being in Good Academic Standing if he or she obtains a Cumulative Grade Point Average (CGPA) of **1.50** and above at the end of an academic session. Such a student is considered eligible to continue in the programme and to proceed to the next level of study.

(b) Poor Academic Standing:

A student whose CGPA falls below **1.50** shall be regarded as being in Bad Standing. This indicates unsatisfactory academic progress and may attract one or more of the following academic actions in accordance with university regulations. Academic warning is issued to notify the student of the need for significant improvement.

(c) Probation

The student is permitted to continue studies on probation for a specified period to improve academic performance. Probation is a status granted to a student whose academic performance fall below an acceptable standard. A student whose CGPA is < 1.5 or more than 10 outstanding courses (University Senate Decision) at the end of a particular year of study earns a period of probation for one academic session. Such a student may be allowed to register for courses at the next higher level in addition to his/her failed courses and ensure a maximum of 18 credit units per semester is not exceeded. Secondly, the pre-requisite courses for the higher-level courses must have been passed.

(d) Withdrawal:

A student whose CGPA is < 1.5 at the end of a particular period of probation has to withdraw from the programme and transfer to another programme within the university incommensurate with his or her academic ability and capacity.

Students are strongly advised to maintain steady academic commitment and to seek guidance from their Academic Adviser or Departmental Course Coordinator whenever they experience academic challenges. Sustained effort and proper time management are essential to maintaining good academic standing and ensuring successful completion of the programme.

3.7 Duration of the Mechanical Engineering Programme.

The duration of the Mechanical Engineering programme, in conjunction with satisfaction of all other university requirements and regulations for each entry is summarized in Table 3.1. Generally, the maximum duration of the programme should not exceed 150% of the normal training period for the programme. No student is awarded a degree without attaining the minimum stipulated years of training.

Table 3.1: Duration Period for Civil Engineering Programme

Type of Admission	Minimum (years)	Maximum (years)	Degree Qualification
UTME	5	7	B. Eng
A LEVEL/Direct Entry	4	6	B. Eng
OND	4	6	B. Eng
HND	3	5	B. Eng

Each academic session or year is divided into two semesters: First semester and Second Semester. Each semester normally comprises 15 weeks of teaching and two weeks of examination.

3.8 Levels of Study

The Mechanical Engineering Programme consists of five levels (100-500levels) with structured courses as follows in Table 3.2

Table 32: Levels and Units involved in Training.

Level	Focus/Theme	Key components	Unit in Charge of Training in IUO
100	Foundational Year	Basic Sciences, Mathematics, general studies and introduction to engineering	College of Natural and Applied Sciences (CNAS)
200	Basic Engineering	Core Engineering Sciences and fundamental mechanical Engineering courses begin	College of Engineering, GST unit/mechanical Engineering Department
300	Applied Mechanical Engineering	Thermal power, Applied Energy, control Engineering, Machine design, Fluid mechanic, Thermodynamics etc.	Mechanical Engineering department

400	Professional Development	SIWES	College/Department
500	Integration and Research	Design projects, seminars and professional Practices.	College/department

3.6. Course System and Credit Load Requirement

The department operates the course credit unit system in accordance with Igbinedion University Okada, Nigeria and National Universities Commission (NUC) guidelines. All courses are assigned units. Units are loads attached to a course. Two credit units load is equivalent to two hours of lecture per week. Two hours of tutorials or three hours of laboratory practical or design work is 1unit. Students must register for a minimum of 18 units and maximum of 24 credit units each semester as approved by NUC, COREN and the university. The minimum total number of credit units required for graduation is typically **180 units** according to CCMAS. To graduate, a student must pass all compulsory courses, complete SIWES and present an approved final year project duly supervised.

3.9 Course Categories and Grouping.

For the B. Eng. degree in Mechanical Engineering programme, courses are listed in the following categories in Table 3.3:

Table 3.3: Course Nomenclature and their Description

Course Nomenclature	Description
Core or compulsory or required Courses (C):	These are courses that students must compulsorily take and pass for the award of Bachelor of Engineering in Mechanical Engineering
Elective Courses (E):	These are courses which are chosen by a student according to interests. It may be within or outside the college. A student may graduate without passing the course provided the minimum credit for graduation has been attained.
Optional course	A course which students can take based on interest and may count towards the minimum credit unit required for graduation.
Pre-requisite Course:	A course which a student must take and pass before taking a particular course at a higher level.

Courses in the programme are group as follows

- (a) **General Studies (GST):** Communication, ICT, Entrepreneurial studies

- (b) **Basic Sciences and Mathematics:** Physics, Chemistry, Mathematics, Statistics
- (c) **Engineering Core courses:** Mechanics, Thermodynamics, Fluid Mechanics, Strength of Materials
- (d) **Mechanical Engineering Core Courses:** Engineering drawing, Mechanics of Machines, machine design, Thermodynamics, Fluid mechanics, Workshop Practice etc.
- (e) **Industrial Training (SIWES)**
- (f) **Final year Project:** A supervised research and design project in the 500level.

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3.10 Registration Procedure and student Workload

At the beginning of every session, all students are expected to register for all their courses for that session using online registration via their student portal as required by the University's Examinations and Records Unit of the Registry. This must be done not later than two weeks after the resumption of the new academic session, which begins with the first semester. Late registration attracts a fee, which is determined by the university. They must register for a minimum of 18 credits per semester and 36 credits per session. Failed courses must be registered first before the student's current level courses. The maximum number of credits for a session must, however, not exceed 48 credits.

3.9 Program delivery and assessment methods

The program delivery and assessment methods are implemented to enhance and support the development of intellectual, practical skills and ensure the attainment of the POs by graduates in the mechanical Engineering programme. It prepares them for successful careers in the field. Program delivery and assessment methods encourage problem solving and critical thinking, provide opportunities for group work, develop communication, presentations, teamwork skills, written assignments, practical skills and the ability of students to apply theoretical knowledge in the course of learning while still in school.

3.9.1. Program Delivery Methods

The program delivery method includes the following, though not limited to it

(a) Classroom Lectures

This is the main delivery method for all the courses where lecturers interact with students to provide guidance, knowledge, teaching, etc. on the subject matter. This equips the students with the fundamental and foundational knowledge as well as a theoretical framework for further use, where and when necessary. The students are encouraged and motivated to actively participate in lecture delivery by making and suggesting their own ideas on the subject. The expansion of knowledge on the subject matter depends solely on the course lecturer, if need be, such as engaging in site visits to buttress a subject area. Class work and assignments, individually or group-wise are also implemented in this method to encourage originality, creativity, innovation, collaboration, investigation and solutions to problems.

(b) Presentations

Presentation in this method of delivery can be project presentation, paper presentations, subject presentations, seminar etc., to build students' confidence and improve skills in communication, collaboration, problem solving, learning, etc. The use of PowerPoint presentations and animation tools to impart insight into the subject is encouraged. Presentations also illustrate ideas and concepts in graphic form. Video presentations are also encouraged to effectively communicate the subject matter and develop students' mindset towards actualising any targeted goals.

(c) Design

In some courses, modern tool usage, such as software like AutoCAD, ORION, etc, is employed in the teaching methods to empower students to meet the fast-changing engineering world and industrial challenges. The students are thus exposed to different tools for design and solving complex engineering problems.

(d) Assignments

Students are encouraged to think critically and apply ideas to practical issues through assignments. Students improve their retention of information and strengthen their grasp of the course subject by working on assignments. Assignments frequently call for students to conduct research and analyze data, honing their capacity to assess sources and make judgments. Assignments assist students in setting priorities, managing their time, and maintaining organization. Through practice with similar questions and situations, assignments can help students become ready for tests and assessments. Students are encouraged to work independently, take charge of their education, and hone their self-directed learning abilities through assignments. Students' capacity to successfully express complicated ideas may be developed through assignments that require them to show their work. It addresses PO3, PO5 and PO8.

(e) Case Studies –

Case studies provide a practical setting for students to apply their theoretical knowledge to solve practical problems, thus making the learning process more engaging and relevant. Analysing case studies assists students to think critically, evaluate data and proffer solutions to complex engineering problems, identify key issues and also draw logical conclusions with recommendations. It helps them to develop decision-making skills through the information and data obtained. It motivates and encourages their communication skills to relay ideas effectively, and exposes them to real-life challenges which must be addressed without compromising standards and ethics. It relates students to the project, society and the environment, thereby aligning with PO5, PO6 and PO7.

(f) Problem-based learning (PBL)

This is another educational learning approach where students are exposed to real-world challenges and problems, and they are required to provide solutions to tackle the problem more especially in groups; however, individual reports may be assessed to evaluate their level of independent thinking and logical conclusion. This empowers students to take an active role. The problems are mostly complex and open-ended,

encouraging students to think outside of box and provide solutions. It also builds their teamwork skills as well as self-learning. It addresses PO3, PO4, PO8, PO9 and PO12.

(g) Seminar –

This assists student to research on a particular subject matter or topic and write a well-detailed report for submission and presentation. It expands the collective knowledge scope of students in the relevant field. Attainment of PO7, PO10, PO12 and PO11 are quite achievable within this scope.

(h) Industrial Training and Visit –

Industrial training and visits give the students opportunities to explore working environments, principles and ethics. Site visits or field visits drive theoretical knowledge down to practical exposure. It aligns with PO8, PO7, PO6 and PO1.

(i) E- Learning Resources-

Videos and E-learning material are also used to give students exposure and retention skills, and knowledge to address any issue.

(j) Industry Guest Lecturing:

Since 2023, the college has been engaging industrialists to provide lectures on industry practices and trends. This helps to meet industrial needs.

(k) Tutorials:

This method relaxes the teaching atmosphere by allowing students to interact more with the course lecturer. It offers opportunities for relevant questions related to a particular course to be addressed. It also broadens the student's knowledge and better understanding. It can be handled by anybody familiar with the subject matter.

(l) Laboratory session-

The civil engineering programme has laboratory courses expanded from 200L to 500L in each semester to enable students to perform experiments on practical courses to drive knowledge down to the roots. Laboratory work demonstrates how theory can be verified by experiments through the interpretation of results. Experiments are normally done in groups of five (5) so students learn to work in teams. This aligns with PO9. The laboratory commitment chart (timetable) for the current and the previous semester is shown in Table.

3.9.2. Assessment Methods Involved

The assessment method employed to support the development of the range of intellectual and practical skills and attainment or achievement of the POs in the programme is in line with NUC and COREN standards and is as follows

- (a) **Written Exams:** This method helps to assess the theoretical knowledge and students' understanding. It gives a basis or scale of assessment and grading.
- (b) **Assignments:** This is a kind of periodic monitoring of students' level of understanding while delivering the course. It helps to increase their critical thinking, communication, collaboration and team skills in solving problems.
- (c) **Laboratory Reports:** students are allowed to perform experiments in courses and provide data, analyse the data and form their conclusions. Reports are graded based

on what the students have technically presented in the report booklet. The theoretical knowledge is put into practice.

- (d) **Presentation and Group Work:** This method encourages teamwork, communication and collaboration skills.
- (e) **Quiz and Class Test:** This helps to assess the students' understanding of the course delivery and materials. The student performances enable the course lecturer to evaluate his or her delivery efficiency and students' understanding and follow-up in the course.
- (f) **Projects:** This is mostly employed in the final year to enable students to research complex engineering problems and offer solutions for the benefit of mankind and society.

3.10 Academic Regulations, Evaluations and Grading System

3.10.1. Evaluation of Student work (Continuous Assessment and Examination)

The Department complies fully with the regulations of the NUC in conducting standard tests (quizzes) and examinations. Continuous assessments are done through essays, tests and practical exercises. Scores from continuous assessment normally constitute 30% of the full marks for courses which are primarily theoretical. For courses which are partly practical and partly theoretical, scores from continuous assessment constitute 30% of the final marks. For courses that are entirely practical, continuous assessment is based on the student's practical work or reports and constitutes 100% of all the marks. In addition to continuous assessment, examinations for every course are normally given at the end of each semester in which it is offered. First semester courses are examined at the end of first semester and the same for second semester courses. All courses are graded based on 100 marks as stipulated in Table 3.4.

Table 3.4: Distribution of marks (continuous assessment and examination weighting)

S/No,	Components	Allocated Marks (%)
1.	Class Attendance	5 %
2.	Assignment (homework)	10%
3.	Tests (Quizzes)	15%
	Total CA	30%
4.	Final Examination	70%
	TOTAL MARKS	100%

In addition, attendance (physical presence) of the student at lectures is very important, and the class register is strictly kept as well as checked by the university authorities before the semester examination. A student must have an attendance score of 75 % to be eligible to sit and write semester examinations.

Students are graded on each course based on a 100 % scale. The percentage, pass scores and attributed letter grades to the grade point value is also stipulated in Table 3.5.

Table 3.5: Percentage score and the letter grade with value point

% Scores	Letter Grade	Grade point on 5 point scale
70 - 100	A	5
60 – 69	B	4
50 – 59	C	3
45 – 49	D	2
0 – 44	F	0

A student who fails a course (with a letter grade F) carries that course over to the next academic session with the same credit units. And the failed course must be registered first before current level courses. Questions are marked in line with a prepared marking scheme. A conference marking is allowed, for proper vetting and cross checking of answer scripts.

3.10.2 Student Course Evaluation and feedback

(a) Student Course Evaluation Form by the University

There is an established mechanism to enable students to evaluate courses delivered to them at the end of each semester, which is an integral component of the course credit system to improve on the effectiveness of course delivery, updates on lecture materials, use of effective teaching aids and tools to maximize the impact of knowledge on students and students' academic performance. In order to achieve effective learning, students are permitted to evaluate courses that are being taught by the departmental lecturers without any victimization. Absolute confidentiality is maintained throughout the exercise, which is carried out by an academic planning unit, chaired by the Director, Academic Planning. Students are expected to be truthful and judge fairly without being biased. Students are not required to write their names on the evaluation forms.

(b) Student Course Evaluation Form by the Department

At the end of every semester, students are required to complete a Course Evaluation Form for each course taken. This form provides an opportunity for students to offer constructive feedback on the content, teaching methods, learning environment, and overall course delivery. The primary purpose of the Course Evaluation is to enhance the quality of teaching and learning within the Department. The feedback gathered helps lecturers and the Department to identify areas of strength and aspects needing improvement in course content, instructional materials, assessment methods, and classroom engagement. Completion of the form is confidential, and students are encouraged to be honest and objective in their responses.

The information collected is analyzed by the Department and used solely for academic improvement and curriculum development. Active participation in course evaluation is a vital component of maintaining high academic standards and ensuring continuous improvement in the learning experience. Students are therefore expected to fill out the evaluation form promptly and responsibly at the designated time each semester.

Appendix A

is the Sample of Student Course Evaluation for the University and

Appendix B

is the Sample of Student Course Evaluation for the Department

3.10.3. Internal and External Examiner System.

a) Setting & Moderation

Examination Questions as applicable, are set by the course lecturers and are internally moderated by the Departmental board of examiners which comprises all academic staff. The internal moderated exam questions for 500L are further sent out to the external examiner accompanied with the model solutions/marking scheme for vetting and moderation. Final year courses and projects are assessed by the external examiner to certify the overall performance of the graduating students.

b) Conduction of Exams:

Examinations are conducted in large halls with students sitting with two space(s) in between. The Departmental examinations officer is in charge of exam materials while members of staff are involved in exams invigilation.

3.10.4. Processing and Issuance of Results:

Results are prepared by level advisers and considered by the Departmental and College board of studies respectively before presentation to the Senate for consideration and approval. The approved results are then communicated to students through their course level advisers. There is provision for ratification and correction where necessary.

3.10.5 Graduation Requirement

For a student to qualify for graduation from the programmes, such a student must have passed all the prescribed courses in addition to satisfactorily meeting the Industrial Training requirements, and all general studies courses of the University. Such a student must have also met the minimum number of years and not exceeded the maximum number of years required for graduation. The class of the Bachelor of Engineering Degree is determined by the final cumulative grade point average earned by the graduating student.

3.10.7 Classification of Degree

The degree classification awarded to graduating students, according to the CGPA (Cumulative Grade Point Average) recommended by the NUC, is presented in Table 3.6

Table

Table 3.6: Degree Classification according to NUC guidelines.

CGPA	Class of Degree (5 point scale)
4.50 – 5.00	First Class
3.50 – 4.49	2 nd Class Upper Division
2.40 – 3.49	2 nd Class Lower Division
1.50 – 2.39	3 rd Class
1.00 – 1.49	Pass.

Thus, the candidate, Mr. ABC, who finished up with a CGPA of 4.81, has earned a first class on a 5-point scale.

3.10.8. Calculation of Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

The CGPA for a student at a particular level is a total of cumulative value points obtained from courses divided by the cumulative credits for those courses. Table 3.7 is a 300L student result who has finished first semester in 300L

Table 3.7. Calculation of CGPA for a 300l student in the Department

	300L FIRST SEMESTER RESULT	1	2	3	4	5 = 1 * 4
COURSE	COURSE	CREDIT	REGULAR		GRADE	VALUE
CODE	TITLE	UNIT	SCORE	GRADE	POINT	POINT
GET 301	Engineering Mathematics III	3	82	A	5	15
GET 307	Introduction to Artificial Intelligence Machine learning and convergence technology.	3	76	A	5	15
IUO-GET-313	Upskill course(I) AUTOCAD	1	73	A	5	5
IUO-GET-303	Engineering law and managerial economics	3	96	A	5	15
IUO-MEE 371	Introduction to Emerging Engineering materials	2	79	A	5	10
IUO-MEE 391	Weldment design	2	80	A	5	10
IUO-ELA 301	Laboratory Practical	3	86	A	5	15
GET 305	Engineering statistics and data analytics	3	76	A	5	15
	TOTAL SEMESTER UNIT	20				
				TOTAL VALUE POINT		100
	GPA	100/20 = 5.00		C. G.P.A	100/20 = 5.00	
	300I SECOND SEMESTER RESULT					
COURSE	COURSE	CREDIT	REGULAR	LETTER	GRADE	VALUE
CODE	TITLE	UNIT	SCORE	GRADE	POINT	POINT
GST 312	Peace and Conflict resolution	2	65	B	4	8
ENT 312	Venture creation	2	72	A	5	10
GET 302	Engineering Mathematics IV	3	73	B	4	12
GET 304	Technical writing and communication (including seminar presentation)	3	65	B	4	12
GET 306	Renewable energy system and technology	3	71	A	5	15
MEE306	Computer aided design and manufacture	1	88	A	5	5

IUO-ELA 302	Laboratory practical	1	78	A	5	5
IUO-GET 314	Upskill course I (Data Analysis)	1	66	B		4
GET 399	SWEP (Student Work Experience Program)	4	72	A	5	30
IUO-MEE 372	Bronze casting Technology	2	60	B	4	8
GST 312	Peace and Conflict resolution	2	67	B	4	8
	TOTAL SEMESTER UNIT	24			TOTAL VALUE POINT	115
GPA	115/24= 4.79					
300L SESSIONAL UNIT	20+24=	44		300L VALUE POINT	100+115=	215
CUMULATIVE G.P.A	215/44 = 4.89					

At the end of this semester, the 300L student with 4.89 is a First class student and can still build capacity for the remaining semesters to improve and sustain first class on his/her result. Therefore, students are advised to improve on their performance as the first class or class of degree is not determined by final year result, rather a cumulative result from 100L,200 L,300 L up till 500 L.

3.11: Examination Regulations and Conduct.

3.11.1 Regulation governing conduct of examination and instructions to Students:

1. Students must wear their **IDENTITY CARDS** on them as a condition to sit and write examinations and also bring along a copy of **ON-LINE REGISTRATION printout**. Names are not allowed on the answer script, otherwise the script will be cancelled.
2. Students must attend punctually at the time assigned to their papers and must be ready to be admitted into the examination hall five minutes before the examination is due to start. Students shall not be permitted in any circumstances to enter the examination hall more than ten minutes before the time appointed for the commencement of the examination. Students arriving more than half an hour after the examination has started shall be admitted only at the discretion of the chief invigilator.
3. Similarly, save with the special permission of the chief invigilator, students may not leave the examination hall during the first and the last half an hour of the examination outside these periods, candidates, with the permission of the invigilator, may leave the room temporarily, and then only if accompanied by an attendant.
4. Students must bring with them to the examination hall their own ink, pens and pencils and any materials which may be permitted by these regulations but they are not allowed to bring any other books or papers.

5. While the examinations are in progress ***communication between students is strictly forbidden, and any candidate found to be giving or receiving irregular assistance may be required to withdraw from the examination and/or penalized after.***
6. Silence must be observed in the examination hall. The only permissible way of attracting the attention of the invigilator is by the candidate raising his/her hand.
7. Students are not allowed to smoke in the examination hall.
8. ***Students are informed that medical attention can be obtained if necessary.***
9. ***The use of scrap paper is not permitted.*** All rough work must be done in the answer books and crossed neatly through supplementary answer books, even if they contain only rough work. Must be tied inside the main answer book.
10. Students are advised in their own interest to write legibly and to avoid using ink. The answer must be written in English except as otherwise instructed. The answer to each question must be started on a separate sheet of paper.
11. Before handing in their scripts at the end of the examination, students must satisfy themselves that they have inserted at the appropriate places their examination numbers and the numbers of the questions they answered.
12. It will be the responsibility of each candidate to hand in his script to the invigilator before he leaves the hall. Except for the question paper and any material, they may have brought with them students are not allowed to remove or mutilate any paper or material supplied by the University.

3.11.2 Regulation governing the Conduct of examinations and instructions to Staff.

1. All members of staff are to wear their **IDENTITY CARDS** while invigilating examination.
2. The organization of invigilation shall be the responsibility of the Time Table Committee in conjunction with the College Deans and HODs. They shall select suitable examination halls and draw up a list of invigilators from members of staff of each College at least a week before the commencement of examination.
3. There shall be a Chief Invigilator for each examination session comprising a listed number of papers.
4. There shall be in each hall, two invigilators for the first fifty candidates or less and one additional invigilator for every 100 candidates or part thereof. There shall be one attendant in each hall, due provision being made for the presence of male and female candidates.
5. All invigilators shall be at the examination with all the examination question papers and answer scripts.
6. For each examination, the Examiners of the respective papers shall be present at the examination for the first thirty minutes to address all matters that may arise and should submit a written situation report on the conduct of the examination to the Chief Invigilator.
7. The student shall not be allowed to bring paper, including blotting papers into the examination hall. They should normally enter the examination hall only with pen, ink, pencil, eraser, ruler and other materials such as mathematical instrument which may be allowed in the examination hall.
8. Bags, books, lecture files, and all other students' properties must be left outside the examination hall.

9. Invigilator shall inspect the hall and search all candidates before they are seated for the examination to ensure that no student has on him/her any unauthorized materials.
10. Exam officers must make available exam malpractice forms to Invigilators for conduction of any exam and any report of exam misconduct should get to exams & records, the Registrar's office not later than 24 hours of occurrence.

3.11.3 Examination Misconducts and Sanctions.

Examination misconduct and sanctions are tabulated in Table 3.8. Students are advised to avoid anything that in hindering their academic pursuit in this great institution.

Table 3.8: Examination Misconducts

S/N.	MISCONDUCT	SANCTION
a.	Bringing in unauthorized materials such as: notes, scraps, electronic aids, etc. into the examination hall.	Rustication for one academic session.
b.	Impersonation: is assuming or taking another person's identity for the purpose of writing an examination of that person. (i) Impersonator is the person who holds himself or herself out as being another person so as to write an examination for that other person. (ii) Impersonatee is a person who procures another person to write an examination for him or her.	(i) If the impersonator is a student of the University, expulsion of the student from the University. (ii) If the impersonator is not a student of the University, he or she may be handed over to the Police. (iii) for an impersonate expulsion from the University
c.	Unauthorized communication during an examination, such as: passing written information in an examination hall,	Rustication for one academic session for first offender and expulsion from the
	orally receiving information from another person within or outside the examination hall, receiving electronic messages from within or outside an examination hall, etc.	University for any such subsequent offence by the same student.
d.	Refusal to submit oneself to physical search by an invigilator of the same sex, such as: (i) failure to present the University identification card; (ii) Bursary receipts; (iii) examination form; (iv) unruly behavior at the entrance into the examination hall; etc.	Denial of entrance into the Examination hall or forfeiture of the examination
e.	Unauthorized possession of university examination answer script(s)	Rustication for one academic semester.
f.	Smuggling of examination script(s) containing already answered questions into the examination hall or attempting to submit same.	Expulsion from the university
g.	Bringing dangerous weapons into the examination hall, such as: gun, knife, cutlass, axe, dangerous chemicals, corrosive materials, or any other object,	Expulsion from the university
h.	Mutilation or replacement of any answer script or paper officially supplied with any other unofficial answer script.	Expulsion from the university.
i.	Forgery or mutilation of university identification card, bursary receipt(s), examination form or any other university examination document.	Expulsion from the university.

Note: A female invigilator is present in every examination hall for the enforcement of physical search on female students suspected to be armed with illegal materials which aid undue advantage during examination.

3.12. Students Industrial Work Experience Scheme (SIWES) Regulations and Requirements.

Engineering education is incomplete without industrial attachment being part of the degree programme. The NUC recommends a minimum duration of 40 weeks (one semester and 3 long vacations) for industrial attachment. The objective of the attachments is to expose the students to a working environment where they can relate theory to practice and enhance their communication and human relations skills. The following practical training scheme: Igbinedion University Okada Engineering Equipment Training (IUO-EET) are carried out by the college and GET 399 and GET 499 are done in industries:

i. IUO-EET 102

This is an intensive four-weeks in house practical training in the various workshops within the college and around the campus. It commences two weeks after the end of the sessional examinations for 100 level Engineering students. During this period, the students are exposed to workshop practices that may be encountered in the mechanical, machine, sheet metal, automobile, welding, carpentry, civil and electrical engineering workshops.

ii. GET 399

The attachment takes place at the end of the 300 level session examinations for 12 weeks of the long vacation. Again, college staffs are expected to visit the trainees for on-the-spot assessment of their progress.

iii. GET 499

The attachment, which begins at the end of the first semester examinations, at the 400 level of the programme, is the final exposure to industrial practice before the completion of the Bachelor of Engineering degree programme. It lasts for 24 weeks. It is expected that during the training, the student is exposed to his/her chosen end degree.

For the Grading and Assessment of Industrial Training, there is a combination of Continuous Assessment (CA) by the supervising college staff that visited the students on training, and the grading of the logbooks and final written reports of each student at the end of each training attachment. The designated officer of the establishment must properly authenticate such logbooks and reports where the students served. 300level and 400level students are expected to present their industrial experience report and presentation to departmental panel for grading.

3.13. Final Year Project and Thesis

A project is an extremely important part of the Engineering Degree programme. Although lectures and laboratory experiments are designed to improve the learning process, projects supplement this process by placing the student on the path of independent thinking. The student will be required to carry out independently a small project which would enable him to develop his thought processes, creativity, problem-solving ability, initiative, and attitude to work.

The nature of the project may be one or more of the following:

- a. Developing a theory for solving a problem
- b. Developing computational procedures for solving a problem
- c. Setting up an experiment to demonstrate an established theory.
- d. Building a working system from established plans and testing the system
- e. Developing a design routine for a device, constructing it (if required for the project) and testing it
- f. Investigating specific problems which may arise in governmental institutions, industrial firms, and other private corporation bodies in the country.
- g. Investigating causes of failure of any specific plant or device and suggesting remedies, if any.

The examination regulation stipulates that “project and thesis” would carry marks equivalent to two 2-hour papers in the final examination. For the purpose of doing this, an oral examination will be held in which the student will be required to defend his project.

3.13.1 How to Select a Project:

A project should normally be chosen from fields related to the specific subject selected by the student for the final year degree examination. In selecting a topic for a project, it is expected that the student goes through the subject titles of papers (in the field of interest) published during the last ten years in engineering journals. A student, first of all, goes through the subject headings as listed in “Mechanical Engineering Abstracts” or “Applied Science and Technology Index”. The specific journal in which the paper of interest is published is then consulted and all references listed in the paper collected. A likely project to be undertaken by any student is subject to review by the supervisor. Supervisor(s) are assigned to a student based on the student area of interest. The student would then prepare a rough outline of the proposed project and submit it to the supervisor. The supervisor, after establishing the feasibility of the project, would give the final go-ahead or possibly suggest something different, or modification in which the supervisor himself is interested. The ideal situation is one where the chosen project coincides with a supervisor’s area of interest. For this reason, members of staff are requested to design projects in their areas of research interest. Students can then choose their project from a list of such project topics. Whenever practicable, students should know their projects long before the beginning of the session.

3.13.2 Basic precepts regarding Engineering Projects:

Two of the most important aspects of a project include the preparation and organization. Preparation and organization are of the utmost importance in writing projects for easy understanding. Preparation requires a careful reading of the instructions and collateral material (references, manuals, etc.), a clear understanding of each step involved in the required procedures before the actual execution of the project, and often a written planned programme (rough outline of proposed, degree to be investigated, preliminary calculations, etc.) Organization is a guiding principle to be followed throughout the preparation, execution and reporting of a particular thing. A good organization entails the neat construction or design of a model that may be easily visualized and checked,

systematic entering of data with descriptive headings and entering of all relevant information regarding equipment used.

3.13.3. Writing Project

A student should aim at finishing his project at about the middle of the second semester, and submit the typed and bound copies of the project two weeks before the beginning of second semester examinations. The time schedule should be roughly as follows:

Selection and Discussion of Project topics	2 weeks
Project Write-up (Chapter 1 – 3)	6 weeks
Presentation of Project Proposal	1 week
Practical Work/Laboratory experiment connected with the project.....(1 st Semester Holiday)	
Completion of Project write-up	4 weeks
Supervisor's review of the project	3 weeks
Correction of the Project work	2 weeks
Project Defense	1 week
Correction and Binding of thesis	4 weeks

3.13.4. Organization of Thesis:

Project format and organization are outlined in the Departmental project guideline format and are available in the Department of Mechanical Engineering.

3.13.5 Quality Control on student Project, dissertation and thesis.

All projects are subjected to plagiarism tests. Supervisors and students are strongly advised not to plagiarize, 30% is pegged for undergraduate projects and any project above the recommended similarity index percent is not acceptable.

3.13.6 Binding and Number of Copies Required

A minimum of four hard copies of the project is required, after all the corrections have been affected and certified by the supervisor. Situations where the student had a co-supervisor, the required number of hard copies will be five. The projects copies are taken to the University library publishing press unit for binding.

3.13.7. Assessment of Project Work

A student project is assessed by a panel of examiners (lecturers in the Department) and external examiners. The assessment is in three (3) stages.

The 1st (preliminary) stage involves discussion of project topics. The student appears before the examiners to present his project topic and proposal. This stage ensures that projects are not duplicated in the Department. And the student is rightly instructed with better clarity on his project work. No mark is allotted.

2nd Stage: The student is expected to appear before the panel with a project write-up covering chapters 1-3. At this stage, the student must have gotten indebted knowledge of his project work as well as reference materials. So, he is expected to present his work

stating the problem, objectives and method of execution, including the laboratory/practical experiments to be carried out.

The panel of examiners scores the students based on the following

Chapter 1 – 10mks

References – 10mks

Chapter 2 – 10mks

Presentation – 20mks

Chapter 3 – 10mks

Dressing – 20mks

Ability to have a mastery of the work and Answer Question – 20mks

A total of 100 marks is allotted.

The 3rd stage takes place in the 2nd semester before the panel of examiners and external examiner when the student must have completed the project. It may also be noted that there is a supervisor's score of 100% for the project, which is added to obtain an average score for a student project. The project supervisor is the only person perhaps who knows as much as a student about the problem involved in a particular project. Therefore, his opinion will carry reasonable weight in assessing the project assessment exercise. The supervisor is expected to consider the following in assessing the project. The level of supervision or guidance he has been able to give you; the level of achievement you attained during the project with or without his guidance; your ability to solve the problems posed by the project and how much of his was through your own effort; Whether you kept a day-to-day record (in the log-book) of the progress made and whether you discussed with him from time to time any problems you been confronted with.

The members will assess the student on the following:

- Understanding of the subject you investigated
- Ability to answer questions (and explain points) on the work you have done.
- Project presentation and layout.
- Student may further be interviewed by the external examiner, or whenever a review of the grading by the supervisor and the panel becomes necessary.

Some of the Project's topics undertaken in the Department are Listed in Appendix B

STUDENT SUPPORT AND DEVELOPMENT

4.1 Handling of Academic Grievances:

Academic grievances are handled by the Head of Department and the appropriate course level adviser. In addition, the university has a guidance and counselling unit for each college in addition to servicom unit for each college. Students are free and encouraged to visit that unit for any problem affecting and challenging their stay and academic pursuit in school. They can also do it anonymously. The servicom unit addresses with immediate effect matters or challenges raised by the writer (student/staff).

4.2 Student Advising and Mentorship System

Each level is assigned a lecturer that is charged with the responsibility of advising students on courses to register for, during any academic session, in line with the NUC maximum credit to be registered for in a session. The course level adviser provides counsel and advice to students on academic issues and courses offered. They also prepare student's results for college and Senate consideration and approval. The names of the level course advisers are provided in Table 4.1 .

Table 4.1: Names of Course Advisers in Mechanical Engineering Department

S/N	LEVEL	NAMES OF STAFF	Phone Numbers
1.	100	Engr. Dr.Mrs. Queeneth Adesuwa KINGSLEY-OMOYIBO	08141391481
2.	200	Engr.Justice Efe IGBAGBON	09050018100
3.	300	Engr.Dr. Moses Olanrewaju ADESUSI	08032175753
4.	400	Engr. Dr.Anthony Chijioke ADINGWUPU	08035043583
5.	500	Engr.Dr.Olorunleke AREGBE	09126756538

4.3 Student Health Well-being

The university has a health clinic facility equipped with modern hospital equipment, doctors, nurses, medical laboratory scientists and hospital attendants within the student and staff residential area for immediate attention to health challenges. Students' hospital cards are issued at the beginning of a new academic session during registration to enable them to use the clinic when the need arises without payment. Staff cards are obtainable at the clinic. Students are advised to keep their clinic cards very well and use them when the need arises.

4.4 Guidance and Counseling of Students

The university has a guidance and counseling unit for each faculty in addition to servicom unit for each college. Students are free and encouraged to visit that unit for any problem affecting and challenging their stay and academic pursuit in school. Or might as well put in writing anonymously and submit to servicom unit who addresses with immediate effect matters or challenges raised by the writer (student/staff). Level course advisors are also involved in guiding and advising the students properly.

4.5 Handling of Behavioural Misconduct of Students

Reports of other unethical or unruly behaviour and attitudes, misconduct relating to interpersonal relationships and others by students/lecturers are handled by a university disciplinary committee comprising of the Dean, student affairs with other constituted members of staff. These misconducts and sanctions are outlined in the student code of conduct. Students are free to make their reports without any victimization and such reports are subject to investigation and necessary actions are taken when proven.

4.6 Student support

Igbinedion University supports students from matriculation to graduation and beyond. This is in accordance with the university's mission to fully empower students through knowledge and entrepreneurship for the world of work and productivity. The main elements of the support policy are as follows: The university established a system of incentives to motivate outstanding students and encourage those who perform below average. The incentives include rewards and prizes (university prizes, Vice Chancellor's Awards and Dean's list, etc.) for students who excel in academics, community service and leadership. Students who perform poorly are placed on special and remedial programmes to enable them to improve. Scholarships and bursaries are also given to deserving students who distinguish themselves or become disadvantaged because of being indigent, loss of parents or inability to meet financial obligations to the university. The students' self-empowerment programme which is elaborated below provides one of the more innovative instruments of student support.

The University's Human Help support Unit counsels and assists students to improve and overcome challenges of learning, emotional stability and self-actualization. The student placement unit collaborates with employers to ensure that our graduating students get competitive jobs before they graduate. Graduating students who distinguish themselves academically, especially those who made first class honors or its equivalent are offered automatic employment or scholarships by the university to support their academic growth and development. The university also offers teaching and non-teaching jobs to its graduates with a view to ensuring that alumni become an integral part of the future development of their alma mater.

4.7 Student Self-Empowerment Programme (SSEP)- Entrepreneurship and Innovation.

Students are also exposed to the concept of entrepreneurship with a view to self-employment. **SSEP** was launched at Igbinedion University Okada IUO's 8th Matriculation Ceremony on 13th January, 2007 with the following objectives: to make students creators and agents of wealth through individual and collective self-help initiatives; strengthen their knowledge of and competencies in a wide variety of income generating entrepreneurial endeavors instill the virtues of dignity of labour and in line with the overall vision of the university make products of IUO better able to cope with the challenges of daily living. Students are trained in the following areas

- Animal Husbandry (Fishery)
- Tailoring/ Fashion Design (Beads, Hand Fans, Gele, Hair Fascinators)
- Cosmetics and Toiletries,
- Block Molding
- Bakery and Confectionery,
- Technology and Creativity
- Desktop Computer Operation and Business Centre
- Automobile Driving,
- Hair Cure, Manicure and Pedicure
- Music (Voice Training, Electronic Keyboard; Drums, Guitar, Percussion, Wind and String Instruments)
- Catering, Cakes and Events Coverage.

In addition, the entrepreneur and skill acquisition centre also houses the Igbinedion University, Okada Hub, which was established by the university in partnership with the Ehizua Hub to promote and foster digital and technological innovation and entrepreneurship while bridging the financial and digital divides. This will give students access to an affordable and high-quality education. It is a platform for students to develop innovative skills, grow into innovators, where their ideas will become patented products. The partnership's flagship hub was signed in the first quarter of 2023 on Airport Road, Benin City, Edo State. The hub's features include a cutting-edge virtual studio, a smart classroom, co-working space, a game room, multimedia studio and a sizable indoor lobby with exquisite design. Students can offer two months short courses in software development, cybersecurity, data analytics, cinematography, photography and video editing.

4.8 Student Associations and Professional Bodies

In line with the Department's mission to produce well-rounded, professionally competent, and socially responsible engineers, students are encouraged to engage actively in student associations and professional bodies. Participation in these organizations provides valuable exposure to professional ethics, leadership, teamwork, and technical advancement and key qualities required for success in the engineering profession.

The following associations are recognized and supported by the Department of Mechanical Engineering:

1. **Nigerian Institution of Mechanical Engineering Students Affiliate (NIMECHESA):** The Nigerian Institution of Mechanical Engineering Students Association (NIMECHESA) is the official student arm of the Nigerian Institution of Mechanical Engineers (NIMECHESA), a division of the Nigerian Society of Engineers (NSE). NIMECHESA serves as a platform for Mechanical Engineering students to: Interact with professional engineers and industry experts, Participate in seminars, workshops, and industrial visits, Develop leadership, innovation, and project management skills, Promote professionalism and excellence in Mechanical engineering practice. Membership in NIMECHESA is open to all students of the Department of Mechanical Engineering. Plate 4.1 is a cross-section of students with her HOD in a picture section with NIMECHESA BANNER after a seminar in 2024/2025 session.

Plate 4.1: Students photo NIMECHESA seminar 2024/2025 session.

2. **Association of Professional Women Engineers of Nigeria (APWEN) – Student Collegiate Chapter**

The APWEN Student Chapter is dedicated to promoting, mentoring, and supporting female engineering students to excel in their chosen fields. Its core activities include mentorship programs, outreach campaigns, technical talks, and leadership development. Through APWEN, female students are inspired to

overcome barriers, embrace innovation, and contribute meaningfully to national development. Membership is open to all female students in the Department.

3. **Nigerian Universities Engineering Students Association (NUESA).** The Nigerian Universities Engineering Students Association (NUESA) serves as an umbrella body uniting engineering students across Nigerian universities. Within the College, NUESA focuses on: Building collaboration among students of various engineering disciplines. Organizing educational, social, and innovation-based activities Promoting leadership, unity, and professional ethics among engineering students.

Students are strongly encouraged to register and participate in the College and departmental association during their studies. Such involvement: develops interpersonal communication, and leadership skills; Provides exposure to professional networks and mentorship; Enhances understanding of engineering practice and ethics; Bridges the gap between theoretical knowledge and practical experience. Active participation in these associations is recognized by the Department as an important component of holistic student development.

The Department of Mechanical Engineering remains committed to nurturing competent and socially responsible engineers through a blend of academic excellence and professional engagement. Students are therefore encouraged to take full advantage of these associations as platforms for learning, leadership, and lifelong professional growth. Through active participation, our students not only strengthen their technical abilities but also build the confidence and character required to contribute meaningfully to national and global development.

4.9 Security and Safety

Perimeter fencing of the campus and staff/students' residential areas with excellent access control are provided, guided and maintained. Security Service Provider such as Sheriff Deputies is also part of the university security agency charged with the responsibility of controlling and guarding administrative offices, laboratories, school properties and student /staff residential areas. They also maintain peace and order within the university. As part of management measures to strengthen security on campus, all staff and students are advised to ensure that they wear/carry their identity (ID) cards on campus. Furthermore, management has reintroduced the use of car stickers and tallies to check and monitor vehicular movements in and out of the university. All staff and students are enjoined to take issues of personal security seriously and report any threat to life and or security infractions to the following numbers

080 2 359 9991 - Dean of Students affairs

081 5 454 4318 – Chief Security Officer

070 6 560 6675 – Deputy Chief Security Officer

In conclusion, the department encourages students to dress in a corporate manner (in line with the Senate Decision) while attending lectures. Students are encouraged to use the library/ICT facilities during their free period. **Students should ensure they obtain their password from the ICT unit to enable them to have access to internet**

resources and e-library books subscribed by the university for their academic purposes. The university monitoring committee, headed by Rev Sr. Rosemary Ifeyinwa Unigwe ensures that lectures are delivered accordingly in line with the lecture time table. There is also a quality assurance committee for each college chaired by the Vice Chancellor's representative, Dean, HODs, and course advisers for effective and efficient delivery of lectures.

4.10 Electronic Library (E-books Resources)

Igbinedion University, Okada Library has windows of opportunity to access EBSCO Host and Research4LIFE database e-content (including e-books and e-journals resource materials). ICT provides good internet facilities for browsing and accessing the library resources. Training is always offered to members of staff and students from time to time regarding the use of library database resources. Email and passwords are created by the ICT unit to enable both staff and students have access to the e-library and other internet resources which are within the university. The Igbinedion University Library is subscribed to almost all the well-known online resource providers in all disciplines. These include;

EBSCO Host Website: <http://search.ebscohost.com>

JSTOR Website: www.jstor.org

Research4life (which grants access to HINARI, AGORA, OARE, ARDI and GOALI).

Website: login.research4life.org

Social Science Research Network

E-REPOSITORY (For e-books, e-journals and e-reports)

Website: <https://www.ssrn.com/index>

Use I. P. Address = [10.10.21.50:8080](https://www.ssrn.com/index)

Directory of Open Access Books (DOAB) Website: <https://www.doab.org>

Directory of Open Access Journal (DOAJ) Website: <https://www.doab.org>

TEEAL

Use I. P. Address [172.16.0.4](https://www.teeal.org/)

Register using your e-mail address – preferably your university e-mail address.

LEGALPEDIA

Use I. P. Address = [172.16.1.55:7757/LEGAPEDIA/P/home.aspx](https://www.legalpedia.org/)

HEINONLINE Website: <http://heinonline.org/HOL/Welcome>

ADVANCES IN PURE MATHEMATICS

<http://www.scirp.org/journal/apm/>

OMICS INTERNATIONAL JOURNAL <https://www.omicsonline.org/scientific-journals.php> 22

HIKARI <http://www.m-hikari.com/journals.html>

JOURNAL OF PHYSICAL MATHEMATICS

<http://www.omicsonline.com/open-access/physical-mathematics.php>

ADVANCES IN MATHEMATICAL PHYSICS

<http://www.hindawi.com/journals/amp/contents/>

AMERICAN JOURNAL OF COMPUTATIONAL MATHEMATICS

<http://www.scirp.org/journal/ajcm/>

ARMENIAN JOURNAL OF MATHEMATICS

<http://www.flib.sci.am/eng/journal/Math/index.html>

AMERICAN JOURNAL OF ECONOMICS AND BUSINESS ADMINISTRATION

<http://thescripub.com/journals/ajebea>

INTERNATIONAL JOURNAL OF MANAGEMENT SCIENCES AND BUSINESS

RESEARCH <http://www.ijmsbr.com/volume-1-issue-1-2/>

BRITISH JOURNAL OF MARKETING STUDIES

<https://www.eajournals.org/journals/british-journal-of-marketing-studies-bjms/>

EUROPEAN JOURNAL OF ACCOUNTING, AUDITING AND FINANCE RESEARCH

<https://www.eajournals.org/journals/european-journal-of-accounting-auditing-and-finance-research-ejaaf/>

INTERNATIONAL JOURNAL OF HUMANITIES AND SOCIAL SCIENCE

<http://www.ijhssnet.com/index.php/archives.html>

JOURNAL OF EMERGING TRENDS IN EDUCATIONAL RESEARCH AND POLICY STUDIES

(JETERAPS)

<http://jeteraps.scholarlinkresearch.com/listofissues.php>

INTERNATIONAL JOURNAL OF HUMAN RESOURCE MANAGEMENT AND RESEARCH

<http://journals.indexcopernicus.com/issue.php?>

BOOKBOONS

Library Genesis (Libgen)

www.bookboons.com

Website: <http://gen.lib.rus.ec>

B-ok.xyz

B-ok.cc

Booksc

Website: <http://b-ok.xyz>

Website: <http://b-ok.cc>

Website: www.booksc

Book Finder

The national academics press

Website: <http://en.bookfi.net>

www.nap.edu

SCOPUS

<https://www.hindawi.com/ai/scopus/ following>

OPEN (OPEN ACCESS PUBLISHING IN EUROPEAN NETWORKS)

<http://www.oapen.org/content/>

OAJSE (OPEN ACCESS JOURNAL SEARCHENGINE)

http://oajse.com/subjects/computer_science.html

JOURNAL OF MATHEMATICS AND STATISTICS

<http://thescipub.com/journals/jmss>

ANNALS OF MATHEMATICAL LOGIC

<http://www.sciencedirect.com/science/journal/>

INTERNATIONAL JOURNAL OF BUSINESS AND ADMINISTRATION RESEARCH REVIEW

<http://ijbarr.com/index.php/archive.html>

EUROPEAN JOURNAL OF BUSINESS AND INNOVATION RESEARCH

<http://www.eajournals.org/journals/european-journal-of-business-and-innovation-research-ejbir/>

ASIAN JOURNAL OF BUSINESS EDUCATION

<http://www.afbe.biz/main/?>

AMERICAN JOURNAL OF BUSINESS EDUCATION (AJBE)

<http://www.cluteinstitute.com/ojs/index.php/AJBE/issue/archive>

INTERNATIONAL BUSINESS AND MANAGEMENT (CS Canada)

<http://www.cscanada.net/index.php/ibm/issue/archive>

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www.manybooks.net

GUTENBER

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www.planetbook.com

E-LIBRARY BOOKS

LIBRARY VOX BOOKS www.e-library.net/free-ebook.htm

www.librivox.org

E-BOOK DIRECTORY

DIGITAL LIBRARY BOOKS

www.e-bookdirectory.com

www.digital.library.upenn.edu/books/

Username and password are obtainable from the University.

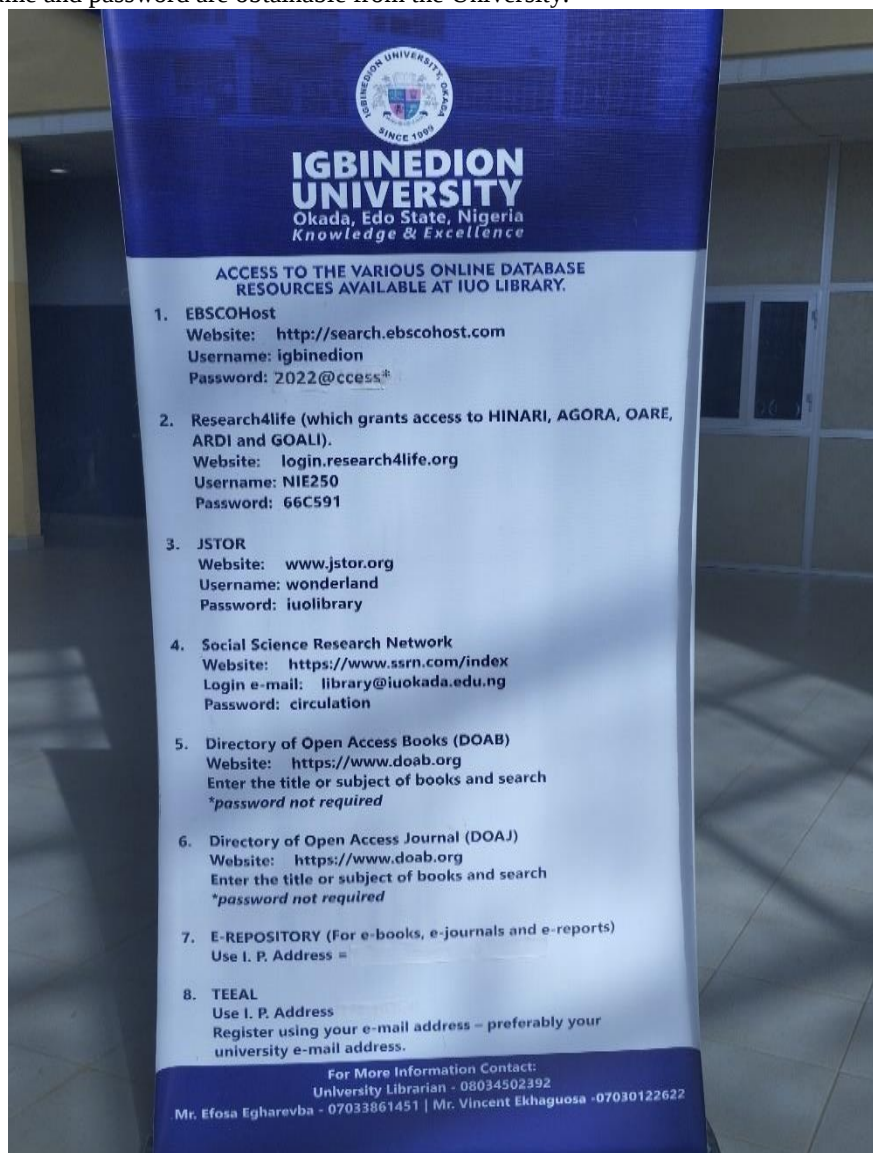


Plate 4.2: E-Library Online Data base Flex

4.11 Computing and Information Technology Systems (ICT Facilities)

The Civil Engineering Departmental office is equipped with basic Information and Communication Technology (ICT) facilities. Also, each lecturer has a personal computer. The departmental and staff computers are also connected to a wireless internet network of the university operated by the ICT. The students have access to computers in the department while they receive further training in the University Computer Laboratory. Browsing sites are available in the ICT, offices, hostels, hot spots are also available. This enables students / staff with laptops to access the internet. The investment and commitment made towards the digitization of Igbinedion University Campus has recorded some level of progress. The University IT academy is set up and

open for all students of Igbinedion University to get certification in at least one IT program. There are five academies.

- CISCO-Academy,
- Huawei-Academy,
- Microsoft-Imagine Academy,
- Amazon-Cloud Web services,
- Mikrotik-Academy).

The academy offers different certification courses ranging from:

Networking, Cybersecurity, Cloud Security, Programing, Data analysis, Application Development, IT Essentials (System Technician), Big Data, Basic Desktop Application and Appreciation, Cloud Computing

Training Structure: The university has made it mandatory for all 100 - 400level students of Mechanical Engineering to be trained and get certified in basic IT skills, which leads to the integration of GST114 as a general course that trains them on both technical and software applications. For all 200 to 300 level mechanical Engineering students, they are expected to pick at least a certification program of their choice which they will be trained in, at a very subsidized cost. The training is tailored to teach and expose the students to various areas of IT as it's applicable to their profession. The student is expected to interface with the academy at least twice a week for hand-on practical which last for 3 hours. The training is streamlined in such a way that it does not conflict with their lectures. In addition, the IT academy accommodates students from the university who want to embark on their Student Industrial Work Experience Scheme (SIWES) with the academy. ICT has a building that houses some of the facilities and academies as shown in Plates 4.3 – 4.5 below.



Plate 4.3 Cyber Security Simulation laboratory



Plate 4.4: ICT Academy Training Center



Plate 4.5: Olorogun (Dr.) Oskar C.J. Ibru, ICT Building, Igbinedion University Okada

ACADEMIC CONTENT

5.1 Academic content

In addition to the philosophy and objectives of the university with a vision to become a centre of academic excellence through teaching and research activities responsive to communal and globalized human needs, the purpose of, B. Eng. (Mechanical Engineering) degree programme is to produce competent Professional Mechanical Engineers by familiarizing students with the basic theoretical and practical tools and techniques required for excellent performance in their future engineering practice.

Engineering is the application of principles of fundamental sciences, engineering, economics, computer technology, and human relations to practical situations in the fields dealing with processes and equipment in which matter is treated to produce something that is beneficial to society and humanity. Training in engineering requires the provision of knowledge, skill and understanding of these principles, for the planning, optimum design, construction, operations of new processes with due consideration to the environment, expansion and or revision of existing ones and assessment of performance of processes and equipment. It is on this premise that the program has been structured.

The program is broken into five (5) levels: 100 level, 200 level, 300 level, 400 level and 500 level.

i. 100 Levels and 200 Level:

100 and 200l are basic / fundamental levels of all engineering programmes. Engineering students take common courses at these levels with their counterparts in other Departments of the College with one additional basic course from a particular programme of study for the 200 levels in second semester.

ii. 300; 400; and 500 Levels:

At these levels, the students take more core departmental courses in their respective programmes, in addition to relevant courses offered by the college. The detailed course structure is presented in various sections below.

iii. Course Coding:

It is proposed that all courses be coded according to department, level and semester. Thus, the Civil Engineering Department codes for all the courses are **MEE (BMAS) and MEE (new CCMAS)**, while other departments have their own codes and other units codes are as shown below;

Entrepreneurial Studies	-	EPS
University General Studies	-	GST
Community Service Development	-	CSP
General Engineering courses-		GET

iv. Level Code for Courses: The level codes for course are as follows:

- 100 levels - 1
- 200 level- 2
- 300 level - 3
- 400 levels - 4
- 500 level- 5

- v. **Semester Codes:** Semester codes are as follows:

First Semester - ending with 1 or any odd number

Second Semester - ending with 2 or any even number

For example, the full course code for a 400 level course, offered in the Department in the first semester, is of the form: MEE 401; where, 4 represents the level, 1 is the number assigned by the Department to track the course and 1 represents first semester. Should the same course be available in the second semester, the course code would be MEE 312, where the '2' at the end of the figure signifies the second semester.

Note: L = Lecture Hours/Week; T = Tutorial Hours/Week; P = Practical Hours/Week.

- vi. **Course Syllabus:** Course structure for all courses in the Mechanical Engineering programme at Igbinedion University, Okada are presented in Tables 5.1 – 5.5 for 100L to 500L, respectively. Levels (100, 200 and 300) are in line with the NUC CCMAS while (400-500l) are in line with NUC BMAS (Benchmark Minimum Academic Standards) and even COREN Outcome Based Education.

5.2 100LEVEL COURSE COURSES AND DESCRIPTIONS

Table 5.1: 100 Level Course Structure

	First Semester				
Course Code	Course Title	Units	Status	LH	PH
GST 111	Communication in English	2	C	15	45
CHM 101	General Chemistry I	2	C	30	-
CHM 107	General Practical Chemistry I	1	C	-	45
MTH 101	Elementary Mathematics I (Algebra & Trigonometry)	2	C	30	-
MTH103	Elementary Mathematics III (Vectors, Geometry & Dynamics)	2	C	30	-
PHY 101	General Physics I	2	C	30	-
PHY 103	General Physics III	2	C	30	-
PHY 107	General Practical Physics I	1	C	-	45
GET 101	Engineer in Society	1	C	15	-
MEE 101	Introduction to Mechanical Engineering	2	C	15	45
IUO-GST 113	Use of Library Study Skills and ICT	2	C	30	-
IUO-GST 114	IT Essentials	1	C	15	-
	Total 1st Semester Credit unit	20			

Second Semester

Course Code	Course Title	Units	Status	LH	PH
GST 112	Nigerian People and culture	2	C	30	-
CHM 102	General Chemistry II	2	C	30	-
CHM 108	General Practical Chemistry II	1	C	-	45
MTH 102	Elementary Mathematics II (Calculus)	2	C	30	-
PHY 102	General Physics II (Electricity & Magnetism)	2	C	30	-
PHY 104	General Physics IV (Waves, vibration and optics)	2	C	30	-
PHY 108	General Practical Physics II	1	C	-	45
GET 102	Engineering Graphics and Solid Modelling I	2	C	15	45
STA 112	Probability I	3	C	45	-
IUO-EET 102	Engineering Equipment Training	1	C	15	45

	Total 2nd Semester Credit Unit	18			
	Total 100Level Sessional Credit Unit	38			

100 LEVEL FIRST SEMESTER COURSE CONTENTS

GST 111: Communication in English

(2 Units C: LH 15; PH 45)

Course Learning Outcomes

At the end of this course, students should be able to:

1. Identify possible sound patterns in the English Language and notable language skills;
2. Classify word formation processes;
3. Construct simple and fairly complex sentences in English;
4. Apply logical and critical reasoning skills for meaningful presentations;
5. Demonstrate an appreciable level of the art of public speaking and listening; and
6. Write simple and technical reports.

Course Contents

Sounds and sound patterns in English Language (vowels and consonants, phonetics and phonology). English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations). Major word formation processes; the sentence in English (types: structural and functional). Grammar and usage (tense, concord and modality). Reading and types of reading, comprehension skills, 3RsQ. Logical and critical thinking; reasoning methods (logic and syllogism, inductive and deductive argument, analogy, generalisation and explanations). Ethical considerations, copyright rules and infringements. Writing activities (pre-writing (brainstorming and outlining). writing (paragraphing, punctuation and expression). post- writing (editing and proofreading). Types of writing (summary, essays, letter, curriculum vitae, report writing, note-making). Mechanics of writing. Information and Communication Technology in modern language learning. Language skills for effective communication. The art of public speaking.

CHM 101: General Chemistry I

(2 Units C: LH 30)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. Define atoms, molecules and chemical reactions;
2. Discuss the modern electronic theory of atoms and write electronic configurations of elements on the periodic table;
3. Rationalise the trends of atomic radii, ionisation energies, electronegativity of the elements, based on their position in the periodic table;
4. Identify and balance oxidation–reduction equation and solve redox titration problems;
5. Draw shapes of simple molecules and hybridised orbitals;
6. Identify the characteristics of acids, bases and salts, and solve problems based on their quantitative relationship;

7. Apply the principles of equilibrium to aqueous systems using LeChatelier's principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures;
8. Analyse and perform calculations with the thermodynamic functions, enthalpy, entropy and free energy; and
9. Determine rates of reactions and its dependence on concentration, time and temperature.

Course Contents

Atoms, molecules, elements and compounds, and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridisation and shapes of simple molecules. Valence forces; Structure of solids. Chemical equations and stoichiometry; chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

CHM 107: General Practical Chemistry I

(1 Unit C: PH 45)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. State the general laboratory rules and safety procedures;
2. Collect scientific data and correct carry out chemical experiments;
3. Identify the basic glassware and equipment in the laboratory;
4. State the differences between primary and secondary standards;
5. Perform redox titration;
6. Analyse the data to arrive at scientific conclusions using record observations and measurements in the laboratory

Course Contents

Laboratory experiments designed to reflect topics presented in courses CHM 101 and CHM 102. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

MTH 101: Elementary Mathematics I (Algebra and Trigonometry) (2 Units C: LH 30) Course Learning Outcomes

At the end of this course students should be able to:

1. Define and explain set, subset, union, intersection, complements, and demonstrate the use of Venn diagrams;
2. Solve quadratic equations;
3. Solve trigonometric functions;
4. Identify various types of numbers; and
5. Solve some problems using binomial theorem.

Course Contents

Elementary set theory, subsets, union, intersection, complements, Venn diagrams. Real numbers, integers, rational and irrational numbers. Mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem, complex numbers, algebra of complex numbers, the argand diagram. De-Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae.

MTH103: Vectors, Geometry and Statistics:**(2 Units C: LH 30)****Course Learning Outcomes**

At the end of this course students should be able to:

1. Perform vector addition, scalar multiplication, and calculate scalar and vector products.
2. Use coordinate geometry concepts to solve problems involving points, lines, circles, and conic sections in 2D and 3D spaces.
3. Analyze and interpret statistical data diagrammatically, calculate measures of location and dispersion, and interpret results.
4. Define sample space and events, apply addition law, and use permutation and combination to evaluate probability.
5. Use binomial distribution and calculate linear correlation coefficients, including product-moment and rank correlation.
6. Apply linear regression analysis to calculate and interpret linear regression equations and apply them to real-world problems.
7. Solve problems involving direction cosines, angles between lines and planes, and distance calculations in 3D space.

Course Content

Vector and Coordinate: Types of vectors; points, line and relative vectors. Geometrical representation of vectors in 1 – 3 dimensions. Addition and subtractions, vectors and multiplication by scalar; Components of vectors in 1, 3 dimensions; direction cosines. Linear independence of vectors. Point of division of a line. Scalar and vector products of two vectors. Simple applications. Two-dimensional coordinates geometry; straight lines, angle between two lines, distance between points. Equation of circle, tangent and normal to a circle. Properties of parabola, ellipse, hyperbola. Straight lines and planes in space, direction cosines; angle between line and between lines and planes; distance of a point from a plane; distance between two skew lines. Statistics: Introduction of statistics. Diagrammatic representation of descriptive data. Measures of location and dispersion for ungrouped data. Grouped distribution measures of location and dispersion for grouped data. Problems of grouping.

Associated graphs. Introduction to probability: sample space and events, addition law, use of permutation and combination in evaluating probability. Binomial distribution. Linear correlation; scatter diagram, product-moment and rank correlation. Linear regression.

PHY 101: General Physics I (Mechanics)**(2 Units C: LH****30) Course Learning Outcomes**

On completion, the students should be able to:

1. Identify and deduce the physical quantities and their units;
2. Differentiate between vectors and scalars;
3. Describe and evaluate motion of systems on the basis of the fundamental laws of mechanics; 4. Apply Newton's laws to describe and solve simple problems of motion;
4. Evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;

5. Explain and apply the principles of conservation of energy, linear and angular momentum; 7. Describe the laws governing motion under gravity; and
6. Explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

Course Contents

Space and time; units and dimension, vectors and scalars, differentiation of vectors: displacement, velocity and acceleration; kinematics; Newton's laws of motion (inertial frames, impulse, force and action at a distance, momentum conservation); relative motion; application of Newtonian mechanics; equations of motion; conservation principles in physics, conservative forces, conservation of linear momentum, kinetic energy and work, potential energy, system of particles, centre of mass; rotational motion; torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates; conservation of angular momentum; circular motion; moments of inertia, gyroscopes and precession; gravitation: Newton's law of gravitation, Kepler's laws of planetary motion, gravitational potential energy, escape velocity, satellites motion and orbits.

PHY 103: General Physics III (Behaviour of Matter)

(2 Units C: LH 30)

Course Learning Outcomes

On completion, the students should be able to:

1. Explain the concepts of heat and temperature and relate the temperature scales;
2. Define, derive and apply the fundamental thermodynamic relations to thermal systems;
3. Describe and explain the first and second laws of thermodynamics, and the concept of entropy;
4. State the assumptions of the kinetic theory and apply techniques of describing macroscopic behaviour;
5. Deduce the formalism of thermodynamics and apply it to simple systems in thermal equilibrium; and
6. Describe and determine the effect of forces and deformation of materials and surfaces.

Course Contents

Heat and temperature, temperature scales; gas laws; general gas equation; thermal conductivity; first Law of thermodynamics; heat, work and internal energy, reversibility; thermodynamic processes; adiabatic, isothermal, isobaric; second law of thermodynamics; heat engines and entropy, Zero's law of thermodynamics; kinetic theory of gases; molecular collisions and mean free path; elasticity; Hooke's law, Young's shear and bulk moduli; hydrostatics; pressure, buoyancy, Archimedes' principles; Bernoulli's equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 107: General Practical Physics I

(1 Unit C: PH 45)

Course Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs; and

5. Draw conclusions from numerical and graphical analysis of data.

Course Contents

This introductory course emphasizes quantitative measurements. Experimental techniques. The treatment of measurement errors. Graphical analysis. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity. (Covered in PHY 101, 102, 103 and PHY 104). However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis, and deduction.

GET 101: Engineer in Society

(1 Unit C: LH

15) Course Learning Outcomes

At the end of this course, the students should be able to:

1. differentiate between science, engineering and technology, and relate them to innovation;
2. Distinguish between the different cadres of engineering – engineers, technologists, technicians and craftsmen and their respective roles and competencies;
3. Identify and distinguish between the relevant professional bodies in engineering;
4. Categorise the goals of global development or sustainable development goals (SDGs); and
5. Identify and evaluate safety and risk in engineering practice.

Course Contents

History, evolution and philosophy of science. Engineering and technology. The engineering profession – engineering family (engineers, technologists, technicians and craftsmen), professional bodies and societies. Engineers' code of conduct and ethics, and engineering literacy. Sustainable development goals (SDGs), innovation, infrastructures and nation building - economy, politics, business. Safety and risk analysis in engineering practice. Engineering competency skills – curriculum overview, technical, soft and digital skills. Guest seminars and invited lectures from different engineering professional associations.

IUO-MEE 101: Introduction to Mechanical Engineering

(1 Unit C:

LH: 30, PH :45) Course Learning Outcomes

Learning Outcomes:

At the end of this course, the students should be able to:

1. differentiate between science, engineering and technology, and relate them to innovation;
2. identify the various branches of mechanical engineering discipline and their applications to the solution of societal problems;
3. demonstrate appreciation of the problem of climate change; and
4. demonstrate appreciation of the role of energy systems to environmental sustainability.

Course Contents

Historical development of the mechanical engineering discipline. Philosophy and scope of contemporary mechanical engineering course programme. Overview of mechanical engineering special fields: applied (solid) mechanics, fluid and thermal engineering (thermodynamics and heat transfer). Industrial/production engineering and engineering management sciences. The linkage between mechanical engineering and other engineering disciplines and the sciences. The concept of innovation. Illustrations of a wide variety applications of mechanical engineering. The role of mechanical engineers in the society and human development. Professional ethical responsibility. Climate change, renewable energy and environmental sustainability.

IUO-GST 113: Use of Library, Study Skills and ICT

(2 Units C: LH 30)

Course Learning Outcomes

Upon the successful completion of this course, students should be able to:

1. Utilize library to locate and use various library materials, including e-learning resources, and understand library catalogues and classification systems.
2. Develop effective study skills, use reference services, and understand copyright implications.
3. Use and access database resources, and apply bibliographic citations and referencing techniques.
4. Apply ICT skills for information management by using hardware and software technologies, including input devices, storage devices, and output devices, to manage information.
5. Demonstrate word processing and communication skills by using word processing software, typing skills, and communication services, including internet services, to produce and share information.

Course Content

Brief history of libraries, library and education, University libraries and other types of libraries, study skills (reference services). Types of library materials, using library resources including e-learning, e-materials; etc. Understanding library catalogues (card, OPAC, etc) and classification, copyright and its implications, Database resources, Bibliographic citations and referencing. Development of modern ICT, Hardware technology software technology, input devices, software technology, input devices, storage devices, output devices, communication and internet services, word processing skills (typing, etc).

GST 114: IT ESSENTIALS

(1 Units C: LH: 15)

Course Learning Outcomes

Upon the successful completion of this course, students should be able to

1. Assemble and configure PC hardware components, including troubleshooting and preventive maintenance.
2. Explain networking fundamentals, configure networks, and apply network troubleshooting techniques.

3. Configure and troubleshoot laptops and other mobile devices, including mobile operating systems.
4. Install and configure Windows, Linux, and OSX operating systems, including mobile operating systems.
5. Explain security threats and apply security best practices to protect computer systems and data.
6. Diagnose and repair common computer problems, including hardware and software issues.
7. Demonstrate professional IT skills and knowledge required of an IT professional, including problem-solving, communication, and collaboration.

Course Content:

Introduction to personal computer hardware, PC assembly, Advanced computer hardware, preventive maintenance and Troubleshooting , Networking concepts, Applied networking , Laptops and other mobile devices, printers, virtualization and cloud computing, Windows installation, windows configuration, mobile, Linux and OSX Operating Systems Security. The IT Professional

SECOND SEMESTER 100LEVEL

GST 112: Nigerian Peoples and Cultures

(2 Units C: LH 30)

Course Learning Outcomes

At the end of this course, students should be able to:

1. Analyse the historical foundation of Nigerian cultures and arts in pre-colonial times;
2. Identify and list the major linguistic groups in Nigeria;
3. Explain the gradual evolution of Nigeria as a political entity;
4. Analyse the concepts of trade and economic self-reliance of Nigerian peoples in relation to national development;
5. Enumerate the challenges of the Nigerian state regarding nation building;
6. Analyse the role of the judiciary in upholding fundamental human rights
7. Identify the acceptable norms and values of the major ethnic groups in Nigeria; and
8. List possible solutions to identifiable Nigerian environmental, moral and value problems.

Course Contents

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and cultures; peoples and cultures of the minority ethnic groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914; formation of political parties in Nigeria; nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concepts of trade and economics of self reliance (indigenous trade and market system; indigenous apprenticeship system among Nigerian peoples; trade, skill acquisition and self-reliance). Social justice and national development (definition and classification of law); Judiciary and fundamental rights. Individuals, norms and values (basic Nigerian norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes

and conducts [Cultism, kidnapping and other related social vices]). Re-orientation, moral and national values (The 3Rs – Reconstruction, Rehabilitation and Re-orientation; re-orientation strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAIC), Mass Mobilization for Self Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

CHM 102: General Chemistry II

(2 Units C: LH

30) Course Learning Outcomes

At the end of this course, the students should be able to:

1. Define fullerenes and its applications;
2. Discuss electronic theory;
3. Determine the qualitative and quantitative of structures in organic chemistry;
4. State rules guiding nomenclature and functional group classes of organic chemistry;
5. Determine the rate of reaction to predict mechanisms of reaction;
6. Identify classes of organic functional group with brief description of their chemistry;
7. Discuss comparative chemistry of group 1A, IIA and IVA elements and basic properties of transition metals.

Course Contents

Historical survey of the development and importance of organic chemistry; fullerenes as fourth allotrope of carbon, uses as nanotubules, nanostructures, nanochemistry. Electronic theory in organic chemistry. Isolation and purification of organic compounds; determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry; nomenclature and functional group classes of organic compounds. Introductory reaction mechanism and kinetics. Stereochemistry. The chemistry of alkanes, alkenes, alkynes, alcohols, ethers, amines, alkyl halides, nitriles, aldehydes, ketones, carboxylic acids and derivatives. The chemistry of selected metals and non-metals. Comparative chemistry of group IA, IIA and IVA elements. Introduction to transition metal chemistry.

CHM 108: General Practical Chemistry II

(1 Unit C: PH

45) Course Learning Outcomes

At the end of this course, the students should be able to:

1. State the general laboratory rules and safety procedures;
2. Collect scientific data and correctly carry out chemical experiments;
3. Identify the basic glassware and equipment in the laboratory;
4. Identify and carry out preliminary tests which include ignition, boiling point, melting point, and test on known and unknown organic compounds;
5. Carry out solubility tests, elemental test and functional group/confirmatory test on known and unknown organic compounds which could be acidic/basic/ neutral organic compounds.

Course Contents

Continuation of CHM 107. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

MTH 102: Elementary Mathematics II (Calculus)**(2 Units C: LH****30) Course Learning Outcomes**

At the end of the course, students should be able to:

1. Identify the types of rules in differentiation and integration;
2. Recognise and understand the meaning of function of a real variable, graphs, limits and continuity;
3. Solve some applications of definite integrals in areas and volumes;
4. Solve function of a real variable, plot relevant graphs, identify limits and idea of continuity;
5. Identify the derivative as limit of rate of change and techniques of differentiation and perform extreme curve sketching;
6. Identify integration as an inverse of differentiation and methods of integration and definite integrals.
7. Perform integration application to areas, volumes.

Course Contents

Functions of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation, maxima and minima. Extreme curve sketching, integration, definite integrals, reduction formulae, application to areas, volumes (including approximate integration: Trapezium and Simpson's rule).

PHY 102: General Physics II (Electricity and Magnetism)**(2 Unit C: PH****30) Course Learning Outcomes**

On completion, the student should be able to:

1. Calculate electric field strength, flux, and forces between charged particles, and apply the inverse square law.
2. Apply Kirchhoff's laws, calculate resistance, power, and potential difference in simple DC circuits.
3. Describe capacitance, energy stored in capacitors, and electromagnetic forces, including electric motors and generators.
4. Apply principles of electromagnetic induction: Students will be able to explain electromagnetic induction, calculate induced e.m.f., and describe energy stored in magnetic fields.
5. Describe simple AC circuits, transformers, and motors, and apply relevant principles.
6. Describe current flow in electrolytes, conduction of electricity through gases, and the photoelectric effect.

Course Content

Electric field: Strength, flux and the inverse square law; electrostatic force between two charged particles; flux model for the electric field. Energy stored in an electric field, electrical potential due to dipole.

Steady direct currents: Simple circuits; potential difference resistance, power, electromotive force, Kirchoffs laws; potential divider, slide-wire potentiometer, bridge circuits, combining resistances. Capacitors: Capacitance, combination of dielectrics, energy stored, charging/discharging. Electromagnetic effects; electromagnetic forces, electric motors, moving coil galvanometer, ammeter, voltmeter, electromagnetic

induction, dynamo. Alternating currents: Simple A.C. circuits, transformers, motors and alternating currents. Magnetic field: The field at the center of a current-carrying flat coil of a current carrying solenoid, outside a long solenoid, flux model and magnetic fields. Electromagnetic induction: Induction in a magnetic field; magnitude and direction of induced e.m.f; energy stored in a magnetic field; self-inductance. Electricity and matter: Current flow in an electrolyte, Millikan experiment; conduction of electricity through gases at low pressure, cathode rays; photoelectricity.

PHY104: General Physics IV (Vibrations, Waves And Optics) (2 Unit C: PH 30) Course Learning Outcomes

On completion, the student should be able to:

1. Describe the velocity and acceleration of a sinusoidal oscillator and apply the equation of motion for simple harmonic motion.
2. Describe the effects of damping and forcing on oscillations, including resonance.
3. Explain the propagation of longitudinal and transverse waves.
4. Describe the formation of images using mirrors and lenses, including microscopes and telescopes.
5. Describe chromatic and spherical aberrations, and explain how to reduce them, as well as describe dispersion by prisms.
6. Explain the relationship between color and wavelength, and describe the principles of spectra.

Course Content

Periodic motion of an oscillator: Velocity and acceleration of a sinusoidal oscillator, equation of motion of a simple harmonic oscillator: damped oscillations; forced oscillations; resonance; propagation of longitudinal and transverse vibrations. Wave and light: Mirrors, formation of images, thin lenses in contact, microscope, telescope; chromatic and spherical aberrations and their reduction, Dispersion by prisms; relations between colour and wavelength; spectra.

PHY 108: General Practical Physics II

(1 Unit C: PH 45)

Course Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs;
5. Draw conclusions from numerical and graphical analysis of data; and
6. Prepare and present practical reports.

Course Contents

This practical course is a continuation of PHY 107 and is intended to be taught during the second semester of the 100 level to cover the practical aspect of the theoretical courses that have been covered with emphasis on quantitative measurements, the treatment of measurement errors, and graphical analysis. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

GET 102: Engineering Graphics and Solid Modelling I (2 Units C: LH 15; PH 45)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. Have a good grasp of design thinking and be obsessed with the determination to apply such to solving simple every day and also complex problems;
2. Recognise the fundamental concepts of engineering drawing and graphics;
3. show skills to represent the world of engineering objects in actionable solid models, and put such models in a form where they can be inputs for simulation and analyses;
4. Analyse such models for strength and cost;
5. Prepare the objects for modern production and manufacturing techniques of additive and subtractive manufacturing;
6. recognise that engineering is multidisciplinary in the sense that mechanical, electrical and other parts of physical structures are modelled in context as opposed to the analytical nature of the courses they take; and
7. Analyse and master the basics of mechanical and thermal loads in engineering systems.

Course Contents

Introduction to design thinking and engineering graphics. First and third angle orthogonal projections. Isometric projections; sectioning, conventional practices, conic sections and development. Freehand and guided sketching – pictorial and orthographic. Visualisation and solid modelling in design, prototyping and product-making. User interfaces in concrete terms. Design, drawing, animation, rendering and simulation workspaces. Sketching of 3D objects. Viewports and sectioning to shop drawings in orthographic projections and perspectives. Automated viewports. Sheet metal and surface modelling. Material selection and rendering. This course will use latest professional design tools such as fusion 360, solid works, solid edge or equivalent.

STA 112: Probability

(3 Units C: LH 45)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. Calculate permutations and combinations, and apply these concepts to solve problems.
2. Describe probability concepts, including random variables, probability distributions, and distribution functions.
3. Describe and apply binomial, geometric, Poisson, and normal distributions.
4. Conduct techniques for exploratory data analysis, including visualization and summary statistics.
5. Apply probability distributions to solve real-world problems, including modelling and analysis.

Course Content

Permutation and Combination. Concepts and principles of probability, Random variables. Probability and distribution functions. Basic distribution: binomial, geometric, passion, normal and sampling distributions, exploratory data analysis.

IUO–EET 102 Engineering Equipment Training

(1 Unit; C:

PH 45) Course Learning Outcomes

On completion of the course, students should be able to:

1. describe the relevancies, importance, and specific activities of each engineering discipline to society.

2. demonstrate workshop and laboratory safety protocols, including emergency response procedures.
3. identify, use, and maintain various engineering tools, equipment, and machines.
4. work effectively in teams to design, manufacture, and deliver engineering projects.
5. design and manufacture simple domestic tools, such as hoes, staples, and furniture.
6. perform simple wiring, install software, and couple computer systems.
7. demonstrate fire-fighting safety skills, emergency response procedures, and engineering safety protocols on site.

Course contents:

Introduction to various engineering disciplines. Relevancies, importance and specific activities of each discipline to society. Identification of laboratories for each discipline. Workshop and laboratory safety. Workshop practice and identification of tools, equipment, machines etc. Team collaboration in engineering projects. Manufacturing of simple domestic tools. Introduction to basic elements of building technology. Hardware maintenance. Installation and repair. Electrical power generation and transmission. Renewable energy sources. Engineering drawing. Gas explosion. Oil spillage. Consequences of oil spillage. Environmental cleanup of contaminated land. Fire-fighting safety and skills. Emergency response training for fire fighting. Engineering safety on site. Laboratory Report writing. Visitation to engineering project sites, both within the university, neighborhood and engineering-based establishments. Identification of all engineering tools, equipment, machines and their applications. Manufacturing of simple domestic tools like hoes, staples, simple chairs, tables, and sign posts in engineering workshops. Simple wiring to supply power to an office. Coupling of computer systems and installation of some software. Identification of motor parts and their uses, changing of car tyres, etc.

5.3 200 LEVEL COURSE STRUCTURE AND DESCRIPTION

Table 5.2: 200 Level Course Structure

	First Semester 200L				
Course Code	Course Title	Units	Status	LH	PH
GET 213	Engineering Drawing	2	C	30	45
ENT 211	Entrepreneurship and Innovation	2	C	30	-
GET 201	Applied Electricity I	3	C	30	45
GET 203	Engineering Graphics & Solid Modelling II	3	C	30	45
GET 205	Fundamentals of Fluid Mechanics	3	C	45	-
GET 207	Applied Mechanics	3	C	45	-
GET 209	Engineering Mathematics I	3	C	45	-
GET 211	Computing and Software Engineering	3	C	30	45
IUO-ELA201	Engineering Laboratory I	1	C	-	45

IUO-EET 213	Engineering equipment training	1	C	30	
	Total First Semester Credit Units	24			
	Second Semester 200L				
Course Code	Course Title	Units	Status	LH	PH
GST 212	Philosophy, Logic and Human Existence	2	C	30	-
GET 202	Engineering Materials	2	C	45	-
GET 204	Students Workshop Practice	2	C	15	45
GET 206	Fundamentals of Thermodynamics	2	C	45	-
GET 208	Strength of Materials	3	C	45	-
GET 299	SIWES I	3	C	9 WEEKS	
GET 210	Engineering Mathematics II	2	C	45	-
IUO-CSP 212	Community Service Programme	1	C	15	-
IUO-ELA202	Engineering Laboratory II	1	C	-	45
IUO-MEE 201	Introduction to Energy materials	1	C	30	
GET 214	Applied Electricity II	2	C	30	
IUO-GST 211	Environment and sustainable development	1	C		45
GET 212	Engineering drawing II	2	C	30	45
	Total Second Semester Credit Units	24			
	TOTAL 200L SESSIONAL CREDIT UNITS	48			

FIRST SEMESTER 200L COURSES

ENT 211: Entrepreneurship and Innovation

(2 Units C: LH 30)

Course Learning Outcomes

At the end of this course, students should be able to:

1. explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation and risk-taking.
2. state the characteristics of an entrepreneur.
3. analyse the importance of micro and small businesses in wealth creation, employment generation and financial independence.
4. engage in entrepreneurial thinking.
5. identify key elements in innovation.
6. describe the stages in enterprise formation, partnership and networking, including business planning.
7. describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world; and
8. state the basic principles of e-commerce.

Course Contents

The concept of entrepreneurship (entrepreneurship, intrapreneurship/corporate entrepreneurship); theories, rationale and relevance of entrepreneurship (Schumpeterian and other perspectives, risk-taking, necessity and opportunity-based

entrepreneurship, and creative destruction); characteristics of entrepreneurs (opportunity seeker, risk-taker, natural and nurtured, problem solver and change agent, innovator and creative thinker); entrepreneurial thinking (critical thinking, reflective thinking and creative thinking). Innovation (The concept of innovation, dimensions of innovation, change and innovation, knowledge and innovation). Enterprise formation, partnership and networking (basics of business plan, forms of business ownership, business registration and alliance formation, and joint ventures). Contemporary entrepreneurship issues (knowledge, skills and technology, intellectual property, virtual office and networking). Entrepreneurship in Nigeria (biography of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

GET 201: Applied Electricity I

(3 Units C: LH 30; PH 45)

Course Learning Outcomes

Students will be able to:

1. discuss the fundamental concepts of electricity and electrical d.c. circuits;
2. state, explain and apply the basic d.c. circuit theorems; 3. explain the basic a.c. circuit theory and 4. apply to solution of simple circuits.

Course contents

Fundamental concepts: Electric fields, charges, magnetic fields. current, B-H curves Kirchhoff's laws, superposition. Thevenin, Norton theorems, Reciprocity, RL, RC, RLC circuits. DC, AC bridges, Resistance, Capacitance, Inductance measurement, Transducers, Single phase circuits, Complex j - notation, AC circuits, impedance, admittance, susceptance.

GET 203: Engineering Graphics and Solid Modeling II

(3 Units C: LH 30; PH 45)

Course Learning Outcomes

Students should be able to:

1. apply mastery of the use of projections to prepare detailed working drawing of objects and designs;
2. develop skills in parametric design to aid their ability to see design in the optimal specification of materials and systems to meet needs;
3. be able to analyze and optimize designs on the basis of strength and material minimization;
4. get their appetites wetted in seeing the need for the theoretical perspectives that create the basis for the analysis that are possible in design and optimization, and recognize/understand the practical link to excite their creativity and ability to innovate; and
5. Translate their thoughts and excitements to produce shop drawings for multiphysical, multidisciplinary design.

Course Contents

Projection of lines, auxiliary views and mixed projection. Preparation of detailed working production drawing; semi-detailed drawings, conventional presentation methods. Solid, surface and shell modeling. Faces, bodies and surface intersections. Component-based design. Component assembly and motion constraints. Constrained motions and animation. Introduction to electronics modeling. Electronics board layout preparation, Component libraries and Schematic design. Parametric modeling and adaptive design. Simulation for material optimization. Designing for manufacturing. Additive and subtractive manufacturing. Production for 3-D printing, Laser cutting and CNC machinery. Arrangement of engineering components to form a working plant (Assembly Drawing of a Plant).

GET 205: Fundamentals of Fluid Mechanics

(3 Units C: LH 45)

Course Learning Outcomes

At the end of this course, the students should be able to :

1. explain the properties of fluids;
2. determine forces in static fluids and fluids in motion;
3. determine whether a floating body will be stable;
4. determine the effect of various pipe fittings (valves, orifices, bends and elbows) on fluid flow in pipes;
5. measure flow parameters with venturi meters, orifice meters, weirs, etc;
6. perform calculations based on principles of mass, momentum and energy conservation;
7. perform dimensional analysis and simple fluid modelling problems; and
8. specify the type and capacity of pumps and turbines for engineering applications.

Course Contents

Fluid properties, hydrostatics, fluid dynamics using principles of mass, momentum and energy conservation from a control volume approach. Flow measurements in pipes, dimensional analysis, and similitude, 2-dimensional flows. Hydropower systems.

GET 207: Applied Mechanics

(3 Units C: LH 45)

Course Learning Outcomes

Students will acquire the ability to:

1. explain the fundamental principles of applied mechanics, particularly equilibrium analysis, friction, kinematics and momentum.
2. identify, formulate, and solve complex engineering problems by applying principles of engineering, science, mathematics and applied mechanics.
3. synthesize Newtonian Physics with static analysis to determine the complete load impact (net forces, shears, torques, and bending moments) on all components (members and joints) of a given structure with a load.
4. apply engineering design principles to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Course Contents

Forces, moments, couples. Equilibrium of simple structures and machine parts. Friction. First and second moments of area; centroids. Kinematics of particles and rigid bodies in plane motion. Newton's laws of motion. Kinetic energy and momentum analyse

GET 209: Engineering Mathematics I

(3 Units C: LH 45)

Course Learning Outcomes

At the end of the course, the students should be able to:

1. solve qualitative problems based on vector and matrix analyses such as linear independence and dependence of vectors, rank etc;
2. describe the concepts of limit theory and nth order differential equations and their applications to physical phenomena;
3. solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables;
4. describe the applications of double and triple integration in finding the area and volume of engineering solids, and explain the qualitative applications of Gauss, Stoke's and Green's theorem;
5. explain ordinary differential equations and applications, and develop a mathematical model of linear differential equations, as well as appreciate the necessary and sufficient conditions for total differential equations; and
6. analyse basic engineering models through partial differential equations such as wave equation, heat conduction equation, etc., as well as fourier series, initial conditions and its applications to different engineering processes

Course Contents

Limits, continuity, differentiation, introduction to linear first order differential equations, partial and total derivatives, composite functions, matrices and determinants, vector algebra, vector calculus, directional derivatives.

GET 211: Computing and Software Engineering

(3 Units C: LH 30; PH 45)

Course Learning Outcomes

At the end of the course, the students should be able to:

1. describe and apply computing, software engineering knowledge, best practices, and standards appropriate for complex engineering software systems;
2. develop competence in designing, evaluating, and adapting software processes and software development tools to meet the needs of an advanced development project through practical object-oriented programming exposure taught in concrete terms with a specific modern language – preferable selected from Python, Java or C++;
3. use widely available libraries to prepare them for machine learning, graphics and design simulations;
4. develop skills in eliciting user needs and designing an effective software solution;
5. recognise human, security, social, and entrepreneurial issues and responsibilities relevant to engineering software and the digitalisation of services; and
6. acquire capabilities that can further be developed to make them productively employable by means of short Internet courses in specific areas;

Course Contents

Introduction to computers and computing; computer organisation – data processing, memory, registers and addressing schemes; Boolean algebra; floating-point arithmetic;

representation of non-numeric information; problem-solving and algorithm development; coding (solution design using flowcharts and pseudo codes). Data models and data structures; computer software and operating system; computer operators and operators' precedence; components of computer programs; introduction to object oriented, structured and visual programming; use of MATLAB in engineering applications. ICT fundamentals, Internet of Things (IoT). Elements of software engineering.

IUO-ELA 201: Engineering Laboratory

(1 Units C: PH 45)

Course Learning Outcomes

At the end of the course, the students should be able to:

1. Perform laboratory tests and interpret various laboratory tests in engineering disciplines.
2. Apply workshop practices by demonstrating proficiency in workshop practices, including safety protocols and tool usage.
3. Design and construct various masonry bonds, including stretcher bond, English bond, and Flemish bond.
4. Apply plastering and finishing techniques to achieve smooth surfaces.
5. Design and install plumbing/sewage systems including pipes, fittings, and fixtures.

Course Content

Performing Laboratory Tests and doing workshop practice in all the Engineering laboratory and workshops. Civil Laboratory & Workshop practice include the following: Bonding, Stretcher Bond, English Bond, Flemish Bond, Plastering and Plumbing/Sewage Systems

IUO-GST 211: Environment and Sustainable Development

(2 Units C: LH 30)

Course Learning Outcomes

At the end of the course, the students should be able to:

1. Explain human relationship with the environment by describing human origin, nature, and relationship with the cosmic environment.
2. Discuss the role of science and technology in society and their role in serving humanity.
3. Describe renewable and non-renewable energy resources, their uses, and environmental implications.
4. Identify environmental hazards such as chemical, radiochemical, and other environmental hazards, and describe their effects on human health and the environment.
5. Apply knowledge of science and technology to understand and address environmental issues, including waste management and pollution control.

Course Content

Man-his origin and nature, man and his cosmic environment, scientific methodology, Science and technology in the society and service of man, Renewable and non-renewable resources man and his energy resources, Environmental effects of chemical plastics, textiles, wastes and other material, Chemical and radiochemical hazards. Introduction to the various areas of science and technology. Elements of environmental studies.

SECOND SEMESTER 200L COURSES

GST 212: Philosophy, Logic and Human Existence

(2 Units C: LH 30)

Course Learning Outcomes

At the end of the course, students should be able to:

1. know the basic features of philosophy as an academic discipline;
2. identify the main branches of philosophy & the centrality of logic in philosophical discourse;
3. know the elementary rules of reasoning;
4. distinguish between valid and invalid arguments;
5. think critically and assess arguments in texts, conversations and day-to-day discussions;
6. critically assess the rationality or otherwise of human conduct under different existential conditions;
7. develop the capacity to extrapolate and deploy expertise in logic to other areas of knowledge, and
8. guide his or her actions, using the knowledge and expertise acquired in philosophy and logic.

Course Contents

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic— the first nine rules of inference. Informal fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content — deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character molding.

GET 202: Engineering Materials

(3 Units C: LH 45)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. demonstrate the role of atoms and molecules (aggregates of atoms) in the building of solid/condensed matter known as engineering materials, the electrons quantum numbers and how the electrons are arranged in different atomic elements, and explain the role of electronic configuration and valence electrons in bonding;
2. define metals, alloys and metalloids, demonstrate mental picture of the solid mineral resources development as a relay race among four ‘athletes’: geologist, mining engineer, mineral processing technologist, process metallurgical engineer, and classify metallurgical engineering into 3Ps: process, physical and production;
3. explain the relationship between structure and properties of materials, characteristics, components and compositions of phase diagrams and phase transformations of solid solutions;
4. define ceramics, glass and constituents of glasses and understand application of ceramics in mining, building, art and craft industries;

5. define and classify polymers as a class of engineering materials and polymeric materials, demonstrate polymerisation reactions, their types and mechanism, and applications of polymers;
6. define properties, types and application of composite materials and fibres (synthetic and natural);
7. define and classify nanomaterials, demonstrate applications of nanomaterials, concept, design and classification of fracture mechanics, corrosion classification, including the five principal ways of controlling corrosion and metal finishing processes such as sherardising, galvanising and anodising; and
8. identify factors affecting the performance and service life of engineering materials/metals and metallography of metals/materials (materials anatomy), which enables metallurgical and materials engineers to prescribe appropriate solutions to test metals/materials fitness in service through structure-property-application relationships.

Course Contents

Basic material science; atomic structure, atomic bonding and crystal structures. Engineering materials situating metals and alloys; metals and alloys, classifications of metals, metal extraction processes using iron and steel (ferrous) and aluminium (nonferrous) as examples, phase diagrams/iron carbon diagrams, and mechanical workings of metals. Selection and applications of metals and alloys for specific applications in oil, aerospace, construction, manufacturing and transportation industries, among others. Ceramics (including glass); definition, properties, structure and classifications of ceramics. Bioactive and glass – ceramics. Toughening mechanism for ceramics. Polymers; definition of polymers as engineering materials, chemistry of polymeric materials, polymer crystallisation, polymer degradation and aging. Thermoplastic and thermosetting polymers and concepts of copolymers and homopolymers. Composites; definition, classification, characterisation, properties and composite. Applications of composites. Nanomaterials; definition, classification and applications of nanomaterials as emerging technology. Processing of nanomaterials including mechanical grinding, wet chemical synthesis, gas phase synthesis, sputtered plasma processing, microwave plasma processing and laser ablation. Integrity assessment of engineering materials; effect of engineering design, engineering materials processing, selection, manufacturing and assembling on the performance and service life of engineering materials. Metallography and fractography of materials. Mechanical testing (destructive testing) of materials such as compressive test, tensile test, hardness test, impact test, endurance limit and fatigue test. Non-destructive test (NDT) such as dye penetrant, x-ray and eddy current.

GET 204: Student Workshop Practice

(2 Units C: LH 15; PH 45)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. identify various basic hands and machine tools, analogue and digital measurement devices and instruments, and acquire skills in their effective use and maintenance;
2. practically apply basic engineering technologies, including metrology, casting, metal forming and joining, materials removal, machine tooling (classification,

- cutting tool action, cutting forces, non-cutting production) and CNC machining technology;
3. master workshop and industrial safety practices, accident prevention and ergonomics;
 4. physically recognise different electrical & electronic components like resistances, inductances, capacitances, diodes, transistors and their ratings;
 5. connect electric circuits, understand different wiring schemes, and check ratings of common household electrical appliances and their basic maintenance; and
 6. determine household and industrial energy consumption, and understand practical energy conservation measures.

Course Contents

The course comprises general, mechanical and electrical components: supervised hands-on experience in safe usage of tools and machines for selected tasks; Use of measuring instruments (calipers, micrometers, gauges, sine bar, wood planners, saws, sanders, and pattern making). Machine shop: lathe work shaping, milling, grinding, reaming, metal spinning. Hand tools, gas and arc welding, cutting, brazing and soldering. Foundry practice. Industrial safety and accident prevention, ergonomics, metrology. Casting processes. Metal forming processes: hot-working and cold-working processes (forging, prestool work, spinning, etc.). Metal joining processes (welding, brazing and soldering). Heat treatment. Material removal processes. machine tools and classification. Simple theory of metal cutting. Tool action and cutting forces. Introduction to CNC machines. Supervised identification, use and care of various electrical and electronic components such as resistors, inductors, capacitors, diodes and transistors. Exposure to different electric circuits, wiring schemes, analogue and digital electrical and electronic measurements. Household and industrial energy consumption measurements. Practical energy conservation principles.

GET 206: Fundamentals of Engineering Thermodynamics (3 Units C: LH 45)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. describe basic concepts of thermodynamics, quantitative relations of Zeroth, first, second and third laws;
2. define and explain system, surrounding, closed and open system, control volume and control mass, extensive and intensive properties;
3. calculate absolute and gage pressure, and absolute temperature, calculate changes in kinetic, potential, enthalpy and internal energy;
4. evaluate the properties of pure substances i.e. evaluate the state of the pure substances such as compressed liquid, saturated liquid-vapour mixture and superheated vapour using property diagrams and tables; arrange the ideal and real gas equations of state,
5. formulate the first law of thermodynamics for a closed system i.e. organize the change in energy in the closed systems via heat and work transfer;
6. distinguish heat transfer by conduction, convection and radiation, and calculate the amount of heat energy transferred;
7. calculate the changes in moving boundary work, spring work, electrical work and shaft work in closed systems;
8. apply the first law of thermodynamics for closed systems and construct conservation of mass and energy equations;

9. formulate the first law of thermodynamics to the open systems i.e. describe steady-flow open system, apply the first law of thermodynamics to the nozzles, diffusers, turbines, compressors, throttling valves, mixing chambers, heat exchangers, pipe and duct flow;
10. construct energy and mass balance for unsteady-flow processes;
11. evaluate thermodynamic applications using second law of thermodynamics;
12. calculate thermal efficiency and coefficient of performance for heat engine, refrigerators and heat pumps; and
13. restate perpetual-motion machines, reversible and irreversible processes.

Course Contents

Basic concepts, definitions and laws (quantitative relations of Zeroth, first, second and third laws of thermodynamics). Properties of pure substances: the two-property rule (P-v-T behaviour of pure substances and perfect gases); state diagrams. The principle of corresponding state; compressibility relations; reduced pressure; reduced volume; temperature; pseudocritical constants. The ideal gas: specific heat, polytropic processes. Ideal gas cycles; Carnot; thermodynamic cycles, turbines, steam and gas, refrigeration. The first law of thermodynamics – heat and work, applications to open and closed systems. The steady flow energy equation (Bernoulli's equation) and application. Second law of thermodynamics, heat cycles and efficiencies.

GET 208: Strength of Materials

(3 Units C: LH 45)

Course Learning Outcomes

At the end of this course, the students should be able to:

1. recognise a structural system that is stable and in equilibrium;
2. determine the stress-strain relation for single and composite members based on Hooke's law;
3. estimate the stresses and strains in single and composite members due to temperature changes;
4. evaluate the distribution of shear forces and bending moments in beams with distributed and concentrated loads;
5. determine bending stresses and their use in identifying slopes and deflections in beams;
6. use Mohr's circle to evaluate the normal and shear stresses in a multi-dimensional stress system and transformation of these stresses into strains;
7. evaluate the stresses and strains due to torsion on circular members; and
8. determine the buckling loads of columns under various fixity conditions at the ends.

Course Contents

Consideration of equilibrium; composite members, stress-strain relation. Generalised Hooke's law. Stresses and strains due to loading and temperature changes. Torsion of circular members. Shear force, bending moments and bending stresses in beams with symmetrical and combined loadings. Stress and strain transformation equations and Mohr's circle. Elastic buckling of columns.

GET 299: Students Industrial Work Experience I weeks) Course Learning Outcomes

(3 Units C: 9

SIWES I should provide an opportunity for the students to:

1. acquire industrial workplace perceptions, ethics, health and safety consciousness, interpersonal skills and technical capabilities needed to give them a sound engineering foundation;
2. learn and practise basic engineering techniques and processes applicable to their specialisations;
3. build machines, devices, structures or facilities relevant to their specific engineering programmes and applications; and
4. acquire competence in technical documentation (log-book) and presentation (report) of their practical experiences.

Course Contents

Practical experience in a workshop or industrial production facility, construction site or special centres in the university environment, considered suitable for relevant practical/industrial working experience but not necessarily limited to the student's major. The students are exposed to hands-on activities on workshop safety and ethics, maintenance of tools, equipment and machines, welding, fabrication and foundry equipment, production of simple devices; electrical circuits, wiring and installation. (8-10 weeks during the long vacation following 200 level).

GET 210: Engineering Mathematics II

(3 Units C: LH 45)

Course Learning Outcomes

At the end of the course, the students should be able to:

1. describe physical systems using ordinary differential equations (ODEs);
2. explain the practical importance of solving ODEs, solution methods, and analytically solve a wide range of ODEs, including linear constant coefficient types;
3. numerically solve differential equations using MATLAB and other emerging applications;
4. perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion, as well as on functions of several variables, including directional derivatives and multiple integrals;
5. solve problems using the fundamental theorem of line integrals, Green's theorem, the divergence theorem, and Stokes' theorem, and perform operations with complex numbers;
6. apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions of complex variables, as well as the theory of conformal mapping to solve problems from various fields of engineering; and
7. evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula.

Course Contents

Introduction to ordinary differential equations (ODEs); theory, applications, methods of solution; second order differential equations. Advanced topics in calculus (vectors and vectorvalued function, line integral, multiple integral and their applications). Elementary complex analysis including functions of complex variables, limits and continuity. Derivatives, differentiation rules and differentiation of integrals. Cauchy-Riemann equation, harmonic functions, basic theory of conformal mapping,

transformation and mapping and its applications to engineering problems. Special functions.

IUO-ELA 202: Engineering Laboratory

(1 Unit, PH 45)

Performing Laboratory Tests and doing workshop practice across the entire engineering programme in the College. Civil Engineering Laboratory & Workshop practice include the following; Wood Work, Wood Type, Wood Defects, Joints, Tools For Woodwork

IUO-MEE 201 Introduction to Energy Materials (2 Units; Elective; LH=30)

Senate-approved relevance

In line with the Igbinedion university mission and vision, the course is aimed to equip mechanical engineering graduates with skills needed in selection of appropriate materials for energy application. Upon graduation, students should be able to contribute to the global goal in the efficiency of the energy sector, manage energy systems, Contribute to the various level of energy value chain in the economy.

Overview

Energy is the major catalyst of industrial growth for sustainable development. The ability to make use of other sources of energy ensures that the ozone layer is protected from depletion but most importantly; this energy must be harnessed in such a way that waste is either minimized or eliminated. Hence, this course is designed to teach various materials for use to ensure energy generation, energy storage, energy transformation and energy utilization efficiency in all forms. Mechanical engineering students will be equipped with requisite skill to manage energy systems by making sure that required materials are employed at various level of energy value chain. This course is developed to instill in the students the ability to employ existing materials for appropriate energy application and to have basic knowledge of materials properties suitable for energy applications.

Objectives

The objectives of the course are to:

1. Define the properties of various energy materials.
2. Describe the process of energy harvesting and materials for energy harvesting.
3. Explain energy storage and materials for energy storage.
4. Examine the process of energy transformation and materials for energy transformation.
5. Described thermoelectric and magneto-caloric materials.

6. Enumerate the importance of catalysis for process efficiency.
7. Manage energy systems by making sure that required materials are employed at various level of energy value chain.
8. To instill in the students the ability to employ existing materials for appropriate energy application,
9. To have basic knowledge of materials properties suitable for energy applications.
10. To ensure energy generation, energy storage, energy transformation and energy utilization efficiency in all forms.

Learning Outcome

On completion of the course, students should be able to:

1. State five (5) properties of energy materials.
2. Examine three (3) processes of energy harvesting and materials for energy harvesting
3. List seven (7) materials for energy storage.
4. Describe three (3) processes of energy transformation.
5. Identify the uses of thermoelectric and magneto-caloric materials.
6. Demonstrate the catalysis process for process efficiency.
7. Manage energy systems by making sure that required materials are employed at various level of energy value chain.
8. Instill in the students the ability to employ existing materials for appropriate energy application,
9. Demonstrate basic knowledge of materials properties suitable for energy applications.
10. Demonstrate basic knowledge in energy generation, energy storage, energy transformation and energy utilization efficiency in all forms.

Course content:

Materials for solar cells. Semiconductors and LED. Production, storage and use of hydrogen. Fuel cells. Batteries: Li-batteries, meta-hybrid batteries, redox flow batteries. Thermoelectric and magneto-caloric materials. Catalysis for process efficiency. Materials for gas power: catalyst, microporous materials, sorption. Energy harvesting (organic and inorganic solar cell). Nuclear materials. Polymer composite for wind energy. Bismuth telluride for thermoelectric. Energy transformation (polymer and solid fuel cell, light emitting diode, engines and turbines). Energy storage (batteries, hydrogen storage, phase change materials).

5.4 300 Level Course Structure and Description.

Table 5.3: 300L Course Structure

IUO-MEE 371- Introduction to Emerging Engineering Materials (2 units; Elective (E); LH30)

Senate approved relevance

Traditional engineering materials such as metals and metal alloys, ceramics and polymers have found applications in various engineering fields. Nevertheless, when special needs e.g. low weight to strength ratio, are required for specific applications, emerging engineering materials become more suitable as they are designed to meet these special needs specifically. The abilities of graduate of mechanical engineering to identify and possess capability to develop these materials put them at vantage positions; to develop more energy efficient, cost effective and serviceable engineering systems. The mission of IOU is to produce graduates that are responsive to global and nation needs. Hence, graduates who offer this course stand the chance of being highly skilled in development of more efficient systems using emerging engineering materials to meet global needs of energy efficient, cost effective and serviceable engineering systems.

Course Overview

Energy efficiency is one of the globally acceptable standard and leverage for competitiveness in engineering systems production. For Nigeria to have her locally produced goods more energy efficient, cost effective and serviceable competitively, mechanical engineering graduates must be acquainted with emerging engineering materials to meet these needs and put the country on the path of development.

This course is designed to impart in graduates of mechanical engineering program, the abilities to design emerging materials and make appropriate use of different technologies for their production. The graduates from this program must be able to structure properties of the emerging materials to meet their desired application.

Objectives

The objectives of the course are to:

1. Understand the concepts of emerging materials.
2. Identify types of emerging engineering materials.
3. Establish the structure-property relation of emerging engineering materials.

4. Determine the properties of emerging engineering materials.
5. Differentiate between properties of emerging engineering materials and traditional engineering materials.
6. Understand design concept of emerging engineering materials.
7. Apply emerging engineering materials concept to: aerospace, automotive, energy storage and management etc.
8. Identify the Performance differences between emerging materials and traditional materials:
9. Determine the Concepts of shape memory alloys, self-heating materials, amorphous metals and metal foams
10. Identify and possess capability to develop these materials and make these materials to advantage positions; to develop more energy efficient engineering systems.

Learning Outcome

On completion of the course, students should be able to:

1. Differentiate between emerging engineering materials and traditional engineering materials.
2. Understand structure-property relation of emerging engineering materials.
3. Understand phase diagram of some emerging engineering materials.
4. Identify processing and manufacturing methods for emerging engineering materials.
5. Highlight the differences in properties between emerging engineering materials and traditional engineering materials.
6. Know the various applications of emerging engineering materials.
7. Differentiate emerging engineering materials concept between : aerospace, automotive, energy storage and management .
8. Understand the Performance of emerging materials and traditional materials:
9. Understand the Concepts of shape memory alloys, self-heating materials, amorphous metals and metal foams
10. Develop energy efficient engineering systems.

Course Content

Definition and examples (carbon Nano-tubes, amorphous metals, Graphene, metal foams, high entropy alloys, fullerene, self-healing materials, shape memory alloys, nickelates etc.) of emerging engineering materials. Concepts of shape memory alloys, self-healing materials, amorphous metals and metal foams. Structure-property relation of emerging materials. Phase diagram of some emerging engineering materials. Design concept of emerging engineering materials. Development, processing and manufacturing methods of emerging engineering materials. Physical, mechanical and chemical properties of emerging engineering materials.

Electrochemical, electrical and thermal properties of emerging materials. Application areas of emerging engineering materials: aerospace, automotive, energy storage and management etc. Performance difference between emerging materials and traditional materials: mechanical, electrical, corrosion, thermal etc.

Minimum Academic Standards: None

IUO – MEE 391 Weldment Design (3 Units; Elective (E); LH=30)

Senate approved relevance

The major concern of engineering profession is problems solving and this involves coming up with efficient designs of structural materials, taking safety of use into cognizance. While structural members are being joined, the joints need to be efficient and safe. Hence, design of the joints must be carried out to ensure that strength requirement of application environment is met, based on joint material specification and size determination. Also, accelerated degradation of the joint due to effect of application environment must be prevented. The vision and mission of IUO is drive knowledge production through training of mechanical engineering students. Therefore, academic training in this course will equip the students with requisite skill to meet global safety requirements of structural materials/members.

Overview

Nigeria today still battles with failed structures that have claimed lives and properties. The oil and gas industry for instance, has witnessed pipelines failures due to corrosion of welded joint which led to spillage and eventual fire outbreak or environmental pollution. Some of these spillages were not necessarily due to vandalism but failure of the pipeline. Consequently, mechanical engineering graduate must be made to acquire necessary skill to design efficient and safer structures.

This course is designed to equip the graduates of mechanical engineering program with the requisite skill needed in the construction and allied industries to tackle failure of structural joints by designing efficient and safe welded members.

Objectives

The objectives of the course are to:

1. Know design factors and types of weldment.

2. Define what an acceptable weld is.
3. Determine weld defects and causes.
4. Identify weld materials and their compatibilities with welding techniques, angle, current and speed.
5. Determine weld design strength, fatigue, residual stress, shear force and distortion.
6. Evaluate performance of welded joint under different loading conditions.
7. Determine weld size, volume and relationship between leg length and throat size.
8. Determine types of corrosion that effect welded joint and heat affected zones.
9. Meet global safety requirements of structural materials/members.
10. Equip Students with the requisite skill needed in the construction and allied industries to tackle failure of structural joints by designing efficient and safe welded members.

Learning Outcome

On completion of the course, students should be able to:

1. Identify types of weld and weldment, weldment design considerations and uses of weldment.
2. Know an acceptable weld; identify weld defects, causes of weld defects and methods of preventing weld defects.
3. Select materials for welding.
4. Interpret welding drawing and symbols.
5. Design weld strength and determine weld size.
6. Understand corrosion mechanism of welded joints and heat affected zones.
7. Develop strategies to prevent corrosion of welded joints.
8. Know the different types of corrosion that effect welded joint and heat affected zones
9. Perform safety activities required for structural materials/members.
10. Skillfully tackle failure of structural joints by designing efficient and safe welded members.

Course content:

Definition of weldment, design factors, types and uses of weldment. Considerations for an acceptable weld, welding defects and causes of defects. Welding symbols and weldment drawing. Materials in welding, compatibility of materials with welding techniques and weld angle, direction, current and speed. Design Weld strength per unit length, fatigue, residual stress, shear and bending force per unit length of weld and distortion. Performance of welded joint under static, fatigue, shear and torsion loading. Weld size and volume. Relationship between leg length and throat size. Corrosion of welded joint and heat affected zones.

Application of weldment design in industries such as oil and gas pipelines, ship building, automotive, aerospace etc.

Minimum Academic Standards: None

IUO- MEE 372 Bronze Casting Technology (2 units; Core (C); LH- 15; PH-45)

Senate approved relevance

Engineering education is giving of oneself a commercial value. Engineers are to acquire education that decodes, discovers and develops what was inscribed in the pages of engineer's textbooks and knowledge acquired becomes a part of you and nobody can take it away. Some basic skills in CASTING can be developed in the sub conscious and built consciousness. Edo state where Okada town (cosmopolitan) was carried out from, is known for BRONZE CASTING which are one of the finest CAST in the world, it is an indigenous process that helps to meet challenges posed by scarcity of industrial products such as plumbing fitting, bearings, pulley wheels, vehicles parts household items, etc. In order to make today Engineer entrepreneurial, it is important to introduce the art of Bronze casting.

Overview

The Benin Bronze casting is an ancient art cast by using the traditional lost wax method and rank among the top castings in the Globe. Igun Street in Benin City, Edo state where we find Okada Town, is the heart of the Ancient Art.

Engineers today will make casting permeate into the society by solving the challenges posed by scarcity of motor spare parts, Scarcity of industry spare parts, limited production of some important items in the home and spare parts of plumbing during construction of house and factories.

Objectives

This course intends to:

1. Define metal casting and state 2 importance.
2. Discuss various types of foundries with respect to type of material cast, type of production and ownership structure.
3. Discuss the importance of foundry industry in manufacturing economy of Edo state

4. Identify the factors and discuss factors militating against the development of foundry industry in Edo state, Benin city.
5. Explain the art of a traditional lost wax process in a typical format.
6. State the advantages of metal casting over other production processes
7. Discuss how a traditional lost- wax casting can be upgraded to the level where it can be used to cast spare parts in Edo state, Benin City and by extension, Okada town.
8. Solve the challenges posed by scarcity of motor spare parts, Scarcity of industry spare parts, limited production of some important items in the home and spare parts of plumbing during construction of house and factories.
9. Explain The Shaw process
10. Discuss the Design considerations in casting.

Learning Outcomes

At the end of the course, students should be able to;

1. Produce engine blocks, brake drums, large iron pipes for water, engine piston, plumbing spare parts, etc., using casting process.
2. Build a furnace
3. Demonstrate the process of the traditional lost wax casting
4. Perform an industrial lost wax casting process
5. Categorize the full- mound casting process
6. Interpret how the process of shell mold casting is done.
7. Propose at least ten (10) safety rules for casting process
8. Produce motor spare parts, industry spare parts, and spare parts of plumbing during construction of house and factories.
9. Demonstrate The Shaw process
10. Interpret Design considerations in casting.

Course Content

Metal casting, type of foundries, types of materials cast. Type of production, ownership structure, importance of the foundry industry, advantages of metal casting, classification of casting process A typical casting process. Non- permanent mold casting. Types of patterns, pattern materials, pattern allowances, pattern shrinking allowance, pattern machine finish allowance. Same casing, molding sands, effects of some special additives in molding sand, testing of molding sand. The gating system. Green sand casting, advantages of green sand mold, disadvantages of green sand molding, dry sand mold casting, and cement bonded sand

molds, core sand molds. The Shaw process, expendable pattern mold, full mold casting, investment casting/lost wax casting advantages of lost wax casting. Traditional lost wax casting. Permanent mold casting. Gravity die casting. Low pressure die casting. High pressure die casting, hot/ cold chamber die casting, centrifugal casting and continuous casting. Furnace. Design considerations in casting. The cupola. Industrial visit to the Benin Bronze cast Igun Street Edo State.

Minimum academic standard : None

IUO – GET 303 Engineering Economics (3 Units, Core; LH=45)

Senate approved relevance

Igbinedion University's mission to enhance human advancement, public welfare through teaching and research has spelt out the need for the study of engineering economics in level three. Students should be able to judge on attractive proposed investment to know how and when to invest in viable ventures. The economic involved in selection between alternatives, purchase methods and the basic concepts of engineering economics are needed. Engineering graduates from Igbinedion University should be able to solve problems emanating from the basic concepts of engineering economics.

Overview

Since the essence of engineering and engineers is to proffer solutions to problems and for sustainability of economic systems by way of identifying needs in the society and designing systems that meet these needs. It essential that engineering graduates from this program are equipped with skills on how economic systems operate in order that such graduates are able to make decisions that are not only related to engineering systems designs but that which relates to investment in machinery and raw materials and the financial flow systems.

Engineering economics will expose the students to the nature of economics, scope of economics, cash flow in the economy and all about cost analysis and investments.

Objectives

The objectives of the course are to:

1. Comprehend the importance of economics in engineering studies.

2. Comprehend the overview of the Nigerian economy and its economic potentials.
3. Comprehend the economist's views of cost.
4. Analyze the procedure for conducting machinery valuation.
5. Comprehend mixed economy, how economy systems solve economics problems.
6. Classify investments, breakdown analysis and replacement analysis.
7. Explain the problems associated with resources allocation and evaluate the performances of resources.
8. Establish the techniques of solving Present worth and Discounted payback.
9. Predict what the Nigerian capital market entails.
10. Categorize the distinctions between economic growth and economic development, economic planning, types of economic planning, problems of economic planning.

Learning Outcome

On completion of the course, students should be able to:

1. Display adequate understanding of engineering economics.
2. List some basic concepts of engineering economics.
3. Solve interest formulas problems, discounted flow problems, present worth problems, equivalent annual growth and rate of return comparison.
4. Implement machinery valuation.
5. Conduct cost/benefit analysis, break-even analysis, simple cost analysis, volume cost ratio analysis, sensitivity analysis and make or buy decision analysis.
6. Present cash flow diagram.
7. Outline issues in development and economic growth of Nigeria.
8. Show the techniques of solving Present worth and Discounted payback.
9. Predict what the Nigerian capital market entails.
10. Categorize the distinctions between economic growth and economic development, economic planning, types of economic planning, problems of economic planning.

Course content:

Concepts of engineering economics. Nature and scope of engineering economics. Law of supply and demand. Element of cost. Time value of money. Interest formulas. Revenue dominated cash flow. Cost dominated cash flow. Rate of return. Machinery valuation:

economic life, scrap value and replacement analysis, machinery depreciation. Make or buy decision: volume/cost ratio, economic analysis, simple cost analysis, break-even analysis. Cost/benefit analysis. Sensitivity analysis. Risk analysis. Cash flow diagram. Present worth. Discounted payback. Nigerian capital market. Investment decision. Economic growth and development: distinctions between economic growth and economic development, economic planning, types of economic planning, problems of economic planning.

Minimum Academic Standards: None

GST 312: Peace and Conflict Resolution

(2 Units C: LH 30)

Learning Outcomes

At the end of this Course, students should be able to:

1. analyse the concepts of peace, conflict and security;
2. list major forms, types and root causes of conflict and violence;
3. differentiate between conflict and terrorism;
4. enumerate security and peace building strategies; and
5. describe the roles of international organisations, media and traditional institutions in peace building.

Course Contents

The concepts of peace, conflict and security in a multi-ethnic nation. Types and theories of conflicts: ethnic, religious, economic, geo-political Conflicts; structural conflict theory, realist theory of conflict, frustration-aggression conflict theory; root causes of conflict and violence in Africa: indigene and settlers phenomenon, boundaries/boarder disputes, political disputes, ethnic disputes and rivalries, economic inequalities, social disputes, nationalist movements and agitations; selected conflict case studies – Tiv-Junkun, ZangoKartaf, chieftaincy and land disputes, etc. Peace building, management of conflicts and security: Peace & Human Development. Approaches to Peace & Conflict Management (religious, government, community leaders, etc.). Elements of peace studies and conflict resolution:

Conflict dynamics assessment Scales: Constructive & Destructive. Justice and Legal framework: Concepts of Social Justice; The Nigeria Legal System. Insurgency and terrorism. Peace mediation and peace keeping. Peace and Security Council (international, national and local levels). Agents of conflict resolution – Conventions, Treaties Community Policing: Evolution and Imperatives. Alternative Dispute Resolution (ADR) (dialogue,. arbitration, negotiation, collaboration, etc).

The roles of international organizations in conflict resolution ((a) The United Nations, UN and its conflict resolution organs. (b) The African Union & Peace Security Council (c) ECOWAS in peace keeping). The media and traditional institutions in peace building. Managing postconflict situations/crises: Refugees.

Internally Displaced Persons (IDPs);the role of NGOs in post-conflict situations/crises.

ENT 312: Venture Creation

(2 Units C: LH 15; PH 45)

Learning Outcomes

At the end of this course, students, through case study and practical approaches, should be able to:

1. describe the key steps in venture creation;
2. spot opportunities in problems and in high potential sectors, regardless of geographical location;
3. state how original products, ideas and concepts are developed;
4. develop a business concept for further incubation or pitching for funding;
5. identify key sources of entrepreneurial finance;
6. implement the requirements for establishing and managing micro and small enterprises;
7. conduct entrepreneurial marketing and e-commerce;
8. apply a wide variety of emerging technological solutions to entrepreneurship; and 9. appreciate why ventures fail due to lack of planning and poor implementation.

Course Contents

Opportunity identification (sources of business opportunities in Nigeria, environmental scanning, demand and supply gap/unmet needs/market gaps/market research, unutilized resources, social and climate conditions and technology adoption gap). New business development (business planning, market research). Entrepreneurial finance (venture capital, equity finance, micro-finance, personal savings, small business investment organizations and business plan competition). Entrepreneurial marketing and e-commerce (principles of marketing, customer acquisition & retention, B2B, C2C and B2C models of e-commerce, First Mover Advantage, E-commerce business models and successful ecommerce companies). Small business management/family business: Leadership & Management, basic book keeping, nature of family business and family business growth model. Negotiation and business communication (strategy and tactics of negotiation/bargaining, traditional and modern business communication methods). Opportunity discovery demonstrations (business idea generation presentations, business idea contest, brainstorming sessions, idea pitching). Technological solutions (The concept of market/customer solution, customer solution and emerging technologies, business applications of new technologies - artificial intelligence (AI), virtual/mixed reality (VR), Internet of things

(IoT), block chain, cloud computing, renewable energy, etc. Digital business and e-commerce strategies).

GET 301: Engineering Mathematics III

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

5. demonstrate a clear understanding of the course content, that is, possess a breadth of knowledge in the area covered;
6. possess an in-depth knowledge upon which a solid foundation can be built in order to demonstrate a depth of understanding in advanced mathematical topics;
7. develop simple algorithms and use computational proficiency;
8. write simple proofs for theorems and their applications; and
9. communicate the acquired mathematical knowledge effectively in speech, writing and collaborative groups.

Course Contents

Linear Algebra. Tensor algebra and analysis, Elements of Matrices, Determinants, Inverses of Matrices, bases representation of tensors. The Euclidean point space and vector spaces. Theory of Linear Equations. Eigen Values and Eigen Vectors. Analytical Geometry. Basic transformations: identity, spherical, Projection and Coordinate Transformation as tensors, Traces, Determinants and other scalar invariants. Equivalent stresses and strains as examples of scalar invariant. Applications to design, analyses and optimization. Elgenvalues, Elgeanvectors of tensors. Solid Geometry. Polar, cylindrical and spherical coordinates. Elements of functions of several variables. Surface Variables. Ordinary Integrals. Evaluation of Double Integrals, Triple Integrals, Line Integrals and Surface Integrals. Derivation and Integrals of Vectors. The gradient of scalar and fiels. Flux of Vectors. The curl of a vector field, Gauss, Greens and Stoke's theorems and applications: Determinations and applications to field equations in linear abd nonlinear mechanics. Singular Valued Functions.

Multivalued Functions. Analytical Functions. Cauchy Riemann's Equations. Singularities and Zeroes.

Contour Integration including the use of Cauchy's Integral Theorems. Bilinear transformation.

GET 302: Engineering Mathematics IV

(3 Units E: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. solve second order differential equations;

2. solve partial differential equations;
3. solve linear integral equations;
4. relate integral transforms to solution of differential and integral equations;
5. explain and apply interpolation formulas; and
6. apply Runge-Kutta and other similar methods in solving ODE and PDEs.

Course Contents

Series solution of second order linear differential equations with variable coefficients. Bessel and Legendre equations. Equations with variable coefficients. Sturm-Liouville boundary value problems. Solutions of equations in two and three dimensions by separation of variables. Eigen value problems. Use of operations in the solution of partial differential equations and Linear integral equations. Integral transforms and their inverse including Fourier, Laplace, Mellin and Handel Transforms. Convolution integrals and Hilbert Transforms. Calculus of finite differences. Interpolation formulae. Finite difference equations. RungeKutta and other methods in the solutions of ODE and PDEs. Numerical integration and differentiation.

GET 304: Technical Writing and Communication (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the student should be able to:

1. demonstrate the concept of clear writing, common pitfalls and unambiguous language in engineering communication, including technical reporting for different applications and emotional comportment;
2. demonstrate the skills of language flexibility, formatting, logic, data presentation styles, referencing, use of available aids, intellectual property rights, their protection, and problems in engineering communication and presentation; and
3. demonstrate good interpersonal communication skills through hands-on and constant practice on real-life communication issues for engineers in different sociocultural milieu for engineering designs, structural failure scenarios and presentation of reports.

Course Contents

A brief review of common pitfalls in writing. Principles of clear writing (punctuations and capitalization). Figures of speech. Units of grammar. Tenses and verb agreement. Active and passive sentences Lexis and structure Fog Index concept. Skills for communication and communication algorithm. Types and goals of communication; Interpersonal communication; features and the Finger Model or A,B,C,D,E of good interpersonal communication (accuracy of

technical terms, brevity of expression, clarity of purpose, directness of focus and effectiveness of the report). Language and organisation of reports. Technical report writing skills(steps, problems in writing, distinguishing technical and other reports, significance, format and styles of writing technical reports). Different formats for communication; styles of correspondences – business report and proposal, business letter, memorandum, e-mails, etc. Proposals for projects and research; format, major steps and tips of grantoriented proposals. Research reports(competency, major steps, components and formats of research reports and publishable communication). Sources and handling of data, tables, figures, equations and references in a report. Presentation skills; overview, tips, organisation, use of visual aids and practising of presentation. Intellectual property rights in research reports. Case studies of major engineering designs, proposals and industrial failures with professional presentation of reports.

GET 305: Engineering Statistics and Data Analytics (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. work with data from the point of view of knowledge convergence, machine learning, and intelligence augmentation, which significantly raises their standard for engineering analysis (the approach forces them to learn statistics in an actionable way that helps them to see the holistic importance of data analytics in modern engineering and technology);
2. anticipate the future with Artificial Intelligence while fulfilling the basic requirements of conventional engineering statistical programming consistent with their future careers;
3. perform, with proficiency, statistical inference tasks with language or programming toolboxes such as R, Python, Mathematica or MATLAB, and Design Expert to summarise analysis and interpretation of industry engineering data, and make appropriate conclusions based on such experimental and/or real-life industrial data;
4. construct appropriate graphical displays of data and highlight the roles of such displays in data analysis, particularly the use of statistical software packages;
5. plan and execute experimental programmes to determine the performance of programme relevant industrial engineering systems, and evaluate the accuracy of the measurements undertaken; and
6. demonstrate mastery of data analytics and statistical concepts by communicating the results of experimental and industry-case investigations, critically reasoned scientific and professional analysis through written and oral presentation.

Course Contents

Descriptive statistics, frequency distribution, populations and sample, central tendency, variance data sampling, mean, median, mode, mean deviation, percentiles. Probability. Binomial, Poisson hypergeometric, normal distributions. Statistical inference intervals, test hypothesis and significance.

Regression and correlation. Introduction to big data analytics and cloud computing applications. Introduction to the R language; R as a calculator; Vectors, matrices, factors, data frames and other R collections. Iteration and looping control structures. Conditionals and other controls. Designing, using and extending functions. The Apply Family. Statistical modelling and inference in R.

GET 307: Introduction to Artificial Intelligence, Machine Learning and Convergent Technologies (3 Units C: LH 45)

Learning Outcomes

At the completion of the course, the students are expected to be able:

1. explain the meaning, purpose, scope, stages, applications and effects of artificial intelligence;
2. explain the fundamental concepts of machine learning, deep learning and convergent technologies;
3. demonstrate the difference between supervised, semi-supervised and unsupervised learning;
4. demonstrate proficiency in machine learning workflow and how to implement the steps effectively;
5. explain natural languages, knowledge representation, expert systems and pattern recognition;
6. describe distributed systems, data and information security and intelligent web technologies;
7. explain the concept of big data analytics, purpose of studying it, issues that can arise with a data set and the importance of properly preparing data prior to a machine learning exercise; and
8. explain the concepts, characteristics, models and benefits, key security and compliance challenges of cloud computing.

Course Contents

Concepts of human and artificial intelligence; artificial/computational intelligence paradigms; search, logic and learning algorithms. Machine learning and nature-inspired algorithms – examples, their variants and applications to solving engineering problems; understanding natural languages; knowledge representation, knowledge elicitation, mathematical and logic foundations of AI; expert systems, automated reasoning and pattern recognition; distributed systems; data and information security; intelligent web technologies; convergent technologies – definition, significance and engineering applications. Neural networks and deep learning. Introduction to python AI libraries.

GET 399: Students Industrial Work Experience II (4 Units C: 12 weeks)

Learning Outcomes

At the end of the SIWES, students should be able to:

7. demonstrate proficiency in at least any three softwares in their chosen career choices;
8. demonstrate proficiency in some animation videos (some of which are free on YouTube) in their chosen careers;
9. carry out outdoor hands-on construction activities to sharpen their skills in their chosen careers;
10. demonstrate proficiency in generating data from laboratory analysis and develop empirical models;
11. demonstrate proficiency in how to write engineering reports from lab work; 12. fill logbooks of all experience gained in their chosen careers; and
13. write a general report at the end of the training.

The experience is to be graded and the students must pass all the modules of the attachment and shall form part of CGPA.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (Students are to proceed on three months of work experience i.e. 12 weeks during the long vacation following 300 level). Students are engaged in the more advanced workshops, indoor software design training similar to what they will use in the industry and outdoor construction activities to sharpen their skills. The use of relevant animation videos that mimic industrial scenarios is encouraged. Students are to write a report at the end of the training. As much as possible, students should be assisted and encouraged to secure 3 months placement in the industry. Examples of outline of activities and experiences to which students are expected to be exposed to earn prescribed credits include:

Section A: Welding and fabrication processes, automobile repairs, · lathe machine operations: machining and turning of simple machine elements, such as screw threads, bolts, gears, etc. Simple milling machine operations, machine tool maintenance and troubleshooting, and wooden furniture making processes.

Section B: Mechanical design with computer graphics and CAD modelling and drafting. Introduction to Solid works: software capabilities, design methodologies and applications. Basics part modelling: sketching with SolidWorks, building 3D components, using extruded Bose base

· Basic assembly modelling, and solid Works drawing drafting. Top-down assembly technique exploded view, exploded line sketch. Introduction to PDMS 3D design software; autoCAD mechanical, SPSS.

A comprehensive case study design project. The student should be introduced to the concept of product/component design and innovation and then be given a comprehensive design project.

Examples of projects should include the following:

8. design of machine components;
9. product design and innovation;
10. part modelling and drafting in solidworks; and
11. technical report writing.

MEE 301: Computer-Aided Design and Manufacture (3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of this course, the students should be able to:

1. visualise and apply basic drafting fundamentals;
2. prepare and edit engineering drawings;
3. explain the concepts and underlying theory of modelling and the usage of models in different engineering applications;
4. compare the different types of modelling techniques and explain the central role solid models play in the successful completion of CAD/CAM-based product development;
5. produce CAD drawings (create accurate and precise geometry of complex engineering systems and use the geometric models in different engineering applications);
6. use and assess commercial CAD/CAM tools efficiently, effectively and intelligently in selected engineering applications;
7. take active role in product design and development process as well as prototyping;
8. model 3D part and assemblies using SolidWorks program (or alternative CAD software);
9. analyse the part design using one of the computational methods (e.g. stress analysis) - calculate part features using math skills;
10. demonstrate proficiency in the concepts of computer-aided manufacturing and a number of applied associated processes; and
11. explain the basic concepts of CNC programming and machining.

Course Contents

Introduction to computer aided design (CAD). Basic data structuring technique. Computer graphics. Geometric transformation techniques. Mathematical bases for surface modeling: curves, surfaces and solids. Principles of solid modeling and application. CAD software. Introduction to CAM: Relation between production volume and flexibility. Various manufacturing systems – batch, mass, group, cellular and flexible manufacturing systems. Type of automation and benefits of soft or flexible automation. Automation in material handling and assembly. CNC machines: Introduction, classification, design and control features including interpolations. Numerical control and NC part programming. Introduction to Robotics: Definitions, motivation, historical development. Basic structure, classification, workspace, drives, controls, sensors, grippers, specifications. Manual CNC programming (milling and turning). Basic and advanced CAD/CAM for CNC (milling and turning).
Group project assignment.

**BENCH MARK ACADEMIC STANDARD (BMAS) INTEGRATED COURSE
STRUCTURE AND COURSE CONTENT 400LEVEL**

Table 5.3 is the course structure for 400l Mechanical Engineering Students.

Table 5.3: 400 Level Course structure and Workload

Semester	Course Code	Course Title	L	T	P	Course Credit	Pre-Requisite
First	MEE 411	Mechanics of Machine III	2	1	-	2	MEE311,MEE312
	MEE 421	Mechanical Engineering Design I	2	1	-	3	
	MEE 431	Strength of Materials III	1	1	-	2	MEE231
	MEE 441	Engineering Statistics	1	1	-	2	
	MEE 451	Thermodynamics III	1	1	-	2	MEE351
	MEE 461	Fluid Mechanics III	1	1	-	2	MEE362
	MEE 481	Automobile Workshop Practice	1	1	-	2	
	GRE 441	Engineering Communications	1	1	-	2	
	ENS 411	Technology Policy and Dev.	1	1	-	2	
	ELA 401	Laboratory Practicals				3	
	EPS 411	Introduction to Entrepreneurship Studies	1	1	-	2	
	Total Credits					24	
Second	IUITS 402	Igbinedion University Industrial Training Scheme				6	

400 Level Course Contents BMAS

MEE 411: Mechanics of Machines III

(2 credits)

Electro-mechanical analogies. Electo-mechanical systems and transducers. Operation of two degree of freedom systems. Principal modes orthogonality. Multi-degree of freedom vibrating systems.

Lumped parameter systems.

Lubrication: Theory of lubrication. Reynolds equation and its application to a converging-diverging wedge. Pad bearings and Journal bearings. Hydrodynamic bearings. Rolling bearing analysis.

Boundary lubrication. Hydrostatic bearings. Bearing materials.

MEE 421: Engineering Design I (3 credits)

Philosophy of design. Design flow charts. Design components, specifications and justification. Detail design (qualitative and quantitative). Materials selection. Stress and deflection analysis. Design against failure. Statistical study of failures and factor of safety. Concepts of adequate, imitative and optimum design. Use of handbooks and standards. Mathematical model o design situations. Component design: Bearing design, Shaft design, Fastenings, Couplings.

MEE 431: Strength of Materials III (2 credits)

Bending of curved beams; Crane hook problem. Principal stresses in bending. Beams with axial loads. Beam columns. Combined bending and torsion. Elastoplastic bending.

Deflection of Intermediate beams. Continuous beams. Energy methods.

Advanced problems in stress analysis: Thick cylinders and spheres under uniform internal and external stresses. Compound cylinders. Stress concentrations. Contact stresses. Strength of riveted, bolted or bonded joints. Torsion of thin-walled tubes. Three dimensional stress and strain analysis. Generalized stress-strain relations. Experimental stress analysis: Principles and applications of Strain gauges, Photo-elasticity, Stress coats.

MEE 441: Engineering Statistics (2 Credits)

Probability- Elements of probability, density and distribution functions, moments, standard distributions, e.t.c.

Statistics- Regression and correlation, large sampling theory. Test hypothesis and quality control. Introduction to statistical analysis software packages (MS Excel, Statistica, SPSS)

Design of Experiments- Statistical methods: measures of central tendency, measures of dispersion. Experimental Design: Significance (levels of significance, tests of significance) Factorial Concept, Analysis of variance (one way designs, two way designs, e.t.c), Means Comparison (Non-parametric, pairwise (LSD, MRT's).

Applications in Modeling- Modeling Techniques, modeling procedure, Applied linear regression basics.

MEE 451: Thermodynamics III (2 credits)

Thermodynamic relations: Maxwell relations. Clapeyron equations. Relations involving u, h and s. Joule-Thomas coefficient. Property diagrams, T-S, h-S, p-h, etc. Specific heat relations. Behaviour of real gases. Gas power plants: Joule cycle; Work ratio and efficiency. Improvement of performance; Inter-cooling, Re-heating, Ericsson cycle. International

combustion engines: Operation of internal combustion engines. Engine cycles, performance and fuel supply. Heat balance. Combustion phenomena. Reciprocating expanders and compressors: Work and heat transfer;

Analysis of compressors. The reciprocating expander. Rotary positive displacement compressors. Steam engine. Refrigeration and feed pump: Reversed Carnot cycle; Performance criteria.

Classification of refrigerators.

MEE 461: Fluid Mechanics III (2 credits)

Concepts of compressibility, Isentropic flow relationships. Static, stagnation and reservoir conditions. Isentropic flow through nozzles and diffusers. Sonic, subsonic and supersonic flows; Practical examples. Shock waves; static and moving waves. Relationship between flow properties behind and in front of stationary and moving shock waves. Flows through constant area ducts without friction and heat transfer, with friction only, and with both friction and heat transfer. Boundary layer thickness: Simplified equations for laminar flows. Turbulent boundary layers. Transition to turbulence and flow separation. Introduction to turbulence; Prandtl mixing length theory. Laminar and turbulent velocity distributions.

Turbulent pipe flows and empirical relations. Moody diagrams, pipe network, surge tanks. Head losses in pipe flows. Pressure drop and velocity relations in gas ducts. Losses in joints and bends of gas ducts.

Theory of Turbo machines. Head-momentum, torque-momentum relations. Dimensional analysis and similarity considerations. Cavitation

MEE 481: Automobile Workshop Practice (2 Credits)

This course covers the fundamentals of Safety; Tools and Equipment. The four stroke cycle and the two stroke cycle operation. Engines-constructural details and layout. Engine Piston. Connecting Rods. Cylinder Block. Head and Valves. How engine produces power. Types of combustion chambers. Details of Camshaft Drive. Principle of Crankshaft, Clutch and Gearbox. Power Transmission Drives. Engine Lubrication, Pump. Oil circulation and filtration. Fuel System. How Carburetor works. Petrol Injection System. Exhaust System. Cooling System. Transmission (Automatic and Manual). Brake System. Tyre and Wheel services. Steering and Suspension System. Auto Electrics and Electronics. Ignition System. Heating and Air conditioning. General Maintenance and Services.

GRE 441: Research Methods and Technical Report Writing (2 credits)

Principles of communication. Parts of technical reports: Abstract, introduction, Main body. Conclusions and Recommendations, Tables, Figures, Graphs, Illustration, References, Appendices.

Writing the first draft. Revising the first draft: Content and structure. Audiences Scientific and Technical Prose: Spelling and Scientific Terminology using numbers and symbols.

Data: Statistical analysis of data and display. Software support for various writing and graphic tasks.

Use of Microsoft power point. Preparation of curricula vitae, research grant proposals, short talks and poster, and feasibility report.

Writing a thesis.

ENS411: Technology, Policy and Development (2 Credits)

Definition and usage of technology; Basic methods of policy analysis and planning; Practical principles for beginning policy analysts; Definition of sustainable development; Distinction between science, engineering and technology; Definition of invention and innovation; Models of technology innovations; Types of technology innovations; Methods for measuring innovation performance; Examination of national technology policy and development strategy.

ELA 401: Mechanical Engineering Laboratory (2 credits)

Experiments in Compression-ignition engines; steam and gas turbines, refrigeration circuits. Examination of liquid fuels and lubrication oils. Measurement of flame speed; Flexibility of flames in moving streams; ignition of liquid fuels, scavenging of two-stroke engines. Experiments in heat transfer and combustion, Turbulence in fluids, applied mechanics and Heat treatment of steels.

EPS 411: Introduction to Entrepreneurship Studies (2 credits)

Second Semester IUTS 402: Igbinedion University Industrial Training Scheme (6 Credit)

A 6-month intensive training program in engineering based establishments (SIWES). Students submit and defend reports at the end of the exercise. They also write examination. The College of engineering has elaborate and well-coordinated SIWES program.

**CORE CURRICULUM MINIMUM ACADEMIC STANDARD (CCMAS)
INTEGRATED COURSE STRUCTURE AND COURSE CONTENT 400LEVEL**

Table : 400 Level Course structure and Workload

Semester	Course Code	Course Title	units	status	LH	PH	Pre-Requisite
	MEE 401	Mechanical(machine) Engineering Design (II)	2	C	30	-	
	MEE 402	Theory(Mechanics)of machines	2	E	30	-	

First	MEE 403	Applied (Engineering) Thermodynamics (I)	2	E	30	-	
	MEE 404	Applied Fluid mechanics	2	E	30	-	
	MEE 405	Heat and Mass transfer	3	E	45	-	
	MEE 407	Advanced mechanics of materials	2	C	30	-	
	GET 402	Engineering project I	2	C	-	90	
	GET 404	Engineering valuation and costing	2	C	30	-	
	IUO-CERT 411	Career enhancement and resilience training	2	C	15	45	
	IUO-MEE 491	Model Analysis of mechanical systems	2	E	30	-	
	IUO-MEE 481	Failure analysis and prevention	3	C	15	45	
	IUO-MEE 492	Integrated Product & Processes Development	2	C	45	-	
	IUO-MEE 493	Mechanical Vibration	2	E	30	-	
Total Credits			28				

Semester	Course Code	Course Title	L	T	P	Course Credit	Pre-Requisite
Second	GET 499	SIWES II Student Industrial Work Experience Scheme				6	24 weeks
	Total Credit					6	

IUO-CERT 411-Career Enhancement and Resilience Training (2 Credit Units; Core; LH = 15; PH = 45)

Senate approved relevance

Career Enhancement and Resilience Training (IUO-CERT 411) is introduced as a course to address the problem of unemployment and un-employability amongst graduates and young professionals in Nigeria and in the world at large. This is in tandem with the mission and vision of Igbinedion University in producing world-class graduates who are equipped to become globally relevant in their chosen professions.

Course Overview

The problem of unemployment and un-employability amongst graduates and young professionals in Nigeria and in the world of large is increasing by the day. Igbinedion University Okada, in collaboration with Flexy Learn, United Kingdom; an international educational and training organization will mount this course for students in the University. The course emphasizes selfreliance and has the potential and capability of distinguishing Igbinedion University graduates. It would also enhance their employability potentials and their ability cope with global megatrends. The course demonstrates the internationalization policy of the University, and the desire to train future ready graduates that would fit into the global labour market. The course provides the foundation for career choices, progressions that are crucial for the training of a well-rounded Igbinedion University graduate. It encapsulates a blend of unique skills that will stimulate students to navigate the challenges of unemployment and un-employability. Thus, the course would provide a paradigm shift towards success and preparation of students to become future leaders, employers of labour and entrepreneurs. The students would learn and earn; thereby removing the disconnect between skills learnt in the classroom and that needed in the industry/labour market.

Objectives :

The objectives of the course are:

1. Use available local and international resources to enhance students' studies and professional careers.
2. Gain professional, cost-effective knowledge and skills in career development.
3. Enhance (or enrich) the content of their Curriculum Vitae using both international and local partnerships.
4. Explain how to grow their passion, hobbies, interest into formidable and successful careers.

5. Explore the different models of increasing student work experiences through volunteering schemes, creativity, extracurricular activities and employability focused projects.
6. Support Students to formulate and follow through on personal career development.
7. Provide students with tools for personalized growth, self-development, career satisfaction and societal impact.

Learning Outcomes

On Completion of the Course, students should be able to:

1. Use available local and international resources to enhance their studies and professional careers.
2. Demonstrate at least one professional cost-effective knowledge and skill to support their career development.
3. Write a Curriculum Vitae that meets local and international standard.
4. Develop ability to grow their passion, hobbies and interest into successful careers.
5. Engage in at least one work experience through volunteering scheme in their community.
6. Formulate and follow through on personal career development.
7. Chart a part for personalized growth and development that can impact on society.

Course Content

Introduction to Career Enhancement and Resilience Training. Career perspectives and opportunities. Problems as opportunities. Self-discovering and career equilibrium. Converting hobbies and interest to passion and profits. The three career E-routes. Understand various career resources. The power of Networking, collaboration and partnership. Career resources of time and skills. Career resources of funding. The fundamentals of career planning. Contemporary issues on skill sets and employability. Global trends in career planning. Exploring global opportunities. Impact of course and profession on SDGs. Examine present and future professional self. Soft skills development.

Minimum Academic Standard: None

IUO-MEE 491 Model Analysis of Mechanical Systems (2 Units; Elective (E); LH-30)

Senate approved relevance

The ability to solve new challenges through innovation and the application of scientific methods and technical analysis is at the heart of mechanical engineering. Future mechanical engineers will face extremely important and various challenges that are difficult to anticipate

and will need to be able to develop their skills through the ability to analyze mechanical systems via the use of models. The ability to frame engineering problems so that relatively simple analysis, practical insight, and intuition can be used to generate innovative solutions is developed through a series of case studies. This course will teach students about model testing, measurement systems, model analysis, review test procedures, and how to create mathematical models. These are in line with Igbinedion University's vision and mission.

Overview

This course deals generally with the introduction to modal testing, applications of modal testing, philosophy of modal testing, summary of theory, summary of measurement methods, summary of analysis, and review of test procedure.

The course will help students understand the fundamentals of mechanical properties and how they relate to mechanical systems. Students will explore these concepts as they relate to mechanical and communication systems, as well as the operation of commonly used tools and equipment.

Objectives

The course should enable the students to:

1. Introduce model testing and review of test procedure
2. Understand the concepts of analysis of non-linear structures
3. Gain the knowledge on mobility measurement techniques
4. Understand various methods of modal parameter extraction
5. Get exposed to the techniques on derivation of mathematical models
6. Explore concepts that relate to mechanical and communication systems.
7. Analyze mechanical systems via the use of models.
8. Frame engineering problems so as to generate innovative solutions developed through a series of case studies.
9. Analyze measurement systems, model analysis and review test procedures,
10. Create mathematical models.

Learning Outcomes

On completion of the course, students should be able to:

1. Develop skills on model testing, measurement methods, summary of analysis and to review test procedure

2. Widen knowledge on SDOF/MDOF / FRF data and properties and to analyze nonlinear structures
3. Have good understand the concepts of measurement system, calibration, measurement on nonlinear structures
4. Gain the knowledge on model analysis, circle fit method, inverse method and curve fitting
5. Get exposure to different types of modal models, response model, spatial models and system models
6. Explore concepts that relate to mechanical and communication systems
7. Develop mechanical systems via the use of models.
8. Solve engineering problems so as to generate innovative solutions developed through a series of case studies.
9. Analyze measurement systems, model analysis and evaluate test procedures,
10. Use mathematical models to solve problems on SDOF/MDOF / FRF.

Course Contents

Introduction to Modal Testing. Applications of Modal Testing. Philosophy of Modal Testing. Summary of Theory, Analysis and of Measurement Methods. Review of Test Procedure. Basic Measurement System. Structure preparation. Excitation of the Structure. Transducers and Amplifiers. Analyzers. Digital Signal Processing. Use of Different Excitation types. Calibration Mass Cancellation. Rotational Mobility Measurement and Measurement on Nonlinear structures.

Multi point excitation methods. Introduction to Modal Models and Display of Modal Model. Response Models, Spatial Models, Mobility Skeletons and System Models.

Minimum Academic Standards: None

Course content:

Concepts, purpose and main methods of surface engineering. Governing laws and classical wear theories. Processes of engineered surface: modification to microstructure without change to chemical composition, modification to chemical composition of wear surface layer. Tribological properties of surfaces and theirs types. Types of friction: rolling friction, sliding friction. Thermal effects of friction. Lubrication. Role of surface in friction processes. Wear mechanisms: mechanical (abrasive), adhesive, corrosive, erosive, cavitation. Properties of materials for improvement in wear resistance. Corrosion mechanisms: tribo-corrosion, bio-corrosion, erosive corrosion, chemical/electrochemical corrosion. Classification of surface engineering techniques: surface modification, dry deposition, wet

deposition. Surface engineering techniques: coating, surface cladding, surface film development, electroplating, anodizing, surface hardening, nitriding, carburizing, carbonitriding. Types of coatings: hard coatings, thermal barrier coatings, anticorrosion coatings. Coating materials. Coating application techniques: plasma spraying, physical vapor deposition, chemical vapor deposition, thermal spraying. Methods of surface characterization: tribological, thermal, mechanical, chemical, electrochemical, microscopic.

Minimum Academic Standards

Surface engineering Laboratory equipped with tribological test equipment, coating and electrochemical test facilities.

IUO-MEE 492 Integrated Product & Processes Development (2 Units; Core (C); LH = 45)

Senate approved relevance

The sole goal of any organization is to provide customer satisfaction by building products and services that not only satisfy needs and wants but also create value for them. This requires product design based on customer feedback and a production process that not only minimizes cost but also provides a competitive advantage. Nevertheless, most organizations tend to follow conventional production methods and processes. More so, in the global age of new technology and competition, organizations have to re-invent the way they cater to the needs of customers; the focus on specialization and customization is ever increasing. Given this scenario, it is imperative for the organization to integrate technology and innovation within the framework of integrated product and process development that will enhance industrialization and economic growth. These are in line with the Igbinedion University Okada vision, where the advancement of engineering, innovation, and technology is continuously dynamic.

Overview

The mechanical design process is the articulation of a physical artifact to satisfy a particular need. The product realization activities include determining customer (user) requirements and product characteristics necessary for satisfaction, including quality, reliability, manufacturing methods and material selection, assembly, cost, environmental concerns, safety regulations,

and more. Successful product development requires formulating the design challenge correctly and generating an initial design specification before focusing on creating solutions.

Following the definition of the problem, the method requires that potential solutions be generated and then evaluated against a set of quantifiable attributes based on the users' requirements and other criteria. The team selects, from a set of candidate embodiments, one that will best satisfy the objectives and constraints. Finally, a detailed plan is developed that clearly shows how the design will be produced and how the methods chosen to produce it will ensure a product that meets the users' requirements and makes a profit for the company. This course will provide an overview of the advances of formal and informal communication in product development, modeling innovation processes, and the design of products.

Objectives

The course should enable the students to:

1. Interpret the concept of integrated product and process development that combined the product design process to create a new standard for providing competitive and high quality products.
2. Gain the knowledge on the product design and development process
3. Experience many aspects of the design process and demonstrate competence in the skills required to participate successfully in this team process.
4. Produce a working, functional prototype of the product's key mechanical system(s) and demonstrate how it satisfies all aspects of functionality while meeting identified customer requirements.
5. Produce a complete description of the final design project, including detailed analysis and plans for production of CTQ systems; an estimate of the life cycle cost; and set of engineering drawings.
6. show how the design will be produced and how the methods chosen to produce it will ensure a product that meets the users' requirements.
7. Enumerate how to make profit for the company.
8. Provide an overview of the advances of formal and informal communication in product development, modeling innovation processes, and the design of products.
9. To articulate physical artifact to satisfy a particular need.
10. To determine customer (user) requirements and product characteristics necessary for satisfaction, including quality, reliability, manufacturing methods and material selection.

Learning Outcomes

On completion of the course, students should be able to:

1. Explain the various process of design and processes involved in product development.
2. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
3. Identify, formulate, and solve engineering problems
4. To apply knowledge of mathematics, science, and engineering
5. To design and conduct experiments, as well as to analyze and interpret data.
6. Demonstrate how the design will be produced and how the methods chosen to produce it will ensure a product that meets the users' requirements .
7. Analyze and show how profit is made for a company.
8. Demonstrate the processes involved in the advances of formal and informal communication in product development, modeling innovation processes.
9. Demonstrate the design of products.
10. Outline the requirements and product characteristics necessary for material selection.

Course Contents

Characteristics of Successful Product Development-Who Designs and Develops Products
Duration and Costs of Product Development-Challenges of Product Development - Development

Processes and Organizations-A Generic Development Process-Concept Development: The FrontEnd Process
Adapting the Genetic Product Development Process- Product Development Process Flows-The AMF Development Process-Product Development Organizations-The AMF Organization.
Product Planning Process- Identify Opportunities- Evaluating and Prioritizing Projects- Allocating Resources and Timing- Pre-Project Planning-Reflection the Results and the Process- Identifying Customer Needs- Raw Data from Customers- Interpreting Process- Identifying Customer Needs- Raw Data from Customers- Interpreting Raw Data in Terms of Customer Needs-Organizing the Needs into a Hierarchy-Establishing the Relative Importance of the Needs-Reflecting on the Results and the Process. What are specifications-When are specifications Established-Establishing target Specifications-Setting the Final Specifications
Concept Generation-The Activity of Concept Generation-Clarify the Problem-Search Externally Search Internally-Explore Systematically- Reflection the Results and the

Process. Concept Selection- Overview of Methodology-Concept Screening-Concept Testing
Define the Purpose of the Concept Test- Choose a Survey Population- Choose a Survey
Format- Communicate the Concept- Measure Customer Response-Interpret the Results-
Reflection the Results and the Process. Product Architecture-Implications of the Architecture-
Establishing the Architecture-Delayed
Differentiation-Platform Planning-Related System-Level Design Issues

Minimum Academic Standards: None

IUO-MEE 481 Failure Analysis and Prevention (2 Units; Core (C); LH-15; PH-45)

Senate approved relevance

An institution where the advancement of engineering and technology is continuously dynamic. Its graduates will become highly skilled and knowledgeable in the maintenance of industrial equipment and machinery. They will be very capable and environmentally friendly engineers who will be very useful in the public and private sectors of the economy, as well as in Nigeria's rapid industrialization and development.

Overview

Most of the engineering activities in Nigerian industries have to do with maintenance. Average Nigerians lack a maintenance culture, and over the years, several government-established firms have stopped working as a result of poor maintenance emanating from machine and equipment failures. Thus, in the industry, maintaining machinery against failure is a critical aspect of engineering. Excessive downtime as a result of continuous breakdowns of machines and equipment could lead to losses in the industry. Every engineer designs against failure, and this is to ensure minimum downtime, thus optimizing profit and minimizing loss.

Although this course will be domiciled in the department of mechanical engineering, it is designed for all facets of engineering that deal with machinery and equipment. It is intended to provide a systematic understanding of various aspects of failure, such as basic sources of failures of machine components, industrial equipment, and engineering tools relevant to failure and failure analysis; general failure analysis procedures through testing; macro- and microscopic observation of fracture and mode of fracture; metallographic procedures; and image analysis.

Objectives

The objectives of the course are to:

1. Understand the engineering aspects of failure and failure analysis
2. Describe the general procedures for failure analysis
3. Describe basic failure mechanisms
4. Identify common failure associated with industrial equipment
5. Describe categories of failure modes
6. Describe the effects of defects on industrial equipment
7. Explain failure analysis techniques
8. Describe failure prevention of industrial equipment
9. Describe failure and maintenance of machine components
10. Understand and able to analysis failure modes

Learning Outcomes

On completion of the course, students should be able to:

1. Explain six basic failure mechanism
2. List five ways failure can be prevented in industrial equipment
3. Describe five ways of maintaining machine components
4. Explain the major causes of failure in industrial equipment
5. Describe at least four types of defect in industrial equipment
6. Analyze failure modes in machine and its components
7. List at a least three characteristics of defects
8. Describe at least two types of failure analysis techniques
9. Explain at least seven consequences of failure in industrial equipment
10. Identify at least four ways failure of machinery can be prevented in the industry

Course Contents

Introduction: Engineering aspects of failure and failure analysis. Defects: Types and characteristics, effects of defects on service properties. General procedures for failure analysis. Basic Failure Mechanisms: Distortion Failures, Overload Failures, Fatigue Failures, Wear Failures, Corrosion Failures, Elevated Temperature Failures, Fractures. Failure Analysis Techniques and Preventive Measures: Non Destructive Testing Techniques and

Metallographic Techniques. Component Failures: Bearings, Chain and Belt Drives, Gears, Lifting Equipment, Mechanical Fasteners, Pressure Vessel, Seals, Shafts, Springs Failure. Modes and Effect Analysis: Failure Modes, Categories of Failure Modes, Failure Effects, Sources of Information about modes and effects, failure consequences, Case Studies on failure Analysis. Failure distributions. Maintenance and Reliability Analysis. Types and principles of maintenance. Maintainability. Concept of reliability and availability. Reliability analysis. Mean life

Minimum Academic Standards

Engineering workshop and laboratory with NUC-MAS requirement facilities

IUO-MEE 493: Mechanical Vibration (2 Units; Elective (E); LH = 30)

Senate approved relevance

The ability to solve new challenges through innovation and the application of scientific methods and technical analysis is at the heart of mechanical engineering. Future mechanical engineers will face extremely important and various challenges that are difficult to anticipate and will need to be able to develop their skills through the ability to develop, diagnose and analyze machines, equipment, and machine components. However, knowledge of vibration is required for the maintenance of the machines and equipment. Unchecked machine vibration can accelerate the rate of wear, which is a major cause of breakdown and thus downtimes. Wear reduces the life of equipment and machines. Vibration machinery can create noise, cause safety problems, and degrade plant working conditions. Besides, vibration can cause machinery to consume excessive power and damage quality. The students of this course will therefore understand the sources of the vibration in automobiles and other machinery and study the various methods to reduce the noise and vibration.

This will help to curb noise pollution and reduce maintainability and losses in the industry.

Overview

In this course, students will learn about mechanical vibration in 1 DoF and 2 DoF systems. Students will learn the mathematical modeling of vibration systems, formulate equations of motion, and solve equations of motion to analyze vibration system response. Various mechanical vibration conditions are discussed in this course, among others; the response of the

vibration of the system is not muffled and damped in the free condition of excitation or by force with various excitations.

The vibration practice on the rotating shaft is also provided as material support. The goal is that students have the ability and experience to model and analyze mechanical vibration problems, especially in the field of mechanical engineering, as well as learn to think critically about utilization in various other fields so as to make the right decision.

Objectives

The course should enable the students to:

1. Understand the sources of vibration and noise in automobiles and make design modifications
2. Learn to reduce the vibration and noise and improve the life of the components
3. Understand the engineering principles in mechanical system to identify, formulate and solve the problem of mechanical engineering.
4. Find the source of engineering problems in mechanical system through research that includes identification, formulation, analysis, data interpretation based on engineering principles
5. Formulate the solution of engineering problem in mechanical system by considering economy, safety, environment and energy conservation.
6. Determine unchecked machine vibration that accelerate the rate of wear.
7. Determine major causes of breakdown and thus downtimes.
8. Determine causes of wear and tear as Wear reduces the life of equipment and machines.
9. Determine causes of Vibration in machinery, causes of safety problems, and causes of degrade in the working conditions of plants.
10. Enumerate the sources of the vibration in automobiles and other machinery and study the various methods to reduce the noise and vibration.

Learning Outcomes

On completion of the course, students should be able to:

1. Translate a physical problem in mechanical vibration to an appropriate mathematical model.
2. Make engineering judgment on the problem of reducing vibration when required and the role of vibration in the design of mechanical equipment.
3. Obtain the free vibration and force vibration solution for two-degree-of-freedom systems.
4. Develop reduced order models to treat systems with a large number of DOF

5. Explain and correlate the properties of complex structures to the overall vibration characteristics in order to design systems having required dynamical properties.
6. Checked machine vibration to reduce the rate of wear.
7. Prevent major breakdown and downtimes.
8. Prevent wear and tear to improve the life of equipment and machines.
9. To Prevent Vibration in machinery, to reduce safety problems, and eliminate degrade in the working conditions of plants.
10. Improve automobiles and other machinery conditions and use the study of the various methods to reduce the noise and vibration in machines.

Course Contents

Review of Single degree freedom systems – Response to arbitrary periodic Excitations – Duhamel's

Integral – Impulse Response function – Virtual work – Lagrange's equation – Single degree freedom forced vibration with elastically coupled viscous dampers- - free un damped vibration respond,- free damped vibration responds, - forced vibration, - based motion, transmissibility, - harmonic excitation, impulse, periodic excitation. System identification from frequency response – Transient Vibration – Laplace transformation formulation. Free vibration of spring-coupled system – mass coupled system – Vibration of two degree freedom system – Forced vibration – Vibration Absorber – Vibration isolation. Normal mode of vibration – Flexibility Matrix and Stiffness matrix – Eigen values and Eigen vectors – orthogonal properties – Modal matrix-Modal Analysis – Forced vibration by matrix inversion – Modal damping in forced vibration – Numerical methods for fundamental frequencies. Systems governed by wave equations – Vibration of strings – Vibration of rods – Euler Equation for Beams – Effect of Rotary inertia and shear deformation – Vibration of plates. Vibration instruments – Vibration exciters Measuring Devices – Analysis – Vibration Tests – Free and Forced Vibration tests. Examples of Vibration tests – Industrial, case studies.

MATALB programming: In this section, students will use numerical codes based on MATLAB to plot response function for various excitations and initial conditions.

Minimum Academic Standards: None.

500L COURSE CONTENTS BENCH MARK ACADEMIC STANDARD (BMAS)

500 Level Course Structure and Contents

GRE501 and GRE502 are Common 500l courses for all engineering students in first and second semester and domicile in Mechanical Engineering department. The course structure and workload for 500l students of Mechanical Engineering are presented in Table 13.

Table 5.4: 500 Level Course structure and Workload

Semester	Course Code	Course Title	L	T	P	Course Credit	Pre-Requisite
First	MEE 500	Project	-	-	9	3	
	GRE 501	Law and Management	2	1	-	3	
	MEE 511	Engineering Systems Dynamics	2	1	-	3	
	MEE 521	Mechanical Engineering Design II	2	1	-	4	
	MEE 551	Thermal Power Engineering I	2	1	-	2	
	MEE 571	Combustion and Heat Transfer	1	1	-	2	
	MEE 541	Engineering Metallurgy II	2	1	-	3	
	ELA 501	Laboratory Practicals				3	
	Total Credits					23	

Semester	Course Code	Course Title	L	T	P	Course Credit	Pre-Requisite
Second	MEE 500	Project	-	-	9	3	
	GRE 502	Engineering Management	2	1	-	3	
	MEE 512	Engr. Mat'l selection, Economics and Failure analysis	2	1	-	3	
	MEE 552	Thermal Power Engineering II	2	1	-	2	
	MEE 562	Fluid Power Systems and Control	2	1	-	3	
	MEE 572	Refrigeration and Air-conditioning	1	1	-	2	
	MEE582	Advanced CAD/CAM	2	1	-	3	MEE 382
	MEE 592	Case Studies in Mechanical	1	1	-	3	
		Engineering					
	Total Credits					22	

500 Level Course Contents

MEE 500: Project (3 credits)

Projects are drawn from a wide variety of different fields to give experience in many aspects of design, manufacture and execution of experiments. They give the students experience in methods of solving problems. Students work in closely-supervised groups or singly on problems which require solutions.

GRE 501: Law and Management (3 credits)

The Management Environment – Formation of a company, sources of finance. Money and Insurance, National policies, GNP growth rate and prediction. Balance of payments, legal liabilities under company law, legal and contractual obligations to employees and the public, contractual obligations.

Organization Management: Principles of organization, span of control. Elements of organization. Types. Principles of management. School of thought. Management objectives. Financial Management – Accounting methods. Financial statement. Element of costing. Cost, planning and control. Budget and budgetary control. Cost reduction programmes. Depreciation accounting, valuation of assets.

Personnel Management – Selection, recruitment and training. Job evaluation. Merit rating. Incentive schemes. Trade unions and collective bargaining.

Industrial psychology – Individual and Group behaviour. The learning process. Motivation and morale. Influence of the Industrial Environment.

MEE 511: Engineering Systems Dynamics (3 credits)

Physical engineering systems, models, modeling distributed and lumped parameter systems. Assumptions in modeling. Governing equations for mechanical, electrical, electro-mechanical and thermal, systems. Fluid transducer components and systems.

System analogues. System response (natural and forced modes) stability. Introduction to non-linear, time-varying systems.

Concepts of noise and vibration control. Loudness, intensity and weighting network. And energy and power; noise-rating curves. Noise measurement and propagation control; Visco elastic damping.

Acoustic properties of common materials.

MEE 521: Mechanical Engineering Design II (3 credits)

Introduction to machine design: Dynamic and varying loads. Effect of manufacturing methods on

design. Optimum design. Prototype design and testing. Safety issues. Ergonomics. Design of machine members: Bolts, brakes, clutches and coupling gears, springs, rope, belt and chain drive hoists. Design of weldments. Friction and bearings. Pressure cylinders. Motor selection. Vibration and design.

MEE 551: Thermal Power Engineering I (2 credits)

Thermodynamics, Carrot cycle, Rankine cycle, Regenerative cycle, Binary vapour cycles, Special turbines, the working fluid.

Direct energy conversion, thermionic, Thermoelectric and Magneto-hydrodynamic converters. Fuel cells, other energy sources. Energy management and storage.

MEE 571: Combustion and Heat Transfer (3 credits)

Fuels and oxidants. Chemical reactions and equation; mass conservation, mass balance, ideal and real reaction. Standardized energy and enthalpy, maximum and adiabatic flame temperature. Dissociation and chemical equilibrium. Introduction to Heat Transfer. Modes of heat transfer, conduction heat transfer. Steady state one-Dimensional conduction equation for plane wall, circular cylindrical and spherical bodies, pipe lagging. Heat electricity analogies. Fluid – solid – fluid systems: Convection transfer, type of convection heat transfer – forced, free, dimensionless groups thermal boundary layer, its development.

Natural and forced convection; Forced convection in steady two-dimensional laminar boundary. Forced convection in pipes and ducts. Turbulence. Free convection. Two-phase connection. Thermal radiation: Steffan-Boltzmann law. Black and grey bodies. Net radiation between a solid body and its surroundings. Solar energy. Combined heat transfer. Heat t ransfer with change of phase.

Extended sources. Heat exchangers; Effectiveness, Analytical relation to capacity-rate ratio and ... number of transfer units in parallel and counter-flow. Selection criteria. Converter applications.

MEE 541: Engineering Metallurgy II (3 Credits)

Heat treatment of steels: Annealing, Hardening and Tempering processes. Surface hardening of steels. High strength steel alloys

Non-ferrous metals and alloys. Copper, Aluminum and Titanium alloys. Alloys for special application; High temperature alloys. Bearing alloys. Light weight structural materials. Nuclear materials.

Environmental Stability of Materials: Oxidation and Corrosion mechanisms. Corrosion control principles.

ELA 501: Laboratory Practical (3 Credits)
Second Semester

MEE 500: Project (3 credits)

Projects are drawn from a wide variety of different fields to give experience in many aspects of design, manufacture and execution of experiments. They give the students experience in methods of solving problems. Students work in closely-supervised groups or singly on problems which require solutions.

GRE 502: Engineering Management II (3 credits)

Resource Management:

Materials management. Purchasing methods. Contracts. Stores and Inventory control. Resource utilization. Time value of money. Interest formulae. Rate of return. Methods of economic evaluation. Selection between alternatives.

Planning Decision Making, Forecasting, planning, scheduling. Production control. Gantt Chart and PERT.

Optimization: Linear programming as an aid to decision-making. Elementary treatment of decisionmaking policies under risks and uncertainties.

Transport materials Handling Selection of transport media for finished goods, raw materials and equipment. Facility layout and location. Work study and production policies.

Basic principles of work study. Principles of motion economy. Ergonomics in the design of workplace and processes. An introduction to computer softwares used in management.

MEE 512: Materials Selection & Failure Analysis (2 Credits)

Review of industrial metals & alloys regarding the factors that govern selection for particular service conditions. Cost, availability, ease of fabrication, comparison of major alloy groups, specification and their use, mechanical testing and prediction of service behaviour. Component

Failure Analysis: Review of common causes of industrial failure and methods of investigation. Non-destructive testing techniques. Failure distributions. Maintenance and Reliability analysis. Types and principles of maintenance. Maintainability. Concepts of reliability and availability. Reliability analysis. Mean life.

MEE 552: Thermal Power Engineering II (2 Credits)

Turbo-machine. Axial flow turbines and compressors. Radial flow turbines and compressors. Performance parameters and curves for steam and gas turbines, compressors. Jet propulsion engines;

Features and principles, Energy transfers, Design of jet nozzles.

MEE 562: Fluid Power Systems & Control (Optional course) (3 Credits)

Fluids for power transmission. Basic fluid power components – pumps, relief valves, non-return valves, fixed and variable area restrictors, actuators, etc. Automatic control systems. Fluidics:

Coats effect, Logic theory and Boolean Algebra. Fluid amplifiers. Block and signal flow diagrams.

Unsteady Oscillatory flow in manometers, reservoirs. Propagation of elastic waves. Water hammer.

Surge tanks and Cavitation. Aerofoil and Crew theory. Hydraulic turbines and pumps.

MEE 572: Refrigeration & Air-Conditioning (2 Credits)

Refrigeration: properties and characteristics of refrigerants. Multi-pressure vapour compression refrigeration systems. Absorption refrigeration.

Air-condition: Fundamental properties of moist air. The psychometry of air-conditioning.

Process estimation of cooling load. The analysis of various HVAC systems and equipment.

MEE 582: Advanced CAD/CAM (3 Credits)

Transformations and Projections. Free- Form Curve Design. Surface Patch Modelling. Solid Modelling. Reverse Engineering. Finite Element Methods. Optimization. Computer Aided Manufacturing (CAM).

MEE 552: Cases Studies in Mechanical Engineering (2 Credits)

The course aims to show the basis for decision making in engineering on the grounds of technical merit, manufacturing aspects and economics. Case studies of successful designs will be analyzed. The course will show some of the interactions between the various courses in mechanical engineering and enables the students to partake in seminars. Topics to be discussed include: Computer applications in mechanical engineering; Value engineering and selection of manufacturing processes for different classes of components; batches; application of basic principles to varying situations, etc.

MEE 531: Elasticity and Plasticity (Optional course) (3 credits)

Two dimensional problems in linear elasticity the stress function and the bi-harmonic equation.

Problems in Cartesian and cylindrical co-ordinates. Rotating disks and cylinders.

Bending in two dimensions; thin circular plates, axi-symmetric bending of cylindrical components. Plastic theory of bending: Simple non-work, hardening solutions using the yield criterion and equilibrium elastic-plastic solutions. Residual stresses. Autofrettage in cylindrical components.

Finite deformations and Work hardening. Levy-Mises equation. Plastic instability.

MEE 561: Building Services Engineering (Optional course) (3 credits)

Control of inner environment (temperature, humidity, air quality and movement). Electrical and plumbing services. Fire protection and smoke control. Fire service system lifts and Escalator services. Piping and water storage systems. Fans and air distribution systems. Fan performance selection and installation. Design of ducts and Distribution systems. Lighting sources and their design and applications. Basic principles of sound control for HVAC system.

MEE 542: Materials Technology (Optional course) (3 credits)

Polymer engineering: Molecular structure and basic types of polymers. Main classes of plastics and their uses. Polymer processing; extrusion, transfer, blow, injection and rotational

moulding techniques. Mechanical properties creep and impact. Visco-elasticity; spring-dashpot models.

Electrical and Optical properties. Thermal properties. Polymer degradation.

Rubbers and Adhesives:

Ceramic technology; Structure and properties of ceramic materials, fabrication and shaping of ceramics, Mechanical properties, Electrical properties.

Composite Materials:

Assessment of toughness in different types of materials. Effect of composition and processing variables. Control of yield stress and toughness in steels. Design of alloy steels, pressure vessel steels, pipeline steels.

Failure mechanisms:

Creep principles and parameters. Creep relaxation. Creep resistance. Theories of fatigue failure; Cumulative damage laws. Factors affecting fatigue resistance, Ductile and Brittle fracture; Cleavage, transition temperature, effects of stress concentration and strain rate. Introduction to fracture mechanics.

Gradually the BMAS courses will erode and be replaced with the current CCMAS.

Below are the CCMAS COURSES and Course learning outcomes **for 500level**.

CORE CURRICULUM MINIMUM ACADEMIC STANDARD (CCMAS) INTEGRATED COURSE STRUCTURE AND COURSE CONTENT 500LEVEL

Table 5.5: Core curriculum minimum academic standard (CCMAS) integrated course structure and course content 500level

500 LEVEL CCMAS COURSES FIRST SEMESTER					
Course Code	Course Title	Units	Status	LH	PH
IUO -GET 503	Engineering Management	2	C	30	-
IUO-GET 531	Computational material science & Engineering	2	E	30	-
IUO -MEE 561	Design of fluid power systems	2	E	15	45
IUO-MEE 581	Engineering Logistics planning	3	C	30	-

IUO-MEE 571	Applied Fluid mechanics for environmental change and renewable energy	2	E	15	45
IUO-MEE 591	System Optimization	3	C	45	-
MEE 500	Project I	3	C	45	-
Total:		17			

SECOND SEMESTER

500LEVEL

COURSE CODE	COURSE TITLE	UNITS	STATUS	LH	PH
IUO-GET 504	Engineering Law	3	C	15	45
IUO-MEE 562	Computational Fluid Dynamics	2	E	30	-
IUO-MEE 522	Computer Aided Design, Manufacturing and Engineering	2	E	15	45
IUO-MEE 582	Engineering Industry soft skills	2	E	30	-
IUO-MEE 592	Municipal Solid waste Management	2	E	15	45
IUO-MEE 542	Materials Technology	3	C	30	-
MEE 500	Project II	3	C	45	-
Total		17			

COURSE CONTENT

IUO – GET 503 Engineering Management (2 Units; Core (C) ; LH=30)

Senate approved relevance

Graduates from this university's engineering program who are expected to be equipped with engineering design skills will also be expected to know how to manage resource. This is premised on the basic ideology that engineers are majorly engaged with Man, Materials, Machines and Money (4Ms). Consequently, it is important that engineering graduates and engineers are highly skilled in the management of these resources for efficient utilization, engineers must know how to combine these resources (4Ms) for optimal performances. These will ensure waste reduction and elimination of redundancy in engineering organization.

Overview

Engineers are usually regarded as professionals who lack management skills but it should be realized that it only takes one who understands engineering to efficiently manage engineering resources and not otherwise. Hence, engineering graduates are required to be skillful in engineering management. The course is composed to instill in graduate of engineering program from this university, the capacity to manage and combine resources efficiently using engineering management skills which will be acquired from taking this course. The course is rich in the sense that it involves topics on process optimization techniques, resource allocation methodologies and use of computer software technology for products/materials management.

Objectives

The objectives of the course are to:

1. Establish different management theories and organization structures.
2. Draw up the advantages and disadvantages of the different management theories and organization structures.
3. Apply the concept of values engineering to solving problems associated with waste (non-value adding activities).
4. Use Critical Path Analysis (CPA) and Programme Evaluation and Review Technique (PERT) in solving problems of job allocation.
5. Solve factory layout and location challenges.
6. Eliminate bottlenecks associated with inventory.
7. Solve the problems associated with resources allocation and evaluate the performances of resources.
8. Manage and combine resources efficiently using engineering management skills.
9. Apply process optimization techniques, resource allocation methodologies and use of computer software technology for products/materials management.

10. Ensure waste reduction and elimination of redundancy in engineering organization.

Learning Outcome

On completion of the course, students should be able to:

1. Define the management theories and organization structures.
2. State the concept of value engineering and apply same to engineering production/services industry.
3. Apply the algorithm involved in Critical Path Analysis and Programme Evaluation and Review Technique to real life shop floor job allocation.
4. Identify factors considered in factory layout and location.
5. Select and apply inventory control systems, including application of spreadsheet for inventory management.
6. Evaluate the performances of resources deployed in production/service systems i.e. materials, machine, manpower.
7. Apply techniques of linear programming, transportation analysis and queuing theory for the purpose of efficient resources allocation.
8. Demonstrate how to Manage and combine resources efficiently using engineering management skills.
9. Practically show how use the optimization techniques, resource allocation methodologies and use of computer software technology for products/materials management.
10. Analyze the waste reduction and elimination of redundancy in engineering organization

Course Content:

Management theories. Concepts of organization, types of organization and structure. Value engineering. Project management concepts. Production planning and scheduling. Critical Path Analysis (CPA). Programme Evaluation and Review Technique (PERT). Machine allocation. Factory layout and location. Warehousing, inventory control and inventory models. Microsoft excel for inventory management. Break-even analysis. Performance measure and evaluation. Statistical inferencing. Systems modeling. Ergonomics/human factor engineering. Job sequencing. Linear programming. Transportation analysis and queuing theory. Concepts, basics and methodology of Lean Six-Sigma (DMAIC).

Minimum Academic Standards: None

IUO – GET 504: Engineering Law (3 Units; Core (C); LH=45)

Senate approved relevance

In line with the mission statement of Igbinedion University to encourage the promotion of discipline, application of knowledge and effective management of resources to achieve set goals, the study of engineering law cannot be overemphasized. Engineering graduates should be acquainted with the law and know the basics as regards liability of engineers, patent, trademarks, copyright, industrial design and case studies relating to professionalism. Engineers should be taught to be sound arbitrators and know about registration of companies and industry acts.

Overview

The engineering graduate students from Igbinedion University, upon graduation should be equipped with all that concerns Law, contracts, torts, workmen compensation, labour law, intellectual property, intellectual property rights and intellectual property management.

The engineers is concerned with the industry and hence should be equipped with industrial law, acts and matters concerning labour and labour relations.

Objectives

The objectives of the course is to:

- 1 Interpret engineering law.
- 2 Describe sources of law and formation of contracts.
- 3 Describe liability in torts, assaults and negligence in engineering settings.
- 4 Enumerate the liability of engineers and industry acts.
- 5 Enumerate issues concerning intellectual property rights and intellectual property management.
- 6 Understand all that it takes to establish a company, company act and trade unions.
7. Evaluate how the engineer is concerned with the industry and show how the engineer is equipped with industrial law, acts and matters concerning labour and labour relations.
- 8.. Describe the law and the basics as regards liability of engineers, patent, trademarks, copyright, industrial design and case studies relating to professionalism.
9. Describe the roles of arbitrators and evaluate the processes of registration of companies and industry acts.
10. patent, trademarks

Learning Outcome

On completion of the course, students should be able to:

- 1 Students should be able to explain intellectual property rights and intellectual property management.
- 2 Students should be able to describe steps in forming a company and explain issues of trade unionism in industries.
- 3 Highlight industry acts and mention some liabilities of the engineers in the industries in Nigeria today.
- 4 Outline liabilities in torts, assaults, and negligence and state torts in engineering settings.
- 5 Outline law of contracts and how contracts are formed and followed in industries.
- 6 Discuss engineering law, state functions of law in engineering settings and list at least two characteristics of law as it relates to industry environment and engineering practice.
7. Explain how the engineer is concerned with the industry and explain how the engineer is equipped with industrial law, acts and matters concerning labor and labor relations.
8. Explain the law and know the basics as regards liability of engineers, patent, trademarks, copyright, industrial design and case studies relating to professionalism.
9. Play the roles of arbitrators and know about registration of companies and industry acts run.
10. Outline types of Patent and Discuss patent search .

Course Content:

Introduction to law. Characteristics of law, functions of law. Sources of law, formation of law. Environmental law. Health and safety law. Property law. Structure of the Nigerian and legal system. Liabilities in torts, assaults, negligence and strict liabilities. Professional court roles in law. Liabilities of engineers. Contract of employment. Contract and breach of contract. Independent contract. Types of contracts. Validity of contract. Binding and void contract. Offer and acceptance. Rules of offer. Termination of offer. Workman compensation. Intellectual property management and rights. Copy right, trade secret. Trade union act. Public procurement act. Trade mark, industrial design. Patent, patent search and application. NOTAP-National Office for Technology Acquisition and Promotion. Registration relating to professionals. Arbitration.

Minimum Academic Standards: None

IUO-MEE 531 Computational Materials Science and Engineering (2 Units; Elective; LH=30)

Senate approved relevance

Develop capabilities in graduates of mechanical engineering to deploy computational power for the purpose of modeling and simulating novel/engineered materials properties, processing, structures and performances; allowing for efficient use of materials and time as against the traditional experimental methods. Such capabilities will ensure graduates from this program are globally competitive, which is in consonance with IUO's mission. Skill such as this is required in the industrial sector when there are needs for the development of new products and improvement on existing ones.

Overview

Nigeria is presently plagued with the problem of under-development due to her inability to export manufacture goods. Some of the reasons for this is the inability to produce products of globally acceptable standards, characterized by poor materials processing, properties, structure and performance. Hence, is it pertinent for us to look inwards and seek ways to impart the Nigerian society and industrial sector of our economy for improvement in products development that ensure timely and resource efficient processes.

This course is designed to imbibe in graduates of mechanical engineering program, the abilities to design new materials properties, structures and behaviours by employing computational methods in the field of materials engineering. Significance of these capabilities lies in the abilities of the graduates to apply this acquired knowledge in industries in order to improve products deliveries.

Objectives

The objectives of the course are to:

1. Evaluate the basic concept of computational materials science and engineering.
2. Evaluate the relationship between materials structure and property.
3. Develop ability to convert laws of physics and engineering into algorithm.

4. Develop new material properties by employing computational methods.
5. Enumerate new and existing materials behaviours and mechanisms.
6. Use computational methods to explain experimental data.
7. Predict materials properties for a particular application using computational methods.
8. Employ computational methods in understanding structure-properties relation.
9. Expose students to the use of software tools in computational materials science and engineering.
10. Enumerate the acquired knowledge in industries that help to improve products deliveries.

Learning Outcome

On completion of the course, students should be able to:

1. Know the idea behind computational materials science and engineering.
2. Enumerate the areas computational materials science and engineering of application.
3. Analyze the physics behind material property.
4. Define the relationship between a material structure and its properties.
5. Develop material models.
6. Develop algorithm for materials models.
7. Perform simulation of materials models.
8. Use at least one software tool for material modeling.
9. Implement material modeling and simulation in at least a particular application area.
10. Show basic acquired knowledge of concepts of industries that help to improve products deliveries.

Course content:

Definition and basic concept of computational materials science and engineering. Materials structure/property relation and physics. Equilibrium and kinetics of materials. Review of numerical methods. Materials modeling and simulation: molecular dynamics, density function theory, phase equilibria, quantum physics/chemistry and electronic structure. Monte Carlo Simulation, Multiphysic, Corrosion Simulation and Finite Element Analysis. Software tools (simulation engines) for materials modeling and simulation: FactSage, MTDATA, PANDAT,

MatCalc, JMatPro, Thermo-Calc, Quantum ESPRESSO, VASP NWChem. Application in nanomaterials, nucleation and growths, sintering, corrosion inhibition and composites.

Minimum Academic Standards

Computational Materials Laboratory equipped with computer workstations. Computational materials software.

IUO-MEE 581 Engineering Logistics planning (2 units; Core (C); LH= 30)

Senate approved relevance

In line with Igbinedion University's mission statement of enhancing human advancement, public welfare, and managing resources in the most effective way, logistics planning is relevant to our students and all those able to benefit without discrimination. Logistics planning will handle public welfare and emphasize entrepreneurship through the encouragement of economic activities such as supplies, transportation, packaging, managing orders in supply, goods stocking, inventory, and distribution of goods and services.

Overview

Engineers are good managers of logistics planning. For sound economic development, the concept of logistics planning cannot be overemphasized. Okada is a cosmopolitan town that houses both international and local students and where goods and services can be moved from one point to another. Economic activities such as food supply, goods and services supply, and transportation. An efficient and effective implementation of logistics objectives is positive with: movement of transport, warehousing and storage, individual packaging, manipulation of materials, warehouse and plant location, supply chain, price fixing, and multi-dimensional segregation of the client's customer loyalty.

This course will help to deploy new solutions to logistics planning. Students will be taught logistics management and how to set up logical tasks to achieve a business plan for logistics in terms of transportation, warehousing and shipment, making orders, packaging, supply and service options, information flow, and import and export document preparation.

Objectives

The course intends to;

1. Describe logistics planning, equip students with expertise in the areas of movement, transportation and fixing of orders with respect to time.
2. Identify transportation problems in the cosmopolitan city of OKADA and its environs and seek to address them.
3. Describe how to handle inventory of logistics activities using ABC method.
4. Describe how to implement logistics objectives in an efficient and effective ways. In the areas of movement and transportation, warehousing and storage, industry packaging, dispatching, product planning and demand forecasting.
5. Identify multi-dimensional segregation of clients' techniques as well as customer loyalty analysis.
6. Identify the processes involved in industrial package, movement, transport and stock control
7. Describe scheduling, sequence and dispatch orders in a factory.
8. Establish a dispatch schedule for 10 shops for the supply of cartons of books on same day.
9. Describe 5 fix orders with respect to time for the supply of books to 5 primary schools
10. Understand and explain a logistics planning for a military supply for ammunitions

Learning Outcomes

At the end of the course, students should be able to;

1. Handle public welfare and manage resources in the most effective way
2. Manage issues concerning supply, packaging, stocking of goods, managing inventory and goods and services distribution
3. Professionally handle transportation matters, supplies and 4. Use new technologies to display new solution in logistic planning.
5. Fix orders with respect to time.
6. Analyzing the processes: industrial package, movement and transport and stock control.
7. Compare and contrast scheduling, sequence and dispatch orders in a factory.
8. Plan a dispatch schedule for 10 shops for the supply of cartons of books on same day
9. Generate 5 fix orders with respect to time for the supply of books to 5 primary schools
10. Design a logistics planning for a military supply for ammunitions

Course Content

Logistics and Planning Transportation. Dispatch. Packaging. Quality control. Batching. Inventory and control. Gantt chart. Warehousing and storage. Industrial stock control. Orders and fixing orders. Forecasting: Demand Forecasting. Planning: Product planning, Purchasing

and Supply. Customer service, Supply chain. Price Fixing, Logistics management, Shipment, customs and

Excise. Techniques for segregation of clients. Analyzing customer loyalty, Storage Material. Control and planning, Logistics planning, an overview

Minimum academic standard: None

IUO-MEE 582 Engineering Industry Soft Skills (2units; Elective (E); LH- 30)

Senate approved relevance

Igbinedion University is a cosmopolitan university that trains people from many different countries all over the world. The university has a wide international sophistication, great cultural diversity. The environment has different ethnic neighborhoods with a wide variety of traditional cultures. The university has a position of openness and tolerance towards the ideas and values of distinct others and the creation of a normative world culture. For our students to be marked out of employment for future leadership roles, they need the ability to relate with others in order for them to succeed in leading teams to get projects done as Engineers. Engineers need the ability to show responsiveness, empathy, team skills, communication skills, time management, skills problem solving skills, critical skills to clients in the course of carrying other duties as this will signal a true commitment to resolve problems, serve needs and better the society. In line with IUO Mission Statement, our students who are provided with world class facilities and opportunities for education, training and employment are encouraged with emphasis on entrepreneurship and how to manage resources. Industries today are in dire need of graduates who can innovate, invent and positively influence their world, find clients, attract clients, retain clients and boost profit for them.

Overview

Engineers need soft skills such as; negotiation skills, communication skills/strong work ethics, problem solving skills/analytical skills, critical thinking skills, conflict resolution skills, interpersonal relationship skills, teams skills, leadership, motivation, stewardship, motivation, etiquette, emotional intelligence, social intelligence, adaptability skills, time management skills, self-awareness and commercial awareness, time management skills.

They also need industries skills such as; career and self-development, equity and inclusion, professionalism/pro-activeness, team work, risk taking, initiative and enterprise, planning and organization, self-management, learning technologies, leadership skills, etc.

Objectives

This course intends to

1. Identify what industries need for our fresh graduates
2. Identify basic soft skills that industry required from our fresh graduates for employment
3. Enable students to understand the effect of not having soft skills and the negative realities
4. Describe how soft skills will make our fresh graduates - employable, relevant and useful
5. Describe the dangers of not having soft skills
6. Outline industries skills learnt.
7. Enumerate relationship skills, team skills and leadership skills.
8. Outline examples of skills needed for motivation, stewardship, motivation, etiquette, emotional intelligence and social intelligence.
9. Highlight all there is about career and self-development, equity and inclusion, professionalism/proactiveness, team work, risk taking, initiative and enterprise, planning and organization, selfmanagement, learning technologies, leadership skills, etc.
10. Recognize the Negotiation skills they possess and use them.

Learning Outcomes

At the end of the course, the students should be able to:

1. Identify their passion and look inwards to identify the soft skills they possess.
2. Enumerate at least 20 soft skills needed for Employability
3. State at least 3 ways if one has soft skills, how it can improve the workplace and affect customer service.
4. Enumerate ten (10) top soft skills employers value in today's organization
5. List 5 reasons soft skills are important in workplace. Identify how organizations look inwards in order to add additional value to their business using soft skills.
6. Demonstrate the industries skills learnt.
7. Name at least five relationship skills, team skills and leadership skills learnt.
8. Name skills needed for motivation, stewardship, motivation, etiquette, emotional intelligence and social intelligence.
9. Categorize all that have been learnt in career and self-development, equity and inclusion, professionalism/pro-activeness, team work, risk taking, initiative and enterprise, planning and organization, self-management, learning technologies, leadership skills, etc.

10. Assess the Negotiation skills they possess and use them.

Course Content

Communication- Effective communication is one of the most important soft skills organizations look out for. Depending on the audience, fresh graduates should be able to effectively communicate, adjust tone and style to soothe the need that arises. Active listening is a soft skill that is so valuable for Engineers as regards Negotiation, working in Teams and reflecting on Information for interpretation and understanding. Email Etiquette is required for business communication when information is given concisely and very clearly. Self-motivation.. Organizations are keen on commitment from employees who will be self-reliant, positive driven, passion driven and be able to work with little or no supervision on any job. A self-motivated person is positive/ambitious, committed and full of initiative. Leadership skills: Employees who inspire, lead teams and manage people is one with leadership skills. Conflict management: Communicating effectively will enable one to manage conflict, resolve differences in the workplace for high productivity, Responsibility, Trustworthiness, Adaptability, Resilience, Conscientiousness, Motivation, Discipline, planning and organization, Team work skills, professionalism and reactive ness as well as Commercial awareness.

Minimum academic standard: None

IUO-MEE 591 System Optimization (3 Units; Core (C); LH = 45)

Senate approved relevance

An institution where the advancement of engineering and technology is continuously dynamic. Its graduates will have developed the necessary skills, creative ability, attitude, and expertise consistent with engineering design and optimization. The principal goal of optimization is to improve industrial productivity, innovation, and infrastructure. It also contributes to overall

sustainability, including environmental sustainability, social sustainability, economic sustainability, and energy resource sustainability, by fulfilling the objective function. SDGs 8 and 9 emphasize the significance of innovation, infrastructure development, long-term economic growth, high levels of economic productivity, well-paying quality jobs, and resource efficiency in consumption and production.

Overview

Engineers are constantly attempting to optimize, particularly in the design and operation of complex systems. This course will prepare students for the challenges ahead in the industry. It will also introduce the students to the process of formally representing an engineering design or decision making problem as a mathematical problem. This course is an application-oriented introduction to engineering systems optimization.

It seeks to motivate the use of optimization models to support engineers in a wide variety of decision-making situations; Show how several application domains (industries) use optimization. Introduce optimization modeling and solution techniques (including linear, non-linear, integer, and network optimization, and heuristic methods); Provide tools for interpreting and analyzing model based solutions (sensitivity and post-optimality analysis, bounding techniques) and Develop the skills required to identify the opportunity and manage the implementation of an optimization-based decision support tool.

Objectives

The objectives include to:

1. Learn classical optimization techniques and numerical methods of optimization.
2. Evaluate Distribution Systems Planning
3. Justify Facility Sizing and Capacity Expansion
4. Appraise and able to apply modern optimization techniques
5. Explain Network Design
6. Explain Integer programming techniques
7. Apply different optimization techniques to solve various models arising from engineering areas
8. Enumerate the fundamental knowledge of Linear Programming and Dynamic Programming problems.
9. Explain Portfolio Optimization
10. Develop the skills required to identify the opportunity and manage the implementation of an optimization-based decision support tool.

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the basics of different evolutionary algorithms
2. Discuss the application of classical optimization techniques
3. State the application of numerical methods of optimization to industry
4. Enumerate fundamentals of Integer programming technique
5. State and explain the application different techniques to solve various optimization problems arising from engineering areas
6. Explain the fundamental knowledge of Linear Programming
7. Discuss and analyze dynamic programming problems.
8. Use any of genetic algorithms, particle swarm optimization, ant colony optimization, artificial neural networks, fuzzy logics to optimize engineering systems
9. State the conditions for local optimum and explain the classes of optimization problems
10. State the skills required to identify the opportunity and manage the implementation of an optimization-based decision support tool.

Course Contents

Classification of optimization problems. Conditions for local optimum. Revised Simplex Method, Dual simplex Method, Sensitivity Analysis. Multistage decision processes. Concepts of sub optimization, Recursive Relation-calculus method, tabular method. Single variable optimization without constraints. Multivariable optimization without constraints and multivariable optimization with constraints-method of Lagrange multipliers, Kuhn-Tucker conditions. Generic formulation of optimization problems. Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, Random population generation. Differences and similarities between conventional and evolutionary algorithms, working principle. Genetic Operators- reproduction, crossover, mutation. Optimization in MATLAB - Exposure to classes of optimization problems: Linear-nonlinear, continuous, constrained unconstrained, single-multiple variables. MATLAB tools for solving optimization problems. Nature inspired heuristics: Genetic algorithms, particle swarm optimization, ant colony optimization, artificial neural networks, and fuzzy logics. Formulation of model- optimization of path synthesis of a four-bar mechanism

Minimum Academic Standards: None

IUO-MEE 592 Municipal Solid Waste Management (2 Units; Elective (E); LH-30)

Senate approved relevance

An institution where the advancement of engineering and technology is continuously dynamic. Its graduates will become highly skilled and knowledgeable in the technology to make waste generation and management more efficient, cost-effective, and environmentally friendly. More so, students of this course will get used to the technical know-how of converting collected wastes to energy and, in the process, creating jobs for themselves and Nigerian youths at large. These are all in line with Sustainable Development Goals (SDGs) numbers 3, 7, 8, 11, and 13.

Overview

The problems associated with municipal solid waste management (MSWM) generation in today's extensive civilized and urbanized society are complex because of the quantity different nature of wastes, the funding restriction for public disposal, interference of technology (energy and raw materials), and complex infrastructure development network in towns and urban cities. As a result, if MSWM is to achieve in consummate approach, the basics aspects need to be identified. Hence, there is urgent need to group the activities from generation to management.

The main six different functional elements (generation, handing and separations, storage and processing at source, collection, the transformation of wastes, transfer and transport, and final disposal) for the engineering comparison and treatment need to be understood in detail.

Besides, the understanding of the functional element is important because it helps in evaluating the impacts of projected changes and technological developments. Municipal solid waste management is an essential part of every society, but it is also one of the most neglected one. An in-depth understanding of the subject is required to tackle the current solid waste management crisis effectively. This course attempts to familiarize various steps involved in solid waste management.

Objectives

The objectives of the course are to:

1. Provides an overview of new and emerging waste management technologies, including regulations, environmental considerations and potential markets
2. Examine regional waste generation
3. Examine global waste challenges, connection to greenhouse gas emissions and sustainability
4. Develop drivers in waste management and waste management in emerging markets
5. Learn about, their environmental and social implications and potential solutions
6. Provide an understanding of current waste management practices provincially and nationally

7. Students will learn the various types of environmental sampling procedures and monitoring equipment used to collect representative environmental data to assess environmental quality and interpret results
8. Examines the principles, methodologies and strategies employed as part environmental sampling programs commonly associated with the waste management industry
9. Emphasize the importance of environmental sampling program quality control including, data documentation, field instrumentation calibration procedures and sample handling techniques
10. Develop various waste management technologies such as bioreactor, gasifier, incinerator, etc. for management of MSW

Learning Outcomes

On completion of the course, students should be able to:

1. Explain the hierarchical structure in solid waste management for sustainable development and a requirement for an integrated solution
2. Discuss technical points that are required to set up a solid waste management system
3. Explain the different types of waste, their handling, storage, disposal requirements, and their potential effect on the environment
4. Discuss the economic analysis of solid waste management system
5. List and explain modern waste disposal & treatment technologies
6. Design an incineration facility
7. Design an anaerobic digestion plant and gasifier plant
8. Explain the differences between anaerobic digestion system and landfill system for biodegradable MSWM
9. Explain the environmental impact of MSW
10. Use multiple criteria decision making systems for an optimum and sustainable integrated solid waste management system based on entire data

Course Contents

Introduction and evolution of solid waste management. Sources/Types and characteristics of solid waste. Generation of solid waste. Waste handling, separation, storage, and processing. Waste collection and the design and operation of: materials recovery facilities (MRFs),

recycling and reuse. Municipal solid waste collection, transportation, segregation and processing. Separation and processing of solid waste. Energy recovery from municipal solid waste. Chemical transformation (combustion/incineration). Biochemical processes and composting. Biological treatment (anaerobic digestion). Disposal of solid waste. Integrated waste management approach. Planning and evaluating the technical and economic feasibility of proposed projects involving a Landfill site selection. Development of waste management system applications, site closure, and postoperational uses will also be discussed. Construction and demolition (C&D) waste management overview. Regulation, beneficial reuses of C&D waste materials. Current issues in solid waste management and review of MSW management status.

Minimum Academic Standards: None

IUO-MEE 561 Design of Fluid Power Systems (2 Units; Elective (E); LH = 30)

Senate approved relevance

The widely used application of fluid power systems in the industry makes it a course that will enhance sustainable development now and in the future. Igbiniedion University aims to reposition university education in Nigeria through the adoption of the triple helix model of development. This course will play an important role in many sectors of the Nigerian economy, including aerospace, machine tools, agricultural, industrial, processing equipment, transportation vehicles, etc., that will enhance industrial development and human advancement. Therefore, this course allows students to develop knowledge and understanding of the operational and maintenance requirements of pneumatic and hydraulic systems and be able to recognize circuit components and interpret drawings for applications in everyday life. It will also impart knowledge on hydraulic and pneumatic systems to make the students able to design various components of fluid power

Overview

The fluid power system is widely used in many areas of industry. In transportation, construction, agriculture, and other off-road applications, machining, ship control, space technology, aircraft, and many more applications, fluid power technology is incorporated. Yearly, the academic world has tried to keep up with the increasing demand for engineering and technical specialists in hydraulic and pneumatic systems by offering new courses or even

a fluid power option. However, properly trained people are still in short supply in this field, and many fluid power manufacturers have begun educating their own to meet this professional expertise demand. Generally, pneumatics involves converting the energy of compressed air or gas to make something work, and this is achieved through the use of compressors, control valves, actuators, and other control equipment.

Also, pneumatic technology is used to power a range of items such as tools, construction equipment, and machinery in the mining, automotive, manufacturing, and medical industries, to name a few.

On the other hand, hydraulics involves the study of liquids at rest and in motion, particularly under pressure, and applies that knowledge to the design and control of machines. In everyday life in construction equipment, airplanes, cars, manufacturing, medical, subsea, and Hydraulics is used many more.

Objectives

The course should enable the students to be familiar with:

1. Hydraulic actuators and Pneumatic actuators and systems
2. Common hydraulic and pneumatic components (pumps, actuators, motors, valves, etc.), their use, symbols, and their performance characteristics
3. Control and regulation elements
4. Hydraulic circuits
5. Pneumatic systems and circuits
6. Installation, maintenance of systems
7. Special circuits
8. Understanding the concept of fluid power and explain how this relates to mechanical and fluid systems
9. Understanding the concept of air power and explain how this relates to mechanical and fluid system
10. The ability to formulate and analyze mathematical models of hydraulic and pneumatic circuits;

Learning Outcomes

On completion of the course, students should be able to:

1. Understand the terminology, functional role, applications and industry practices related to fluid power systems
2. Demonstrate good grounding in the subject area of fluid power
3. Appreciate the circuits and feel the advantages over the similar mechanical systems

4. Gain knowledge on the use of special control and regulation elements
 5. Describe the operational and maintenance requirements of pneumatic and hydraulic systems
 6. Explain and interpret pneumatic and hydraulic circuit diagrams and relate these to everyday applications
 7. Use mathematical models to describe the operation, and analyze the performance of various fluid power systems using appropriate statics, dynamics, fluid mechanics, thermodynamics and heat transfer equations
 8. Use computer software to design, simulate, and analyze various fluid power systems
 9. Have hands-on experience using hydraulic learning stations. Build basic hydraulic systems, operate them, and collect experimental data
 10. Design and implement simple fluid power systems common in industrial applications using commercial components: circuits for directional, speed, pressure, force, and flow control
- Course Contents**

Properties of air – compressibility, moisture content, need for lubrication, mechanical systems versus air system. Hydraulic Power Generators. Selection and specification of pumps, Pump characteristics. Linear and Rotary Actuators – Selection, specification and characteristics. Pressure- direction and flow control valves - relief valves, non-return and safety valves- actuation systems. Automatic control systems. Unsteady oscillatory flow in manometers, reservoirs. Aerofoil and Kutta theory. Reciprocation, quick return, sequencing, synchronizing circuits. Accumulator circuits, industrial circuits, press circuits - Hydraulic milling machine - grinding, planning, copying, - forklift, earth mover circuits- Design and selection of components - safety and emergency mandrels. Pneumatic fundamentals-control elements, position and pressure sensing - Logic circuits - switching circuits - fringe conditions modules and these integration - Sequential circuits - cascade methods - step counter method - Compound circuit design - Combination circuit design. Pneumatic equipment- selection of components - design calculations – application -fault finding- hydro pneumatic circuits - use of microprocessors for sequencing - PLC, Low cost automation - Robotic circuits

Minimum Academic Standards: None

IUO-MEE 562 Computational Fluid Dynamics (2 Units; Elective (E); LH = 30)

Senate approved relevance

The recent flooding in Nigeria caused a lot of natural disasters and environmental degradation. A lot of properties and infrastructures were destroyed. Also, Nigeria is one of the frontrunners in crude oil production globally, and over the years, defects in pipelines resulting from crude oil transportation have caused environmental pollution and economic losses. To achieve Sustainable Development Goals (SDGs) number eleven (11) of sustainable cities and communities, one must not only understand Nigeria's climate change (SDG-13), but the average Nigerian Engineering student should be trained on fluid flow to avoid such disasters in the future. Computational fluid dynamics is an important tool to investigate fluid flow problems in the industry and academia. Such knowledge can be used to control overflow in the Nigerian ocean, pressure differential in pipelines, and drainages in the nooks and crannies of towns and cities in Nigeria. Such measures will help to protect infrastructures, thus creating an enabling environment for industrialization and sustainable development, which is in line with Igbinedion University's mission and vision. The students upon graduation will be able to assess the quality of numerical results and the efficiency of numerical methods for basic fluid flow model problems. After completion of this course, the student will have a solid background to enable them to apply CFD methods as a tool for design, analysis and engineering applications.

Overview

The course is designed to reflect the wide applications of computational fluid dynamics (CFD). It will also impart the knowledge on numerical methods and algorithm to solve various various complex problems in fluid mechanics. This course will provides an introduction to computational fluid dynamics. The students will train the numerical solution of model problems by developing and testing own MATLAB programs. With a strong emphasis on understanding and application of the underlying methods, enthusiastic students will be able to write their own CFD codes during the course.

This course can be taken without prior background in computational techniques. A background in fundamental fluid dynamics, partial differential equations, linear algebra, and a programming language is desirable. The primary focus of this course is to gain a solid foundation in numerical methods for convection-diffusion problems. The emphasis is on the physical meaning underlying the required mathematics. A control volume method, which is a robust, physically intuitive numerical approach widely used in industry and academia alike, is taught.

Objectives

The course should enable the students to:

1. Learn the different grid generation methods
2. Enable the students to understand the various discretization techniques and solving solution methodologies
3. Understanding the Navier-stokes equation for different flow field
4. Learn about different governing equation and boundary condition
5. Understand the requirement of the different turbulence model for solving the Reynolds Average Navier-stokes equation

Learning Outcomes

On completion of the course, students should be able to:

1. Formulate different governing equation like continuity, momentum and energy equation
2. Discretization equation using finite difference method and finite volume methods, numerical error associated with first order and second order.
3. Derivation of Reynolds average Navier-stroke equation
4. Closure problem associated with Reynolds average Navier- stroke equation using different turbulence model.
5. Generation of the grid required in the computational domain for solving the Navier-stroke equation.

Course Contents

Basics of CFD, Governing equations of Fluid Dynamics – Continuity momentum and Energy equations, Physical Boundary conditions, Mathematical behavior of PDEs on CFD – Elliptic, Parabolic and Hyperbolic equations. Methods of deriving discretization equations – Finite difference & Finite volume methods, Finite difference discretization of wave equation, Laplace equation, Burger’s equation, numerical error and stability analysis. Time dependent methods – Explicit, Implicit – Crank – Nicolson methods, time split methods. Solution methodologies – Direct & iterative methods – Thomas algorithm – Relaxation method – Alternate Direction Implicit method. Finite volume formulation of steady one-dimensional convection and Diffusion problems, Central, upwind, hybrid and power-law schemes – Discretization equations for two dimensional convection and diffusion. Representation of the pressure – Gradient term and continuity equation – Staggered grid – Momentum equations – Pressure and

velocity corrections – Pressure – Correction equation, SIMPLE algorithm and its variants. Time – averaged equation for turbulent flow, Turbulence Models – Zero equation model, one equation model, two equation k- models, and advanced models. Algebraic Methods – Differential Equation methods – Adaptive grids

Minimum Academic Standards: None

IUO-MEE 522 Computer-Aided Design, Manufacturing and Engineering (2 Units; Elective (E); LH = 15; PH = 45)

Senate approved relevance

An institution where the advancement of engineering and technology is continuously dynamic. Its graduates will become highly skilled and knowledgeable in development of equipment, machines and machine components, etc., using Engineering Computer Aided Design (CAD), Manufacturing (CAM), and Engineering (CAE) skill. The students will be very competent and environmentally friendly engineers who will be very useful in the public and private sectors of the economy, as well as in Nigeria's rapid industrialization and development.

Overview

Most of the engineering activities especially in the industry start with programming and modeling. Such modeling can be done using Mathematical equations, physically, and also through computer aided design (CAD). Without the initial stage, manufacturing of such engineering components and equipment will be difficult. Thus, this course will make students to understand and learn about design and development of various engineering equipment, mechanical components, electrical and computer components, etc., using modeling software. It will also impart knowledge on all aspects of CAD, CAM and CAE industry. Besides, it will provide quality education in the field of CAD, CAM, and CAE in recent and future developments.

Objectives

The objectives of the course are to:

1. Impart the parametric fundamentals to create and manipulate geometric models using curves, surfaces and solids
2. Provide the students with a foundation in CAD, CAM, and CAE.

3. Learn and for giving hand on experience of using modeling software like Pro-E, CATIA V6, and Solid Works
4. Introduce the students to Finite Element Techniques.
5. Train students for solving problems in short duration through the use of modeling software
6. Make the students aware of the capabilities and limitations of computer design tools for engineers.
7. Widen the exposure of the students to contemporary design tools such as optimization and Rapid Prototyping.
8. Produce knowledgeable users of CAD systems.
9. Learn and apply all of the steps of the computer aided design process in proposing and building models in design projects.
10. Design and model a mechanical part that meets preset constraints and specifications.

Learning Outcomes

On completion of the course, students should be able to:

1. Create the different wireframe primitives using parametric representations.
2. Evaluate design, analyze and optimize using commercial CAD, CAE software as black box for required mass properties
3. Apply geometric transformations on the created wireframe, surface and solid models.
4. Present an overview of CAD, CAM, and CAE and describe its applications in different fields
5. Outline the basic principles associated with CAD and to demonstrate common drafting techniques used by professionals
6. Introduce the advanced capabilities of CAD, CAM, CAE and how they can be used to increase productivity
7. Provide information about the CAD, CAM, CAE industry resources
8. Use CAD software tools for assembly of mechanism from schematic or component drawing and conduct position/ path/ kinematic / dynamic analysis of a mechanism in motion.
9. Model a dimensional visualization of mechanical components through appropriate sketching exercises.

10. Produce an industrial component by interpreting 3D part model/ part drawings using CAM technology through programming, setup, and ensuring safe operation of Computer Numerical Control (CNC) machine tools.

Course Contents

Analytical, Synthetic curves with advantages, Disadvantages, Comparison with parametric curves, Geometric modeling curves and surfaces, Representation, Wire frame models, Parametric representations, Parametric curves and surfaces, Manipulations of curves, Surface and Solid

Modeling, Bresenham's /Mid-point line, circle, ellipse algorithms. Solid models, Fundamentals of solid modeling, Different solid representation schemes, Half -spaces, Boundary representation (Brep), Constructive solid geometry (CSG), Sweep representation, Analytic solid modeling, Perspective, Parallel projection, Hidden line removal algorithms. Operating systems, Simulation and Machining using CNC / DNC Machine Tools , Use of FEM Packages, Relational Data Base, Networking – Practice on Computer Aided Measuring Instruments, Image Processing, Software Development for Manufacturing, CNC Controllers, Use of advanced CNC Machining Packages, Business Data Processing. Exercises in Modeling and Analysis of Mechanical Components and assembly using Parametric and Feature based packages like PRO-E/ SOLID WORKS / CATIA / NX/ ANSYS/NASTRAN etc. Laboratory Work: Graphics programming in C++/MATLAB for geometric modeling of different Curves, Surfaces and Solid primitives. The generated geometric models will have the capability to be modified as per the user's requirements. Students will be given different 2D/3D shapes to be generated by graphics programming in C++/MATLAB using surface and solid modeling schemes tools such as Solid Works, Pro-E, CATIA V6, etc. Students will also be given projects based on geometric modeling in Rapid Prototyping.

Minimum Academic Standards: Engineering workshop and laboratory facilities

IUO – MEE 571 Applied Fluid Mechanics for Environmental Change and Renewable Energy (2 Units; Elective (E); L=15; P=45)

Senate approved relevance

The engineering profession is concerned with problem solving which requires innovative and efficient design of fluid machines, its interaction with the natural environment taking safety of use into cognizance. While there are problems arising from the interaction of naturally

occurring fluid activities with the natural environment, there are also man-made fluid machines that are very useful in terms of renewable energy generation and use, the control natural disasters and the design of fluid machine must be safe and efficient. Hence, disaster control systems must be designed to ensure that they are able to handle such problems when the needs arise. Also, it is important that the behavior of fluid as it interacts with environment is predictable so that preventive measures can be put in place. This will prevent accelerated degradation of the environment due to fluid activities. It is equally important to understand fluid machines that extract energy from the environment and how they interact with the environment to prevent possible preventable disasters in the future. The vision and mission of IUO is drive knowledge production through training of mechanical engineering students. Therefore, academic training in this course will equip the students with requisite skill to meet global safety requirements of fluid machines as concerns their interaction with the environment and also to understand the need for systems designs that can mitigate disaster due to the interaction of rainwater runoffs with the environment.

Overview

The devastating effect of the flood that occurred along the Benue and Niger rivers in Nigeria in the last quarter of 2022 cannot be over emphasized. The disaster claimed lives and damaged properties. Though, the flood was due to the opening of the floodgate of dam in northern Cameroun, the disaster could have being averted if proper flood control systems are installed downstream of the dam to forestall such occurrences.

The energy that can be harnessed from such volume of water flow is enormous. Thus, what resulted in a disaster can actually be converted to a useful source of hydropower supply if properly managed. Consequently, mechanical engineering graduate must be made to acquire necessary skill to design efficient and safer flood water handling systems that can solve the adequate power supply problems being faced by Nigerians. This course is designed to equip the graduates of mechanical engineering program with the requisite skills and knowledge needed in the construction and allied industries to tackle flooding problems, generate useful energy via a system that is environmentally friendly.

Objectives

The objectives of the course are to:

1. Know the fundamental concepts in free surface flows
2. Know the effect of gradually varied unsteady free surface flow

3. Use computer program to study the characteristics of free surface flows
4. Have a basic understanding of flood routing
5. Understand urban storm water routing
6. Understand the concepts of combined free surface and pressure surge analysis, and syphonic rainwater systems.
7. Define environmental change
8. Know how to generate electricity using wind power, tidal power wave power and the prospect for the coastal regions of Nigeria
9. Define the concept of hydrology
10. Understand hydropower system and its development in Nigeria.

Learning Outcome

On completion of the course, students should be able to:

1. Define free surface flows and understand the fundamental concepts
2. Know the effect of gradually varied unsteady free surface flow
3. Use computer program to predict the characteristics of free surface flows
4. Define and have an understanding of flood routing
5. Understand urban storm water routing and its application in flood water control
6. Solve problems involving combined free surface and pressure surge analysis, and syphonic rainwater systems.
7. Define environmental change, factors influencing environmental change and probable steps to forestall future disasters due to environmental changes.
8. Understand how to generate electricity using wind power, tidal power wave power and the prospect for the coastal regions of Nigeria
9. Define the concept of hydrology and its application in hydropower development
10. Understand hydropower system and its development in Nigeria.

Course Content

Flow with a free surface in pipes and open channels. Specific energy and alternative depths of flow. Gradually varied unsteady free surface flows. Computer program UNSCHAN. Implicit four-point scheme. Flood routing. The prediction of flood behaviour. Time-dependent urban storm water routing. Combined free surface and pressure surge analysis. Syphonic rain water system. Environmental Change. Wind turbines for electrical power generation. Wave energy conversion for electrical power generation. Tidal power. Wave and tidal power prospect for coastal region in Nigeria. Hydrology. Hydro-power plants. Hydro-power plant development in

Nigeria. Combined hydro and steam power plants. Comparison of hydro power station with thermal power stations.

Minimum Academic Standards: None.

GET 501: Engineering Project Management (3 Units C: LH 45)

Learning Outcmr

At the end of the course, students should be able to:

1. explain the basics of project management as it relates to the Engineering discipline;
2. demonstrate knowledge and understanding of engineering, management and financial principles and apply these to their own work, as a member and/or leader in a team, to manage projects and in multi-disciplinary environments;
3. conduct, manage and execute projects in multi-disciplinary areas;
4. possess the skills needed for project management; and
5. work within the budget when executing a project for proper management.

Course Contents

Project management fundamentals - definitions, project environment, nature and characteristics, development practice, management by objectives, and the centrality of engineering to projects, infrastructures, national and global development. The scope of project management-organizational, financial, planning and control, personnel management, labour and public relations, wages and salary administration and resource management. Identification of project stakeholders; beneficiaries and impacted persons- functions, roles, responsibilities. Project community relations, communication and change management .Project planning, control and timeliness; decision making, forecasting, scheduling, work breakdown structure (WBS), deliverables and timelines, logical frameworks (log frames), risk analysis, role of subject matter experts (SMEs), role conflicts; Gantt Chart, CPM and PERT .Optimization, linear programming as an aid to decision making, transport and materials handling. Monitoring and Evaluation-key performance indices (KPIs); methods of economic and technical evaluation. Industrial psychology, ergonomics/human factors and environmental impact considerations in engineering project design and management. Project business case - financial, technical and sustainability considerations. Case studies, site visits and invited industry professional seminars. General principles of management and appraisal techniques.Breakthrough and control management theory; production and maintenance

management.Training and manpower development. The manager and policy formulation, objective setting,planning, organising and controlling, motivation and appraisal of results.

GET 504: Engineering Law

(2 Units C:LH 30)

Leaming Outcomes

Students will be able to:

5. describe and explain the basic concept, sources and aspects of law;
6. describe and explain the major differences between the various categories of law, courts and legal jurisdictions;
7. describe and explain legal principles and their application in professional engineering design and management services and their professional liability implications; and
8. develop reasoned analysis of real-life or hypothetical engineering scenarios using the legal principles undertake critical analysis of reliable information to develop, and practically present technical reports for use in varying judicial/quasi-judicial settings including as an expert witness.

Course Contents

Common Law: its history, definition, nature and division. Legislation, codification interpretation. Equity: definition and its main spheres. Law of contracts for Engineers: Forms of contract and criteria for selecting contractors; offer, acceptance, communication termination of contract. Terms of Contracts; suppliers' duties-Damages and other Remedies.Termination/cancellation of contract Liquidation and Penalties; exemption clauses,safety and risk. Health and Safety. Duties of employers towards their employees. Duties imposed on employees. Fire precautions act. Design for safety. General principles of criminal law. Law of torts: definition, classification and liabilities. Patents: requirements, application, and infringement. Registered designs: application, requirements, types and infringement.Company law. Labour law and Industrial Law. Business registration.

MEE 503: Applied Design

(3 Units C: LH 45)

Learning Outcomes

At the end of this course, the students should be able to:

1. demonstrate proficiency in systematic scientific design methodology;

2. demonstrate creative application of the design process to engineering problems;
3. demonstrate proficiency in design for the manufacture of complete mechanical systems and devices;
4. undertake a group design project;
5. submit reports showing all calculations, justification for choice of design and instructions on detail design, manufacture, testing and use; and
6. demonstrate use and evaluation of a CAD/CAM software package in the actual manufacturing design project.

Course Contents

Scientific Design Methodology: creative application of the design process to engineering problems with emphasis on the manufacture of complete systems to accomplish overall objectives of minimum weight, high efficiency while satisfying the design constraints. An appreciation of the process of engineering design, and of systematic procedures and tools usable in the design process, with particular reference to mechanical systems and devices. Topics include systematic problem definition, search for possible solutions, statistical analysis of stress/strength interference, experiment planning techniques, optimum design for minimum weight and cost, and management of the design process. Design Project: Students will be required to conduct a design project under supervision, using the presented techniques, and taking at least to a workable layout drawing of a device. The design should involve simple mechanical systems (e.g. testing and assembling devices, heat drive, etc.) for a specified duty, analyse its operating conditions and after considering the design criteria, choose between

potential solutions. Reports submitted by students should contain all calculations, a comparison of potential solutions, justification for the design finally chosen, and instructions on detail design, manufacture, testing and use. Use and evaluation of several CAD/CAM software packages. Students will gain experience with CAD/CAM software while carrying out an actual manufacturing design project.

MEE 500: Project

(6 Units C: LH/PH 270)

Learning Outcomes

At the end of this course, the students should be able to:

1. identify an engineering research problem;
2. demonstrate proficiency in PowerPoint presentation in a seminar;

3. demonstrate a methodology for actualizing aims and objectives of a research project;
4. partake in a group research project efficiently; and
5. submit report comprising a topic, abstract, problem statement, aims and objectives, methodology, experimentation and/or analysis, results and analysis, conclusion and recommendation.

Course Contents

Final-year projects are assigned at the beginning of each academic year. Each final year student chooses a project supervisor in consultation with the final-year project coordinator. The process is entirely interactive, but the coordinator ensures that there is an even distribution of students amongst the lecturers. The final topic is decided by the student and his supervisor, selected from the fields of mechanics of solids and fluids, materials science, machine design, heat power, heat transfer, production technology, industrial engineering and management. Each student presents at least two seminars as part of their final year project, usually at the beginning and ending of the second semester. Each student is required to submit a report of their findings and undergo an oral examination. All seminars are scored by a panel of lecturers.

Minimum Academic Standards: None.

UNDERGRADUATE RESEARCH OPPORTUNITIES AND DEPARTMENTAL RESEARCH AREAS

6.1. Undergraduate Research Opportunities

The Department of Mechanical Engineering provides students with numerous opportunities to engage in research, innovation, and applied problem-solving as part of their academic training. Undergraduate research forms an essential component of the Mechanical Engineering curriculum, helping students to develop analytical skills, creativity, and an investigative mindset required for professional and postgraduate advancement. Students are encouraged to undertake final year projects and supervised investigations that address real-world engineering challenges affecting communities, industries, and the environment.

Through these projects, students learn how to:

- Formulate research problems and objectives.
- Apply scientific and engineering principles to practical situations.
- Collect, analyze, and interpret technical data.
- Communicate findings effectively through written reports and presentations. The Department provides guidance, supervision, and access to laboratories and field facilities to ensure that students gain hands-on experience in research design, testing, and data analysis. Collaborative research with industry and

professional bodies is also encouraged, especially in areas of national importance such as water supply, road infrastructure, and environmental sustainability.

6.2. Departmental Research Areas

The Department of Mechanical Engineering engages in multidisciplinary research aimed at addressing Nigeria's infrastructural, environmental, and developmental needs. Faculty members and students contribute to research that promotes innovation, sustainable development, and technological advancement. Major research areas in the Department include:

1. **Design and Manufacture Engineering**
2. **Industrial/Maintenance Engineering**
3. **Thermal Power Engineering**
4. **Applied Energy Engineering**
5. **Fluid Mechanics**

The Department encourages interdisciplinary collaboration between students and staff across different fields of engineering and applied sciences. Partnerships with government agencies, Industries, companies, and research institutions provide students with practical exposure to real-life engineering projects. Outstanding undergraduate research works are often showcased during departmental exhibitions, project defenses, and national competitions, and students are motivated to publish or present their findings in professional fora. The Department is continually expanding its research capacity through the establishment of modern laboratories, digital design tools, and partnerships with professional and international bodies. Students are therefore urged to approach research with enthusiasm, innovation, and a sense of responsibility toward solving societal problems through engineering.

PROFESSIONAL REGISTRATION AND STAFF QUALIFICATION

7.1 Professional Registration

Graduates of Mechanical Engineering are encouraged to pursue professional registration to become recognized engineers in Nigeria. To become a fully qualified professional engineer, graduates must be registered by the Council for the Regulation of Engineering in Nigeria (COREN)- the statutory body responsible for regulating and controlling the practice of engineering. They can then use the letters "Engr." before their names, indicating that they are registered Engineers.

The requirements are:

1. B. Eng. qualification obtained from accredited universities offering engineering disciplines, complete the mandatory Student Industrial Work Experience Scheme (SIWES)
2. 4 years working experience after graduation (Post graduation practical experience) under the supervision of registered engineers
3. Technical professional experience report writing and project Design with other exams which may be examined by the Nigerian Society of Engineers regulation body.

4. The national youth service year is often counted as one if spent with an appropriate engineering enterprise.

Professional registration not only confers legal recognition to practice as an engineer but also enhances career advancement, ethical practices and contribution to national development. The department encourages both students and staff to engage in continuous professional development and to seek membership and registration with relevant professional bodies.

7.2 QUALIFICATION REQUIREMENT FOR DEPARTMENTAL STAFF

The entry qualifications of staff seeking academic placement in the Department as recommended by the NUC and COREN, are as follows:

7.2.1 ACADEMIC STAFF

a. Graduate Assistant:

Candidates must have an Honours Degree in the appropriate discipline with at least a Second Class (Lower pass), and should have completed the National Youth Corps Service, where applicable.

b. Lecturer II:

Candidates must have a degree of Master's in the appropriate discipline plus at least two years of cognate experience.

c. Lecturer I:

Candidates should normally have a Ph.D. Degree with at least one year of teaching or industrial experience, plus one scholarly publication. However, where a candidate does not possess a PhD, but has a degree of Master's with sufficient industrial experience, acceptable for professional registration, such a candidate, who should also show evidence of research potential, may be considered.

d. Senior Lecturer:

Candidates should normally possess a Ph.D. Degree and/or research experience and/or industrial experience. Such candidates should also have six (6) scholarly publications, four (4) of which must be journal articles. The other two (2) may be referred to Proceedings or Technical Reports. The candidates should also be registered with their professional bodies (COREN, etc.).

e. Associate Professor:

Candidates should normally possess a Ph.D. Degree with teaching and research experience. Such candidates should possess the ability to provide academic leadership in addition to having a considerable number of referred journal publications (not less than 12), that must be assessed externally.

f. Professor:

Candidates should normally possess a Ph.D. Degree, with teaching and research experience. They should have a demonstrable ability to provide virile academic leadership in addition to a considerable number of referred journal articles that must be externally assessed.

7.2.2. TECHNICAL STAFF:

The services of very competent senior technical staff are required to run laboratories, workshops/studios, and maintain teaching and research equipment. The requisite qualifications and experience are presented below for each category of technical staff:

a. Assistant Technical Officer:

Candidates should possess an Ordinary National Diploma in the appropriate discipline. **b. Technical Officer II/Technologist II:**

Candidates should possess a Higher National Diploma with at least two (2) years cognate experience, or a City and Guilds Certificate with at least four (4) years cognate experience.

c. Senior Technical Officer/Technologists:

As above, but with at least six (6) years and eight (8) years cognate experience as per qualification, respectively.

d. Principal Technical Officer/Technologist:

As above, but with at least eight (8) years and ten (10) years cognate experience, respectively. **e. Assistant Chief Technical Officer/Technologist:**

As above, but with at least twelve (12) years, and fourteen (14) years cognate experience, respectively.

f. Chief Technical Officer/Technologist:

As above, but with at least fourteen (14) years and sixteen (16) years cognate experience, respectively.

7.3 Qualification and List of Mechanical Engineering Staff

The department has a highly experienced team of academic, technical and administrative staff with cognate experience. Names, rank, status, qualifications and professional membership of Mechanical Engineering teaching staff, non-teaching staff indicating Full Time (FT) and Part Time (PT) (adjunct). List of Mechanical Engineering Staff as specified in Table 7.1

Table 7.1: Names of Staff, Rank, Status and area of Specialization. Mechanical Engineering Staff.

S/ N	NAME OF STAFF	RANK/DESIGN ATION	STATUS	CORE N NUMB ER	QUALIFICATION/AREA OF SPECIALIZATION
1	Prof. Idenyi Ndubuisi Edennaya	Professor	Full time Sabatical	R,66758	Professor of Materials/Metallurgy Engineering PhD Materials/Metallurgy MEng Materials/Metallurgy BEng Materials /Metallurgy

2	Dr. Andrew Amagbor Erameh	Associate Professor	Full time	R,16583	BEng, Mechanical (1999, AAU) MSc. Engineering Management, RSUT-2010. MEng. Manufacturing (2013 UNIBEN) PhD Manufacturing (UNIBEN,2019) Professor of Design & Manufacturing
3	Engr. Dr. Mrs. Queeneth Adesuwa Kingsley-Omoyibo	Associate Professor	Full time	R,33942	BEng, Petroleum (2007, UNIBEN) MEng. Industrial Engineering (2013 UNIBEN) PhD Industrial Engineering (UNIBEN,2017) Industrial Engineering/Production.
4	Engr.Dr. Anthony Chijioke Adingwupu	Senior lecturer	Full time/Adjunct	R,49367	BEng, Mechanical (2009, UNIBEN) MSc. Mechanical (2014 UNILAG) PhD Mechanical(UNIBEN,2022) Thermo-Fluids &Applied energy.
5	Dr. Kelly Ejiroghene Orhorhoro	Senior Lecturer	Full time	R,39424	BEng, Mechanical (2010, UNIBEN) MSc. Mechanical (2014 UNIBEN). PhD Mechanical(UNIBEN,2020) Design &Manufacture.
6.	Dr.Augustine Ikenna Onyegbadue	Senior Lecturer	Full time /Adjunct	R,38335	BEng, Electrical Electronics (I.U.O) first class honors. MEng. Electrical Electronics (UNN) PhD Electrical Electronics (UNN)

7.	Dr.Fred Izilein	Senior Lecturer	Full time /Adjunct	R,90636	B.Eng., Electrical Electronics (AAU) 2000 M.Eng. Electrical Electronics (UNIBEN) 2008 PhD Electrical Electronics (I.UO) 2024
8	Engr. Olorunleke Aregbe	Lecturer I	Full time	R,26893	BEng, Mechanical (2009, UNIBEN) MEng. Mechanical (2000, UNIBEN) PhD Mechanical(I.U.O, inview) Fluid Mechanics.
9.	Dr. Moses Olanrewaju Adesusi	Lecturer I	Full time	R,59027	B.Eng, Materials& Metallurgy MEng. Materials& Metallurgy PhD Materials & Metallurgy
10.	Engr.Justice Efe Igbagbon	Lecturer II	Full time	R,72712	Materials& Metallurgy .Eng, Materials MEng. Thermal Power Engineering

Laboratory Staff

The laboratory staff available for the programme are shown in Table 7.2

Table 7.2: laboratory staff

S/N	Name	Rank/Designation Date of First Appointment	Qualifications, Dates obtained, Membership of professional Association	Duties Performed
				/Courses Taught
1	Mr. Odejimi, L.	Chief Technologist	PGDT(Ed), 1997, HND,Yaba Tech. 1982, COREN 2007	ELA201, ELA302 ELA301, ELA501,ELA401
2	Ajayi Gbenga	Technologist I	M.Eng (mech-in view) PGD Mechanical(IUO),HND OND	ELA501,ELA502

3	Mr. Okotie, Emeke	Technologist II	M.Eng (mech-in view) HND (Mechanical) OND MECH	ELA301, ELA401 ELA302, ELA502
4	Mr. Nwaekwu, Jonathan	Technologist I	C&G 1979, C&G 1976, C&G 1974	ELA201, ELA202
5	Mr. Agaji, Gabriel	Foreman	OND	ELA201, ELA202

Administrative Non-Teaching Staff:

Disposition in the College/School/Faculty/Department where programme/Sub- discipline/Discipline to be Accredited is offered. The Administrative Non-Teaching Staff Disposition in the College/Department are summarized in Table 20.

Table 7.4: Administrative Non-Teaching Staff Disposition in the College/Department.

S/N	Name of Staff	Rank/Designation Salary Scale and Date Of First Appointment	Qualification, Dates Obtained	Post Qualification Work Experience	Remark
1.	Mr Victor Obot	Administrative Officer II UNTSSS 01/03 (2021) College officer	B. Sc.2015 (University of Uyo) M.Eng2019(IUO)	10 years	F/T
2.	Mrs.Eucharia .A. Abolarin	Secretary		12years	F/T
3.	Mrs.Ameh Rose	Cleaner	PSLC		F/T
4.	Ms.Iyogbon Dorcas	Cleaner	PSLC		F/T

Table 7.5: Names of Staff, Rank, Status and area of Specialization. Mechanical Engineering Staff.

S/ N	NAME OF STAFF	RANK/DESIGN ATION	STATUS	CORE N NUMB ER	QUALIFICATION/AREA OF SPECIALIZATION
1	Prof. Idenyi Ndubuisi Edennaya	Professor	Full time Sabatical	R,66758	Professor of Materials/Metallurgy Engineering PhD Materials/Metallurgy MEng Materials/Metallurgy BEng Materials /Metallurgy
2	Dr. Andrew Amagbor Erameh	Reader	Full time	R,16583	BEng, Mechanical (1999, AAU) MSc. Engineering Management, RSUT-2010. MEng. Manufacturing (2013 UNIBEN) PhD Manufacturing (UNIBEN,2019) Professor of Design & Manufacturing
3	Engr. Dr. Mrs. Queeneth Adesuwa Kingsley-Omoyibo	Reader	Full time	R,33942	BEng, Petroleum (2007, UNIBEN) MEng. Industrial Engineering (2013 UNIBEN) PhD Industrial Engineering (UNIBEN,2017) Industrial Engineering/Production.
4	Engr.Dr. Anthony Chijioke Adingwupu	Senior lecturer	Adjunct	R,49367	BEng, Mechanical (2009, UNIBEN) MSc. Mechanical (2014 UNILAG) PhD Mechanical(UNIBEN,2022) Thermo-Fluids &Applied energy.

5	Dr. Kelly Ejiroghene Orhororo	Senior Lecturer	Full time	R,39424	BEng, Mechanical (2010, UNIBEN) MSc. Mechanical (2014 UNIBEN). PhD Mechanical(UNIBEN,2020) Design &Manufacture.
6.	Dr.Augustine Ikenna Onyegbadue	Senior Lecturer	Adjunct	R,38335	BEng, Electrical Electronics (I.U.O) first class honors. MEng. Electrical Electronics (UNN) PhD Electrical Electronics (UNN)
7.	Dr.Fred Izilein	Senior Lecturer	Adjunct	R,90636	B.Eng., Electrical Electronics (AAU) 2000 M.Eng. Electrical Electronics (UNIBEN) 2008 PhD Electrical Electronics (I.UO) 2024
8	Engr.Dr. Olorunleke Aregbe	Lecturer I	Full time	R,26893	BEng, Mechanical (2009, UNIBEN) MEng. Mechanical (2000, UNIBEN) PhD Mechanical (I.U.O) Fluid Mechanics.
9.	Dr. Moses Olanrewaju Adesusi	Lecturer I	Full time	R,59027	B.Eng, Materials& Metallurgy MEng. Materials& Metallurgy PhD Materials & Metallurgy Materials& Metallurgy
10.	Engr.Justice Efe Igbagbon	Lecturer II	Full time	R,72712	B.Eng, Materials MEng. Thermal Power Engineering

a) Professor

Table 7.6a: List of Professors/Associate Professors

N ₀	Name		Qualification	COREN Registration	Others
1	Engr. Prof. Idenyi Ndubuisi Edennaya	FT	B.Eng/M.Eng/Ph.D	R,66758	Please see Table 4
2	Engr. Dr. Andrew Erameh Associate Proffessor	FT	B.Eng/M.Eng/Ph.D	R.16583	Please see Table 4
3	Engr. Dr. Mrs.Queeneth Adesuwa Kingsley-Omoyibo Associate Professor	FT	B.Eng/M.Eng/PhD	R,33942	Please see Table 4

b) Senior Lecturer

Table 7.6b: List of Senior Lecturers

N ₀	Name		Qualification	COREN Registration	Others
1	Engr. Dr.Anthony Chijioke Adingwupu	FT	B.Eng/M.Eng/PhD	R.49367	Please see Table 4
2	Engr. Dr. Kelly Ejiroghene Orhorhoro	FT	B.Eng/M.Eng/PhD	R.39424	Please see Table 4
3	Engr. Dr.Augustine Ikenna Onyegbadue	FT	B.Eng/M.Eng/PhD	R.38335	Please see Table 4
4	Engr. Dr.Fred Izilein	FT	B.Eng/M.Eng/PhD	R,90636	Please see Table 4

c) Lecturer I

Table 7.6c: List of Lecturer I

N ₀	Name		Qualification	COREN Registration	Others
1	Engr.Dr.Olanrewaju Moses Adesusi	FT	B.Eng/M.Eng.	R, 59027	Please see Table 4
2	Engr.Dr. Olorunleke Aregbe	FT	B.Eng/M.Eng/PhD	R.26893	Please see Table 4

c) Lecturer II

Table 7.6d: List of Lecturer II and below

N ₀	Name		Qualification	COREN Registration	Others
1	Engr. Justice Efe Igbagbon	FT	B.Sc/M.Eng	R,72712	Please see Table 4

- The academic/teaching staff CV are contained in a separate folder.

7.4 PROGRAMME WORKLOAD BY STAFF

Shown below are the staff workloads with respect to courses taught in the department.

Table 7.7: Programme Workload by Staff

Total number of student in 2024/2025 session 86 students.

		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Prof. Ndubuisi Edennaya Idenyi					L	T	P	
	First Semester	IUO GET 531	7		2	-	-	2
	Second Semester	IUO-MEE201	14		1	-	-	1
		IUO-MEE372	27		1	-	-	1
		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Andrew Eramah					L	T	P	
Associate Professor								
	First Semester	IUO-GET 303	27		3		3	6
	Second Semester	GET 212	14		2			2
		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Queeneth Adesuwa Kingsley-Omoyibo					L	T	P	
Associate Professor								
	First Semester	GRE 501	7		3	1		4
		MEE 441	23		2	1		3
	Second Semester	GRE 502	7		3	1	1	5
		Course Taught	No Students Taught	Credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Anthony Adingwupu					L	T	P	
Senior Lecturer								
	First Semester	IUOMEE561	7		2			2
		GET 205	14		3			3
	Second Semester	GET 210	14		2	2		4
		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Kelly Orhorhoro					L	T	P	
Senior Lecturer								

	First Semester	GET 211	14		3		3	6
	Second Semester	IUO MEE 592	7		2		2	4
		Course Taught	No Students Taught	Credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Augustine Ikenna Onyegbadue Senior Lecturer					L	T	P	
	First Semester	GET 201	14		3			3
	Second sem.	GET 214						
	Second Semester	IUO-GST-211	14		1			1
		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Fred Izilein Senior Lecturer					L	T	P	
	First Semester	GET 305	27		3		3	6
		GET 404	23		2			2
	Second Semester	ENT 312	27		2			2
		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Moses Olanrewaju Adesusi Lecturer I					L	T	P	
	First Semester	IUO GEET531	7		2	1		3
		GET 203	14		3	1		4
	Second Semester	GET 202	14		2		1	3
		IUO MEE 201	14		1			1

		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Dr. Olorunleke Aregbe Lecturer I					L	T	P	
	First Semester	IUO MEE 481	23		3			3
		MEE 405	23		3			3
		MEE 407	23		2			2
	Second Semester	IUO MEE 562	7		2			2

7.5 LABORATORY TEACHING STAFF

The detail of the Technologist in the department is indicated in the table below. The department

		Course Taught	No Students Taught	credit	Staff Contact Hours			Weekly Hours
Engr. Justice Efe Igbagbon Lecturer II					L	T	P	
	First Semester	GET 307	27		3		3	3
		IUO MEE 371	27		2			2
	Second Semester	GET 204 GET 208	14		3			3

has four (4) Technologists - Some are registered with COREN and the others registered with NATE which is a body under COREN.

Laboratory Staff

The laboratory staff available for the programme are shown in Table 20

Table 7.8: List of Full-Time Laboratory Technologists

Name	Rank /Designation Date of Appointment	Qualifications, Professional Association	Duties Performed
Mr. Odejimi, Lucky.	Chief Technologist R,00549 ET	PGDT(Ed)1997, UNIBEN. HND Mech. Engineering 1981 Yaba Tech.,OND 1979 Yaba Tech, Mechanical Power Plant.	ELA301, ELA501,ELA401
Ajayi Gbenga	Technologist I	PGD (IUO) 2024, HND 2021, Fed. Poly Ado Ekiti. OND 2017.Federal Poly Ado Ekiti.	ELA201, ELA302
Mr. Okotie, E.	Technologist II	BEng FUOYE 2022 HND (Mechanical) Yaba Tech 2011OND Yaba Tech 2008.Mechanical	ELA401 ELA302, ELA502
Mr. Nwaekwu, Jonathan	Technologist I	C&G 1979, C&G 1976, C&G 1974	ELA201,ELA202
Mr. Agaji, Gabriel	Foreman	HND Usen Poly, OND Usen Poly.	ELA201, ELA202

* The Technologist Staffs CVs are contained in a separate folder – Appendix A

Table 21: Administrative Non –Teaching Staff in Department of Mechanical Engineering

7.6 Technical NON-TEACHING Staff

Table 7.9: List of List of Technical Non-Teaching Staff

No	Name of Staff	Gender	Rank/ Appointment Date	Qualifications	Remark
1	Mr. Victor Obot	M	Administrative officer II UNTSSS 01/03 2021	MSc. 2019(IUO) BSc.2015 (Uni.Uyo)	College officer
2	Mrs. Eucharia Abolarin	F	Administrative officer I UNTSSS 02/01 2021	BSc.	Departmental Secretary
3	Ms.Iyogbon Dorcas	F		PSLC	Cleaner
4	Mrs.Ameh Rose	F		PSLC	Cleaner
5	Mrs .F.Iyamu	F		PSLC	Office Assistance Mechanical Engineering

* The Technical Staffs CVs are contained in a separate folder – Appendix

Table 7.10: List of Full-Time Staff in the Department

S/N	Name of Staff/ COREN No.	Rank/ Post	Dedicate d/Shared	Qualification / Date		Specialization	Teac hing Yea rs	Credit Hours taught in the Current & Last Semesters	
				Degree	Year/Institution			First	Secon d
1	Engr. Dr. Mrs. Queeneth Adesuwa Kingsley- Omoyibo (Associate Professor) R.33942	Associate Professor & Head of Department	Dedicated	B.Eng.	University of Benin, Edo State, Nigeria, 2007	Industrial & Production	8	7	5
				M.Eng.	University of Benin, Edo State, Nigeria, 2013				
				PhD	University of Benin, Edo State, Nigeria, 2017				
2	Engr. Prof. Ndubuisi Edennaya Idenyi R.66758	Professor	Dedicated	B. Eng.	BEng Materials/Metallurgy	Materials/Metal lurgy	15	2	2
				MEng.	MEng Materials/Metallurgy				
				PhD	PhD Materials/Metallurgy				
3	Engr. Dr. Andrew Erameh. (Associate Professor) R,16583	Associate Professor	Dedicated	B.Eng	BEng, Mechanical (1999, AAU)	Design & Manufacturin g	18	6	2
				MEng.	MSc. Engineering Management, RSUT-2010. MEng. Manufacturing (2013 UNIBEN)				
				PhD	PhD Manufacturing (UNIBEN, 2019) Design & Manufacturing				
4	Engr. Dr. Anthony Adingwupu R49367	Senior Lecturer	Dedicated	B.Eng	BEng, Mechanical (2009, UNIBEN)	Thermo- Fluids	9	5	4
				M.Eng	MSc. Mechanical (2014) UNILAG				

				PhD	PhD Mechanical(UNIBEN,2022)	&Applied energy			
5	Engr. Dr. Kelly Ejiroghnene Orhorhoro R,39424	Senior Lecturer	Dedicated	BEng	BEng, Mechanical (2010, UNIBEN)	Design &Manufacture	6	6	4
				M.Eng	M.Eng. Mechanical (2014 UNIBEN).				
				PhD	PhD Mechanical(UNIBEN,2020)				
6	Engr. Dr. Augustine Ikenna Onyegbadue R,38335	Senior Lecturer	Dedicated	B.Eng.	BEng, Electrical Electronics (I.U.O) (first class honors.)	Electrical Electronics	8	3	1
				M. Eng.	MEng. Electrical Electronics (UNN)				
				PhD	PhD Electrical Electronics (UNN)				
7	Engr. Dr. Fred Izilein R,90636	Senior Lecturer	Dedicated	B.Eng.	B.Eng., Electrical Electronics (AAU) 2000	Electrical Electronics	10	8	2
				M. Eng.	M.Eng. Electrical Electronics (2008)				
				PhD	PhD Electrical Electronics(IUO)(2024)				
8	Engr. Moses Olanrewaju Adesusi R,59027	Lecturer I	Shared	B.Eng	BEng Materials/Metallurgy	Materials and Metallurgy	5	7	4
				M.Eng.	MEngMaterials/Metallurgy				
				PhD	PhD Materials/Metallurgy				
9	Engr. Dr. Olorunleke Aregbe R,26893	Lecturer I	Dedicated	B.Eng.	BEng, Mechanical (2000), UNIBEN)	Fluid Mechanics	9	8	2
				M.Eng.	MEng, Mechanical (2000), UNIBEN)				
				PhD	PhD, Mechanical (2025), (I.U.O)				
10	Engr. Justice Efe Igbagbon R72712	Lecturer II	Dedicated	B.Eng.	BEng Production/Materials/MetallurgyDELSU 2012	Thermal Power Engineering	3	5	3
				M.Eng.	MEng Mechanical Engineering Thermal Power 2017				
				Ph.D	PhD Mechanical Engineering Thermal Power (in-view)				

7.7 ADMINISTRATIVE SUPPORT

The Department has seven administrative support staff. The administrative officer and the administrative assistant both hold Bachelor's degree and are computer literate. They are both very good in office administration, hardworking and have contributed to the overall growth of the Department. The detail of the administrative staff in the Department is shown in Table 23.

Table 7.11: List of Administrative and Support Staff

N _o	Name	Gender	Rank/Date of Appointment	Qualification / Date	Post Qualification Experience	Remark	Appt Date
1.	Mrs Eucharia Abolarin	F	Departmental secretary	BSc.	12years	The staff is hard working	
2	Mr Obot	M	College Administrative Officer II UNTSSS 01/03 (2021) College officer	MSc. 2019(IUO) BSc.2015(Uni.Uyo)	10 years	The staff is hard working	
4	Ms Iyogbon Dorcas	F	Cleaner	PSLC	3years	The staff is hard working	
5	Mrs Rose Ameh	F	Cleaner	PSLC	5years	The staff is hard working	
6	Mrs.F.Iyamu	F	Cleaner	WASSCE (20...)	6years	The staff is hard working	

* The Administrative Staffs CVs are contained in a separate folder – Appendix A

7.8 External Examiners in the Mechanical Engineering Department

Table 7.12: External Examiners of Department of Mechanical Engineering.

S/ N	Name of External Examiner	Rank/Designation	Duty	Qualification and Date obtained	Affiliation
	2016/2017 – 2017/2018- 2018/2019				
1	Prof. Ighodalo Osagie	Professor	External Examiner	B. Eng (Mech) M. Eng (Mech) Ph D (Mech), COREN	Mechanical Engineering Department, Ambrose Ali University, Ekpoma
	2019/2020 – 2020/2021- 2021/2022				
2	Prof.Christopher Ishicheli	Professor	External Examiner	B. Eng (Mech) M. Eng (Mech) Ph D (Mech), COREN.	Mechanical Engineering Department, Federal University of Petroleum Resources, Effurun, Delta State, NIGERIA.
	2022/2023 - 2023/2024 – 2024/2025				
3	Prof.Rasaq Adetunji	Professor	External Examiner	B. Eng (Mech) M. Eng (Mech) Ph D (Mech), COREN	Mechanical Engineering Department, Federal University of Agriculture Abeokuta FUNAAB.
	2025/2026 - 2026/2027 – 2027/2028				
4	Prof. Sufianu Adeiza Aliu	Professor	External Examiner	B. Eng (Mech) M. Eng (Mech) Ph D (Mech), COREN	Mechanical Engineering Department, University of Benin.

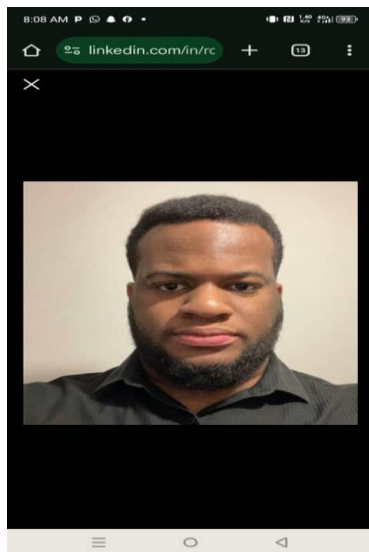
ALUMNI

8.1. Mechanical Engineering, IUO Alumni contribution to Nigeria and the world.

The graduates of Mechanical Engineering, IUO are able to hold their own and defend their certificates anywhere in the world. They leave the campus and enter the world to conquer and to excel. Today, there is an array of standard bearers for IUO-Mechanical Engineers. Grandaunts who have distinguished themselves in the field. In this section we present some of them to inspire the students. The list here is by no means exhaustive, it is just a sampler, however, it shows how the vision of excellence of the University is being realized with proofs all around the globe.

ALUMNI PROFESSIONAL PROFILES.

ENGR. CHUKWUNONSO IYITOR



Iyitor is a Professional Engineer, a front end web developer currently based in Dublin Ireland. He has Over 6 years' experience in building and maintaining Websites and web applications. Education:

Robert Chukwunonso Iyitor, attended Griffith College Dublin from 2019 to 2020. where he studied a range of digital media and programming courses including:

1. 3 D Modelling and animation
2. Interaction Design
3. Multimedia Programming
4. Server side web developer
5. Game Design and development,

He is a B.Eng. degree holder in Mechanical Engineering from Igbinedion University Okada (**IUO 2012**).

Honors:

Best Academic achievement award

Griffith college Dublin December 2020.

He specializes in Mechanical Engineering consultancy, research, education and training involving high technology engineering services in support of superior Website projects. He is a registered engineer with COREN and NSE in Nigeria. He is active with several local and international organizations and agencies with a mandate to advance the WEB and build infrastructure for Web design.

ALUMNI PROFESSIONAL PROFILES.

ENGR. UMOH EFFIOM



Effiom is currently the managing Director/Chief Executive officer of ProfoGas Nigeria limited.

He is also the chairman of board of Fastpace.ng an indigenous courier and logistics service Provider

He holds a Masters degree in Advanced Mechanical Engineering from Cranfield university Bedfordshire. He also holds a certificate in Entrepreneurial management from Pan-Atlantic University enterprise development center. He has executed several projects in procurement, construction, and installation of oil and Gas facilities for NPDC and NGC.

He is a B.Eng. degree holder in Mechanical Engineering from Igbinedion University Okada (**IUO 2012**).

ALUMNI PROFESSIONAL PROFILES.

ENGR. ADESOLA OLUWASIJIBOMI



Adesola is a graduate awardee at the 6th Annual awards Gala held in Bessborough in Saskatchewan. He brought communities together and made Igbinedion University proud. Adeola is the 2018 graduate students association research for excellence in Engineering. He produced an outstanding research result in his course of study. He has a PhD in Mechanical Engineering within 3 years. He graduated in 2010 from Igbinedion University Okada, Nigeria. He bagged his MEng in 2014 in Mechanical Engineering and has received 8 awards during his PhD Studies. Indeed, Adesola has made Igbinedion University Proud because To lead is our Goal. Our Product and achievement: Proclaiming our greatness and Fame. God bless Igbinedion University. (IUO, 2010)

ENGR. OLADAPO TAIWO MUBARAK



Mubarak graduated 2020 he is a Professional Engineer specialist in energy, trading, and data analysis. He works as a risk reporter, data analytics at ESB, an Irish energy company using machine learning models. He bagged a masters in Data analytics from National college of Ireland.

His skills involves but not limited to Python, SQL, Tableau, and certified in AI Fundamentals.

He is a B.Eng. degree holder in Mechanical Engineering from Igbinedion University

Okada (**IUO 2020**).

Skills:

Data labelling

Quality assurance

ETRM

Performance metrics

Microsoft Azure

APPENDIX A



IGBINEDION UNIVERSITY, OKADA STUDENT COURSE EVALUATION FORM

Dear Student,

It is a global practice in academic settings that students are given the opportunity to express their views and make recommendations on their educational activities. Such an effort will facilitate improved student-teacher relationships and provide an opportunity for the College/Department to correct any areas of lack and improve the teaching-learning environment. This will in turn improve the quality of teaching-learning activities and the learning outcomes. You are therefore requested to sincerely complete the form below. Please tick. The response that you think is the most appropriate to each statement. Note: You are not required to write your name.

S/N	Area of Assessment	Excellent	Very Good	Good	Fair	Poor	Weighted Average
A	COURSE PRESENTATION						
1.	Clearly states the course objectives and course contents						
2.	Covers course content with a schedule						
3.	Discusses mode of assessment with students						
4.	Presents material in a well-organized way						
5.	Completes syllabus within time						
B	MODE OF DELIVERY						
6.	Makes good use of teaching aids						
7.	Is clear and understandable at lectures						
8.	Pace of lecture delivery						
9.	Allows opportunities for asking questions						
10.	Shows thorough knowledge of subject						
11.	Links theory with practical						
12.	Lecturer available for consultation on course-related matters outside classes						
C	LECTURER'S COMPORTMENT AND CLEANLINESS IN CLASS						
13.	General appearance of lecturer and Attitude in Class						
14.	Ensures that class is Clean and controls class well						
15.	Punctuality and reliability in attendance						
16.	Reschedules lectures and makes up for lost time						

D	PEDAGOGY						
17.	Gives adequate assignments and returns written work on time.						
18.	Makes constructive comments on written work						
19.	Gives adequate tutorials						
20.	The Course has increased my knowledge of the subject						

Any other comments about the course and / or Lecturer:

APPENDIX B



IGBINEDION UNIVERSITY, OKADA
Gen. Abdulsalami A. Abubakar College of Engineering
Department of Mechanical Engineering

Mechanical Engineering Programme

Students' Course Evaluation Questionnaire (Evaluation of CLOs)

Course Code: IUO-MEE 201

Course Name: Introduction to Energy Materials

Session -Semester: 2024/2025 –Second semester

The questionnaire should be filled by each student at the time of course completion.

Please give us your views so that the quality of this course can be improved. You are encouraged to be candid in your answers. Any information you share here will be kept confidential.

Course Learning Outcomes

For each Learning Outcome listed below, please choose the one response that most accurately represents your view:

1 = Strongly disagree

2 = Disagree

3 = Not Sure

4 = Agree

5 = Strongly Agree

I was able to attain the following learning outcomes for this course:

CLO1	Examine three processes of energy harvesting and materials for energy harvesting.	
CLO2	List Materials for Energy storage.	
CLO3	Manage energy systems by ensuring that required materials are used at various levels of energy value chain.	
CLO4	Demonstrate basic knowledge in energy generation, energy storage ,energy transformation and energy utilization in all forms	

CLO5	Describe three processes of Energy transformation.	
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APPENDIX C

SAMPLES OF PROJECT TOPICS COMPLETED BY STUDENTS IN THE DEPARTMENT

List of Degree projects with Titles.

List of Titles of Degree project for 2017/18 academic session

- Modification of a Hydraulic Floor Crane
- Characterisation of food waste in Okada, Edo state
- Design and Fabrication of Food Waste Homogeniser
- Modal Analysis of Different Geometries of a Wind Turbine, Tower A Case Study of UNIBEN Energy Centre Wind Turbine Tower
- Effect of Annealing on Welded and Unwelded Medium Carbon Steel in Sea Water
- Design and Fabrication of Thermo Electric Power Generator
- Design, Fabrication and Testing of a Mellon Seed Shelling Machine
- Design and Fabrication of a Mini Cloth Dryer
- Design and Fabrication of a Wind Tunnel for Testing Horizontal Axis Wind Turbine

List of Titles of Degree project for 2018/19 academic session

- Powering of Spark Ignition Generator using a Locally Made Propane Venturi Mixer
- Design of a Portable Spot Welding Machine
- Investigation of Mechanical Properties of Sawdust Briquettes using Starch and Organic Waste as Binders
- Design and Development of a Biomass Downdraft Gasifier
- Optimisation and Evaluation of Throughput Capacity, Slicing Efficiency and Damage Efficiency of a Modified Plantain Slicing Machine using Varying Cutter Blades
- Design and Fabrication of a Furnace for Plastic Waste Recycling
- Numerical Analysis of Thermal/Mechanical Behaviour of Pipe Flange Connection
- Evaluation of the effect of Temperature and PH on the Biogas Yields from CO-Digestion of Food Waste and Cow Dung
- Investigation of Percentage Total and Volatile Solid on Biogas from Biodegradable Organic Solid Waste

List of Titles of Degree project for 2019/20 academic session

- Design and Fabrication of a mini Bandsaw

- Gasification of some common agricultural waste in Okada Edo state
- Investigation of Mechanical Properties of Rafia Palm Fibre Reinforced Polyvinyl Chloride matrix Composite
- Evaluation of a designed biogas purification filter for removal of siloxane for internal combustion engine
- Design and Fabrication of a Dust Extractor
- Modelling Cutting Temperature and Force in Turning Operation using Regression Analysis
- Evaluation of the Mechanical properties of Banana Peduncle Fibre Reinforced Polyvinyl Chloride matrix Composite
- Semi automation of a Hydraulic Jack for Lifting of Vehicle
- Design and Fabrication of an Evaporative Cooling System to Preserve Tomatoes
- Numerical Study of A Downdraft Gasifier To Produce Syngas From Palm Kernel Shell

S/N	MAT. NO.	NAMES ↓	SEX	PROJECT TOPICS
1		OLADAPO TAIWO MUBARAK	M	DESIGN AND FABRICATION OF AN EVAPORATIVE COOLING SYSTEM TO PRESERVE TOMATOES
2		STEVEN KEVIN PAUL	M	DESIGN AND FABRICATION OF AN EVAPORATIVE COOLING SYSTEM TO PRESERVE ORANGES
3.		ABHULIMEN OSOLASE ORIAIFO	M	OPTIMISATION AND EVALUATION OF THROUGHPUT CAPACITY, SLICING EFFICIENCY AND DAMAGE EFFICIENCY OF A MODIFIED PLANTAIN SLICING MACHINE USING VARYING CUTTER BLADES

NAMES OF COMMITTEES, MEMBERS OF THE COMMITTEE AND TERMS OF REFERENCE FOR THE COMMITTEES.

S/N	NAMES OF COMMITTEES	MEMBERS OF THE COMMITTEE	TERMS OF REFERENCE FOR THE COMMITTEES.
1	Examination Committee	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo (Associate Professor) (Chairman) Ag. HOD Associate Prof. Andrew Amagbor Erameh Dr.O.M. Adesusi (secretary) Dr. Anthony Chijioke Adingwupu Engr.Aregbe	1.To ensure that all examination questions are collated, assembled and properly disseminated for examination purposes. 2.To ensure that Question for External Examination Vetting are Properly collated and sent. 3.To ensure that all vetted questions are in line with the structured outline. 4. To ensure that Senate results are properly prepared by level advisers for college board meetings and for senate approval. 5.To ensure cases of missing results are handled professionally and well sorted. 6.To ensure that marked examination booklets are marked speedily for early results submission. 7.To submit an annual activity report to the department.
2	Quality Assurance	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo(Chairman) Ag.HOD Engr.Aregbe Engr.Efe Justice Igbagbon Dr. O.M.Adesusi (secretary)	1.To Keep accurate records of attendance for lectures for both students and lecturers. 2. To keep records of Lecture content relevant to curriculum and ensure continuous assessments are done. 3.To recommend to Departmental board, on issues bothering on completion of course content and curriculum in the department of Mechanical Engineering. 4.To Ensure that Students attend classes as well as the lecturers go to class to Teach. 5.To inform lecturers and students in clear terms at the beginning of every semester, on the consequences of truancy. 6.To submit an annual activity report to the department.

			7. To monitor course allocation in accordance with area of specialty every semester 8. To submit an annual activity report to the department.
3	Project coordination committee	Engr.Aregbe Engr.Efe Justice Igbagbon Dr. Kelly Ejiroghene Orhorhoro Dr. O.M.Adesusi (secretary)	1.To ensure that students are allocated to lecturers with respect to areas of discipline, 2.To Ensure hitch – free project defenses every session. 3.To prepare defense results for Exam committee. 4. To map out strategic plans on how to ensure project originality and mastery of the subject area chosen. 5.To ensure students are allocated to supervisors using the university policy on project submission and ensuring deadlines are met. 6. To Ensure rules and regulations on Project defense are communicated to both Lecturers and students. 7. To submit an annual activity report to the department.
4	Curriculum committee	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo(Chairman) Ag. HOD Prof. Andrew Amagbor Erameh Dr. Kelly Ejiroghene Orhorhoro Dr. O.M.Adesusi (secretary)	1.To review the curriculum of Mechanical Engineering yearly. 2. To keep the department abreast of latest issues on curriculum development. 3.To submit an annual activity report to the department.
5	Linkages and collaboration	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo(Chairman) Ag.HOD Dr. Anthony Chijioke Adingwupu Dr. Kelly Ejiroghene Orhorhoro. Dr. O.M.Adesusi (secretary)	1.To attract Industries to the department for collaboration and Industrial Experience Scheme, 2. To Source of Industries That are willing the accept mechanical Engineering students for IT. 3. To submit an annual activity report to the department.
6	Research and publication committee	Dr. Kelly Ejiroghene Orhorhoro. (Chair) Dr. O.M. Adesusi Engr.Aregbe (secretary)	1.To maintain the oversight of academic and research integrity 2.To monitor and improve performance against institutional benchmark for academic quality and outcome. 3.To guide the successful publication of research for attention of scholars to their institution.

			4.To ensure that lecturers progress through their field. 5.To provide advice and guidance to lecturers on journal editors, and publishers on ethical matters. 6.To ensure quality of papers submitted to journals. 7.To ensure journal article reporting standards. 8.For primary advisory roles in the department, on Journals, research and publications to make informed decisions for the department. 9.To oversee and monitor publication in the department of Mechanical Engineering. 10. To submit an annual activity report to the department.
7	Level Advisers	All departmental Lecturers	1. To improve the academic success of students 2. To inform students on university policies and training and offer expert advice on all the student needs to know while in the university. 3. To provide guidance for students and help them make informed decision. 4. To submit an annual activity report to the department.
8	Accreditation committee	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo(Chairman) Ag.HOD Prof Andrew Erameh Dr. Anthony Adingwupu Dr. Kelly Ejiroghene Orhorhoro Dr. O.M.Adesusi (secretary)	1.To assist the head of Department in preparing for accreditations and ensuring that Both lecturers and students are ready for accreditation. 2.With the lead of the Head of Department, the committee is to oversee the preparedness of all items on the check list to facilitate the accreditation exercise and help to coordinate all accreditation activities and processes. 3. To make recommendation to the Head of Department on: identification of all that will be needed for accreditation not shorter than one month to accreditation visit

			date for both post graduate and undergraduate programs. 4. To submit an annual activity report to the department.
9	Student Alumni committee	Prof Andrew Erameh(Chairman) Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo. Ag.HOD Engr.Aregbe Dr. Kelly Ejiroghene Orhorhoro Dr. O.M.Adesusi (secretary)	1.To gather a network of mechanical engineering graduates for a formidable alumni team. 2. To ensure the loyal support of alumni for fund raising prospects. 3.To ensure that the alumni generate invaluable word-of-mouth marketing among their social and professional network. 4.To organize social events for fund raising, publish newsletters or magazines. 5.To organize annual Home coming. 6.To provide corporate knowledge and networks such as industry trends, experience of market place to inform curriculum development and strategy. 7.To build Igbinedion University reputation and make her degrees more valuable. 8.To promote a strong relationship between the university and her graduates. 9.To submit an annual activity report to the department
10	Staff and student welfare committee	Engr.Aregbe Dr. Anthony Adingwupu Dr. O.M.Adesusi (secretary)	1.To Ensure needs of staff and students are met. 2.To address the needs of students and staff and work out a template on how to operate. 3. To submit an annual activity report to the department.
11	Seminar coordination committee	Dr. Kelly Ejiroghene Orhorhoro. Dr.O.M. Adesusi (Chair) Engr.Aregbe Engr.Efe Justice Igbagbon(secretary) Dr.Kelly Ejiroghene Orhorhoro	1.To Coordination all departmental seminars. 2. To ensure a robust seminar presentation. 3. To present a policy with a uniform method of choosing topics for seminars by students. 4. To periodically schedule well organized seminars

			5. To submit an annual activity report to the department..
12	Departmental board	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo(Chairman) Ag.HOD All departmental staff Dr.O.M.Adesusi (Departmental secretary)	The departmental board shall be responsible for all Departmental matters. To submit an annual activity report to the department.
13.	Fund raising committee	Engr.Aregbe Engr.Efe Justice Igbagbon Dr. O.M.Adesusi (secretary)	1.To Identify activities for fund raising for departmental action. 2. To raise funds for the upkeep of the department, 3.To keep records of all Departmental funds and expenditures. 4. To Strictly monitor departmental finances and render annual accounts to departmental boards. 5. To submit an annual activity report to the department..
14.	Promotions and Staff development committee	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo(Chairman) Ag.HOD All Professors Senior lecturers Dr. O.M.Adesusi (secretary)	1.To Screen Promotion Applications submitted for promotion exercise and make recommendations. 2.To organize Training programs for Departmental Staff. 3.To submit an annual activity report to the department..
15.	Nigerian Institution of Mechanical Engineers (NiMechE) students chapter Igbinedion University Okada advisory committee.	Engr.Dr. Mrs.Q.A. Kingsley-Omoyibo(Chairman) Ag.HOD All Professors Senior lecturers and others. Engr.Efe JusticeIgbagbon(secretary) Dr. O.M.Adesusi (Student Advisory lead)	1.To oversee the general NiMechE advising. 2.To monitor NiMechE finances for proper appropriation of funds and report irregularities to the head of department. 3.To Ensure proper elections of student members are conducted. 4.To arrange for immediate elections on expiration of tenures. 5.To ensure students pay dues to sustain the activities of the student chapter. 6.To embark on Industrial visits, summer educational trips to other Universities in Nigeria and Trainings in the Field of Mechanical Engineering. 7. To submit an annual activity report to the department.

16.	Student Industrial Work Experience Scheme(SIWES) committee	Dr. Kelly Ejiroghene Orhorhoro. (Chair) Engr.Aregbe Engr.Efe Justice Igbagbon Dr. O.M.Adesusi (secretary)	1.To coordinate SIWES postings and activities. 2.To monitor students attendance during SIWES. 3.To organize SIWES defense 4.To produce a list of students on SIWES with location. 5.To collect visitation travel funds, schedule visits to students on SIWES, and submit report to department. 6. To submit an annual activity report to the department.
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