THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

SCHOOL OF BASIC MEDICAL SCIENCES

DEPARTMENT OF BIOMEDICAL TECHNOLOGY

CURRICULUM FOR PROPOSED POSTGRADUATE DIPLOMA PROGRAMME

1. PROGRAMME OFFERED

Postgraduate Diploma in Biomedical Technology (PGD Biomedical Technology)

2. PROGRAMME PHILOSOPHY

Exigencies and realities in technological development have placed increasing demands on the current state of Biomedical Professionals training vis-a-vis the necessity for continuous professional development. The Postgraduate Diploma in Biomedical Technology programme will provide an opportunity for academic and professional advancement in Biomedical Technology discipline for:

(a) Holders of HND in Physical, Biological or Medical Sciences, Engineering and other closely related disciplines;

(b) Candidates intending to pursue higher degrees in Biomedical Technology but who are deficient in academic qualifications;

(c) Candidates who are desirous to broaden their technical knowledge in Biomedical Technology in order to effectively cope with increasing professional responsibilities in their places of work; and

(d) Professionals from Physical, Biological or Medical Sciences, Engineering and other closely related fields.

3. PROGRAMME OBJECTIVES

The main focus of the Postgraduate Diploma programme is to develop and broaden the academic and professional capacity of graduates with a view to pursue fulfilled and result-oriented careers in the field of Biomedical Technology.

The specific objectives of the programme are to:

(a) give opportunity for graduates from closely related disciplines who intend to pursue higher degrees in Biomedical Technology;

(b) develop fundamental skills in candidates for research in Biomedical Technology

(c) give opportunity to Biomedical Technology graduates without requisite academic qualifications for higher degree in Biomedical Technology to makeup for their deficiencies; and

(d) give opportunity for professionals in industrial and healthcare sectors who intend to pursue higher degrees in Biomedical Technology.

4. PROGRAMME JUSTIFICATION

The justifications for the PGD programme include but not limited to the following:

(a) All health institutions both in Nigeria and abroad have Biomedical Engineering/Technology Departments. Thus, it has become imperative to train personnel to provide medical/health services in these institutions;

(b) Postgraduate Diploma (PGD) graduates in Biomedical Technology (BMT) graduates are engaged in the practice of Biomedical Engineering and Technology in the Medical and Allied Institutions, industries, education as well as offering services in the public and private sectors both locally and internationally.

(c) PGD Graduates in BMT contribute to technological and economic developments in Nigeria and beyond.

(d) PGD Graduates in BMT are prepared for admission to top graduate programs in both local foreign institutions.

(e) PGD Graduates in BMT are motivated toward and engaged in continuous professional developments through individual efforts and advanced professional education.

5. ADMISSION REQUIREMENTS

Candidate must satisfy the general regulations governing postgraduate studies at The Federal University of Technology, Akure. In addition, candidates must have obtained:

(a) A first degree from The Federal University of Technology, Akure (FUTA) or any other accredited University, not lower than third class in Biomedical Technology and any other closely related disciplines; and

(b) Higher National Diploma (HND) with at least Lower Credit level or its equivalent in Biomedical Technology from any accredited Monotechnic and Polytechnic.

6. PROGRAMME DURATION

The PGD programme shall be for a period of four semesters. The four semesters shall be by course work and examinations and the candidate shall present a project submitted and approved at the end of the fourth semester.

7. REQUIREMENTS FOR GRADUATION

In addition to satisfying other University regulations, to be eligible for the award of the postgraduate diploma (PGD) degree in Biomedical Technology, a candidate must have;

(a) passed all the courses recommended by the Department;

(b) fulfilled all other conditions as prescribed by the Board of the School of Postgraduate Studies of the University;

(c) successfully completed and defended a research project in an oral examination by a Panel of Examiners; and

(d) successfully passed a minimum of 78 Total Load Units (TLU).

8. COURSE OUTLINE

YEAR 1 FIRST SEMESTER

S/N	Course Code	Course Title	Contact Hours			Course Unit
			L	T	P	
1	BMT 701	Biomaterials I	2	0	3	3
2	BMT 703	Biomechanics	2	0	0	2
3	BMT 705	Introductory Human Anatomy and Physiology	2	1	0	3
4	BMT 707	Gross Anatomy of the Upper and Lower Limbs	2	0	3	3
5	BMT 709	General Histology	1	0	3	2
6	BMT 711	Medical Reliability Engineering	2	0	0	2
7	BMT 713	Biomedical Equipment Maintenance	1	0	3	2
8	BMT 715	Statistical Analysis for Biomedical Students	1	0	3	2
TOTAL						**19**

YEAR 1 SECOND SEMESTER

S/N	Course Code	Course Title	Contact Hours			Course Unit
			L	T	P	
1	BMT 702	Artificial Organs and Implants	2	0	0	2
2	BMT 704	Biomedical Electronic and Applications	1	0	3	2
3	BMT 706	Programming and Simulation Techniques	1	0	3	2
4	BMT 708	Computational Methods in Biomedical Technology	2	0	3	3
5	BMT 710	Systemic Histology (Organology)	2	0	0	2
6	BMT 712	Physiology of the Cardio-Pulmonary System	2	0	0	2
7	BMT 714	Introduction to Low-End Embedded Systems	2	0	3	3
8	BMT 716	Introduction to Human Genetics	2	0	0	2
9	BMT 718	Biomaterials II	2	0	0	2
TOTAL						**20**

YEAR 2 FIRST SEMESTER

S/N	Course Code	Course Title	Contact Hours			Course Unit
			L	T	P	
1	BMT 717	Prosthetics & Orthotics	2	0	0	2
2	BMT 719	Cell and Tissue Engineering	1	0	3	2
3	BMT 721	Clinical Engineering	1	0	3	2
4	BMT 723	Rehabilitation Engineering	1	0	3	2
5	BMT 725	Introduction to High-End Embedded Systems	2	0	3	3
6	BMT 726	Neuroanatomy	2	0	0	2
7	BMT 729	Neurophysiology	2	0	0	2
8	BMT 799	PGD Research Project	0	0	18	6
TOTAL						**21**

YEAR 2 SECOND SEMESTER

S/N	Course Code	Course Title	Contact Hours			Course Unit
			L	T	P	
1	BMT 720	Biomedical Telemetry	2	0	0	2
2	BMT 722	Intensive Care Unit Technologies	2	0	0	2
3	BMT 724	Modern Biomedical Imaging	2	0	3	3
4	BMT 726	Learning and Linear Control Theory	2	0	0	2
5	BMT 728	Nonlinear Adaptive Control	2	0	0	2
6	BMT 730	Cardio-Pulmonary Biomechanics	2	0	0	2
7	BMT 732	Neural Control of Human Locomotion	2	0	0	2
8	BMT 734	Applied Biomedical Instrumentation	2	0	3	3
TOTAL						**18**

9. POSTGRADUATE DIPLOMA COURSE SYNOPSES

BMT 701: BIOMATERIALS (3 UNITS)

Introduction to materials, their surface and mechanical properties. Biomaterials used in prosthetic devices, dentures, arterial grafts, orthopaedic implants, and other medical applications, factors involved in the design of implants; biocompatibility, biomaterial/tissue interactions and others. Biosensors. Neuro-prostheses.

BMT 702: ARTIFICIAL ORGANS AND IMPLANTS (2 UNITS)

Review of Biomaterials used for artificial organs. Prosthetic Heart Valves. Evaluation of Prosthetic Heart Valves. Cardiac pacemaker. Evaluation and implantation of a Pacemaker. Artificial ear and nose. Cochlear implant. Basic concept of blood connecting devices used as replacement for natural organs: Artificial: kidney, lung valves, heart-lung bypass, total heart, and pancreas. Attempts at techniques of developing artificial organs where necessary. Drug implants. Biocompatibility in artificial organs and rehabilitation engineering.

BMT 703: BIOMECHANICS (2 UNITS)

Introduction to biomechanics: qualitative & quantitative analysis in biomechanics, the fundamental principles of biomechanics, anatomy & physiology of the muscular and skeletal systems, terminologies related to movement of the human body – adduction, abduction, circumduction etc. Motion: laws of motion, linear and angular motion, kinetics and kinematics of human movement. Mechanical Characteristics of muscles: force-velocity relationship, force-length and force-time relationships. Mechanical Energy: work and power in human movement. Biomechanics of the tendons, ligaments and spine. Biomechanics of upper and lower limbs.

BMT 704: BIOMEDICAL ELECTRONIC AND APPLICATIONS (2 UNITS)

Concept of frequency response analysis of electronic amplifiers and oscillators. Power feedback and instrumentation. Introduction to operational amplifiers (inverting, non-inverting, summer, unity-gain, differential, multistage, Instrumentation, etc). Field effect transistor circuits and applications (FETs, JFETs, CMOS, NMOS, MOSFETs – Enhancement and Depletion types), stabilized power supply and voltage regulation circuits. Sensors, transducers, noise and interference in biomedical systems. Application of biomedical electronics to biological and human systems for measurements and diagnosis.

BMT 705: INTRODUCTORY HUMAN ANATOMY AND PHYSIOLOGY (3 UNITS)

Definition of Human Anatomy, Physiology Anatonomical Sciences. Methods of Studying Anatomy: Regional Anatomy, System Anatomy and Clinical Anatomy. Descriptive Terms. Terms of Relationship of the human body. Terms of Comparison. Hierarchy of Organization. Body Cavities and quadrants. Concise review of: Skeletal System and Joints; Muscular System and mnement; Structural Organization of the nervous system.

Introduction to physiology and its place in medicine. Cell as basic functional unit of human body; relation to tissue, organs, organ systems. The composite cell and cell communication mechanisms. Concept of homeostasis and feedback mechanisms. Compartmentalization, composition and measurement of body fluids. Introduction to human genetics and genome.

BMT 706: PROGRAMMING & SIMULATION TECHNIQUES (2 UNITS)

Introduction to scientific programming and computing. Algorithm development, large scale data analysis, and effective visualization of results, using MATLAB & Simulink, Python, C/C++ and RStudio. Programming projects from biomedical applications.

BMT 707: GROSS ANATOMY OF THE UPPER AND LOWER LIMBS (3 UNITS)

UPPER LIMB: Osteology of upper limb. Axis-appendicular muscles: Anterior and posterior . Brachial plexus. Axilla muscles of the arm. Cubital fossa and cubital tunnel. Forearm muscles. Carpal tunnel. Blood supply of upper limb. Applied radiology.
LOWER LIMB: Gluteal region, thigh, lumbosacral plexus and popliteal fossa, leg, foot, bones of the free lower limb, bones of the pelvic girdle, vascular anastomoses, blood supply and drainage, lymphatic drainage, innervations. Special structures-femoral triangle, adductor canal, inguinal region, e.t.c. bones and joints. Surface anatomy, applied and radiological anatomy of the lower limbs.

BMT 708: COMPUTATIONAL METHODS IN BIOMEDICAL TECHNOLOGY (2 UNITS)
Numerical linear algebra, root finding, approximation theory, concepts of numerical differentiation and integration, ordinary differential equations, optimization techniques, initial and boundary value problems, finite elements methods, direct and indirect methods in matrix theory, optimization with constraints analysis of numerical stability. Review of numerical analysis – Lagrange method, Newton method, cubic spline, least squares, interpolation, curve fitting and least squares methods. Classical and evolutionary optimization algorithms; first principle models, empirical models, input-output models, state-space models, Markovian models. Introduction to nonlinear systems modeling using neural networks, fuzzy rule-based logic, and neural-fuzzy techniques. Rudiments of computer programming using MATLAB and Simulink®.

BMT 709: GENERAL HISTOLOGY (2 UNITS)
Definition of terms in histology: Introduction to light and electron microscopy, units of measurements. Functions of the cell, components of the cell, cell division and cycle. Basic tissue of the body, the epithelial, connective tissues, muscle and nervous tissues, lymphoid organs. Chromosomes, transcription and translation of DNA. Protein secretion.

BMT 710: SYSTEMIC HISTOLOGY (ORGANOLOGY) (2 UNITS)
Cardiovascular system, skin, gland of the skin, structure of the nails and hair, respiratory system, digestive system. Urinary and genital systems. Electronmicrograph studies of each organ. Definitions, functions of the cell, Component of the cell, cell division, cell cycle, chromosomes, protein secretion and transcription of DNA. Introduction to light microscopy, electron microscopy and units of measurements. Basic tissue of the body, the epithelial, connective tissues, muscle and nervous tissues, lymphoid organs.

BMT 711: MEDICAL RELIALBILITY ENGINEERING (2 UNITS)
Introduction to reliability. Elementary reliability theory. Indices of reliability failure rate models. Failure distribution reliability function. Mean time to failure. Mean time between failures. Reliability of systems, serial configuration, parallel configuration, and redundancy. Determination of reliability of electronic systems. Power system reliability. Factors affecting power system reliability. Power systems reliability indices – customer oriented and system oriented. System maintainability. Analysis of down time. Repair-Time distribution. Exponential Repair-Time. Reliability concept in preventive maintenance. Methods of improving systems reliability.

BMT 712: PHYSIOLOGY OF THE CARDIO-PULMONARY SYSTEM (2 UNITS)
Physiologic anatomy of the cardiovascular system. Electrical and mechanical pump functions of human heart: cardiac cycle, heart sound, jugular venous pulsation and pressure; arterial pulsations. The vascular system; cross-sectional area of different vascular groups, exchange of fluids across the capillaries, Vascular endothelium in cardiovascular control. Cardiac output and its estimation, Systolic, Diastolic, pulse, and mean pressures.

BMT 713: BIOMEDICAL EQUIPMENT MAINTENANCE ` (2 UNITS)
Introduction and importance of maintenance. Types of Maintenance: Corrective maintenance, Preventive maintenance, Predictive maintenance, and Zero Hours maintenance (Overhaul). Basic theory of reliability. Reliability of medical devices and equipments. Routine services, repairs and maintenance schedule of

machines and equipment diagnosis. Preventive maintenance of lubrication systems, cooling systems, ignition systems, electrical systems, electronic systems, hydraulic systems, power transmission systems. Theory of interchangeability. Technology of repair of basic elements of medical equipments.
Maintenance models: Corrective model, Conditional model, Conditional model, Systematic model, High availability maintenance model. Legal maintenance and Subcontracted maintenance to a SPE. Fault analysis report, Implementation of maintenance software (Engineering RENOVETEC), Monitoring scheduled stops and reviews, Development of procedures. Responsibilities and Job description of a maintenance engineer as well as maintenance skills.

BMT 714: INTRODUCTION TO LOW-END EMBEDDED SYSTEMS (3 UNITS)
The transistor as a switch, power dissipation, base over drive storage drive and switching speed, logic gates: AND, OR, NAND, NOR, EX-OR, X-NOR, truth tables. Noise margin, totem pole, open collector and tristate outputs, TTL, CMOS, NMOS, ECL. Combinational systems, Boolean algebra, identities, De-Morgan's law, Karnaugh maps, Qunine McCluskey minimization by computer aided techniques. The half and full adders. Flip-flop: R-S, J-K and D types. Edge and level trigger, master-slave types, the shift register. Circuit techniques. Oscillators sine wave amplitude control, sequencing, frequency stability, waveform discrimination. Practical ramp generators. Conversion techniques, frequency to voltage, staircase generation, analogue to digital converters, digital to analogue converters. Termination of pulsed lines, Beageron diagram. Low noise amplifier design. Use of discrete components for minimum noise. Counter and counter applications. Memory devices. Introduction to microprocessors and microcontrollers and their applications to biomedical engineering and medical technologies.

BMT 715: STATISTICAL ANALYSIS FOR BIOMEDICAL STUDENTS (2 UNITS)
Introductory statistical methods involving descriptive and inferential statistics, normal distribution, measurement of central tendencies, data collection, assembling, analyses and data interpretations. Using Statistical Package and Software (SAS, JMP, SPSS, etc) for *t*-test analyses, regression analyses, chi-square analysis, Pearson's correlation and analysis of variance (ANOVA), and for mean-separation and *post-hoc* tests.

BMT 716: INTRODUCTION TO HUMAN GENETICS (2 UNITS)
Meaning, principles and importance of human genetics. Gene, its structure and functions,genetic code, genotype and phenotype. DNA Replication, translation and transcription. Structure, number, classification and theories of inheritance of chromosomes. Chromosomes variations and factors determining variations in humans. Gene and gene families.Linkage, recombination (crossover) and chromosome mapping. Mendelism. Polymorphism. Probability, sex chromosomal abnormalities and autosomal anomalies, other aberrations. Briefs on cytogenetics, molecular genetics, human population genetics, developmental genetics, clinical genetics and genetic counseling, human genome and project, and origin of mankind.

BMT 717: PROSTHETICS & ORTHOTICS (2 UNITS)
Definition and meaning of prosthetics, orthotics, Prosthetic and Orthotic devices. Amputation as an indication for prosthetic devices. Principles of Socket fabrication of devices. Casting. Types of plastics used in socket fabrication (laminates, blends, thermoplastics, cosmetic finishing plastics). Types of prosthetic feet. Prosthetics knee Unit. Lower Limb Orthoses. Upper limb Prostheses. Spinal orthotics. Externally powered Prostheses and Orthoses.

BMT 718: BIOMATERIALS II (2 UNITS)
Provides an overview of the physical and chemical properties of the materials used in health care and biotechnology. The four materials classes (metals, ceramics, polymers, composites). Emphasis on the four materials classes (metals, ceramics, polymers, composites), material types and material properties pertinent to their use in implanted medical devices. Topics include crystal structures of metallic and ceramic alloys used in

dental and orthopaedic implants, surface properties such as chemical inertness, surface roughness and adhesivity, and factors that contribute to implant failure.

BMT 719: CELL & TISSUE ENGINEERING (2 UNITS)

Application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development; structure and function. Histological tissue structures in the body and basic building blocks of the tissue and clinical need for replacement. Engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Different sources of stem cells and their applications to tissue engineering. The structure and function of cells, basic principles involved in cell culture, and safety rules in handling cells. Experimental methods used to investigate the cell deformability, adherence strength, and cell motility. Laminar flow assays and micromanipulation methods. Discussions of recent trends in tissue engineering including stem-cell and tissue growths and replacements.

BMT 720: BIOMEDICAL TELEMETRY (2 UNITS)

Review of sensors and signals. Definition and Introduction to Telemetry systems. Applications and usage of Telemetry systems. Trends and Technology. Frequency Spectrum and Electromagnetic spectrum. Wireless Mobile Telecommunication systems, WMTS. Components of WMTS. Transmitters, Receivers, Modulation and Demodulation. Measurement, Monitoring and Control with Telemetry Systems. Radio Frequency, RF and RF Transmitters. Stationary and Ambulatory Telemetry Systems.

BMT 721: CLINICAL ENGINEERING (2 UNITS)

Introduction to Clinical engineering, life sciences, and medicine. Aspects of engineering in the clinical setting and discusses topics such as biomedical instrumentation, clinical laboratory measurements, medical device sterilization techniques, reliability engineering, regulatory practices. Clinical equipments in modern operating theatre. The role of Biomedical Clinical Engineers and Technologists in Clinical Engineering framework.

BMT 722: INTENSIVE HEALTHCARE UNITS TECHNOLOGIES (2 UNITS)

This course will teach the fundamental engineering skills required for managing critical care and emergency ward facilities. An array of critical care facilities and equipment will be discussed in details. Oxygen concentrators – Capnographs monitoring systems - cardiac monitor, multipara monitor - Advanced defibrillators –internal and external - Intermediate level of suction apparatus – Laryngoscope - Advance level of radiant warmer, phototherapy units - Doppler fetal heart rate device (handheld type), Fetal Tocography - C.T.G, Baby Incubator, Neonatal ventilator. Electrosurgical units, Warmer (Blood and Patient) - Operation Theatre (OT).

BMT 723: REHABILITATION ENGINEERING (2 UNITS)

Principles and practices of rehabilitation engineering and the role of engineers in the delivery of health care to disabled individuals. Discussions of approaches to diagnosis and treatment of disorders involving motor function will be included as will an analysis of the design of devices and systems to aid the disabled. Disabilities as a result of stroke, spinal cord disorders, cerebral palsy and Parkinson's disease will be discussed. Examples of technologies examined include devices aiding mobility, limb prosthetics, robotic aids, functional electrical stimulation, and interfaces to microcomputers.

BMT 724: MODERN BIOMEDICAL IMAGING (3 UNITS)

Planar X-rays. Physics of X-rays production, interaction with matter and detection. Image quality modeling and assessment. Image reconstruction and applications in diagnostic and image-guided procedures. Magnetic resonance imaging (MRI), Ultrasound imaging, Mammography imaging, Computed Tomography Scanning. For each system the course describes the fundamentals principles of the wave generation and detection, the diagnostic methods, image characteristics, and the biological effects of the given wave/radiation.

BMT 725 INTRODUCTION TO HIGH-END EMBEDDED SYSTEMS (3 UNITS)

Review of digital electronics and programmable logic devices. Introduction to VHDL (Very-high-speed Hardware Description Language); Low-end and high-end real-time embedded systems; Introduction to model-based design and rapid prototyping design techniques. Basics of Computer architecture, organization and design: CISC (complex instruction set computer), RISC (Reduced instruction set computer), Harvard and von Neumann architectures. Embedded processor architectures: Xilinx® microprocessor, Xilinx® PicoBlaze™ microcontroller, Xilinx® Microblaze™ soft-processor, IBM PowerPC™440 hard-processor. VLSI design principles and Xilinx® CAD tools for designing and testing VLSI circuits and chips. Basic technology necessary to design FPGA-based digital systems using MATLAB/Simulink® and Xilinx® Design Suite. FPGA architecture, design methodologies, Programming, Implementation with focus in digital signal/image processing.

BMT 726: LEARNING & LINEAR CONTROL THEORY (2 UNITS)

Probabilistic foundations of learning theory. We will discuss topics in regression, estimation, optimal control, system identification, Bayesian learning, and classification. Our aim is to first derive some of the important mathematical results in learning theory, and then apply the framework to problems in biology, particularly animal learning and control of action. Introduction to linear systems: analysis, stability and control. First and second order systems, linear time invariant discrete and continuous systems, convolution, Fourier series, Fourier transforms, Laplace transforms, stability of linear systems, input output and state space representation of linear systems, stability, observability, controllability, and PID controller design. Use of linear systems analysis and control techniques of biomedical engineering. Use of systems analysis techniques to enhance their understanding of biological systems and control systems engineering techniques to design control systems for medical devices. Extensively uses of computer simulation to understand system causality, perform sensitivity analysis, and implement control system tools.

BMT 727: NEUROANATOMY (2 UNITS)

Introducing coverings of brain and spinal cord, topography and structure of spinal cord, basic neuronal arrangements. Classification of neurons and nerves according to function; cranial nerves (intracranial and extracranial); peripheral nerves- nuclei of origin in spinal cord and brainstem, course and distributions; peripheral nerve endings and receptors. Topography of the brainstem and its internal structure. Tracts of spinal cord and brainstem. The cerebral hemisphere: structure, brain commisures, internal capsule functional areas, olfactory region and limbic system, the diencephalons, basal ganglia. The cerebellum- topography, internal structure, connections, functions. Visual and auditory pathways. Ventricles of the brain and cerebrospinal fluid, blood supply of CNS, clinical considerations- motor and sensory disorders, spinal reflexes, eyeballs reflexes.

BMT 728: NONLINEAR ADAPTIVE CONTROL (2 UNITS)

Nonlinear Control Systems: Characteristic of nonlinear system behaviour; linearized models. State-space; approximate construction of state trajectories. Describing functions: use in predicting oscillations. Piecewise-linear systems: point transformation method. Variable-structure systems: sliding-mode control. Compensation for nonlinearities: feedback linearization. Lyapunov function: methods of construction and use. Absolute stability: circle and Popov criteria, small gain theorem.

Adaptive Control Systems: System models for self-tuning: deterministic and stochastic. Structure of adaptive control systems. Adaptation method: direct (implicit) and indirect (explicit). Estimation of parameters: gradient descent, recursive least squares. Controller design by pole assignment.

Control Theory and Industry: Sequence control techniques; industrial control sensors. Stabilization techniques; cement industrial control applications; steel industry and textile control systems; agro-allied, industry applications.

BMT 729: NEUROPHYSIOLOGY (2 UNITS)

Introduction to nervous system organization. Synaptic and functional transmission, somatosensory physiology, ascending spinal tracts, thalamus and sensory cortex, physiology of pain, reflex organization of motor neurons and its control of muscles, monosynaptic stretch reflex, tendon jerk, plantar reflex. The lower motor neurons. Motor cortex cortico-spinal tract pyramidal tract lesion. Posture, the extrapyramidal pathways and regulation of posture. Basal ganglia: Control of movement and posture including function and dysfunction. Cerebellum and motor function/equilibrium. Ascending/descending reticular systems: influence, including slee-wakefulness. The limbic system and physiology of motivation. Physiological correlates of learning memory. Other aspects of physiology including behaviours, emotion, intelligence, personality development, etc.

BMT 730: CARDIO-PULMONARY BIOMECHANICS (2 UNITS)

Broad fields of cardiac and pulmonary biomechanics. Review of anatomy and physiology of the human circulatory and respiratory systems before focusing on engineering approaches to the study of these respective areas of study. Topic areas will include: rheology of blood, mechanics of blood vessels and the airway, steady and unsteady flow models, cardiac and pulmonary bioinstrumentation, cardiac ejection mechanics, mechanics of ventilation, and applications of imaging techniques to study the cardiac and pulmonary systems.

BMT 732: NEURAL CONTROL OF HUMAN LOCOMOTION (2 UNITS)

Fundamental concepts and current issues in neural control of human locomotion. Role of the nervous system in the production of voluntary movement in humans. Neural structures and pathways involved in motor control and feedback, including the cerebral cortex, basal ganglia, cerebellum, brainstem, spinal cord, muscle, sensory receptors, reflex arcs, and other control circuits . The interaction of the motor control system with the environment in functional movements (e.g., reaching, locomotion, and balance) .Typical development and learning of motor control as well as atypical motor control, in the case of motor disorders, Studies the biomechanics and neural control of human locomotion. Kinematics, kinetics and muscle activity patterns of normal walking, measurement systems used in human motion analysis, and neuro-physiological control of locomotion.

BMT 734: APPLIED BIOMEDICAL INSTRUMENTATION (2 UNITS)

Various types of biomedical sensors including sensors measuring pressure, flow, motion, temperature, heat flow, evaporation, bio-potential, bio-magnetism, and chemical quantities. Underlying measurement principles and design will be emphasized. Various practical applications will be introduced.
Fundamental principles of biomedical instrumentation and their application to real-world devices. In a combination of laboratory and classroom exercises, students design, construct, and test biomedical instruments from the ground level up. Emphasis on use of computers and digital signal processing techniques in biomedical instruments.

BMT 799: PGD RESEARCH PROJECT (6 UNITS)

A research project in contemporary Biomedical Engineering/Technology under the supervision of a staff. A detailed report on the research is presented at the completion of the project.

10. STAFF LIST

(a) Academic Staff

S/N	Names	Qualifications	Status	Area of Specializations
1.	Dr. V. A. Akpan	BSc. (Abraka), M.Tech. (Akure), PhD. (Thessaloniki)	Reader / Ag. HOD	Instrumentation, Intelligent Control & Embedded Systems Engineering
2.	Prof. G. C. Okoye	MBBS (Lagos), M.Sc. (Glasgow), Ph.D (Glasgow)	Professor	Rehabilitation Medicine & Bioengineering
3.	Prof. I. A. Adebayo	D.V.M. (Ibadan), M.VSc. (Ibadan), Ph.D (Ibadan)	Professor	Virology and Epideminology
4.	Prof. A. M. Arogunjo	B.Sc. (Ilorin), M.Sc. (Ibadan), Ph.D (Akure)	Professor	Radiation and Health Physics
5.	Prof. B. E. Boboye	B.Tech. (Akure), M.Sc. (Ile-Ife), Ph.D (Switzerland)	Professor	Genetics/Molecular Biology and Biotechnology
6.	Prof. O. A. Dahunsi	B.Eng. (Akure), M.Eng. (Minna), Ph.D (Witwatersrand)	Professor	Intelligent Control and Mechatronics Engineering
7.	Prof. S. P. Ayodeji	B.Eng. (Akure), M.Eng. (Akure), Ph.D (Akure)	Professor	Ergonomics & Orthopaedic Engineering
8.	Prof. B. O. Akinnuli	Dip. In PHE (Benin), B.Eng. (Akure), M.Eng. (Akure), Ph.D (Akure)	Professor	Biomechanics & Rehabilitation Engineering
9.	Dr V.O. Ukwenya	B.Sc. (Ilorin), M.Sc. (Lagos), Ph.D (Ilorin)	Reader	Radiology and Molecular Reproduction
10.	Dr. O. O. Obe	B.Tech. (Akure), M.Sc. (Lagos), Ph.D (Romania)	Reader	Robotics & Automation
11.	Dr. A. A. Ponle	B.Eng. (Akure), M.Eng. (Akure), Ph.D (Sendai, Japan)	Reader	Electronic Instrumentation and Control Engineering
12.	Dr. I. O. Oladele	B.Eng. (Akure), M.Eng. (Akure), Ph.D (Akure)	Reader	Polymer Composite & Biomaterials Engineering
13.	Dr. K. F. Akingbade	HND (Ibadan), PGD (Akure), M.Eng. (Akure) Ph.D (Akure)	Reader	Control Engineering and Telecommunication
14.	Dr. A.O. Kolawole	B.Tech. (Akure), M.Tech. (Akure), Ph.D (Akure)	Reader	Biophysical Chemistry
15.	Dr. E. O. Onagbola	B. Tech., M. Tech. (Akure), Ph.D (Auburn)	Senior Lecturer	Applied Biology
16.	Dr. O. W. Apena	B.Eng. (Akure), M.Eng. (U.K), PhD (U.K)	Senior Lecturer	Instrumentation & Biomedical Engineering
17.	Dr. S. O. Jeje	B.Sc. (Ilorin), M.Sc. (Ibadan), Ph.D (Ibadan)	Senior Lecturer	Reproductive Physiology
18.	Dr. O. M. Ijomone	B.Sc. (Port Harcourt), M.Sc. (Ile-Ife), Ph.D (Ile-Ife)	Senior Lecturer	Neuroanatomy
19.	Dr. G. T. Adedeji	B.Sc. (Ilorin), M.Sc. (Ibadan), Ph.D (Ibadan)	Senior Lecturer	Renal Physiology
20.	Dr. T. S. Olawuyi	B.Sc. (Ilorin), M.Sc. (Ilorin), Ph.D (Port Harcourt)	Lecturer I	Reproductive Anatomy
21.	Dr. S. I. Oyeleye	B.Tech (Akure), M.Tech (Akure), Ph.D (Akure)	Lecturer II	Nutrigenomics & Pharmacology
22.	Dr. O. B. Ogunsuyi	B.Tech (Akure), M.Tech (Akure), Ph.D (Akure)	Lecturer II	Neurobiochemistry

(b) Technical Staff

S/N	Names	Qualifications	Status	Area of Specialization
1	Mr. R. O. Bello	HND (Akure), Final Diploma (NIST), PGD (Akure), M.Tech. (Akure)	Assistant Chief Technologist	Electronic Instrumentation
2	Mr. K. A. Adewole	HND (Ado-Ekitit), PGD (Akure), M.Tech. (Akure)	Assistant Chief Technologist	Building Services
3	Mr. T. Ajiboye	HND (Akure), PGD (Akure), M.Tech. (Benin)	Principal Technologist	Production/Manufacturing Engineering
4	Engr. B. T. Ayeni	OND (Owo), HND (Owo), PGD (Akure)	Technologist I	Control & Embedded Systems Engineering
5	Mr. U. G. Uche	OND (Unwana), HND (Unwana)	Technologist II	Electronic Instrumentation
6	Mr. E. L. Isunu	HND (Akure), PGD (Akure)	Technologist II	Virology & Clinical Microbiology
7	Mrs. M. O. Joseph-Ajayi	HND (Akure), PGD (Akure)	Technologist II	Electronic Instrumentation
8	Mrs. A. A. Adeseko	NCE (Ikere)	Laboratory Assistant	Medical Physics

(c) Administrative Staff

S/N	Names	Qualifications	Status
1	Mrs. Akudo Esther Oluyemi-Awe	OND (Enugu), HND (Yaba), B.Sc (Ikeji)	Deputy Chief Confidential Secretary