



BABCOCK UNIVERSITY

ILISAN-REMO, OGUN STATE, NIGERIA

SCHOOL OF BASIC MEDICAL SCIENCES

DEPARTMENT OF PHYSIOLOGY

BABCOCK UNIVERSITY

ILISAN REMO

OGUN STATE

NIGERIA

WEBSITE: www.babcock.edu.ng

Bachelor of Science (BSc) Physiology

2023 – 2027

ABOUT THE DEPARTMENT OF PHYSIOLOGY

At the heart of understanding health and performance lies the intricate study of body functions. The Department of Physiology is dedicated to unravelling the mysteries of the human body, exploring its complexities from molecular mechanisms to whole-body systems. Our staff, comprised of a diverse team of passionate educators, researchers and professionals, strive to advance knowledge in the field of physiology and its applications in health. Through innovative research and collaborative partnerships, we aim to address pressing health challenges to improve the quality of life. Our commitment extends beyond the classroom and laboratory. We foster a dynamic learning environment that encourages critical thinking, creativity and curiosity. Whether you are a student embarking on your academic journey or a researcher pushing the boundaries of scientific discovery, we welcome you to explore the opportunities that await you in Physiology. We are dedicated to providing an enriching educational experience that empowers students with the knowledge and skills to excel. By cultivating a culture of inclusivity, integrity and excellence, we strive to make meaningful contributions to society by translating our research discoveries into improved healthcare practices and policies. Join us as we push the boundaries of life science research, inspire future generations of scientists and make meaningful contributions to the society.

DEPARTMENT OF PHYSIOLOGY (B.Sc., Physiology)



Oluseyi Abimbola Olayinka

HEAD OF DEPARTMENT

List of Faculty

NAME	RANK	QUALIFICATIONS
ADEGOKE Olufeyisipe Adefunke	Professor	Ph. D, M. Ed., M.Phil., B.Sc.
OLOYO Ahmed Kolade	Professor	Ph. D, M.Sc., B.Sc.
ARIKAWE Adesina Paul	Associate Professor	Ph. D, M.Sc., MBBS
OSONUGA Ifabunmi Oduyemi	Associate Professor	Ph. D, M.Sc., DVM
AJIBOYE Kolawole Isaac	Senior Lecturer	Ph. D, M.Phil., M.Sc., B.Sc.
OLAYINKA Oluseyi Abimbola	Senior Lecturer	Ph. D, PDE, FMLSCN, M.Sc., B.Sc.
AKINDELE Raheem Akinwunmi	Senior Lecturer	FWACS, M.Sc., MBBS
OLUDARE Gabriel Olorunleke	Senior Lecturer	Ph. D, M.Sc., B.Sc.
OGHENETEGA Onome Bright	Lecturer II	Ph. D, PDE, M.Sc., B.Sc.
AKANO Oyedayo	Lecturer II	Ph. D, M.Sc., B.Sc.
OYEBANJO Oyetola Tolulope	Lecturer II	Ph. D, M.Sc., B.Sc.
ADEKUNBI Daniel A.	Lecturer II	Ph. D, M.Sc., B.Sc.
ADEBODUN Great O.	Lecturer II	M.Sc., B.Sc.
MOFOLORUNSO Adekunle M.	Lecturer II	M.Sc., B.Sc.
OKWUTE Patrick Godwin	Lecturer II	M.Sc., B.Sc.
ADEOYE David Ayodeji	Lecturer II	M.Sc., B.Tech.
BADEJOGBIN Olabimpe C.	Assistant Lecturer	M.Sc., B.Sc.
ADEOGUN Adetomiwa Ezekiel	Graduate Assistant	B.Sc.
OLATINWO Goodness Olusayo	Graduate Assistant	B.Tech.
ADEBAYO Oluwadunsin I.	Graduate Assistant	B.Tech.

DEPARTMENT'S VISION STATEMENT

Our vision is to be a global leader in physiology education, research and innovation. We envision a future where our graduates pioneer discoveries to drive transformative changes in healthcare, become leaders in the field, and through our collaborative efforts, shape a healthier world.

MISSION STATEMENT

Our mission is to produce globally competitive life science researchers with solid academic and professional background in physiology through the delivery of holistic education, research and interdisciplinary collaboration.

PHILOSOPHY OF PHYSIOLOGY PROGRAMME

At the core of our undergraduate program in Physiology lies a commitment to fostering a deep understanding of the intricate mechanisms governing the human body. Grounded in the principles of scientific inquiry, critical thinking and hands-on experience, our program is designed to empower students with the knowledge and skills necessary to excel in diverse career paths within the biomedical sciences.

OBJECTIVES

The objectives of the physiology programme will be achieved through: -

Experiential Learning: We believe that active engagement is essential for meaningful learning. Our curriculum integrates classroom instruction with laboratory experiment. Through hands-on experimentation, students not only grasp theoretical concepts but also develop practical skills and scientific reasoning that are vital for success in the field.

Interdisciplinary Approach: Our programme embraces the multidisciplinary nature of Physiology through the offering of a curriculum that provides a comprehensive understanding of physiological processes at multiple levels of organization. Students will be encouraged to explore connections across disciplines, fostering a holistic perspective that enriches their understanding of complex biological systems.

Student - Centred Education: We prioritize the individual growth and success of each student. Our faculty are dedicated mentors who provide personalized guidance, support and encouragement. Small class sizes and collaborative learning environments facilitate meaningful interactions between students and faculty, fostering a sense of community and belonging. We are committed to promoting diversity, equity and inclusion, ensuring that all students have equal opportunities to thrive and succeed.

Through our hands-on experiments and supportive learning environment, we aim to inspire a lifelong passion for the study of Physiology and prepare students to become future leaders and innovators in healthcare, research and beyond.

ADMISSION REQUIREMENTS

Prospective candidates for the program must have five Ordinary Level Credits or equivalent in English Language, Mathematics, Biology, Chemistry, and Physics in not more than two sittings.

For Direct Entry into the 200L, in addition to the Ordinary Level requirements above, candidates must pass A' Level, which must include Mathematics, Biology, Chemistry and Physics.

In addition, candidates must sit and pass the Babcock University screening test (written and oral).

MINIMUM REQUIREMENTS FOR GRADUATION

- A. A minimum of 74 credits of Departmental Courses.
- B. A minimum of 71 credits in courses outside the Department.
- C. Complete, report and defend a research project supervised by a faculty supervisor.

A minimum of 144 credits is required for a student to graduate from the Program.

For the purpose of the minimum standards in Physiology, the courses are categorized into two:

- 1. General Studies/ Education courses
- 2. Core courses

A core (compulsory) course must be taken and passed by all students before they can be awarded a degree.

Cognate courses are to be taken from other departments. For each course specified, the categories to which it belongs and weight (credits) attached are indicated. All courses are listed by the year in which they could be offered on the programme.

A credit of a course is defined as one contact hour of lecture / tutorial / seminar or three hours practical per week in a semester of 17 weeks.

Level	Dept. Courses	GST/BU- GEDS Courses	Non - Dept. Courses	Total
100	3	11	23	37
200	18	10	11	39
300	25	9	-	34
400	28	6	-	34
Total	71	37	34	144

Programmes

The Department of Physiology runs the following academic programmes:

1. B.Sc. Degree in Physiology (8 semesters)
2. M.Sc. Degree in Physiology (Minimum of 3 semesters for regular students)

SUBDIVISION OF COURSES INTO LECTURE, TUTORIAL/PRACTICAL

All students in the School of Basic Medical Sciences should take a minimum load of 16 credits per semester. Tutorials will be held for students in small groups. Thus, a course of one credit would comprise of 12 hours of lecture and 6 hours of tutorial or seminar.

B.Sc. (Hons.) PHYSIOLOGY**100 LEVEL COURSES**

Course Code	Course Title	Status Core / Elective	Semester	
			1 ST	2 ND
BU-GST 011	Citizenship Orientation		0	
BU-GST 012	Citizenship Orientation			0
GST 111	Communication in English	C	2	
GST 112	Nigerian Peoples and Culture	C		2
BU - GST 105	Use Of Library & Study Skills	C	2	
BU - GST 112	Health Principles	C		1
BU - GST 120	ICT Fundamentals & Office Productivity Management	C	1	
BU - GST 126	Life and Teachings of Christ the Messiah	C		3
BIO 101	General Biology I	C	2	
BIO 102	General Biology II	C		2
BIO 107	General Biology Practical I	C	1	
BIO 108	General Biology Practical II	C		1
BU-PIO 128	Introduction to Physiology	C		3
CHM 101	General Chemistry I	C	2	
CHM 102	General Chemistry II	C		2
CHM 107	General Chemistry Practical I	C	1	
CHM 108	General Chemistry Practical II	C		1
PHY 101	General Physics I	C	2	
PHY 102	General Physics II	C		2
PHY 107	General Physics Practical I	C	1	
PHY 108	General Physics Practical II	C		1
MTH 101	Elementary Mathematics I	C	2	
COS 101	Introduction to Computing Sciences	C	3	
TOTAL (37 Credits)			19	18

B.Sc. (Hons.) PHYSIOLOGY

200 LEVEL COURSES

Course Code	Course Title	Status Core / Elective	Semester	
			1 ST	2 ND
BU-GST 021	Citizenship Orientation		0	
BU-GST 022	Citizenship Orientation			0
ENT 211	Entrepreneurship and Innovation	C	2	
GST 212	Philosophy, Logic and Human Existence	C		2
BU - GST 200	Communication in French	C		1
BU - GST 215	Adventist Heritage	C	3	
BU - GST 220	Origins and Science	C		1
BU - GST 221	Introduction to Agriculture	C	1	
BU - GST 290	Introduction to Data Analytics	C	1	
ANA 203	General and Systemic Embryology	C	2	
PIO 201	Introductory Physiology & Blood	C	2	
PIO 203	Physiology of Excitable Tissues	C	2	
PIO 212	Renal & Body fluids Physiology	C		2
PIO 214	Introduction to Cardiovascular and Respiratory Physiology	C		3
PIO 216	Gastrointestinal Physiology	C		2
PIO 218	Introduction to Laboratory Physiology I	C		1
BU - PIO 231	Audiometry	C	2	
BU - PIO 234	Spirometry	C		2
BU - PIO 235	Electrocardiography	C	3	
BCH 201	General Biochemistry I	C	2	
BCH 202	General Biochemistry II	C		2
BCH 203	General Biochemistry Practical I	C	1	
BIO 208	Biostatistics	C		2
TOTAL (39 Credits)			21	18

B.Sc. (Hons.) PHYSIOLOGY

300 LEVEL COURSES

Course Code	Course Title	Status Core / Elective	Semester	
			1 ST	2 ND

BU-GST 031	Citizenship Orientation		0	
BU-GST 032	Citizenship Orientation			0
ENT 312	Venture Creation	C		2
GST 312	Peace and Conflict Resolution	C		2
BU - GST 310	Data Analysis Using Advanced Excel SPSS Power BI Tableau	C	1	
BU - GST 312	Family Life	C		1
BU - GST 317	Fundamentals Of Christian Faith	C	3	
PIO 301	Reproduction	C	2	
PIO 302	Physiology Entrepreneurship	C		2
PIO 303	Endocrinology	C	2	
PIO 305	Neurophysiology I	C	2	
PIO 307	Neurophysiology II	C	2	
PIO 309	Practical Physiology II	C	1	
PIO 310	General Principles of Pharmacology	C	2	
PIO 350	Students' Industrial Work Experience Scheme	C		6
BU - PIO 331	Introduction to Epigenetics	C	3	
BU - PIO 332	Regenerative Physiology	C		3
BU - PIO 334	Echocardiography	C		3
TOTAL (34 Credits)			18	19

B.Sc. (Hons.) PHYSIOLOGY

400 LEVEL COURSES

Course Code	Course Title	Status Core / Elective	Semester	
			1 ST	2 ND
BU-GST 041	Citizenship Orientation		0	
BU-GST 042	Citizenship Orientation			0
BU - GST 440	E-Project Management and Simulation	C	3	
BU - GST 400	Religion and Social Ethics	C	3	
PIO 401	Seminar Presentation I	C	1	
PIO 403	Research Methodology	C	2	
PIO 414	Cardiopulmonary Physiology	C		2
PIO 416	Exercise & Sports Physiology	C		2
PIO 490	Research Project	C		6
BU - PIO 422	Physiology of Mental Health	C		2
BU - PIO 427	Physiology of Phytochemistry	C	2	
BU - PIO 432	Environmental Physiology	C		2

BU - PIO 434	Computational Physiology	C		3
BU - PIO 435	Review of Some Systems in Physiology	C	3	
BU - PIO 437	Physiology of Aging	C	3	
TOTAL (34 Credits)			17	17

100 Level Physiology Course Description

GST 111: Communication in English

(2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. identify possible sound patterns in English language;
2. list notable language skills;
3. classify word formation processes;
4. construct simple and fairly complex sentences in English;
5. apply logical and critical reasoning skills for meaningful presentations;
6. demonstrate an appreciable level of the art of public speaking and listening; and
7. write simple technical reports.

Course Contents

Sound patterns in English, language (vowels and consonants, phonetics and phonology), English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations), sentence in English (types: structural and functional, simple and complex), grammar and usage (tense, mood, modality and concord, aspects of language use in everyday life), logical and critical thinking and reasoning methods (logic and syllogism, inductive and deductive argument and reasoning methods, analogy, generalisation and explanations), ethical considerations, copyright rules and infringements, writing activities: (pre-writing, writing, post-writing, editing and proofreading; brainstorming, outlining, paragraphing, types of writing, summary, essays, letters, curriculum vitae, report writing, note making, mechanics of writing), comprehension strategies: (reading and types of reading, comprehension skills, 3RsQ), information and communication technology in modern language learning, language skills for effective communication, major word formation processes, writing and reading comprehension strategies, logical and critical reasoning for meaningful presentations, the art of public speaking and listening, and report writing.

GST 112: Nigerian Peoples and Culture

(2 Units C: LH 30)

Learning Outcomes

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

1. analyse the historical foundation of Nigerian culture and arts in pre-colonial times;
2. list and identify the major linguistic groups in Nigeria;
3. explain the gradual evolution of Nigeria as a political unit;
4. analyse the concepts of trade, economic and self-reliance status of the Nigerian peoples towards national development;
5. enumerate the challenges of the Nigerian state towards nation building
6. analyse the role of the judiciary in upholding people's fundamental rights
7. identify acceptable norms and values of the major ethnic groups in Nigeria; and
8. list and suggest 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 culture; peoples and culture of the ethnic minority 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; the nationalist movement and struggle for independence), Nigeria and challenges of nation building (military intervention in Nigerian politics; the Nigerian civil war), the concept of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigeria people; trade, skill acquisition and self-reliance), social justices and national development (law definition and classification, judiciary and fundamental rights, individual, 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 3R's – reconciliation, reconstruction and rehabilitation ; operation feed the nation (OFN), green revolution, austerity measures, war against indiscipline (WAI), war against indiscipline and corruption(WAIC), mass mobilization for self-reliance, social justice and economic recovery (MAMSER), national orientation agency (NOA), current socio-political and cultural developments in Nigeria.

BIO 101: General Biology I

(2 Units C: LH 30)

Learning Outcomes

At the end of lectures in Plant Biology, students should be able to:

1. explain cells structures and organisations;
2. summarize functions of cellular organelles;
3. characterize living organisms and state their general reproduction;
4. describe the interrelationship that exists between organisms;
5. discuss the concept of heredity and evolution; and

6. enumerate habitat types and their characteristics.

Course Contents

Cell structure and organisation, functions of cellular organelles. characteristics and classification of living things. chromosomes, genes; their relationships and importance. general reproduction. interrelationships of organisms (competitions, parasitism, predation, symbiosis, commensalisms, mutualism, saprophytism). heredity and evolution (introduction to Darwinism and Lamarckism, Mendelian laws, explanation of key genetic terms). elements of ecology and types of habitats.

BIO 102: General Biology II (2 Units C: LH 30)

Learning Outcomes

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

1. List the characteristics, methods of identification and classification of Viruses, bacteria and fungi;
2. state the unique characteristics of plant and animal kingdoms;
3. describe ecological adaptations in the plant and animal kingdoms;
4. explain nutrition, respiration, excretion and reproduction in plants and animals; and
5. describe growth and development in plants and animals.

Course Contents

Basic characteristics, identification and classification of viruses, bacteria and fungi.

A generalized survey of the plant and animal kingdoms based mainly on the study of similarities and differences in the external features. Ecological adaptations. Briefs on physiology to include nutrition, respiration, circulatory systems, excretion, reproduction, growth and development.

BIO 107: General Biology Practical I (1 Unit C: PH 45)

Learning Outcomes

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

1. outline common laboratory hazards;
2. provide precaution on laboratory hazards;
3. state the functions of the different parts of microscope;
4. use the microscope and describe its maintenance;
5. draw biological diagrams and illustrations; and
6. apply scaling and proportion to biological diagrams.

Course Contents

Common laboratory hazards. prevention and first aid. measurements in biology. uses and care of microscope. compound and dissecting microscope. Biological drawings and illustration, scaling, accuracy and proportion. use of common laboratory apparatus and laboratory experiments designed to illustrate the topics covered in **BIO 101**.

BIO 108: General Biology Practical II

(1 Unit C: PH 45)

Learning Outcomes

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

1. describe the anatomy of flowering plants;
2. differentiate types of fruit and seeds;
3. state ways of handling and caring for biological wares;
4. describe the basic histology of animal tissues; and
5. identify various groups in the animal kingdom.

Course Contents

Anatomy of flowering plants, primary vegetative body. stem, leaf and root to show the mature tissues namely parenchyma, collenchyma, sclerenchyma, xylem and phloem. Types of fruits and seeds. Care and use of dissecting kits and other biological wares. Dissection and general histology of animal tissues based on vertebrate forms. Morphology and functions of epithelial, muscular, nervous and connective tissues. Examination of various groups of lower invertebrates under microscopes, identification of various groups of organisms in Animal Kingdom, and any experiment designed to emphasize the practical aspects of topics in BIO 102.

CHM 101: General Chemistry I

(2 Units C: LH 30)

Learning Outcomes

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

1. define atom, molecules and chemical reactions;
2. discuss the Modern electronic theory of atoms;
3. write electronic configurations of elements on the periodic table;
4. justify the trends of atomic radii, ionization energies, electronegativity of the elements based on their position in the periodic table;
5. identify and balance oxidation – reduction equation and solve redox titration problems;
6. illustrate shapes of simple molecules and hybridized orbitals;
7. identify the characteristics of acids, bases and salts, and solve problems based on their quantitative relationship;
8. 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;
9. analyse and perform calculations with the thermodynamic functions, enthalpy, entropy and free energy; and
10. 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. Hybridization 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 102: General Chemistry II

(2 Units C: LH 30)

Learning Outcomes

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

1. state the importance and development of organic chemistry;
2. define fullerenes and its applications;
3. discuss electronic theory;
4. determine the qualitative and quantitative of structures in organic chemistry;
5. describe rules guiding nomenclature and functional group classes of organic chemistry;
6. determine rate of reaction to predict mechanisms of reactions;
7. identify classes of organic functional group with brief description of their chemistry;
8. discuss comparative chemistry of group 1A, IIA and IVA elements; and
9. describe 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 nanotubes, 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 107: General Chemistry Practical I

(1 Unit C: PH 45)

Learning Outcomes

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

1. describe the general laboratory rules and safety procedures;
2. collect scientific data and correctly carrying out Chemical experiments;
3. identify the basic glassware and equipment in the laboratory;
4. tell the differences between primary and secondary standards;
5. perform redox titration;
6. record observations and measurements in the laboratory notebooks; and
7. analyse the data to arrive at scientific conclusions.

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.

CHM 108: General Chemistry Practical II

(1 Unit C: PH 45)

Learning Outcomes

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

1. identify the general laboratory rules and safety procedures;
2. collect scientific data and correctly carrying out Chemical experiments;
3. identify the basic glassware and equipment in the laboratory;
4. identify and carry out preliminary tests which includes ignition, boiling point, melting point, test on known and unknown organic compounds;
5. execute solubility tests on known and unknown organic compounds;
6. execute elemental tests on known and unknown compounds; and
7. conduct functional group/confirmatory test on known and unknown 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.

PHY 101: General Physics I (Mechanics)

(2 Units C: LH 30)

Learning outcomes

At the end of the course, 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;
5. evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;
6. explain and apply the principles of conservation of energy, linear and angular momentum;
7. describe the laws governing motion under gravity;
8. 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 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). Coordinate systems. 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 102: General Physics II (Electricity & magnetism) (2 Units C: LH 30)

Learning Outcomes

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

1. describe the electric field and potential, and related concepts, for stationary charges;
2. calculate electrostatic properties of simple charge distributions using Coulomb's law, Gauss's law, and electric potential;
3. describe and determine the magnetic field for steady and moving charges;
4. determine the magnetic properties of simple current distributions using Biot-Savart and Ampere's law;
5. describe electromagnetic induction and related concepts and make calculations using Faraday and Lenz's laws;
6. explain the basic physical of Maxwell's equations in integral form;
7. evaluate DC circuits to determine the electrical parameters;
8. determine the characteristics of ac voltages and currents in resistors, capacitors, and Inductors.

Course Contents

Forces in nature. Electrostatics (electric charge and its properties, methods of charging). Coulomb's law and superposition. Electric field and potential. Gauss's law. Capacitance. Electric dipoles. Energy in electric fields. Conductors and insulators. DC circuits (current, voltage and resistance. Ohm's law. Resistor combinations. Analysis of DC circuits. Magnetic fields. Lorentz force. Biot-Savart and Ampère's laws. Magnetic dipoles. Dielectrics. Energy in magnetic fields. Electromotive force. Electromagnetic induction. Self and mutual inductances. Faraday and Lenz's laws. Step up and step-down transformers. Maxwell's equations. Electromagnetic oscillations and waves. AC voltages and currents applied to inductors, capacitors, and resistance.

PHY 107: General Practical Physics I (1 Unit C: PH 45)

Learning Outcomes

At the end of the course, students 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.

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, etc. (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.

PHY 108: General Practical Physics II

(1 Unit C: PH 45)

Learning Outcomes

At the end of the course, students 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;
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.

MTH 101: Elementary Mathematics I

(2 Units C: LH 30)

Learning Outcomes

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

1. explain basic definition of set, subsets, union, intersection, complements and 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 Content

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.

COS 101: Introduction to Computing Sciences

(3 Units C: LH 30; PH 45)

Learning Outcomes

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

1. explain basic components of computers and other computing devices;

2. describe the various applications of computers;
3. explain information processing and its roles in the society;
4. describe the Internet, its various applications and its impact;
5. explain the different areas of the computing discipline and its specializations; and
6. demonstrate practical skills on using computers and the internet.

Course contents

Brief history of computing. Description of the basic components of a computer/computing device. Input/Output devices and peripherals. Hardware, software and human ware. Diverse and growing computer/digital applications. Information processing and its roles in society. The Internet, its applications and its impact on the world today. The different areas/programs of the computing discipline. The job specializations for computing professionals. The future of computing.

Lab Work: Practical demonstration of the basic parts of a computer. Illustration of different operating systems of different computing devices including desktops, laptops, tablets, smart boards and smart phones. Demonstration of commonly used applications such as word processors, spreadsheets, presentation software and graphics. Illustration of input and output devices including printers, scanners, projectors and smartboards. Practical demonstration of the Internet and its various applications. Illustration of browsers and search engines. How to access online resources.

BU - PIO 128: Introduction to Physiology (3 Units; Core; LH= 30)

Learning Outcomes

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

1. State two (2) functions each of the nervous, endocrine, cardiovascular, respiratory, digestive and renal systems.
2. Explain two (2) physiological mechanisms which regulate body functions.
3. Enumerate three (3) body systems with functional interdependence.
4. Discuss at least two (2) importance of regulating body functions.
5. Identify two (2) systems involved in homeostasis.

Course Content

An overview of body systems. Functions of body systems. The nervous system. Functions of the nervous system. Introduction to cardiovascular system. Functions of the cardiovascular system. Respiratory system. Functions of the respiratory system. Endocrine system. Functions of the endocrine system. Renal system. Functions of renal system. Introduction to reproductive system. Functions of the reproductive system. Homeostasis. Metabolism. Energy balance. Mechanisms regulating body functions.

200 Level Physiology Course Description

ENT 211: Entrepreneurship and Innovation

(2 Units C: LH 30)

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; analyze the importance of micro and small businesses in wealth creation, employment, and financial independence;
3. engage in entrepreneurial thinking;
4. identify key elements in innovation;
5. describe stages in enterprise formation, partnership and networking including business planning;
6. describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world;
and
7. state the basic principles of e-commerce.

Course Contents

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 (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 forming alliances and joint ventures), contemporary entrepreneurship issues (knowledge, skills and technology, intellectual property, virtual office, networking), entrepreneurship in Nigeria (biographies of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship) and basic principles of e-commerce.

GST 212: Philosophy, Logic and Human Existence (2 Units C: LH 30)

Learning Outcomes

A student who has successfully gone through this course should be able to:

1. identify the basic features of philosophy as an academic discipline;
2. identify the main branches of philosophy & the centrality of logic in philosophical discourse;
3. describe 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, etc.

PIO 201: Introductory Physiology and Blood

(2 Units C: LH 30)

Learning Outcomes

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

1. describe the composition of a cell membrane;
2. explain how a potential difference across a membrane will influence the distribution of a cation and an anion;
3. describe how transport rates of certain molecules and ions are accelerated by specific membrane transport proteins;
4. distinguish between active (primary and secondary) transport, facilitated diffusion, and

- passive diffusion based on energy source and carrier protein involvement;
5. identify the mechanisms and role of selective transporters for amino acids, neurotransmitters, nutrients, etc.;
 6. understand the general concepts of homeostasis and the principles of positive and negative feedback in physiological systems;
 7. identify the site of erythropoietin production, the stimulus for its release, and the target tissue for erythropoietin action;
 8. discuss the normal balance of red blood cell synthesis and destruction, including how imbalances in each lead to anemia or polycythemia;
 9. list and differentiate the various types of leukocytes;
 10. describe the role of thrombocytes in haemostasis; and
 11. list clotting factors and discuss the mechanism of anti-coagulants.

Course Contents

Introduction and history of physiology. Structure and functions of cell membranes. Transport process. Special transport mechanism in amphibian bladder, kidney, gall bladder, intestine, astrocytes and exocrine glands. Biophysical principles. Homeostasis and control systems including temperature regulation. Biological rhythms. Composition and functions of blood. Haemopoiesis. WBC and differential count. Plasma proteins Coagulation, fibrinolysis and platelet functions. Blood groups – ABO system – Rh system. Blood transfusion – indication for collection and storage of blood, hazards of blood transfusions. Reticulo- endothelial system. Immunity and immunodeficiency disease and HIV.

PIO 203: Physiology of Excitable Tissues

(2 Units C: LH 30)

Learning outcomes

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

1. list the steps in excitation-contraction coupling in skeletal muscle;
2. describe the structure of the neuromuscular junction;
3. list some intracellular factors that can cause muscle fatigue;
4. describe the distinguishing characteristics of multi-unit and unitary smooth muscles;
5. explain the steps in the excitation-contraction coupling mechanism in cardiac muscle and compare with skeletal muscle including different mechanisms for sarcoplasmic reticulum calcium release;
6. explain how the resting membrane potential is generated
7. state the Nernst equation, and indicate how this equation accounts for both the chemical and electrical driving forces that act on an ion;
8. discuss the mechanisms by which an action potential is propagated along both nonmyelinated and myelinated axons;
9. describe the principle of the voltage clamp and how it is used to identify the ionic selectivity of channels; and
10. discuss the disorders that can occur at the neuromuscular junction.

Course Contents

Structure and functions of nerves, cardiac muscle, smooth muscle and skeletal muscle, Muscles: structure, excitation, theories of excitation-contraction. Membrane potentials. Nerve generation

and conduction of impulse and its physiological properties. Synapses and synaptic transmission

PIO 212: Renal and Body Fluids Physiology

(2 Units C: LH 30)

Learning Outcomes

On completion of this course, the student should be able to;

1. sketch a cross section of a kidney; identify the renal cortex, renal medulla, renal calyces, medullary pyramids, renal pelvic space, renal artery, renal vein, and ureter;
2. describe renal blood flow, renal plasma flow, glomerular filtration rate, and filtration fraction and list typical values;
3. explain the concept of renal clearance. Use the clearance equation and an appropriate compound to estimate the glomerular filtration rate, renal plasma flow, and renal blood flow;
4. describe the effects of reductions in GFR on plasma creatinine concentrations and plot the relationship;
5. discuss the role of the ascending limb of the loop of Henle in producing a high renal interstitial fluid osmolality. From the loop of Henle, contrast the tubular fluid and interstitial fluid osmolality changes that allow either a dilute or a concentrated urine to be produced and excreted;
6. describe processes that lead to acid-base disturbances and list the common causes;
7. identify major routes and normal ranges for water intake and loss, and predict how changes in intake and loss affect the distribution of total body water.
8. list the various body fluid compartments and their ionic compositions
9. describe the methods used in measuring the body fluid compartments and
10. discuss the role of the kidney in maintaining homeostasis of body fluids

Course Contents

Macroscopic, microscopic and ultra-structure of the kidney. Elements of renal functions. Glomerular filtration. Concept of clearance. Tubular reabsorption and secretion. Renal blood flow. Body fluid and electrolyte balance. Buffer mechanism and pH regulation. Counter-current system. Micturition. Abnormalities of renal functions. Composition and estimation of body fluid compartments. Concept of water and electrolyte balance. Role of the kidney in body fluid homeostasis.

PIO 214: Introduction to Cardiovascular and Respiratory Physiology (3 Units C: LH 45)

Learning Outcomes

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

1. state Starling's law of the heart and describe the application of the law in keeping the output of the left and right ventricles equal;
2. describe how ionic currents contribute to the four phases of the cardiac action potential;
3. explain the ionic mechanism of pacemaker automaticity and rhythmicity, and identify

- cardiac cells that have pacemaker potential and their spontaneous rate;
4. identify neural and humoral factors that influence their rate;
 5. describe the various phases of ventricular systole and ventricular diastole;
 6. describe the timing and causes of the four heart sounds;
 7. explain why the ECG tracing looks different in each of the 12 leads;
 8. explain the principles underlying cardiac output measurements using the Fick principle, dye dilution, and thermodilution methods;
 9. list the factors that shift laminar flow to turbulent flow;
 10. describe the relationship between velocity, viscosity, and audible events, such as murmurs and bruits;
 11. describe how arterial systolic, diastolic, mean, and pulse pressure are affected by changes in a) stroke volume, b) heart rate, c) arterial compliance, and d) total peripheral resistance;
 12. define the Starling equation and discuss how each component influences fluid movement across the capillary wall;
 13. list the anatomical components of the baroreceptor reflex;
 14. explain three positive feedback mechanisms activated during severe hemorrhage that may lead to circulatory collapse and death;
 15. define compliance and identify two common clinical conditions in which lung compliance is higher or lower than normal;
 16. list the factors that determine total lung capacity, functional residual capacity, and residual volume;
 17. define surface tension and describe how it applies to lung mechanics, including the effects of alveolar size and the role of surfactants;
 18. explain how the shape of the oxyhemoglobin dissociation curve influences the uptake and delivery of oxygen;
 19. list the forms in which carbon dioxide is carried in the blood; and
 20. identify the regions in the central nervous system that play important roles in the generation and control of normal respiration.

Course Contents

The heart; events of the cardiac cycle. Control of cardiac contractility. Cardiac electrophysiology. Properties of cardiac muscles. Cardiac output - measurement and control. Haemodynamics of circulation. Arterial blood pressure and its regulation. Cardiovascular reflexes. Peripheral resistance and local control of the circulation. Regional blood flow. Cardiovascular changes in exercise, haemorrhage and shock. Respiratory physiology – functions of upper respiratory tract. Mechanics of respiration including compliance. Surfactant. Lung volume and capacities. Pulmonary gas exchange. Blood gas transport. Pulmonary function tests. Nervous and chemical control of respiration. Response to hypoxia, high altitude, exercise and artificial respiration.

PIO 216: Gastrointestinal Physiology

(2 Units C: LH 30)

Learning Outcomes

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

1. compare and contrast the regulation of gut function by nerves, hormones, and paracrine regulators;
2. identify the cell type and anatomical location of the endocrine cells secreting major GI

- hormones, such as gastrin, secretin, cholecystokinin (CCK), GLP-1, GLP-2, leptin, and motilin;
3. list the physiological functions of the components of saliva;
 4. describe the role of HCl in the gastric digestion of carbohydrates and protein, and how pepsinogen is activated;
 5. list the mechanisms contributing to gastric mucosal defense and how they can be compromised by drugs or pathogens;
 6. list the stimuli that release secretin and CCK and explain the route by which these regulatory peptides stimulate the pancreas;
 7. describe the cellular mechanisms for the hepatic uptake, conjugation, and secretion of bile salts and bilirubin;
 8. describe the sequential digestion of ingested starch by enzymes of the salivary glands, pancreas, and the intestinal apical membrane;
 9. describe the mechanisms and molecules mediating the solubilization and digestion of lipids in the small intestine; and
 10. describe the disorders of motility that can lead to gastroparesis, achalasia, diarrhea, constipation, megacolon and irritable bowel syndrome.

Course Contents

Physiologic anatomy of the gastrointestinal tract, Review of smooth muscle function, Secretions in the G.I.T. and their control, Movements of the gastrointestinal tract, Digestion and absorption of various food substances, Physiologic anatomy of the liver and biliary system including their functions, Disorders of G.I.T, The gut as an endocrine organ. Nutrition: energy and other dietary requirements. Basal metabolic rate. Nitrogen balance. Amino acid deficiency. Hormonal control of nutritional needs, vitamins, mineral mechanisms. Food value of local foodstuffs. Diet sheets and nutritional deficiency states.

PIO 218: Introduction to Laboratory Physiology I (1 Unit C: PH 45)

Learning Outcomes

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

1. acquaint themselves with the proper handling of laboratory equipment;
2. dissects laboratory animals and mount an isolated organs for a specific experiment;
3. use human subjects for some of the experiments like blood grouping, etc.;
4. take recordings of an experiment and interpret the results accordingly; and
5. understand basic laboratory management techniques and safety measures.

Course Contents

Laboratory sessions on basic physiology experiments, especially those related to the frog sciatic nerve, smooth muscles and blood physiology.

BU - PIO 231: Audiometry

(2 Units; Core; LH= 15; PH= 30)

Learning outcomes

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

1. State one (1) principle of audiometry.
2. Operate two (2) audiometry equipment.
3. Perform three (3) audiometric assessments.
4. Describe three (3) hearing defects.
5. Interpret at least two (2) types of audiometric results.

Course Contents

Structures and functions of auditory system. Sound and its properties. Hearing assessment techniques. Mechanism of hearing. Principle of audiometry. Types of hearing tests. Techniques in audiometry. Setting up audiometric equipment. Operating audiometric equipment. Performing hearing tests. Interpretation of audiometric results. Causes of hearing defects. Auditory processing disorders and their assessment. Rehabilitation and management of hearing loss. Hearing aids and cochlear implants. Paediatric audiology. Industrial audiology. Preventive measures against hearing defects. Basic research in audiometry. Ethical issues in audiology practice. Professional standards of practice and quality assurance.

BU - PIO 234: Spirometry

(2 Units; Core; LH= 15; PH= 30)

Learning outcomes

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

1. State one (1) principle of spirometry.
2. Discuss two (2) roles of spirometry in evaluating lung function.
3. Operate one (1) spirometry equipment.
4. Perform one (1) calibration and quality control check on spirometry equipment.
5. Describe three (3) spirometry tests.

Course Contents

Introduction to spirometry. Structure and function of the respiratory system. Principle of spirometry. Role of spirometry in evaluating lung function. Types of respiratory conditions diagnosed with spirometry. Types of spirometry tests. Spirometry equipment and accessories. Calibration and maintenance of spirometry equipment. Use of sensors for various spirometry tests. Forced vital capacity (FVC). Forced expiratory volume in one second (FEV1). Peak expiratory flow (PEF). Interpretation of spirometry results. Preparation of patients for spirometry. Positioning for spirometry tests. Proper breathing techniques for spirometry testing. Quality control of spirometry results. Interpretation of Spirometry data.

BU - PIO 235: Electrocardiography

(3 Units; Core; LH= 30; PH= 45)

Learning Outcomes

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

1. Explain two (2) principles of ECG.
2. List three (3) components of a normal ECG waveform.
3. Describe three (3) abnormal and one (1) normal ECG waveform.
4. State two (2) clinical implications of different abnormal ECG findings.
5. Interpret five (5) abnormal ECG findings.

Course Contents

Structure and physiology of the heart. Electrical conduction system. Introduction to Electrocardiogram. ECG lead placement. Waveform characteristics. ECG interpretation. Components of a normal ECG waveform. Heart rate calculation. Normal ECG variations. Abnormal ECG Findings. Sinus arrhythmias. Atrial arrhythmias. Ventricular arrhythmias. AV conduction disturbances. Advanced ECG Concepts. Electrolyte imbalances and their effect on ECG. Myocardial infarction and ECG changes. Pacemaker function and ECG interpretation. ECG Interpretation Practice. Hands-on ECG interpretation sessions.

ANA 203: General and Systemic Embryology

(2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. explain how the embryo forms from the zygote;
2. discuss the role of cleavage and gastrulation in animal development;
3. demonstrate an understanding of embryology and significance of prenatal diagnostic methods;
4. describe structural features of primordia in tissue and organs at different developmental stages; and
5. define risk periods in histo- and organogenesis, and to analyse the most often observed developmental anomalies.

Course Contents

Spermatogenesis, oogenesis; ovarian follicles; ovulation; corpus luteum; menstruation; uterine cycle; hormonal control of uterine cycle; fertilization; cleavage; implantation; reproductive technologies-IVF/surrogacy/embryo transfer; embryo manipulation & potency/twinning; molecular embryology and transgenesis; gastrulation; notochord, neurulation; derivatives of the germ layers; folding of the embryo; fetal membranes; placenta; development of limbs and teratology, growth and perinatology; congenital malformations – general introduction, the cardiovascular system, skin, structure of the nails and hair, macrophagic system; cellular immunology; lymphoid organs; glands – endocrine and exocrine, respiratory system, digestive system, urinary and genital systems, and electron micrograph studies of each organ.

BCH 201: General Biochemistry I

(2 Units C: LH 30)

Learning Outcomes

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

1. explain the structure of different macromolecules in biological system;
2. identify types of chemical reactions involving these macromolecules;
3. explain the various methods of isolation of these macromolecules;
4. estimate the effects of acids and alkalis on the macromolecules;
5. describe how to purify the macromolecules; and
6. discuss quantification of the various macromolecules.

Course Contents

Introductory chemistry of amino acids, their properties, reactions and biological functions. Classification of amino acids: neutral, basic and acidic; polar and non-polar; essential and non-essential amino acids. Peptides. Introductory chemistry and classification of proteins. Biological functions of proteins. Methods of their isolation, purification and identification. Primary, secondary, tertiary and quaternary structures of proteins. Basic principles of tests for proteins and amino acids. Introductory chemistry of carbohydrates, lipids and nucleic acids. Nomenclature of nucleosides and nucleotides, effects of acid and alkali on hydrolysis of nucleic acids.

BCH 202: General Biochemistry II

(2 Units C: LH 30)

Learning Outcomes

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

1. describe the structure of the cell including its components;
2. discuss the interrelationship between different organelles of the cell;
3. recognize the differences between plant and animal cells;
4. isolate the various organelles of both plant and animal cells; and
5. discuss the influence of hydrogen ion concentration on cellular function.

Course Contents

The cell theory. Structures and functions of major cell components. Cell types, constancy and diversity. Cell organelles of prokaryotes and eukaryotes. Chemical composition of cells. Centrifugation and methods of cell fractionation. Structure, function and fractionation of extra-cellular organelles. Water, total body water and its distribution. Regulation of water and electrolyte balance. Disorder of water and electrolyte balance. Acidity and alkalinity, pH and pK values and their effects on cellular activities.

BCH 203: General Biochemistry Practical I

(1 Unit C: PH 45)

Learning Outcomes

At the end of the course, students will be able to understand the various laboratory procedures used in the study of various biochemical processes described in BCH 201 and 202.

Course Contents

Laboratory experiments designed to reflect the topics covered in BCH 201 and BCH 202.

Introduction to laboratory methods and procedures employed in studying biochemical processes.

BIO 208: Biostatistics

(2 Units C: LH 30)

Learning Outcomes

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

1. differentiate between continuous and discontinuous data;
2. explain sampling procedures in biology;
3. summarize and present biological data;
4. describe measures of central tendency and probability theory; and
5. conduct ANOVA, Chi-square, t-tests and F-tests and state their importance.

Course Contents

Variability in biological data: continuous and discontinuous variables. statistical sampling procedures. observations and problems of estimation. representation and summarization of biological data. frequency distribution. measures of central tendency and dispersion. Probability theory. normal, binomial and Poisson distribution. t-test, f-test and chi-square test. analysis of variance (ANOVA) and covariance. principles of experimental design. correlation, linear and curvilinear regression and transformation.

300 Level Physiology Course Description

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 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, unutilised 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 e-commerce 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 (IoTs), Blockchain, Cloud Computing, Renewable Energy etc. Digital business and e-commerce strategies).

GST 312: Peace and Conflict Resolution

(2 Units C: LH 30)

Learning Outcomes

At the end of the 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 roles of international organisations, media and traditional institutions in peace building.

Course Contents

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; Zango-Kartaf, 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 Nigerian legal system, insurgency and terrorism, peace mediation and peace keeping, peace & security council (international, national and local levels), agents of conflict resolution – conventions, treaties community policing: evolution and imperatives, alternative dispute resolution, ADR. dialogue b). arbitration, c). negotiation d). collaboration, etc., 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, media and traditional institutions in peace building, managing post-conflict situations/crisis: refugees, internally displaced persons, IDPs and the role of NGOs in post- conflict situations/crisis.

PIO 301: Reproduction

(2 Units C: LH 30)

Learning Outcomes

On completion of this course, students should be able to;

1. describe developmental changes in the male and female reproductive systems, including the mechanisms responsible for these changes, during in utero development, and in childhood through puberty;
2. list the physiological functions of the major components of the male reproductive tract;
3. discuss the biosynthesis, mechanism of transport within the blood, metabolism and elimination of testosterone and related androgens;
4. list the causes and consequences of over-secretion and under-secretion of testosterone for a) prepubertal and b) postpubescent males;
5. explain the roles of FSH, LH, estradiol, and inhibin in oogenesis and follicular maturation;
6. list the actions and cellular mechanisms of estrogens;
7. list the actions and cellular mechanisms of progesterone and other progestins;
8. describe the development and the major physiological functions of the placenta;
9. discuss the neuroendocrine regulation of milk secretion and milk ejection; and
10. explain the physiological basis of steroid hormone contraception.

Course Contents

Fertilization. Structures of ectodermal, mesodermal and endodermal origins and embryogenesis of different organs. Medical genetics. Physiologic anatomy of male reproductive system. Spermatogenesis. Male sexual act-nervous co-ordination. Male sexual hormones. Cryptorchidism. Physiological anatomy of the female reproductive system. The female sex hormones. Oestrous and menstrual cycles. Physiology of pregnancy, parturition and lactation. Pregnancy tests. Contraception and physiological basis of infertility.

P10 303: Endocrinology

(2 Units C: LH 30)

Learning Outcomes

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

1. list the hypothalamic factors that control the secretion of each of the anterior pituitary hormones and describe their route of transport from the hypothalamus to the anterior pituitary;
2. list the 3 major families of the anterior pituitary hormones and their biosynthetic and structural relationships;
3. describe the posterior pituitary lobes with respect to cell types, vascular supply, development, and anatomical function relative to the hypothalamus;
4. identify the steps in the biosynthesis, storage, and secretion of tri-iodothyronine (T3) and thyroxine (T4) and their regulation;
5. describe the regulation of parathyroid hormone secretion and the role of the calcium-sensing receptor;
6. identify the major hormones secreted from the endocrine pancreas, their cells of origin, chemical nature and physiological actions;
7. list the functional zones (one medullary and three cortical zones), innervation, blood supply, principal hormones secreted from each zone of the adrenal glands;

8. identify the major physiological actions and therapeutic uses of glucocorticoids;
9. list the major mineralocorticoids and identify their biological actions and target organs or tissues; and
10. identify the chemical nature of catecholamines, their biosynthesis, mechanism of transport within the blood, and how they are degraded and removed from the body.

Course Contents

Nature of hypothalamo-hypophyseal relationship. Synthesis, storage and release of the neurohypophyseal and adenohypophyseal hormones. Functions of the hypothalamus to include regulation of body temperature, thirst appetite and food intake. Regulation of adenohypophyseal function and higher autonomic control. Functions and control of the secretions of the pituitary, thyroid, parathyroid, pancreas and adrenal glands. Abnormalities of endocrine functions. Normal integration in the control of calcium and glucose metabolism.

PIO 305: Neurophysiology 1

(2 Units C: LH 30)

Learning Outcomes

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

1. explain how inhibitory and excitatory post-synaptic potentials can alter synaptic transmission;
2. list the major receptor classifications and representative receptor agonists;
3. describe the cutaneous and proprioceptive mechanoreceptors and their function;
4. describe formation and reabsorption of cerebral spinal fluid (CSF), including the anatomy and function of the choroid plexus;
5. compare and contrast the barrier mechanisms between the blood brain barrier and the blood CSF barrier and the consequences of barrier break down;
6. describe the major areas of the cerebral cortex and their roles in perception and motor coordination. Identify the Brodmann areas for visual, auditory, somatosensory, motor, and speech areas;
7. discuss the pathways for pain/temperature/coarse touch system and its connections to the cerebral cortex;
8. list the neural components of the dorsal column-medial lemniscus system and its trigeminal analogs;
9. describe the functions of the medial and lateral motor pathways and trace their origins and terminations within the spinal cord;
10. describe the physiologic-anatomy of the major ascending tracts (anterolateral and dorsal column-medial lemniscus systems) and descending spinal cord tract (cortico-spinal tract, CST), including crossing of midline;
11. list the functions of the following brainstem reflexes: cardiovascular baroreceptor, respiratory stretch receptor, cough reflex, pupillary light reflex, gag reflex, and blink reflex;
12. explain the role of the brain stem reticular formation in pain perception and modulation, level of consciousness, integration of brainstem reflexes, and the location of noradrenergic, serotonergic, and dopaminergic nuclei;
13. list the physiological functions of the Hypothalamus;
14. list the three functional divisions of the cerebellum, detailing the input and output connections of each. Describe how these areas are integrated with the lateral and medial motor pathways;

15. discuss the overall functions of the basal ganglia in the initiation and control of movement;
16. describe how the amygdala interacts with the cerebral cortex to produce cognitive emotional behaviours;
17. describe the three states of human brain activity based on EEG, EOG and EMG recordings; and
18. distinguish the major characteristics of the major seizure disorders: grand mal, Absence seizure (Petite mal), simple partial and complex partial seizures, and status epilepticus.

Course Contents

Functional organization of CNS. Autonomic neurotransmitters and autonomic effects. Peripheral nervous system. The reflex arc and general properties of reflexes. Receptors and receptor potentials. Cerebrospinal fluid and the blood-brain barrier. The human brain — cerebrum, brain stem, basal ganglia, thalamus, hypothalamus and cerebella. The limbic system. Electrophysiology of the cerebral cortex, the electroencephalogram. Alertness and sleep. Postural regulation and postural reflexes. Speech, learning and memory. Conditioned reflexes and spinal cord transection.

PIO 307: Neurophysiology II

(2 Units C: LH 30)

Learning Outcomes

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

1. describe the gross structure of the eye and basic physiological optics;
2. draw a diagram of the retino-thalamo-cortical pathways;
3. describe the pupillary light reflex and its diagnostic value;
4. discuss the processing of information in the visual cortex and the consequence of a lesion in the higher visual association areas;
5. list the mechanical structures involved in sound detection;
6. draw a diagram of the auditory pathways including all central connections;
7. list the most important vestibular and associated reflexes;
8. list the major types of eye movements;
9. describe the location, structure, and afferent pathways of taste receptors;
10. describe the structure and function of the central taste centers;
11. describe the location, structure, and afferent pathways of smell receptors; and
12. explain how olfactory receptors are activated and the mechanism of olfactory transduction.

Course Contents

Physiology of vision: structure of the eyeball. Optics – eye an optical instrument. Refraction of light and refractive errors. Accommodation. Visual pathways and visual defects. Structure of retina. Biochemistry of vision. Visual acuity, fields of vision and color vision.

Physiology of hearing: Auditory stimulus and sound appreciation. Sound characteristics: pitch, intensity and quality. Auditory pathways, neural basis of audition. Types of deafness and tests of both nerve functions. Audiometry. Vestibular pathway and vestibulo-ocular reflex

Physiology of taste: gustatory system receptors – taste buds and sensation of tastes. Afferent pathways. Tests for taste and abnormality of taste.

Physiology of smell: olfactory receptors and pathways. Tests of olfaction. Abnormalities of olfaction and olfactometry.

PIO 309: Physiology Practical II

(1 Unit C: PH 45)

Learning Outcomes

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

1. acquaint themselves with the proper handling of laboratory equipment;
2. dissect laboratory animals and mount an isolated organs for a specific experiment;
3. use human subjects for some of the experiments like ECG, etc
4. take recordings of an experiment and interpret the results accordingly.; and
5. understand more laboratory management techniques and safety measures

Course Contents

Laboratory sessions on physiology experiments related to cardiovascular physiology, gastric secretions, respiratory, renal and neurological functions.

PIO 302: Physiology Entrepreneurship

(2 Units C: LH 30)

Learning Outcomes

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

1. appreciate the role of entrepreneurship in Physiology in the 21st century;
2. discuss entrepreneurship knowledge, skills and attitudes and their roles for a successful business in Physiology;
3. identify the different entrepreneurial opportunities available in Physiology;
4. identify and discuss the barriers to a successful entrepreneurship in Physiology; and
5. develop at least two (2) different business models in Physiology.

Course Contents

Concepts of entrepreneurship, entrepreneurial knowledge, skills and attitudes needed in the 21st century in the field of Physiology, definition of small business, strengths and weaknesses of small business, trends expected of small businesses, ethics and social responsibility - the role that values play in ethical behaviour and the importance of ethics; ethics versus social responsibility, the business plan in Physiology; the need for a business plan, the steps in the preparation of a business plan and financial plans, location of a business in Physiology; importance of site selection for a business, processes for selecting the right site for a business, financing a business in Physiology; estimating the money needed to launch a new business, ways to raise money for a new business, organizational planning for a business in Physiology; staffing. training and organizational charts.

PIO 390: Students' Industrial Work Experience (3 Units C: PH 135)

Learning Outcomes

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

1. describe the skills acquired during the industrial attachment;
2. relate the skills acquired to physiological principles learnt; and
3. list the entrepreneurial potentials of the skills they have acquired.

Course Contents

Students will be posted to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industry-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training.

PIO 310: General Principles of Pharmacology (2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. know the various routes of drug administration and how they influence onset of drug action;
2. know the factors that affect drug absorption, distribution, metabolism and excretion;
3. understand the role of receptors as targets for drug action;
4. understand the fundamental differences between agonists and antagonists; and
5. know the common system parameters in pharmacokinetics and their measurements.

Course Contents

Introduction: history of Pharmacology and relationship of Pharmacology to other pharmaceutical and clinical subjects, pharmacology textbooks and journals, definition and sources of drugs, routes of drug administration, drug absorption, distribution, elimination and factors affecting them, enzyme induction and enzyme inhibition, mechanisms of drug action
– receptor and non-receptor theory, drug dosage and dose response curves, and measurement of some pharmacological parameters.

BU - PIO 331: Introduction to Epigenetics (3 Units; Core; LH= 30; PH= 45)

Learning outcomes

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

1. State one (1) principle underlying epigenetic modifications.
2. Describe two (2) relationships between epigenetic regulation and gene expression.
3. Explain two (2) roles of epigenetics in human and environmental health.
4. Describe three (3) techniques used to study epigenetic regulation.
5. Analyse one (1) epigenetic data.

Course content

Introduction to epigenetics. Epigenetic mechanisms. DNA methylation. DNA methylation and gene expression. Techniques for studying DNA methylation. Histone proteins and their modifications. Histone modifications and gene expression. Histone modifications and disease. Histone modifications techniques. Non-coding RNAs. Non-coding RNAs and epigenetic regulation. Non-coding RNAs and disease. Techniques for studying non-coding RNAs. Epigenetic Inheritance. Epigenetic inheritance and disease. Techniques for studying epigenetic inheritance. Epigenetics and Development. Epigenetic regulation during development. Epigenetics and cell differentiation. Epigenetic regulation in stem cells.

Epigenetic regulations. Epigenetics and Disease. Epigenetic changes in various diseases. Epigenetic regulation and drug development. Epigenetics and the environment.

BU - PIO 332: Regenerative Physiology

(3 Units; Core; LH= 30; PH= 45)

Learning outcomes

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

1. Explain one (1) principle of regenerative physiology.
2. Identify two (2) types of stem cells and their potential in regenerative physiology.
3. Discuss one (1) emerging trend in regenerative physiology.
4. State two (2) ethical implications of regenerative physiology.
5. Describe one (1) potential use of regenerative physiology.

Course Contents

Regenerative Physiology. Cellular Mechanisms of Regeneration. Signalling pathways involved in regeneration. Stem cells and role in regeneration. Regeneration in different tissues and organs. Molecular mechanisms of regeneration. Gene expression and regulation. Epigenetic modifications and role in regeneration. Role of extracellular matrix in regeneration. Regeneration in muscle and bone tissue. Regeneration in nervous system and brain. Regeneration in heart and liver. Regeneration in disease and injury. Regeneration in cancer and tumours. Regeneration in chronic diseases such as diabetes and arthritis. Regeneration after injury. Regeneration in aging and age-related diseases. Clinical applications of regenerative physiology. Regenerative therapies. Stem cell therapy. Gene therapy and gene editing. Ethical implications of regenerative medicine. Career prospects in regenerative physiology.

BU - PIO 334: Echocardiography

(3 Units; Core; LH= 30; PH= 45)

Learning outcomes

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

1. State two (2) physical principles of echocardiography.
2. Identify four (4) structures of the heart using echocardiography.
3. Recognize one (1) normal and one (1) abnormal cardiac anatomy and physiology.
4. Perform two (2) basic echocardiographic measurements and calculations.
5. Interpret two (2) echocardiographic findings with clinical data.

Course Contents

Introduction to echocardiography. Ultrasound transducers and Echocardiogram machines. Image acquisition and optimization. Normal cardiac structure and function. Echocardiographic views and planes. Echocardiographic evaluation of cardiac function. M-mode and Doppler echocardiography. Calculation of haemodynamic parameters. Assessment of valvular function. Evaluation of myocardial ischemia and infarction. Echocardiography in Cardiac Pathology. Pericardial disease. Infective endocarditis. Aortic disease. Pulmonary hypertension. Cardiac tumours and masses. Clinical applications of Echocardiography. Echocardiography in cardiac disease management. Integration of echocardiography with other imaging modalities.

400 Level Physiology Course Description

PIO 401: Seminar Presentation I

(1 Unit C: LH 15)

Learning Outcomes

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

1. identify a topic of current interest in advancing the knowledge of physiology;
2. search for the appropriate literature in the chosen topic; and
3. prepare and disseminate the knowledge using the appropriate format within a time frame.

Course Content

A seminar on current concepts or advances on a specific topic in Human Physiology. The aim is to develop in the student the ability to search for past and current literature on any given topic.

PIO 403: Research Methodology

(2 Units C: LH 30)

Learning Outcomes

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

1. describe the different types of research designs;

2. discuss the various types of referencing systems;
3. identify the various sources of Information for Literature review;
4. enumerate the different sampling methods with their merits and demerits;
5. compare and contrast between parametric and non-parametric statistics;
6. identify the regulatory bodies for research ethics and their mandates;
7. list the fundamentals of research ethics
8. discuss the use of computer packages in research.
9. describe the concept of population; and
10. describe the steps in writing a research project.

Course Contents

Introduction to biomedical research. Types of research designs. Literature review. Identification of research gaps and referencing styles. Sampling and sampling techniques. Questionnaire design and validation. Data analysis and presentation. Ethics in biomedical research. Use of computer packages in research and presentations.

PIO 414: Cardiopulmonary Physiology

(2 Units C: LH 30)

Learning Outcomes

1. On completion of this course, students should be able to: describe the historical developments in cardiovascular and respiratory physiology;
2. discuss the progressive changes in maternal blood volume, cardiac output, and peripheral resistance during pregnancy and at delivery;
3. list the functions in utero of the fetal ductus venosus, foramen ovale, and ductus arteriosus. Explain the mechanisms causing closure of these structures at birth;
4. describe the redistribution of cardiac output during various degrees of exercise to the CNS, coronary, splanchnic, cutaneous, and skeletal muscle vascular beds during sustained exercise (distance running). Explain the relative importance of neural and local control in each vascular bed;
5. list the various causes of hypertension and discuss the underlying mechanisms;
6. discuss the direct cardiovascular consequences of the loss of 30% of the circulating blood volume on cardiac output, central venous pressure, and arterial pressure. Describe the compensatory mechanisms activated by these changes;
7. list the factors that determine total lung capacity, functional residual capacity, and residual volume. Describe the mechanisms responsible for the changes in those volumes that occur in patients with emphysema and pulmonary fibrosis;
8. differentiate between the two broad categories of restrictive and obstructive lung disease, including the spirometric abnormalities associated with each category;
9. discuss the physiology of jet lag; and
10. describe the mechanism of Nitrogen narcosis in deep sea diving.

Course Contents

Developmental milestones in cardiovascular and respiratory physiology. Cardiopulmonary function in the fetus and in old age. Cardiopulmonary responses at rest and in moderate to severe stress conditions. Pathophysiology of hypertension, obstructive and restrictive lung diseases. Principles of servomechanism as applied to cardiopulmonary physiology. Aviation, space and deep-sea physiology.

PIO 416: Exercise and Sports Physiology

(2 Units C: LH 30)

Learning Outcomes

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

1. define the thermoregulatory set point and describe the negative feedback control of body core temperature and the role of the hypothalamic set point;
2. compare the normal distribution of cardiac output with the distribution of cardiac output during aerobic (sustained) exercise and anaerobic (brief maximal burst) exercise;
3. describe the redistribution of cardiac output during exercise to the CNS, coronary, splanchnic, cutaneous, and skeletal muscle vascular beds during sustained exercise (distance running).
4. explain the relative importance of neural and local control in each vascular bed;
4. define VO_{2MAX} and identify situations in which it is limited by cardiac output, pulmonary gas exchange, and skeletal muscle blood flow and oxygen uptake;
5. discuss the changes in renal blood flow and glomerular filtration rate caused by an increase in renal sympathetic nerve activity during exercise;
6. describe the health benefits of exercise training on the cardiovascular, musculoskeletal, endocrine, immune and nervous systems;
7. discuss how exercise training alters insulin action and glucose entry into cells;
8. Define exercise and classify the different forms of exercise;
9. Distinguish between an isometric and isotonic contraction; and
10. List the energy sources of muscle contraction and rank the sources with respect to their relative speed and capacity to supply ATP for contraction and how they are different in the three muscle types.

Course Contents

Definitions of physical exercise and sport. Energy expenditure during physical exercise. Cardiovascular, respiratory and renal adjustments during physical exercise. Thermoregulatory system in exercise. Water and electrolytes balance in exercise. The integrated neural and hormonal control during physical exercise. The health benefits of physical exercise and the role of exercise in the management of various health conditions.

BU - PIO 422: Physiology of Mental Health

(2 units; Core: LH= 30)

Learning Outcomes

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

1. Describe two (2) physiological processes contributing to mental health disorders.
2. State two (2) neurotransmitter functions impacted by drugs.
3. Identify three (3) impacts of stress on mental health.
4. State four (4) ethical considerations in conducting research on mental health.
5. Identify four (4) of the limitations of existing research in mental health.

Course Contents

Physiology and mental health. Physiological processes involved in mental health disorders. Neurotransmitters. Neurotransmitter imbalances. Neurotransmitter activity. Drug therapy and mental

health. The impact of drug therapy on neurotransmitter activity. The role of the brain in mental health. Brain regions and mental health. Brain injury and disease on mental health. Brain imaging techniques and mental health research. Applications of brain imaging techniques. Stress and mental health. Physiological response to stress. Stress and mental health disorders. Animal models in mental health research. Genetics and mental health disorders. Genetic factors in mental health.

BU - PIO 427: Physiology of Phytochemistry

(2 Units; Core; LH= 30; PH= 30)

Learning outcomes

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

1. List at least five (5) phytochemicals present in plants.
2. State the effects of phytochemicals on two (2) body systems.
3. Enumerate three (3) phytochemicals used in traditional and modern medicine.
4. Analyse at least two (2) research papers on the use of phytomedicine in the treatment of one medical condition.
5. State two (2) side effects of a known traditional phytochemical compound.

Course Contents

Introduction to phytochemistry. Phytochemical composition of locally available plants. Physiological effects of phytochemicals on body systems. Mechanisms of action of phytochemicals. Types of phytochemical compounds. Traditional and modern uses of phytomedicine. Side effects of phytochemicals. Interaction of phytochemicals with body systems. Plant-based therapies in clinical practice. Nervous system effects of phytochemicals. Immune system effects of phytochemicals. Antioxidant effects of phytochemicals. Cardiovascular effects of phytochemicals. Respiratory effects of phytochemicals. Effect of phytochemicals on the gastrointestinal system. Pharmacokinetics of phytochemicals. Research methods on assessing phytochemical efficacy. Economic implication of phytochemistry.

BU - PIO 432: Environmental Physiology

(2 Units; Core; LH= 30)

Learning outcomes

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

1. List three (3) physiological responses of organisms to changes in the environment.
2. State two (2) principles of thermoregulation and osmoregulation.
3. Discuss three (3) benefits of physiological responses to changes in the environment.
4. Describe at least one (1) laboratory experiment to measure physiological responses to different environmental conditions.
5. Analyse two (2) physiological responses that play a role in enabling living organisms to survive in different environments.

Course content

Introduction to environmental physiology. Homeostatic regulatory mechanisms. Thermoregulation. Osmoregulation. Physiological responses to changes in environmental temperature. Effect of

environmental changes on respiratory physiology. Physiological adaptations to extreme environments. Environmental stressors and impacts on health. Air pollution and respiratory health. Climate change and impacts on human health. Physiological effect of exposure to environmental chemicals. Environmental ethics and policy. Laboratory experiments to measure physiological responses to different environmental conditions. Implications of environmental changes for organismal physiology. Environment-induced systemic dysfunctions. Environmental conservation strategies. Optimizing physiological functions in adverse environment.

BU - PIO 434: Computational Physiology (3 Units; Core; LH= 30; PH= 45)

Learning outcomes

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

1. Describe two (2) computational approaches used in studying physiological systems and processes.
2. Apply two (2) computational methods to model physiological systems.
3. Analyse and interpret one (1) set of physiological data using appropriate statistical and computational techniques.
4. State two (2) principles of systems physiology and their applications.
5. Demonstrate proficiency in the use of two (2) computational tools for modelling.

Course Contents

Introduction to mathematical concepts. Techniques of modelling physiological systems. Differential equations. Numerical methods. Statistical analysis. Principles of systems physiology. Application of computational models in systems physiology. Simulation of complex biological systems. Introduction to computational tools. Techniques for modelling physiological data. Techniques for analysing physiological data. Programming languages. Data visualization. Software for simulation. Data analysis. Research applications of computational physiology. Application of computational physiology in medicine, pharmacology and biomedical engineering.

BU - PIO 435: Review of Some Systems in Physiology (3 Units; Core; LH= 45)

Learning Outcome

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

1. Describe three (3) functions of each system in the human body.
2. Analyse the role of two (2) physiological processes in the development and progression of disease.
3. Enumerate three (3) interactions that maintain normal bodily functions.
4. Explain two (2) mechanisms that regulate homeostasis.
5. Apply one (1) knowledge of systemic physiology to one real-life scenario.

Course Content

Cellular physiology. Homeostasis. Blood physiology. Fluid and electrolyte balance. Energy metabolism. Signal transduction. Cardiovascular system. Respiratory System. Gastrointestinal System. Renal System. Neurophysiology. Endocrine System. Integration of body systems. The interactions between different systems of the body. Feedback mechanisms. Hormonal regulation of homeostasis. Control of body temperature. Immune system. Reproductive system.

BU - PIO 437: Physiology of Aging

(3 Units; Core; LH= 30)

Learning outcomes

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

1. Describe three (3) physiological changes that occur during the aging process.
2. Explain two (2) theories of aging.
3. List five (5) factors that contribute to healthy aging and longevity.
4. Identify three (3) impacts of aging on the different systems of the body.
5. Describe two (2) relationships between aging and the development of diseases.

Course Contents

Physiology of aging. Theories of aging. Mechanisms of aging. Oxidative stress. DNA damage and repair. Telomeres and telomerase. Epigenetics. Mitochondrial dysfunction. Cardiovascular system and aging. Strategies for maintaining cardiovascular health. Respiratory system and aging. Age-related respiratory diseases. Strategies for maintaining respiratory health. Nervous system and aging. Age-related neurological diseases. Endocrine system and aging. Changes in hormone levels and function with age. Age-related endocrine diseases. Strategies for maintaining endocrine health. Factors contributing to healthy aging and longevity. Nutrition and aging. Exercise and aging. Stress and aging. Sleep and aging.

PIO 490: Research Project

(6 units C: PH= 230)

Learning Outcomes

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

1. prepare the final write-up of the research project using the appropriate format within the stipulated time frame; and
2. present and defend the write-up of the research project.

Course Contents

Independent research findings into selected areas/topics of interest to be supervised by an academic staff. Students will be required to carry out literature survey on the topics, perform experiments and produce reports (preferably at the end of second semester). Students will be subjected to both seminar and oral examination on the projects undertaken.

