EDO STATE UNIVERSITY UZAIRUE

EDO STATE, NIGERIA

FACULTY OF BASIC MEDICAL SCIENCES

DEPARTMENT OF BIOCHEMISTRY

STUDENT HANDBOOK

FOR UNDERGRADUATE PROGRAMME

2023-2028 EDITION

Administrative Building

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NOTES ON THE UNIVERSITY

The WHEEL represents technological and innovative advancement. It shows that the University is at the forefront of technological and innovative advancements.

The BEAKER and the TEST TUBE represent scientific expertise and meritorious research. They reveal that Edo State University Uzairue is a centre for scientific expertise and laudable research

The COMPASS represents modern methods of educational delivery. It shows that at Edo State University, lectures are delivered using modern educational facilities.

The KEY represents the knowledge potential for future leadership. It reveals that Edo State University is poised to equip students with the knowledge and potential to be future leaders.

The BOOK represents quality education, research and groundbreaking discoveries. It shows that Edo State University Uzairue is a centre for quality education, research and groundbreaking discoveries, all for the development of humanity.

The University colours are Blue, Lemon Green and White. The Blue colour represents harmonizing industry and technology. Lemon green colour represents agriculture: the main occupation of the people of Edo State, especially, the Edo North. White represents peace, which is the hallmark of the Edo people.

Edo State University Uzairue Motto: Quality Education for Development
The motto "Quality Education for Development" positions Edo State University Uzairue as a citadel of learning where the search for truth and academic excellence are pursued for the advancement of man and his culture.

Vision: The vision of Edo State University is to become a centre of excellence in quality teaching, research, innovation and community development.

Mission: Through its teaching, research, and innovative activities, the University is poised to be a major contributor to the advancement of knowledge, wisdom and understanding for the benefit of the University in encouraging and promoting scholarship and will relate its activities to social, cultural and economic needs of the people of Edo State in particular and Nigeria in general.

FORWARD

You are welcome to the Department of Biochemistry, Edo State University Uzairue, Edo State, Nigeria. Let me congratulate you on your recent admission to study Biochemistry in this world class University. In the course of your studentship in this University, you will take courses designed to equip you with requisite skills and knowledge capable of making you a world class Biochemist. Biochemistry has to do with reactions in cellular and subcellular levels in living systems; this includes microorganisms, plants and animals. It is thus referred to as the Chemistry of life. Being a laboratory-based discipline, it also incorporates techniques developed in Chemistry and Biology. Biochemistry has also contributed significantly to Medical Science, Genetics, Pharmaceutical Sciences, Agriculture, Food and Nutritional Science, Forensic Science among other disciplines. Additionally, Biochemistry plays an important role in research and development. This is contingent on the development of drugs and other therapies capable of managing diseases/disorders once thought to be incurable and development of diagnostic tools among others. It is indeed a thing of pride to be a Biochemist.

The B.Sc. Programme in the Department commenced in 2016, being one of the pioneering programmes in the University. It is designed to empower students with the basic general knowledge and skills in various areas of Biochemistry. The B.Sc. curriculum in EDSU is student-centered and employs the latest teaching facilities in the dissemination of knowledge. This is in addition to well trained and exposed Academic staff who will be willing to provide guidance, answer your questions and receive feedback on any problem you encounter in your studies. I, therefore advice you to make good use of these resources.

This handbook has been put in place to provide you with information aimed at making your academic sojourn as easy as possible. You should also check the noticeboards regularly and other University-approved information platforms for reliable information.

It is my hope that upon the completion of your B.Sc. programme, you will be able to utilize Biochemical skills in solving life problems, thus contributing your quota to the development of the society

Olulope Olufemi AJAYI, Ph. D.

Lecturer-in-Charge

PREFACE

This edition of the B.Sc. students' handbook is aimed at being a compendium of necessary information expected to be a reference point and a guide for students. It contains information on course registration, units of courses expected to be registered per semester, learning outcomes, objective, course content of each course and graduation requirements among other things. It also informs on adequate staffing. This becomes necessary to keep to the NUC guidelines.

It is my hope that you will find the information in this handbook helpful. I therefore wish you a fulfilling academic journey in the world class University

Olulope Olufemi AJAYI, Ph. D.

Lecturer-in-Charge

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ACADEMIC STAFF LIST

S/N	NAME	QUALIFICATION	STATUS
1	AJAYI, Olulope O.	B.Sc. (UNAD), M.Sc. (Ibadan), Ph.D. (Ibadan)	Lecturer I/Lecturer-in-Charge
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4	UGBENYEN, Anthony M.	B.Sc. (Ekpoma), M.Sc. (Ibadan), Ph.D. (Fort Hare)	Associate Professor
5	OSIBEMHE, Martin	B. Sc. (Ekpoma), M.Sc. (Benin), Ph.D. (Benin)	Senior Lecturer (On sabbatical in the Department)
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TECHNICAL AND ADMINISTRATIVE STAFF LIST

S/N	NAME	QUALIFICATION	STATUS
1	OLORI Eric O.	B.Sc. (Ilorin), M. Sc. (Ilorin)	Scientist I
2	ITSE, U.	HND (Auchi)	Technologist II
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4	AIMOMOH Joseph I.	HND (Auchi)	Confidential Secretary
5	SALIU Nana A.	SSCE	Clerical Officer

B.Sc. Biochemistry

Overview

Biochemistry programme is designed to enable graduates acquire broad based knowledge of chemical processes in living organisms ranging from single to multi- cellular organisms, both plants and animals. The first year of the programme is designed to prepare the students to acquire sound background knowledge of relevant science subjects, which would be a foundation to prepare them for specialized knowledge of Biochemistry. During the second and third year, the programme will expose the students to fundamental constituents (macro and micro) that constitute life processes and their dynamics. This will prepare them to appreciate the consequences of various deviations from normal during the final year.

Philosophy

Biochemistry programme provides broad based education that explains chemical processes that take place in living organisms and the causes of various deviations, which can invariably lead to pathological conditions. It also provides basis for manipulation of normal processes to achieve desired outcome. Products of the programme will be suitable for employment in health, food and related industries. They can also be self- employed.

Objectives

The main objectives of the degree programme in biochemistry would be to:

1. provide students with a broad and balanced foundation of biochemical knowledge and practical skills;
2. develop in students the ability to apply knowledge and skills to solving theoretical and practical problems in biochemistry;
3. develop in students, a range of transferable skills that are of value in biochemical and non-biochemical employment
4. provide students with knowledge and skills base from which they can proceed to further studies in specialised areas of biochemistry or multi-disciplinary areas involving biochemistry;
5. provide, through training and orientation, an appreciation of the rewards of inter- and multi-disciplinary approach to the solution of complex life problems; and
6. generate in students an appreciation of the importance of biochemistry in industrial, economic, environmental, technological and social development.

Unique Features of the Programme

The unique features of the programme include:

1. development, in the students, of high cognitive abilities and skills related to biochemistry and other life sciences;
2. students would be introduced to properties of flora and fauna, which are abundant in the tropics that may enable their use for drug development;

3. graduates would be capable of exhibiting practical skills in biochemistry, including knowledge of safety issues in laboratories and instrumentation;
4. graduates would be able to develop scientific information literacy skills to support independent learning and industrial knowledge; and
5. graduates would be able to demonstrate critical thinking skill to solve problems relating to biochemistry and other life sciences.

Employability Skills

1. Graduates would be familiar with various biochemical processes used in industries.
2. They will imbibe a sense of enthusiasm for biochemistry as central to other life sciences.
3. Appreciation of biochemical application in other related fields.
4. They can be self-employed by establishing relevant small and medium scale enterprises.

21st Century Skills

1. Critical thinking, problem solving, reasoning, analysis, interpretation and synthesizing information.
2. Predictability skills without using live specimen.
3. Creativity, imagination, innovation and personal expression.
4. Research skill and practices and interrogative questioning.
5. Oral and written communication.
6. ICT literacy, data interpretation and analysis.

Admission and Graduation Requirements

Admission Requirements

1. The entry requirements for a four-year degree programme shall be senior secondary certificate (SSC) credit passes (WASC; NECO or equivalent) in five subjects at not more than two sittings. Such subjects shall include English language, Mathematics, Biology, Chemistry and Physics. In addition, an acceptable pass in the Unified Tertiary Matriculation Examination (UTME) is required for admission into 100 Level.
2. Candidates with five SSCE (or equivalent) credit passes with at least two at the GCE Advanced Level or IJMB or JUPEB in Biology and Chemistry, may be considered for admission into 200 Level.

Graduation Requirements

Expected duration for UTME candidates shall be 4 years and students are required to pass a minimum of 120 units. For direct entry students, expected duration for graduation shall be 3 years and would be expected to pass a minimum of 90 units which must include all compulsory courses.

Global Course Structure
100 level

Course Code	Course Title	Unit(s)	Status
GST 111	Communication in English I	2	C
GST 112	Nigerian Peoples and Culture	2	C
MTH 101	Elementary Mathematics I	2	C
MTH 102	Elementary Mathematics II	2	C
COS 101	Introduction to Computing Sciences	3	C
BIO 101	General Biology I	2	C
BIO 102	General Biology II	2	C
BIO 107	General Biology Practical I	1	C
BIO 108	General Biology Practical II	1	C
CHM 101	General Chemistry I	2	C
CHM 102	General Chemistry II	2	C
CHM 107	General Chemistry Practical I	1	C
CHM 108	General Chemistry Practical II	1	C
PHY 101	General Physics I	2	C
PHY 102	General Physics II	2	C
PHY 107	Experimental Physics I	1	C
PHY 108	Experimental Physics II	1	C
TOTAL		**29**	

200 Level

Course Code	Course Title	Unit(s)	Status
GST 212	Philosophy, logic and Human Existence	2	C
BCH 201	General Biochemistry I	2	C
BCH 202	General Biochemistry II	2	C
BCH 203	General Biochemistry Practical	1	C
ENT 211	Entrepreneurship and Innovation	2	C
STAT 201	Statistics for Agriculture and Biological Sciences	3	C
Course Code	**Course Title**	**Unit(s)**	**Status**
EDSU-BCH 222	Functional Biochemistry	3	C
EDSU-CHM 207	General Chemistry Practical III	1	C
EDSU-CHM 208	General Chemistry Practical IV	1	C
EDSU-CHM 210	Physical Chemistry I	2	C

EDSU-CHM 211	Organic Chemistry I	2	C
EDUS-CHM 212	Inorganic Chemistry I	2	C
EDSU-CHM 213	Analytical Chemistry I	2	C
EDSU-AEB 211	Genetic Variability	2	E
EDSU-MCB 221	General Microbiology	2	C
TOTAL		**29**	

300 Level

Course Code	**Course Title**	**Unit(s)**	**Status**
GST 312	Peace Studies and Conflict Resolution	2	C
ENT 312	Venture creation	2	C
BCH 301	Introduction to Enzymology	2	C
BCH 302	Metabolism of Carbohydrates	2	C
BCH 303	Metabolism of Lipids	2	C
BCH 304	Metabolism of Amino Acids & Proteins	2	C
BCH 305	Metabolism of Nucleic Acids	2	C
BCH 306	Analytical Methods in Biochemistry	3	C
BCH 307	Membrane Biochemistry	2	C
BCH 308	Bioenergetics	2	C
BCH 309	Inorganic Biochemistry	1	C
BCH 399*	Industrial Training (SIWES) (12 Weeks)	3	C
Course Code	**Course Title**	**Unit(s)**	**Status**
EDSU-BCH 310	Introductory Molecular Biology	2	C
EDSU-BCH 314	Experimental Biochemistry II	2	C
EDSU-BCH 317	Biochemistry of Hormones	3	E
EDSU-BCH 324	Basic Immunology	3	C
EDSU-ENT 321	Entrepreneurial Skills (Practical course)	1	C
EDSU-CHM 303	Organic Chemistry II	2	C
TOTAL		**38**	

*To take place during the long vacation between 300 and 400 Levels

400 Level.

Course Code	**Course Title**	**Unit(s)**	**Status**
BCH 401	Advanced Enzymology	2	C
BCH 402	Molecular Biochemistry	2	C
BCH 403	Metabolic Regulations	3	C
BCH 404	Biochemical Reasoning	1	C
BCH 405	Plant Biochemistry	3	C
BCH 406	Project	6	C
BCH 407	Bioinformatics	2	C
BCH 408	Biochemical Entrepreneurship	2	C

Course Code	Course Title	Unit(s)	Status
EDSU-BCH 414	Biochemistry of Selected Organs and Tissue	3	E
EDSU-BCH 415	Clinical Biochemistry and Pharmacology	3	C
EDSU-BCH 416	Forensic Biochemistry	3	E
EDSU-BCH 417	Seminar and Biochemistry Literature	2	C
EDSU-BCH 419	Food/Nutritional Biochemistry	3	E
EDSU-BCH 425	Advanced Immunology	2	E
EDSU-BCH 426	Biochemical Engineering	2	E
EDSU-BCH 427	Environmental Biochemistry and Toxicology	2	E
EDSU-ENT 421	Entrepreneurship Development.	1	C
TOTAL		**42**	

100 Level

GST 111: Communication in English (2 Units, Core: 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 and 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 and collocations). Sentence in English (types, structural and functional, simple and complex). Grammar and usage (tense, mood, modality, concord and 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, letter, curriculum vitae, report writing, note making and 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. Art of public speaking and listening. Report writing.

GST 112: Nigerian Peoples and Culture (2 Units, Core: LH=30)

Learning Outcomes

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

1. analyse the historical foundation of the 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 and colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914, formation of political parties in Nigeria, nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics and Nigerian Civil War). 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 Nigeria 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 – Reconstruction, Rehabilitation and Re-orientation; re-orientation strategies: 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

MTH 101: Elementary Mathematics I (Algebra and Trigonometry) (2 Units, Core: LH 30)

Learning Outcomes

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

1. explain basic definition of set, subset, union, intersection, complements and use of venn diagrams;
2. solve quadratic equations;
3. solve trigonometric functions;
4. identify the various types of numbers; and 5. solve some problems using binomial theorem

Course Contents

Elementary set theory, subsets, union, intersection, complements and venn diagrams. Real numbers, integers, rational and irrational numbers, mathematical induction, real sequences and

series, theory of quadratic equations and binomial theorem. Complex numbers, algebra of complex numbers and the argand diagram. De-Moivre's theorem, nth roots of unity. circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae.

MTH 102: Elementary Mathematics II (Calculus) (2 Units, Core: LH=30)

Learning Outcomes

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

1. identify the types of rules in differentiation and integration;
2. describe the meaning of function of a real variable, graphs, limits and continuity; and
3. solve some applications of definite integrals in areas and volumes.

Course Contents

Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation. Extreme curve sketching, integration as an inverse of differentiation. Methods of integration and definite integrals. Application to areas and volumes.

COS 101: Introduction to Computing Sciences (3 Units, Core: 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

BIO 101: General Biology I (2 Units, Core: LH=30)

Learning Outcomes

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

1. explain cell structure and organizations;
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 Lamarkism, Mendelian laws, explanation of key genetic terms). Elements of ecology and types of habitat.

BIO 102: General Biology II (2 Units, Core: 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, Core: PH=45)

Learning Outcomes

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

1. outline common laboratory hazards;
2. provide precautions 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, Core: PH=45)

Learning Outcomes

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

1. describe the anatomy of flowering plants;
2. differentiate types of fruits 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, Core: LH=30)

Learning Outcomes

At the end of this course, 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, 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 and structure of solids. Chemical equations and stoichiometry, chemical bonding and intermolecular forces and 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, Core: LH=30)

Learning Outcomes

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

1. state the importance and development of organic chemistry;
2. define fullerenes and their 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 reaction;
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 nanotubules, nanostructures and nano chemistry. 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 Core: PH=45)

Learning Outcomes

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

1. describe the general laboratory rules and safety procedures;
2. collect scientific data and correctly carrying out chemical experiment;
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 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, Core: 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 carry 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

On completion 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; and 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, 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, Core: LH=30)

Learning Outcomes

On completion 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 distribution 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; and 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, current, voltage and resistance, Ohm's law and 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, resistance and combinations.

PHY 107: General Practical Physics I (1 Unit, Core: PH=45)

Learning Outcomes

On Completion 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; and
5. draw conclusions from numerical and graphical analysis of data.

Course Contents

This introductory course emphasizes quantitative measurements, the treatment of measurement errors and graphical analysis. A variety of experimental techniques should be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat and viscosity covered in PHY 101. 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, Core: PH=45)

Learning Outcomes

On Completion 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; and
5. draw conclusions from numerical and graphical analysis of data.

Course Contents

This introductory course emphasizes quantitative measurements, the treatment of measurement errors and graphical analysis. A variety of experimental techniques should be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity and many more, covered in PHY 102. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

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

Learning Outcomes

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

1. know the basic features of philosophy as an academic discipline;
2. identify the main branches of philosophy & the centrality of logic in philosophical discourse;
3. know the elementary rules of reasoning;
4. distinguish between valid and invalid arguments;
5. think critically and assess arguments in texts, conversations and day-to-day discussions;
6. critically asses 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 and many more

ENT 211: Entrepreneurship and Innovation (2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation, and risk taking;
2. state the characteristics of an entrepreneur;
3. analyse the importance of micro and small businesses in wealth creation, employment and financial independence;
4. engage in entrepreneurial thinking;
5. identify key elements in innovation;
6. describe stages in enterprise formation, partnership and networking including business planning;
7. describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world;
8. 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 (biography of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

200 Level

BCH 201: Introductory Biochemistry I (2Units, Core: LH=30).
Learning Outcomes
At the end of the course, students should be able to:

1. describe the history and relevance of Biochemistry to other disciplines
2. explain the structure of different macromolecules in biological system;
3. identify types of chemical reactions involving these macromolecules;
4. explain the various methods of isolation of these macromolecules;
5. estimate the effects of acids and alkalis on the macromolecules;
6. describe purification of macromolecules; and
7. 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 nonessential 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: Introductory Biochemistry II (2Units, Core: LH=30).

Learning Outcomes

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

1. explain 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. describe 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 extracellular 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 (1Unit, Core: 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

This is an introductory laboratory course for students in Biochemistry and Microbiology. The experiments include: Qualitative analysis of some important biochemical substances such as proteins, amino acids, carbohydrates, lipids, nucleic acids, enzymes etc; estimation of glucose by iodine oxidation in alkaline conditions, determination of ascorbic acid using 2, 5 dichlorophenol indophenols and estimation of amino acids by formal titration.
Text: Departmental laboratory practical manual.

STA 201: Statistics for Agriculture and Biological Sciences (3 Units, Core: LH=45)

Learning Outcomes

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

1. explain the scope for statistical methods in biology and agriculture;
2. define the measures of location, partition and dispersion;
3. explain the elements of probability; probability distributions: binomial, Poisson, geometric, hypergeometric, negative binomial and normal, Student's t and chi-square distributions;
4. differentiate point from interval estimation and could be able to tests for hypotheses concerning population means, proportions and variances;
5. compute for regression and correlation as well as conduct some Non–parametric tests with reference to Contingency table analysis; and
6. explain the elements of design of experiments and Analysis of variance.

Course Contents
Scope for statistical method in Biology and Agriculture. Measures of location, partition and dispersion. Elements of probability. Probability distributions: binomial, Poisson, geometric, hyper geometric, ne negative binomial and normal, Student's t and chi-square distributions. Estimation (point and interval) and tests of hypotheses concerning population means, proportions and variances. Regression and correlation. Non–parametric tests. Contingency table analysis. Introduction to design of experiments. Analysis of variance.

EDSU-BCH 222: Functional Biochemistry (3 Units, Core: LH=45)

Senate –Approved Relevance

Training of proficient graduates who are vastly skilled and are able to apply the knowledge and skills of Functional Biochemistry in living systems. Functional Biochemistry in health and disease conditions offers lucid details of the biochemistry required to understand the physiological functions of body organs and systems. This will be of relevant application in medicine, agriculture and pharmaceutical industry. This is in tandem with the mission of EDSU to produce Biochemistry graduates that are well equipped with sound knowledge and innovative ideas capable of meeting societal, cultural and economic needs of the people of Edo State in particular and Nigeria in general

Overview
Functional Biochemistry enables the understanding of physiological processes in health and disease at the molecular level. It also emphasizes the dynamic attributes of Biochemistry as well as its relevance to basic body functions. The course is therefore designed to introduce students to the process of biochemical signal transduction. The roles of signaling molecules e.g. hormones and neurotransmitters in signal transduction. The features and physiological actions of selected plant and animal hormones. The composition of muscle and biochemistry of muscle contraction are also covered. Below are the objectives, learning outcomes and course contents of the course

Objectives
The objectives of the course are to:
1. discuss signaling molecules
2. discuss biochemical information flow (signal transduction) in organisms
3. discuss the mechanisms of signal transduction
4. describe the physiological actions of plant and animal hormones;
5. discuss the composition of muscle and the biochemistry of muscle contraction and relaxation

Learning Outcomes
At the end of this course, students should be able to:
1. enumerate at least four signaling molecules
2. describe biochemical signal transduction in organisms
3. explain six mechanisms of signal transduction
4. explain the physiological actions of plant and animal hormones; auxins, gibberellins, oestrogen, testosterone, etc.
5. explain muscle composition and the biochemistry of muscle contraction and relaxation

Course Content
Introduction to biochemical information flow. Strategies of signaling (physical and chemical) presented in a hierarchical fashion. Hormones and neurotransmitters as chemical mediators of signals in plant and animals. An outline of physiological action and metabolism of selected plant and animal hormones. An outline of the physiological action and metabolism of auxins. An outline of the physiological action of gibberellins. An outline of the physiological action of cytokinins. An outline of the physiological action of gibberellins. An outline of the physiological action of ethylene. An outline of the physiological action of insulin. An outline of the physiological action of Parathyroid hormone. An outline of the physiological action of estrogens. An outline of the physiological action of androgens. Ligand-gated nerve of nerve impulse (action potential, acetylcholine and other neurotransmitters e.g. GABA serotonin, norepinephrine). Signal transduction cascades to highlight the roles of cAMP, IP_3. Diacylglycerol. Signal transduction cascades to highlight the roles of and Ca^{2+} ions in sensing and processing stimuli. Composition of muscle and biochemistry of muscle contraction.

EDSU-CHM 207: General Chemistry Practical III (1 Unit, Core: PH=45)

Senate-Approved Relevance

The knowledge of General Chemistry practical III is integral in the training of Biochemistry students who will later become competent Scientists capable of solving problems. This is in consonance with the vision and mission of EDSU. It introduces students to good laboratory procedures and conduct of basic chemistry experiments.

Overview

This practical course is designed to expose students to the basic chemistry experiments including; measurement of pH, relative molar mass, temperature measurement and gas laws.

It will also inculcate in students good laboratory practices and proper report preparation of chemistry laboratory experiments

Objectives

The objectives of the course are to:

1. describe the measurement of pH
2. determine the relative molar mass from the colligative properties
3. demonstrate the partition coefficient of two immiscible solvents
4. demonstrate temperature measurements and heat of dissolution, heat of neutralization and many others
5. determine the critical solution temperature of water-phenol system
6. measure the molar volume of a gas and universal gas constant.

Learning Outcomes

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

1. explain the measurement of pH
2. determine the relative molar mass from the colligative properties
3. demonstrate the partition coefficient of two immiscible solvents

4. demonstrate temperature measurements and heat of dissolution, heat of neutralization and many others
5. determine the critical solution temperature of water-phenol system
6. determine the molar volume of a gas and universal gas constant.

Course Contents

pH measurement. Determination of relative molar mass from colligative properties. Demonstration of partition coefficient in two immiscible solvents. Temperature measurement. Heat of dissolution. Heat of neutralisation. Determination of critical solution. Temperature of water- phenol system. Ideal gas law. Ideal gas equation. Measuring the molar volume of a gas. The universal gas constant. Boyles law. Charles law. Avogadro's law. Dalton's law of partial pressure. Gay lussac's law.

EDSU-CHM 208: General Chemistry Practical IV (1 Unit Core: PH=45)

Senate-Approved Relevance

General Chemistry practical IV is vital in the training of Biochemistry students. It enhances the analytic and problem solving skills of students who will be able to apply these skills in solving problems. This is in consonance with the vision and mission of EDSU. It introduces students to good laboratory procedures and conduct of basic chemistry experiments, particularly testing for basic functional groups in chemical compounds.

Overview

This practical course is designed to expose students to preparation of solution. Qualitative determination of functional groups including; ketone, aldehydes, amides, carboxyl, carbonyl etc.

Students will also be taught proper report preparation of chemistry experiments

Objectives

The objectives of the course are to:

1. observation of general laboratory rules
2. discuss the preparation of simple organic compounds (esters, aldehydes and ketones)
3. discuss the analytical method in preparation of vinegar
4. conduct a simple experiment on thin layer chromatography
5. perform an experiment on the dehydration of alcohol
6. conduct experiments on qualitative analysis of common functional groups

Learning Outcomes

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

1. list at least five general laboratory rules
2. explain the preparation of simple organic compounds (esters, aldehydes and ketones)
3. describe the analytical method in preparation of vinegar
4. demonstrate a simple experiment on thin layer chromatography
5. demonstrate an experiment on the dehydration of alcohol
6. demonstrate experiments on qualitative analysis of common functional groups.

Course Contents

Preparation of esters. Preparation of aldehydes. Preparation of ketones. Vinegar analysis. Chromatography. Paper chromatography. Thin layer chromatography. Dehydration of alcohol groups. Qualitative analysis of common functional groups. Qualitative analysis of Thiol. Qualitative analysis of Qualitative analysis of Amines. Qualitative analysis of Amides. Qualitative analysis of Carboxyl group. Qualitative analysis of Carbonyl. Qualitative analysis of Nitriles. Qualitative analysis of ether. Qualitative analysis of ester.

EDSU-CHM 210: Physical Chemistry I (2 Units Core: LH=30)

Senate-Approved Relevance

The knowledge of Physical Chemistry enhances the understanding of metabolic processes. It entails concepts such as entropy, chemical potential, energies and probability of reactions. It is of significance to Biochemistry graduates who will be able to solve problems using the skills acquired from the course. This is in consonance with the vision and mission of EDSU. Relevance is seen in Biochemistry graduates capable of applying this knowledge in different areas where Biochemistry is of essence

Overview

The course explains kinetic theory of gases, laws of thermodynamics and reaction rates. Students will also be exposed to photochemical reactions and introduction to electrochemistry

Objectives

The objectives of the course to:

1. discuss the kinetic theory of gases and solve problems related to ideal and real gases;
2. derive the formula for molecular velocity of gases and use the derived formula to solve problems;
3. describe and explain the fundamental concepts of physical chemistry including those of statistical mechanics, chemical Kinetics, quantum mechanics and spectroscopy;
4. apply simple models to predict properties of chemical systems;
5. discuss type of solutions; define different concentration terms which include molarity, normality etc. explain vapour pressure lowering of the solvent, boiling point elevation of solutions, freezing point depression of solution and measurement of osmotic pressure;
6. apply numerical or computational methods to calculate physical properties of Chemical systems and assess the appropriateness of different computational techniques and numerical approximations for solving chemistry problems;
7. design and plan an investigation by selecting and applying appropriate practical, theoretical, and/or computational techniques or tools; and
8. describe the electrolytic conduction, states the Faraday's Law and Conductance Law of solution and calculation on electrical conductance on different electrolyte solution.

Learning Outcomes

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

1. state the kinetic theory of gases and solve problems related to ideal and real gases;
2. derive the formula for molecular velocity of gases and use the derived formula to solve problems;
3. describe the fundamental concepts of physical chemistry including those of statistical mechanics, chemical Kinetics, quantum mechanics and spectroscopy;
4. apply simple models to predict properties of chemical systems;
5. define and state type of solutions; define different concentration terms which include molarity, normality etc. explain vapour pressure lowering of the solvent, boiling point elevation of solutions, freezing point depression of solution and measurement of osmotic pressure;
6. apply numerical or computational methods to calculate physical properties of Chemical systems and assess the appropriateness of different computational techniques and numerical approximations for solving chemistry problems;
7. design and plan an investigation by selecting and applying appropriate practical, theoretical, and/or computational techniques or tools;
8. state Ohms law and describe the electrolytic conduction, states the Faraday's Law and Conductance Law of solution and calculation on electrical conductance on different electrolyte solution.

Course Contents

Kinetic theory of gases. Science of real gases. First law of thermodynamics. Second law of thermodynamics. Enthalpy. Entropy. Free energy. Reactions equilibria. Phase equilibria. Reaction rates. Zero order. First order. Second order. Rate laws. Mechanism of elementary processes. Theories of elementary processes. Photochemical reactions. Basic electrochemistry.

EDSU-CHM 211: Organic Chemistry I (2 Units, Core: LH=30)

Senate-Approved Relevance

The knowledge of Organic Chemistry plays a critical role in the understanding of biochemical processes. It is of significance to Biochemistry graduates who will be able to solve problems using the skills acquired from the course including the structures of aromatic compounds. This is in consonance with the vision and mission of EDSU. Relevance is seen in Biochemistry graduates capable of applying this knowledge in different areas where Biochemistry is of essence

Overview

Students will be exposed to the chemistry of aromatic compounds, structures of biomolecules; starch, cellulose, proteins etc. Energetics of reaction mechanisms will be studied. Furthermore, the course focuses on stereochemistry and synthesis of alicyclic carbon compounds

Objectives

The objectives of the course are to:

1. describe and solve problems in chemistry of aromatic compounds
2. describe the structures of simple sugars, starch and cellulose, peptides and proteins and show the difference in their conformation structure
3. discuss and solve problems in chemistry of bifunctional compounds
4. discuss he mechanisms of substitution, elimination, addition and rearrangement reactions;
5. describe stereochemistry and its application

6. describe condition and pathways of the following organic reactions - Grignard reaction, Aldol and related reactions
7. describe simple alicyclic carbon compounds and their synthesis.

Learning Outcomes

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

1. explain and solve problems in chemistry of aromatic compounds;
2. explain the structures of simple sugars, starch and cellulose, peptides and proteins and show the difference in their conformation structure;
3. describe and solve problems in chemistry of bifunctional compounds;
4. explain he mechanisms of substitution, elimination, addition and rearrangement reactions;
5. explain stereochemistry and its application;
6. describe condition and pathways of the following organic reactions - Grignard reaction, Aldol and related reactions; and
7. explain simple alicyclic carbon compounds and their synthesis.

Course Contents

Chemistry of aromatic compounds. Structures of simple sugars. Structures of starch. Structures of cellulose. Structures of peptides. Structures of proteins. Chemistry of bi-functional compounds. Energetics of reaction mechanisms. Kinetics, and the investigation of reaction mechanisms. Mechanisms of substitution. Mechanisms of elimination. Mechanisms of addition. Rearrangement reactions. Stereochemistry. Examples of various named organic reactions e.g., Grignard reaction, Aldol and related reactions. Simple alicyclic carbon compounds. Synthesis of simple alicyclic carbon compounds

EDSU-CHM 212: Inorganic Chemistry I (2 Units, Core: LH=30)

Senate-Approved Relevance

Inorganic compounds play significant roles in metabolic processes e.g. Catalysis, etc. It leverages on the interactions of inorganic molecules with macromolecules in living systems. Therefore, its knowledge enhances the understanding of Biochemistry. The production of competent Biochemistry graduates who will be able to apply these knowledge and skills aligns with the vision and mission of EDSU.

Overview

The course is designed to expose students to the chemistry of first row transition metals of the periodic table. It also focuses on the coordination chemistry, organometallic chemistry, the roles played by metals in living systems and redox reactions

Objectives

The objectives of the course are to:

1. describe the first-row transition elements
2. discuss crystal field theory (CFT) and draw the diagram to illustrate with examples of coordination compounds
3. discuss state the advantages of CFT over other bonding theories

4. discuss the comparative Chemistry of the following elements. (I) Ga, In, Tl (II). Ge, Sn, Pb (III). As, Sb, Bi (IV). Se, Te, Po
5. describe organometallic chemistry
6. classify organometallic compounds with examples
7. discuss the roles of metals in biochemical systems
8. discuss the concepts of hard and soft acids and bases.
9. describe oxidation and reduction reaction

Learning Outcomes

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

1. list and explain the first-row transition elements
2. explain crystal field theory (CFT) and draw the diagram to illustrate with examples of coordination compounds
3. state the advantages of CFT over other bonding theories
4. discuss the comparative Chemistry of the following elements. (I) Ga, In, Tl (II). Ge, Sn, Pb (III). As, Sb, Bi (IV). Se, Te, Po
5. define organometallic chemistry
6. classify organometallic compounds with examples
7. list the roles of metals in biochemical systems
8. explain the concepts of hard and soft acids and bases.
9. explain oxidation and reduction reaction

Course Contents

List first row transition metals. Chemistry of first row transition metals. Introduction to coordination chemistry. Elementary treatment of crystal field theory. Comparative Chemistry of Ga, In, TI. Comparative Chemistry of Ge, Sn, Pb. Comparative Chemistry of As, Sb, Bi. Comparative Chemistry of Se, Te, Po. Elementary introduction to organometallic chemistry. Metals in biochemical systems. Role of metals in biochemical systems. Concepts of hard and soft acids. Concepts of hard and soft bases. Oxidation reactions. Reduction reactions.

EDSU-CHM 213: Analytical Chemistry I (2 Units, Core: LH=30)

Senate-Approved Relevance

The training of high quality graduates who are highly skillful in the application of analytical chemistry in biochemical processes is in tandem with the mission of EDSU. The knowledge of analytical chemistry is of essence in the learning of Biochemistry and of relevance in the analysis of samples.

Overview

The course is designed to expose students to the theory and types of errors, sampling techniques and chemical analysis. It also focuses on the statistical analysis of data, optical methods of analysis among others. The objectives, learning outcomes, course content required for achieving this purpose are discussed below.

Objectives

The objectives of the course are to:

1. discuss analytical processes
2. describe the forms of error and their implications on laboratory analysis
3. state different statistical tool use in treatment of data
4. solve practical problems using the statistical tools
5. discuss sampling and give reasons for sampling in field work
6. describe different sampling techniques
7. discuss different forms of sample collection and processing
8. discuss volumetric method of analysis and solve some practical problems
9. discuss gravimetric method of analysis and solve some practical problems.

Learning Outcomes

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

1. explain analytical processes which include description of chemist as a problem solver;
2. differentiate among the forms of error and explain their implications on laboratory analysis
3. state different statistical tool use in treatment of data
4. solve practical problems using the statistical tools
5. define sampling and give reasons for sampling in field work
6. state different sampling techniques
7. state different forms of sample collection and processing
8. describe volumetric method of analysis and solve some practical problems
9. describe gravimetric method of analysis and solve some practical problems.

Course Contents

Theory of errors. Types of errors. Statistical treatment of data. Excel spreadsheet. SPSS. Theory of sampling. Chemical methods of analysis. Volumetric analysis. Gravimetric analysis. Data analysis. Correlation analysis. Regression analysis. Presentation and physicochemical methods. Optical methods of analysis. Separation methods. Chromatography. Distillation. Filtration. Decantation etc.

EDSU-AEB 211: Genetic Variability and Evolution (2 Units, Elective: LH=30)

Senate-Approved Relevance

The Department is committed to producing qualified graduates who are skilled and knowledgeable in modern trends relevant to this field of genetic variability and evolution. More so, graduates who are spurred to solve the budding problems related to animal and human mutation. This is achieved through its teaching, research and innovative activities

Overview

This course explains the basic structure of the human nucleic acids, components of the structure and any structure to show abnormalities. The course also exposes the effect of mutation on genetic recombination, protein and DNA structures with emphasis to discuss variation, speciation and natural selection that occasioned evolution will also be discussed

Objectives

The objectives of the course are to:

1. explain the basic concepts of genetic variability and evolution
2. discuss the different factors that cause natural selection
3. describe genetic evolution
4. outline the concepts of genetic variability
5. explain the various ways genes recombine and undergo mutations

Learning Outcomes

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

1. define the basic concepts of genetic variability and evolution
2. list five factors that cause natural selection
3. explain genetic evolution
4. list five concepts of genetic variability
5. discuss the two various ways genes recombine and undergo mutations

Course content

The DNA. Structure of DNA. DNA acquisition. DNA mutations. Chromosomal mutations. Protein structure. Effect of mutation. Effect of mutation on genetic recombination. Genetic recombination. Genetic mapping. Genetic mapping at the molecular level. Mendelian populations. Hardy-Weinberg equilibrium. Variation in population. The three natural strategies generating genetic variations contribute differently to the evolution process. Natural selection. Speciation. Evolution of organism. Conceptual aspects of the theory of molecular evolution.

EDSU-MCB 221: General Microbiology (2 Units Core: LH=30)

Senate –approved relevance

The knowledge of General Microbiology is important in the training of Biochemists. This is because of the ubiquitous nature of microorganisms and their involvement in health and diseases. This is coupled to the fact that metabolic processes take place in microbes. Therefore the ability of a Biochemistry graduate to capably apply the knowledge of microbiology, particularly in research aligns with the set goals of EDSU.

Overview

The course exposes students to the basic concepts of microbiology, microbiology laboratory setting, particularly, basic protocols in a microbiology laboratory. It also focuses on preparation of culture media and staining techniques. The objectives, learning outcomes and course content aimed at achieving this purpose are found below

Objectives

The objectives of the course are to:

1. describe the basic concepts and scope of microbiology;
2. discuss the layout of a microbiology laboratory, equipment and reagents in a microbiology laboratory
3. discuss the theory behind basic protocols in a microbiology laboratory.

4. describe culture media
5. discuss staining techniques

Learning Outcomes

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

1. explain the basic concepts and scope of microbiology
2. describe the layout of a microbiology laboratory, equipment and reagents in a microbiology laboratory
3. discuss the theory behind basic protocols in a microbiology laboratory.
4. Prepare culture media
5. Evaluate staining techniques

Course Contents

History of the Science of Microbiology. Classification of organisms into prokaryotes and eukaryotes. Classification of prokaryotes into archaea and eubacteria. Anatomy and cytochemistry of bacteria. Anatomy and cytochemistry of fungi. Shapes, groupings and colonial morphology of bacteria. Shapes, groupings and colonial morphology of fungi. Structure of viruses. Sterilization and disinfection. Structure, ecology and reproduction of representative microbial genera. Culture of micro-organisms. Isolation of micro-organisms. Isolation of bacteria, viruses, fungi (yeasts and moulds). Nutrition and biochemical activities of micro-organisms. Antigens and antibodies. Identification and economic importance of selected microbial groups. Microbial variation and heredity. Study of laboratory equipment. Introduction to microbiology of air food, milk, dairy products, water and soil. Staining techniques, antibiotic sensitivity tests, serological tests, antimicrobial agents.

300 Level

GST 312: Peace and Conflict Resolution (2 Units, Core: 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 and 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 many more. Peace building, management of conflicts and security, peace and human development. Approaches to peace &conflict management-(religious, government, community leaders and many more). Elements of peace studies and conflict resolution: conflict dynamics assessment scales, constructive and destructive. Justice and legal framework: concepts of social justice. The Nigeria 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): a). Dialogue b). Arbitration, c). Negotiation d). Collaboration and many more Roles of International Organisations 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). The role of NGOs in post-conflict situations/crisis.

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 and market research). Entrepreneurial finance (venture capital, equity finance, micro finance, personal savings, small business investment organisations 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 bookkeeping, 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 and many more. Digital Business and E-Commerce Strategies).

BCH 301: Ezymology (2 Credits, Core; LH=30).

Learning Outcomes

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

1. discuss why enzymes are grouped into different classes;
2. explain the basis of classification of enzyme;
3. identify the role vitamins in the cellular system;

4. illustrate the basis and mechanism of enzyme- catalysed reactions;
5. derive equations governing enzyme reactions in cellular systems; and
6. explain the effect of various factors on enzyme reactions.

Course Contents
Discovery, classification and nomenclature of enzymes. Vitamins and co-enzymes. Fat and water soluble vitamins. Structures and functions of vitamins and co-enzymes. Kinetics of enzymes and inhibition. History of enzymology, definition, enzyme as catalyst, general characteristics, nomenclature, nature of enzymes. Genetics of enzymes and inhibition. Levels of structural organization; active site, nature of active site, enzyme kinetics, analytical enzymes – isolation, purification and characterisation of enzymes and measurement of enzyme activity – methods and principles. Analytical enzymes. Mechanisms of enzyme catalyzed reactions. Effects of temperature, pH, ions and inhibitors on enzyme catalysed reactions. Derivation of Michaelis-Menton equation. Allosteric/regulatory enzymes. Estimation of kinetic parameters-enzyme activities, Km, Vmax, Ki etc. Zymogen activation, digestive enzymes etc. Recent advances in enzymology.

BCH 302: Metabolism of Carbohydrates (2 Units, Core: LH=30)

Learning Outcomes
At the end of the course, students will be able to:
1. explain the structure and functions of various polysaccharides;
2. describe the various pathways polysaccharides could be broken down in cellular systems;
3. discuss how the end product of carbohydrate metabolism is attained;
4. explain the central importance of TCA cycle in cellular metabolism; and
5. predict consequences of disorders of carbohydrate metabolism

Course Contents
Chemistry and function, isolation and purification of polysaccharides. Molecular weight determination and analytical methods for structural determination of polysaccharides. Biochemistry of important disaccharides, oligosaccharides and polysaccharides; degradation and digestion of carbohydrates - sugars, storage polysaccharides and cell walls. Glycolysis, the tricarboxylic acid cycle, the phosphogluconate pathway, the glycoxylate pathway; the pentose phosphate pathway and the cori cycle, the calvin pathway. Gluconeogenesis and glycogenesis, glycogenolysis, metabolism of fructose, Polyol pathway. Regulation of carbohydrate metabolism. Disorders of carbohydrate metabolism.

BCH 303: Metabolism of Lipids (2 Units, Core: LH=30)

Learning Outcomes
At the end of the course, students will be able to:
1. describe how various types of lipids (fats and oil) are synthesized;
2. discuss the implication of unsaturation in lipids and oils;
3. explain the mechanism of their degradation;
4. describe the importance of the various pathways of lipid metabolism; and
5. explain the implication of disorder in metabolism to the cellular systems.

Course Contents
Classification of lipids - fatty acids, triglycerides, glycosylglycerols, phospholipids, waxes, prostaglandins. Lipid micelles, monolayers and bilayers. Oxidation of fatty acids. Microsomal peroxidation of polyunsaturated fatty acids. Metabolism of unsaturated fatty acids: essential

and non-essential. Metabolism of acylglycerols. Metabolism of phospholipids. Cholesterol biosynthesis and breakdown. Metabolism of ketone bodies. Integration of lipid metabolism. Acetic acid as a central precursor for biosynthesis of lipids. Lipoprotein metabolism and transport of lipids. Adipose tissue metabolism.

BCH 304: Metabolism of Amino Acids & Proteins (2 Units, Core: LH=30)

Learning Outcomes

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

1. illustrate why and how proteins are broken in cellular systems;
2. explain how to determine the molecular weight of proteins;
3. recognise the relationship between the urea cycle and other pathways of protein metabolism;
4. describe the differences between ketogenic and glucogenic amino acids; and
5. identify the role of inorganic nitrogen in protein synthesis and breakdown.

Course Contents

Amino acids as building blocks of proteins and the peptide bond as covalent backbone of proteins. Forces involved in the stabilization of protein structure. Protein isolation, fractionation, purification and characterization. Amino acid analysis of peptides and proteins. Methods for the determination of the sequence of amino acids in proteins. Protein biosynthesis, molecular weight determination of proteins. Techniques in protein biochemistry. Oxidative degradation of amino acids and metabolism of one carbon units. Ammonia toxicity and urea formation. Ketogenic and glucogenic amino acids. Biosynthesis of amino acids and some derivatives, the urea cycle; metabolism of inorganic nitrogen. Disorders of amino acid metabolism and polyamines.

BCH 305: Structure and Functions of Nucleic Acids (2 Units, Core: LH=30)

Learning Outcomes

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

1. explain the levels of organisation of nucleic acids;
2. discuss the three- dimensional structure of nucleic acids;
3. interpret how information encoded in genes are able to direct protein synthesis;
4. describe the structure of proteins from nucleic acid composition of the gene; and
5. identify the various implications of disorders in nucleic acid metabolism.

Course Contents

Structure and function of nucleic acids. The genetic code and protein synthesis. Metabolism of purines and pyrimidines, nucleosides and nucleotides. Degradation of purine and pyrimidine nucleotides. DNA replication and DNA repairs. Disorders and abnormalities of nucleic acid metabolism-gout, Lesch-Nyhan syndrome, hypouricaemia, orotic aciduria, Reye's syndrome, Xeroderma pigmentosus and skin cancer.

BCH 306: Analytical Methods in Biochemistry (3 Units, Core: LH=45).

Learning Outcomes

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

1. Explain the principles of instrumentation in biochemistry;
2. Describe how the level of precision attained in analysis is dependent on the method employed;
3. Discuss why a method is preferred in a particular biochemical investigation;
4. Explain the theoretical basis of major instruments used in biochemical analyses;

5. Perform some specific analytical investigations.

Course Contents
Tissue and cell culture techniques, immunoassays, blotting and isotopic techniques. Separation techniques in biochemistry. The principles, procedures, and application of centrifugation, chromatography, electrophoresis and analytical techniques. The principles, instrumentation, and application of the following: Manometry, Photometry (Spectrophotometry, Spectrofluorimetry and flame photometry), Calorimetry, optical spectroscopy, X-ray diffraction. Mass and Nuclear Magnetic Resonance, Spectrometry. Radioimmunoassay, pH measurement, Isotopes in Biochemistry. This course includes laboratory practical classes, which will provide students the opportunity to practice the various techniques and familiarise themselves with the types of equipment used for the techniques.

BCH 307: Membrane Biochemistry (2 Units, Core: LH=30).

Learning Outcomes
At the end of the course, students will be able to:
1. explain the role of membrane as gatekeeper of cells;
2. describe the make-up of membranes;
3. identify the models used to explain the arrangement of molecules contained in membranes; and discuss the mechanism of transportation of molecules into and out of cells.

Course Contents
The central dogma of membrane biology (the fluid mosaic model), Membrane functions, types and composition: Lipid structure, properties and formation of the bilayer; protein and carbohydrates. Membrane structure and integrity. Membrane asymmetry and movements, diffusion, rotation and fluidity. Isolation and identification electron microscopy and marker enzyme assays. Introduction to receptor function: antigenicity of membrane components. Cell membrane and toxins, transport processes, action of polymyxin and ionophores. Introduction to neurotransmission. Membrane transport system- active versus passive transport systems. Transport of sugars and amino acids. Defence mechanism in parasites. Biomembranes of parasites.

BCH 308: Bioenergetics (1Unit, Core; LH=15).

Learning Outcomes
At the end of the course, students will be able to:
1. illustrate how biological energy is generated in the cells;
2. explain the concept of ‘fuel molecules’; and
3. imbibe comprehensive knowledge of biological energy transformation and utilisation

Course Contents
Reaction orders, first, second, third and zero order reactions. High-energy compounds; chemical potentials, electrochemical potentials, electron transport system and oxidative phosphorylation. Uncouplers of oxidative phosphorylation. Shuttle systems for oxidation of extra-mitochondrial NADH, ATP Cycle. Regulation of ATP production. Biological oxidation-reduction reactions. Catalysis and activation energy. Buffers and buffer systems. Chemical Transport across biological membranes.

BCH 309: Inorganic Biochemistry (1 Unit, Core: LH 15)

Learning Outcomes

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

1. explain the roles of inorganic ions in biological systems;
2. discuss the functions of ions in enzyme actions; and
3. describe the importance of nitrogen and sulphur cycles in living systems.

Course Contents

Relationship between the physicochemical properties and biological functions of inorganic ions. Ligand complexes and their biochemical significance. Trace elements in biological systems. Electrolyte metabolism. Nitrogen cycle and sulphur cycle.

BCH 399: Industrial Attachment (For 4 year Programme - 12 weeks) (3 Units, Core: PH 135)

Learning Outcomes

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

1. explain how theoretical principles in biochemistry are employed in industrial production; and
2. describe the clinical application of various metabolic abnormalities for those in clinical laboratories.

Course Contents

Students should be attached to some relevant industrial organisations for 12 Weeks at the end of 300 Level during the long vacation before commencement of 400 Level. Assessment to be based on seminar presentation, report and assessment by their industry and university supervisors.

EDSU-BCH 310: Introductory Molecular Biology (2 Units, Core: LH=30)

Senate –Approved Relevance

To train competent graduates who are knowledgeable in the molecular and cellular basis of life. This is expected to widen their scientific horizon in deciphering the role of nucleic acids, genes and chromosomes in the sustenance of life. This conforms to EDSU mission statement of producing highly skilled and innovative Biochemistry graduates that will be able to apply the knowledge of molecular biology to other areas of life including medicine, agriculture etc.

Overview

The knowledge of introductory molecular biology is essential in this modern age. It examines the composition, structure and interactions of cellular molecules that play significant roles in maintenance of cellular functions. This course introduces students to the basics of molecular biology including the structure of nucleic acids, chromosome and the gene.

The course will focus on DNA replication, RNA synthesis and protein synthesis. The process of gene expression, gene control as well as mechanisms of DNA damage and repair will be covered by the course. Diseases associated with defective DNA repair will also be discussed

Objectives
The objectives of the course are to:

1. describe the structure of the gene, chromosomes and nucleic acids
2. discuss the pathway of genetic information flow and the roles of the enzymes involved
3. discuss genetic expression in both prokaryotic and eukaryotic organsisms
4. describe DNA damage and repair mechanisms
5. enumerate diseases consequent on defect in DNA repair mechanisms

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

1. distinguish among the gene, chromosomes and nucleic acids
2. explain the central dogma of molecular biology; DNA replication, transcription and translation.
3. distinguish between genetic expression in prokaryotes and eukaryotes
4. explain DNA damage and DNA repair mechanisms
5. list at least three diseases associated with defective DNA repair.

Course Contents
Cellular ultra-structure. Chromosome structure and gene expression. A more comprehensive study of the pathway of biological information transfer processes. Central dogma of molecular biology. The process of DNA replication. The process of transcription (RNA synthesis). Translation (protein synthesis). DNA and RNA polymerase in prokaryotes and eukaryotes. The roles of other enzymes in the central dogma of molecular biology. Histones and molecular chaperones. Prokaryotic gene expression and control (lac operon, trp operon). Eukaryotic gene expression and control. Introduction to DNA damage. DNA damaging agents. Types of damage of DNA. Pathological manifestations of defective DNA repair including Xeroderma pigmentosum, Ataxia telangiotasia, Fanconi`s anaemia and Cockayne syndrome. DNA repair mechanisms.

EDSU-BCH 314: Experimental Biochemistry II (2 Units, Core: LH=45).

Senate –approved relevance

Training of Biochemistry graduates with proficiency in good laboratory skills is in tandem with the vision and mission of EDSU in producing quality graduates who able to proffer solutions to societal needs. Relevance of this course is seen in Biochemistry graduates capable of conducting quality biomedical research

Overview

This practical course is designed to expose students to the conduct of qualitative and qualitative tests of carbohydrates, amino acids and proteins, lipids and nucleic acids. This will be achieved by the use of relevant technique and equipment.

Objectives
The objectives of the course are to:

1. describe qualitative and quantitative tests of biomolecules
2. distinguish between qualitative and quantitative tests of biomolecules
3. discuss methods of cell fractionation
4. estimate enzyme purification
5. analyze biomolecules

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

1. explain qualitative and quantitative tests of biomolecules ; carbohydrates, proteins and lipids
2. differentiate between qualitative and quantitative tests of carbohydrates, proteins and lipids
3. describe the three major steps involved in cell fractionation
4. conduct enzyme purification
5. apply different methods in estimating biomolecules e.g. glucose; glucose oxidase method, O'toluidine method etc.

Course Contents
Qualitative and quantitative tests of carbohydrates. Molisch test. Fehling's test. Bial's test. Glucose oxidase method. O'toluidine method. Somogyi Nelson method of glucose estimation. Qualitative and quantitative tests of proteins. Ninhydrin test. Biuret test. Xanthoproteic test. Million's test. Sakaguchi test. Nitroprusside test. Cyesteine sulphur test etc. Qualitative and quantitative tests of lipids. Solubility test. Transparency test. Glycerol-Acrolein test. Test for unsaturation. Test for free fatty acids etc.
Qualitative and quantitative tests of nucleic acids. Isolation of DNA and RNA. Purification of DNA and RNA.

Methods of separation of proteins using separation techniques. Methods of protein purification. Experimental approach to the study of plasma membrane proteins. Experimental approach to the study of glycoproteins. Enzyme isolation. Enzyme purification. Kinetic characterization of enzymes (Pre-requisite: BCH 203)

Minimum Academic Standards
Biochemistry Laboratory

EDSU-BCH 317: Biochemistry of Hormones (3 Units, Elective: LH=45).

Senate –approved relevance

Training of competent graduates who are well-informed of the metabolism/Biochemistry of hormones and the roles of hormones in biochemical processes is in agreement with the vision and mission of EDSU which is to produce Biochemistry graduates capable of solving societal problems with requisite acquired skills and innovative ideas. This is of relevance in understanding the molecular basis of hormone action, biochemical basis of endocrinological disorders, techniques in hormone testing and possible remedies.

Overview

Hormones are important in life processes in plants and animals. Therefore this course entails molecular mechanisms of action of hormones, metabolism and physiological actions of hormones. It also covers the regulatory mechanisms of hormones, the interference of environmental factors/endocrine disruptors with the endocrine system as well as hormone agonists. It will also expose students to the biochemical basis of endocrinopathies (Prerequisite: BCH 222)

Objectives
The objectives of the course are to:

1. discuss the structure and classification of hormones
2. describe the functions of hormones
3. discuss the metabolism of hormones
4. discuss the molecular mechanisms of action of hormones
5. discuss the regulation of the endocrine system

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

1. explain the structure and classification of hormones
2. discuss at least three functions of hormones
3. explain the metabolism of selected peptide, amino acid-derived and steroid hormones
4. describe the molecular mechanisms of action of selected peptide, amino acid derived and steroid hormones
5. explain the different regulatory mechanisms in the biosynthesis, transport, breakdown and excretion of hormones

Course Contents
Biochemical aspects of endocrinology. Chemistry and Structures of hormones. Evolution of hormone action. Classes of hormones; amino acid derived hormones, steroid hormones and polypeptide hormones. Inter/intra cellular mediators of hormones. Hormone receptors. Binding activity and cellular response to hormone. Molecular mechanisms of action of hormones. Kinetics of binding and mode of action of hormones. cAMP as second messenger and other second messengers. Role of calcium and other ions in the biochemistry of hormones. Hormone agonists and partial agonists. Hormone antagonists e.g. endocrine disruptors. Biochemistry of insulin, glucagon and other hormones controlling carbohydrate metabolism. Regulation of the endocrine system. Storage, secretion and function of hormones; Parathyroid hormones. 1, 2, 5-Dihydroxy-cholecalciferol and calcitonin. Prostaglandins. Biochemical basis of endocrinological disorders and hormone testing (Pre-requisite BCH 222).

EDSU-BCH 324: Basic Immunology (3 Units, Core: LH=45).

Senate –approved relevance

To train high quality graduates who are knowledgeable in the dogmas and mechanisms of healthy immune system as well as host's protection against infective agents. This is in consonance with EDSU mission statement aimed at meeting human developmental needs by producing adequately trained Biochemistry graduates. Relevance of the course is in its application in Biochemical research, medicine and other areas of life.

Overview
The knowledge of basic immunology is very important. It focuses on the components of the immune system, types of body immunities, recognition of self by the immune system and the biochemical basis of non-recognition of self-cells. This therefore emphasizes the significance of this course to students of Biochemistry. Therefore, this course is designed to introduce students to the basics and applications of immunology. It introduces students to the roles of immune cells, types of immunity, antigen-antibody reactions, autoimmunity and autoimmune diseases, hypersensitivity reactions, autoimmunity and autoimmune diseases as well as methods of immunological assay. Students will also be introduced to the applications of

immunology. In addressing this need, below are the objectives, learning outcomes and course content.

Objectives

The objectives of the course are to:

1. describe the basic concepts of immunity
2. discuss the types of immunity
3. describe the role of cells of the immune system
4. discuss antigen-antibody interactions and the forces involved
5. describe hypersensitivity reactions
6. discuss immune tolerance, autoimmunity and autoimmune diseases
7. describe methods of immunological assay

Learning Outcomes

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

1. explain the basic concepts of immunity including humoral and cellular immunities
2. explain innate and acquired immunities
3. explain the role of the following immune cells; neutrophils, basophils, eosinophils, monocytes, natural killer cells etc.
4. explain antigen-antibody interactions and the forces involved
5. describe four types of hypersensitivity reactions (types I-IV hypersensitivity reactions)
6. explain immune tolerance, autoimmunity and autoimmune diseases; organ-specific and systemic autoimmune diseases
7. explain the principle, procedure and application of radioimmunoassay, immunoelectrophoresis, etc.

Course Contents

Basic immunology. Fundamental concepts of immunity. Humoral and cellular products of immunity. Cells of the immune system. Natural and acquired immunity. Antigens: Structure and classification. Antibodies: Structure and function as well as structure-function relationships. Synthesis of antibodies. Organization, structure and characteristics of immunoglobulins. Molecular basis of antibody diversity. Antigen-antibody reactions. Production, detection and uses of monoclonal antibodies. Production, detection and uses of polyclonal antibodies. The complement system. Major Histocompatibility Proteins, Mononuclear phagocytic cells, Granulocyte cell population, Agglutination reactions, Hypersensitivity and allergies. Therapeutic and prophylactic applications of immunology. Immune tolerance, autoimmunity, transplantation immunity, immunology of reproduction. Cancer biology and immunology. Radioimmunoassay, Immunoelectrophoresis.

EDSU-CHM 303: Organic Chemistry II (2 Units Core: LH 30)

Senate-Approved Relevance

The knowledge of Advanced Organic Chemistry plays a critical role in the understanding of biochemical processes. Production of proficient Biochemistry graduates with a strong rational analytic minds capable of applying the knowledge of organic chemistry in metabolism aligns with the vision and mission of EDSU

Overview

The course exposes students to the chemistry of aromatic and polycyclic compounds, heterocyclic chemistry, forensic analysis of samples and reactive intermediates. It also focuses on techniques of studying organic compounds such as nuclear magnetic resonance etc.

Objectives

The objectives of the course are to:

1. discuss aromatic and alicyclic compounds by their structure.
2. describe the properties of aromatic and alicyclic compounds, and the chemical consequences of aromaticity
3. discuss the mechanism of electrophilic aromatic and alicyclic substitution
4. outline the completed electrophilic aromatic substitution reactions of the following types: halogenation, nitration, sulfonation, and Friedel-Crafts acylation & alkylation
5. discuss the chemistry of heterocyclic Chemistry (3,4,5 and 6-membered ring of O, N, S heterocyclic compounds)
6. describe the Reactive intermediates – carbocations, carbanions, carbenes, nitrenes
7. describe the rearrangement reactions e.g., Beckmann, Baeyer-Villiger.
8. illustrate with various reaction mechanisms and types
9. discuss forensic analysis of biological samples, pharmaceutical samples, organic analytes and macromolecular samples

Learning Outcomes

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

1. distinguish between aromatic and alicyclic compounds by their structures.
2. identify atleast three properties of aromatic and alicyclic compounds, and the chemical consequences of aromaticity
3. write the mechanism of electrophilic aromatic and alicyclic substitution
4. outline the completed electrophilic aromatic substitution reactions of the following types: halogenation, nitration, sulfonation, and Friedel-Crafts acylation & alkylation
5. explain the chemistry of heterocyclic Chemistry (3,4,5 and 6-membered ring of O, N, S heterocyclic compounds)
6. explain the Reactive intermediates – carbocations, carbanions, carbenes, nitrenes
7. express the rearrangement reactions e.g., Beckmann, Baeyer-Villiger.
8. illustrate with various reaction mechanisms and types
9. organize forensic analysis of biological samples, pharmaceutical samples, organic analytes and macromolecular samples

Course Contents

Aromatic chemistry. Alicyclic chemistry. Survey of representative polycyclic compounds. Halogenation. Nitration. Sulfonation. Friedel-Crafts acylation. Alkylation. Heterocyclic Chemistry (3,4,5 and 6-membered ring of O, N, S heterocyclic compounds). Reactive intermediates. Carbocations. Carbanions. Carbenes. Nitrenes etc. Selected rearrangement reactions such as, Beckmann, Baeyer-Villiger, and many others to illustrate various reaction mechanisms and types. Forensic analysis of biological samples. Analysis of pharmaceutical samples. Analysis of organic analytes. Analysis of macromolecular samples. (Pre –requisite: CHM 211)

EDSU-ENT 321: Entrepreneurial Skills (1 Unit, Core: LH 0; PH 45)

Senate- approved relevance

The training of high-quality graduates who are equipped with the knowledge of channeling their creativity into creating productive and innovative things that can contribute significantly to the current competitive world at large and particularly Nigeria is of immense relevance to

Edo State University. This is important as it will lead to the production of graduates with innovative, analytical, and logical reasoning.

Overview
The course is designed to expose to the production of household materials including; soap, toothpaste, tooth brush. Students will also be exposed to basic skills like baking, photography, table water production, tanning, metal fabrication, tailoring, carpentry, painting etc.

Learning objectives
The learning objectives of this course are to:
1. define the concepts and profitability of entrepreneurial skills.
2. develop high entrepreneurial potential in students.
3. describe the key requirements for entrepreneurial skills
4. analyze the various possible business ideas open to students.
5. engage in practical activities on various entrepreneurial skills

Learning Outcomes:
At the end of this course, students should be able to:
1. explain at least two concepts and profitability of entrepreneurial skills.
2. apply the entrepreneurial potential in setting up a business.
3. outline five key requirements for the entrepreneurial skills
4. explain one possible business idea.
5. showcase the product from the practical activities their various entrepreneurial skills for exhibition

Course Contents
Soap/Detergent production. Toothbrush production. Tooth paste making. Photography. Brick making. Rope making. Brewing. Glassware production and Ceramic production. Paper production. Water treatment/conditioning/packaging. Food processing. Food preservation and packaging. Metal fabrication. Tanning industry. Vegetable oil extraction. Farming. Fisheries/aquaculture. Plastic making. Refrigeration/Air-conditioning. Carving. Weaving. Bakery. Tailoring. Printing. Carpentry. Interior Decoration. Animal husbandry, etc. Case Study Methodology that apply to the development and administration of Cases that bring out key issues of the business environment, start-up, pains and gains of growth of businesses, etc. Particular reference will be made to Nigerian businesses. Experience sharing by business actors in the economy with students during Case presentations.

400 Level

BCH 401: Advanced Enzymology (2 Units, Core: LH=30).
Learning Outcomes
At the end of the course, students will be able to:
1. explain the concept and necessity for multi- enzyme actions;
2. describe the chemistry of catalysis;
3. discuss the role of active sites in enzymatic reactions;
4. illustrate various methods that could be used for enzyme assays;
5. relate the mechanism of regulation of enzyme action and its synthesis.

Course Contents
Enzyme structure and properties. Steady state enzyme kinetics. Transient kinetic methods. Chemistry of enzyme catalysis. Regulatory enzymes. Molecular models for allosterism. Enzyme assemblages, principles of catalysis, multienzyme systems, allosterism and enzyme

inhibition. Regulation of enzyme activity and synthesis; chemical modification of enzyme activity, enzyme reaction mechanism. Enzyme assays. Criteria to determine enzyme purity. Enzyme reconstitution. Regulation of enzyme activity and synthesis. (Pre-requisite BCH 312).

BCH 402: Molecular Biochemistry (2 Units, Core: LH=30)

Learning Outcomes

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

1. explain how genes can be sequenced to determine the structure of DNA contained therein;
2. illustrate the mechanism of replication of DNA in both procaryotic and eucaryotic organisms;
3. describe how genes can be influenced to obtain a pre-determined outcome;
4. discuss the mechanism of action of gene- specific chemical compounds; and
5. explain the bias of human genome project. Sciences

Course Contents

Recombinant DNA and gene cloning. Extra-chromosomal factors, plasmids, episomes. Genetic control of viral replication, Model systems used for studying embryology (differentiation) at the molecular level.Model systems in differentiation studies.Control of cell proliferation, molecular genetics of the haemoglobinopathies. Poymerase chain reaction: Application in biotechnology. Vector biology. SDS-PAGE, Southern, Northern and Western blotting. Genomic libraries, construction and screening. Genomics and metagenomics. Introduction to microarray. Restriction enzymes, DNA Library, Gene Mapping, Restriction Fragment Length Polymorphism, Gene Knockout, Gene Therapy, Human Genome Project. Etiology of cancer, Biochemical changes in cancer cells, Role of oncogenes, proto-oncogenes & tumor suppressor genes, Action of Growth Factors on cell cycle and mitosis, Cancer Chemotherapy, Biochemical basis of metastsis, Evaluation of Tumor Markers in cancer management. Biochemistry of Stem cell/tissue regeneration. (Pre-requisite BCH 310).

BCH 403: Metabolic Regulations (2 Units, Core: LH=30).

Learning Outcomes

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

1. explain the central role of Kreb's cycle in macromolecular metabolism;
2. identify the inter-relationship between metabolic pathways of macromolecules;
3. describe how a product of one cycle can inhibit another pathway; and
4. identify the need to regulate various metabolic pathways and how the cell does it.

Course Contents

Advanced studies in degradation and synthesis of biological compounds. Carbohydrate degradation and synthesis, and regulatory processes. Lipid, protein, purines and pyrimidine degradation and synthesis and regulatory process. Endocrine system and mechanism of hormone control of metabolism. The relationship of Citric acid cycle to protein, carbohydrate, lipid and nucleic acids. Integration of metabolic pathways. Turn-over rates and metabolic pools. Regulation of enzymes of metabolic pathways-feedback inhibition versus enzyme synthesis. Catabolite repression, end product repression. Identification of different regulatory mechanism in metabolic pathways.

BCH 404: Biochemical Reasoning (1 Unit, Core: LH=15).

Learning Outcomes

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

1. apply their broad knowledge of biochemistry to explain any problem they confront; and
2. write scientific papers for conferences and publication.

Course Contents
Evaluation and design of experimental biochemistry from available information and data. Analysis, interpretation and inference- drawing from biochemical research data. Problems solving in biochemistry using examples from the literature. This should consists of take home assignments to be discussed later in class.

BCH 405: Plant Biochemistry (2 Units, Core: LH 30)

Learning Outcomes
At the end of the course, students will be able to:
1. describe the metabolic pathways that are peculiar to plants;
2. explain the concept of secondary metabolites and their application for medicinal purposes;
3. discuss the chemical processes involved in photosynthesis as basis of life; and
4. identify the importance of hormones of plant origin.

Course Contents
Organisation of plant cells. The plant cell wall structure, formation and growth. Biochemistry of plant development. Lignin formation. The biochemistry of important plant processes and metabolic pathways. Photosynthesis. Secondary metabolites. Plant hormones and structure-activity relationship of plant hormones. Biosynthesis of carotenoid pigments. Synthetic growth regulators and herbicides. Indigenous plants of medicinal importance. Recent advances in medicinal plant biochemistry.

BCH 406: Project (6 Units, Core; PH=270)
Learning Outcomes
At the end of the course, students will be able to:
1. explain laboratory procedures including safety precautions;
2. carry out independent researches that will lead to tangible outcomes; and
3. present outcome of their researches in seminars and conferences

Course Contents
Independent research findings into selected areas/topics of interest to the supervising 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

BCH 407: Bioinformatics (2 Units, Core: LH=30).
Learning Outcomes
At the end of the course, students will be able to:
1. identify the use of computational methods to predict life processes; and
2. explain various programmes applicable to life sciences.

Course Contents
This is a survey course which provides an overview of current applications of computational techniques in life science laboratories. It discusses the most important strategies and resources for annotation of biological sequences on the internet, their judicious application and the interpretation of results. An overview of bioinformatics, history of bioinformatics, genome sequencing projects, database searching algorithms (BLAST, FASTA), pairwise and multiple

sequence alignments, phylogenetic analysis, data mining in novel genomes, current topics in bioinformatics and use of perl to facilitate biological analysis
Lectures will normally be introduces through the pre-reading material. Assignments will complement the lectures by practicing techniques of computational molecular data analysis, with an emphasis on web based tools.

BCH 408: Biochemical Entrepreneurship (2 Units, Core: LH 30)
Learning Outcomes
At the end of the course, students will be able to:

1. explain how to apply their theoretical knowledge to start small/ medium scale production facilities;
2. describe the application of enzymes in industrial processes; and
3. discuss the importance of value chain in biochemical processes.

Course Contents
Entrepreneurship skills related to biochemistry, creation of new ventures/business, writing and designing business plans, feasibility studies, financial planning and management, production of local diagnostic kits, soap/detergents, crude commercial enzymes, quality vegetable oils, bread, confectionery, food processing/packaging and preservation, production of ointments and medicinal plant extracts. Students will be grouped in areas of interest

EDSU-BCH 414: Biochemistry of Organs and Tissues (3 Units, Elective: LH=45).

Senate –approved relevance
Training competent Biochemistry graduates with vast knowledge of the biochemistry of the various organs and tissues with the view to understanding their functions in health and disease is one of the core mandates of EDSU. Of significance is the liver that performs a myriad of functions; drug detoxification, metabolism of macronutrients, excretion of drugs, bilirubin etc., glycogen, vitamins' and minerals' storage among other functions.

Overview

Tissues and organs are of significance in multicellular organisms, going by the specialized and complex functions they perform. This course is therefore designed to expose students to the organization and structure of key tissues and organs in the body such as the blood, muscles, liver, kidneys, spleen etc. the course also focusses on the different functions of these tissues and organs

Objectives
The objectives of the course are to:

1. discuss the organization and structure of some tissues and organs
2. describe the biochemical role of the liver
3. discuss the biochemical roles of the kidneys
4. describe the biochemical roles of the eyes
5. discuss the biochemical roles of the blood
6. discuss the biochemical roles of other tissues and organs such as spleen, pancreas, muscles etc.

Learning Outcomes

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

1. explain the organization and structure of some tissues/organs e.g. blood, liver, kidneys, etc.
2. elucidate the functions of the liver; synthesis of biomolecules, detoxification, excretion, etc.
3. describe the functions of the kidneys; endocrine, excretion, etc.
4. explain the biochemistry of sight
5. explain the functions of the blood; transport of nutrients and waste products of metabolism, etc.
6. describe the functions of other tissues and organs including spleen, pancreas, muscles etc.

Course Contents

A general overview of cellular organization. Intracellular organization, structure and functions of the liver. Intracellular organization, structure and functions of the kidney. Composition, structure and functions of the blood. Intracellular organization, structure and functions of the eyes. Intracellular organization, structure and functions of the pancreas. Intracellular organization, structure and functions of the testes. Intracellular organization, structure and functions of the spleen. Intracellular organization, structure and functions of the muscles. Intracellular organization, structure and functions of the adipose tissue. Intracellular organization, structure and functions of the brain,

Intracellular organization, structure and functions of the ear. The inter tissue/organ functions among the tissues and organs. Functional aspects of neural biochemistry. Membrane potential and transport. Neurotransmitters and biogenic amines in the brain. Biochemistry of the eye and vision**.**

Minimum Academic Standards

Biochemistry Laboratory

EDSU-BCH 415: Clinical Biochemistry and Pharmacology (3 Units, Core: LH=45).

Senate –Approved Relevance

To train competent graduates with vast knowledge and skills of Clinical Biochemistry and Pharmacology which is expected to be applied, is one of the mandates of EDSU. EDSU has a vision and mission of producing Biochemistry graduates capable of solving problems contingent on acquired skills and innovative ideas. Understanding the indications for the different tests of general wellbeing coupled with their principles, pathophysiology of diseases, disease prognosis and diagnosis, drug administration and metabolism will go a long way in reducing the high spate of disease misdiagnosis.

Overview

This course is designed to expose students to the indications of laboratory tests of general wellbeing and the biochemical basis of tests of general wellbeing; liver function tests, renal function tests, fluid electrolytes, immunochemistry etc. It also focuses on drug design, drug metabolism and drug resistance. The course also entails the therapeutic potentials of selected Nigerian traditional medicinal plants

Objectives
The objectives of the course are to:

1. describe of tests of general wellbeing
2. describe indications for the tests of general wellbeing
3. conduct of some tests of general wellbeing
4. describe of the metabolism of xenobiotics
5. discuss of drug design, resistance and factors that affect drug efficacy

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

1. describe tests of general wellbeing; liver function tests, renal function tests, etc.
2. explain indications for the tests listed in objective 1.
3. conduct liver function tests and renal function tests
4. explain drug metabolism; Phase 1 and 2 reactions, cytochrome P450 system
5. explain drug design, resistances and factors affecting drug potency

Course Contents
The course covers the theoretical basis of laboratory tests of clinical significance in diagnosis and management of diseases. Routine tests of general wellbeing. Urinalysis. Haematological tests. Renal function tests. Test of electrolyte balance. Liver function tests. Endocrine function assessment. Immunochemistry. Introduction to pharmacological concepts. Drug administration, absorption, distribution and receptors. Xenobiochemistry and drug metabolism. Drug metabolizing enzymes and drug interactions. Role of Cytochrome P450 and various mechanisms of Detoxification.
Biochemical basis of drug resistance. Drug design. Theories of the mechanism of drug action. Drug resistances and other factors affecting drug efficacy. The physiological and biochemical action of some selected drugs. Reactive oxygen species - mediated toxicity. Nigerian traditional medicinal plants in the management and therapy of common ailments in Nigeria- malaria, sickle cell anaemia, common cold, hepatitis etc. Comparison of the metabolism of biomolecules. Biochemical mechanisms of drug action against parasites. Metabolic factors affecting chemotherapeutic agents.

Minimum Academic Standards
Biochemistry Laboratory

EDSU-BCH 416: Forensic Biochemistry (3 Units, Elective: LH=45)

Senate –approved relevance

Training of proficient Biochemistry graduates who are able to apply the skills of Forensic Biochemistry is in tandem with the vision of EDSU. EDSU is aimed at producing Biochemistry graduates with skills including; collaboration, planning, ethics and use of technology in forensic investigations. This will enhance their capacity in analyzing biological samples in solving problems particularly at crime scenes, paternity disputes and law enforcement, among others.

Overview

This course is designed to expose students to the need for forensic investigations, procedure for obtaining samples for forensic tests, the procedures for forensic analysis as well as the

biochemical basis of forensic analysis. The role of 'omics' in forensic analysis and the applications of forensic biochemistry will also be discussed in the course

Objectives

The objectives of the course are to:

1. appraise the procedures for securing, assessing and processing scenes of crime
2. describe the procedure for obtaining and preserving samples for forensic analysis
3. describe the biochemical basis of forensic analysis
4. discuss the types and analytic methods of physical and trace evidence
5. discuss the applications of forensic biochemistry

Learning Outcomes

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

1. evaluate procedures for securing, assessing and processing scenes of crime
2. explain the step by step procedure for obtaining and preserving materials for forensic analysis
3. explain the biochemical basis of forensic analysis
4. conduct certain analytic methods of physical and trace evidence
5. list five applications of forensic biochemistry to life and other disciplines

Course Contents

History of forensic science. Procedure for the extraction of contaminants of forensic from tissues. Collection and preservation techniques for materials of forensic interest. DNA and biological evidence. Drugs and toxicology. Fingerprints and pattern evidence. Trace evidence. Digital evidence. Ballistic evidence. Analysis of blood splatter. Criminal profiling.

Analytical procedures in forensic analysis. The use of Proteomics, genomics, metabolomics and other novel investigative techniques in forensics. Forensic psychology. Forensic odontology. Forensic enthomology. Forensic anthropology. Applications of forensic biochemistry in medicine. Law, science and medicine in forensic practices.

Minimum Academic Standards

Biochemistry Laboratory

EDSU-BCH 417: Seminars and Biochemical Literature (2 Units, Core: LH=30)

Senate –approved relevance

Training of Biochemistry graduates with proficiency in the conduct of literature search, manuscript preparation and seminar presentation skills aligns with the vision and mission of EDSU. This is of relevance in the conduct of research and public presentation

Overview

The course is designed to expose students to the systematic approach of literature search and preparation of scientific manuscript. This entails; defining research questions and seminar topic, the necessity and design of literature search, critical appraisal and management of texts searched. The use of anti-plagiarism tools, preparation of power point slides and presentation of power point slides will be discussed in the course

Objectives

The objective of the course are to:

1. discuss the process of literature search
2. identify subject heading and key terms in the conduct of literature search
3. review t literatures
4. conduct quality literature search

5. describe step by step process of preparing quality scientific write-ups and seminar presentation

Learning Outcomes

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

1. describe the process of literature search
2. recognize subject heading and key terms in the conduct of literature search
3. appraise literature
4. demonstrate quality literature search
5. prepare and present quality scientific papers and seminar presentations

Course Contents

Courses to cover reading assignments to students which are expected to be completed during 3-6 hours library studies and later presented as short seminars. One lecture weekly on growth and development of Biochemistry emphasizing major breakthrough in Biochemical research.

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Define research question. Define seminar topic. Design search strategy. Literature search on science direct. Literature search on scopus. Literature search on pubmed. Literature search on researchgate. Literature search on Google scholar. Use of subject identifiers. Use of author identifiers. Determination of inclusion and exclusion criteria. . Critical evaluation and analysis of texts. Management of texts of choice. Plagiarism check. Preparation of slides on power point. Presentation of slides on power point.

EDSU-BCH 419: Food/Nutritional Biochemistry (3 Units, Elective: LH=45)

Senate –approved relevance

To train competent graduates who are knowledgeable and skillful in Food and Nutritional Biochemistry and capable of applying these skills in mitigating the high prevalence of nutritional disorders is the mandate of EDSU. The current upsurge in nutritional disorders due to poor nutritional knowledge, wrong choices of food and unhealthy eating habits is a major contributor to metabolic diseases and the attendant mortality. These are gaps required to be filled by the expertise of Biochemistry graduates of EDSU

Overview

The course is designed to expose students to the biochemical basis of nutrition and diet. It covers the biochemical basis of food alteration and the attendant effects on food quality, food processing, preservation and storage. Food vitamin and mineral supplementation, the role of microorganisms in food security, gene dosage and its application will also be taught in the course

Objectives

The objectives of the course are to:

1. describe biochemical alterations in food, meat, fish and fruits.
2. discuss the mechanisms of food additives in food preservation.
3. describe the principle and applications of culture methods
4. discuss health benefits of microbial secondary metabolites
5. discuss gene dosage
6. describe applications of gene dosage

Learning Outcomes
At the end of the course, students will be able to

1. describe biochemical alterations in food, meat, fish and fruits. i.e. enzymatic and non-enzymatic browning, etc.
2. describe the different mechanisms of action of food preservatives in food preservation.
3. explain the principle and applications of culture methods
4. describe the health benefits of microbial secondary metabolites
5. explain gene dosage
6. enumerate at least four applications of gene dosage

Course Contents
Biochemical changes in food, meat, fish and fruits. Enzymatic browning and bio-deterioration of food products: vegetable and oils, milk and milk products, cereal formula. Food processing. Food additives and preservatives. Food preservation and storage of traditional foods- root and stem tubers, fruits and fruit drinks, seeds and grains, green vegetables. Food nutrients. Energy values of food and energy expenditures by mammalians. Quality control of food. Continuous culture methods, principle and application. Fermentation—alcoholic, amino acids, antibiotics and other secondary metabolites. Fermentation Biotechnology-Beer, wine and spirit production. Process evaluation and development. Over-production of metabolites - amino acids, taste enhancers, vitamins, toxin etc. Methods for screening and selecting micro-organisms of industrial importance. Induction of mutation in micro-organism and plants for the purpose of over production. Strain selection/development and enhancement. Gene dosage. Application of gene dosage in industrial processes.

Minimum Academic Standards
Biochemistry Laboratory

EDSU-BCH 425: Advanced Immunology (2 Units, Elective: LH=30, PH=45).

Senate –Approved Relevance

To train competent graduates who are able to apply the knowledge and skills of advanced immunology in health and disease aligns with the vision and mission of EDSU which is to produce graduates well equipped with quality knowledge and innovative ideas in meeting societal, social, cultural and economic needs of the people of Edo State in particular and Nigeria in general. The knowledge of the immunological basis of diseases such as cancer and other chronic diseases is vital to the development of therapies including immunotherapy and other immune-dependent therapies which have been reported to be safer and more effective than the current conventional therapies.

Overview
The course will expose students to the basics of clinical immunology, cancer immunology, immunology of infectious diseases and various immunological disorders. It will also focus on immunological basis of treating immunological and other chronic diseases such as immunotherapy, immunoglobin replacement therapy and vaccine development.

Objectives
The objectives of the course are to:

1. discuss the fundamental concepts in clinical immunology
2. describe immunological disorders

3. discuss responses to parasitic infections
4. describe immunological control methods of infections
5. discuss the procedure for isolating, culturing of infectious agents from a host

Learning Outcomes

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

1. describe the basics of clinical immunology
2. explain immunological disorders and remedies using immunological approach
3. explain immune responses to parasitic infections
4. enumerate methods of control of parasitic infections
5. describe the procedures for isolating, culturing of parasites from infected host

Course Contents

This course covers the fundamentals of clinical immunology and mechanisms of immunopathology. Tissue reactions of injury. Allergic diseases. Cancer immunology. Immunological Disorders. Immunotherapy. Immunomodulators and Immuno suppressive agents. Immunoglobulin Replacement Therapy. Cytokine and Cytokine Receptor-Mediated Therapy. Cellular immune reconstitution. Immunoprophylaxis. Vaccine. Parasite Escape within Hosts. Natural selection of antigenic variants. Pathogen manipulation of host, immune dynamics. Sequence of variants in active, switching from Archives. Polymorphisms in immune Regulation. Types of parasitic protozoa. Methods of control of parasitic diseases. Techniques for the isolation of parasitic protozoa from infected animals. Culture of parasitic protozoa. Catabolism and generation of energy: nucleic acid metabolism. Protein and lipid metabolism and lipid in protozoa. Biochemical mechanism of drug action. The immunology and plasma membrane of parasitic protozoa. (Pre-requisite BCH 224).

Minimum Academic Standards

Biochemistry laboratory

EDSU-BCH 426: Biochemical Engineering (2 Units, Elective: LH=30, PH=45).

Senate –Approved Relevance

A core mandate of EDSU is to produce biochemistry graduates capable of using biological materials such as cells, organisms in developing other products and processes. This is seen in the production of secondary metabolites, certain hormones like insulin from microorganisms among others. This will go a long way in ameliorating the healthcare system in disease diagnostics and management

Overview

The course is designed to expose students to the wide scope of biochemical engineering. It covers both biological and mathematical model developments in microbial culture. The role of heat and other factors in biochemical engineering process will also be discussed in the course

Objectives

The objectives of the course are to:

1. describe the scope of biochemical engineering
2. discuss unit operations in biochemical engineering
3. describe microbial growth kinetics
4. discuss volumetric oxygen transfer

5. describe the applications of heat and other factors in biochemical engineering

Learning Outcomes

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

1. explain the scope of biochemical engineering
2. describe unit operation in biochemical engineering
3. explain the requirements for microbial growth
4. enumerate factors affecting volumetric oxygen transfer
5. explain the application of heat transfer in biochemical engineering

Course Contents

Introduction- Definition and scope of biochemical engineering. Dimensions and Units. Scope of biochemical engineering. Metabolic stoichiometry. Primary and secondary metabolites. Microbial Growth –Requirements for growth, types of media, the batch culture, mathematical model of simple batch culture, diaxic growth. Growth inhibition kinetics. Structured and unstructured kinetic models. Transport mechanisms in bioprocess systems. Gas-liquid mass transfer in cells. Factors affecting volumetric oxygen transfer. Factors affecting growth and product formation. Unit Operations–Material and Energy balance. Heat transfer coefficient. Application of heat transfer (sterilization, canning, pasteurization, chilling and freezing, refrigeration. Methods of sterilization. Thermal death kinetics of microorganisms. Design of bioreactors. Non-ideal reactors. Kinetics of mixed cultures. Food processing.

Minimum Academic Standards

Biochemistry Laboratory

EDSU-BCH 427: Environmental Biochemistry and Toxicology (2 Units, Elective: LH=30, PH=45).

Senate –Approved Relevance

To train competent biochemistry graduates who are able to apply the knowledge of Environmental Biochemistry and Toxicology to mitigate the gross environmental pollution, particularly in Nigeria is in tandem with the vision and mission of EDSU. Environmental pollution has been implicated in the upsurge in the prevalence of communicable diseases in the developing countries. Therefore, graduates of this course are expected to advance the course of a safer environment by developing novel technologies that aid the production of clean alternative energy as well as production of environmental-friendly packaging materials. This will invariably reduce the impact of climate change.

Overview

The course is designed to expose students to the biochemical basis of eco-toxicology, mechanisms of action of environmental pollutants, diseases associated with environmental toxicants, assays of environmental pollutants. Furthermore, the course entails environmental impact assessment, bio monitoring and remediation

Objectives

The objectives of the course are to:

1. discuss the basis of ecotoxicology
2. describe environmental impact assessment
3. discuss bio-monitoring

4. describe environmental remediation
5. discuss novel methods of environmental remediation

Learning Outcomes

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

1. define the fundamentals of ecotoxicology
2. explain environmental impact assessment methods
3. describe the biochemical basis of bio-monitoring
4. explain environmental remediation
5. describe the role of eco-friendly agents in remediation

Course Contents

Fundamentals of ecotoxicology. Importance of ecotoxicology. Chemical movements and fates in the environment. Terrestrial ecotoxicology. Aquatic ecotoxicology. Atmospheric ecotoxicology. Poisons: definitions and mechanisms of action. Molecular and cellular mechanisms of toxicity and carcinogenesis. Good laboratory practices in ecotoxicology. Biomarkers of ecotoxicology. Endocrine and developmental disruptors. Bioassays. Modelling and geographic information systems in ecotoxicology. Types of models. Modelling exposure. Linking models to geographic information systems. Environmental impact assessment. Bio-monitoring. Environmental remediation.

Minimum Academic Standards

Biochemistry Laboratory

EDSU-ENT 421 Entrepreneurship Development (1 Unit, Core: LH 15).

Senate- approved relevance

There is no market for vision, and turning the vision into a solution makes a real entrepreneur. One of the greatest challenges of entrepreneurs is staring-up. Having trained and equipped graduates with creative, productive, and innovative knowledge, a key to achieving the vision of Edo State University of graduating competitive graduates is the provision of the opportunity to put the knowledge to practice. One of the channels of achieving this is through entrepreneurial competition which is the main content of this course. This is important as it will help the students to take the step of putting their vision into solution provision, and source of capital for the winner.

Overview

Students will be exposed to innovative ways of preparing business plan. They will also be taught models of wealth creation, and the management of business. This includes management of personnel, finance etc. Students are expected to prepare and defend a business plan proposal

Learning objectives

The learning objectives of this course are to:

1. explain the various models of wealth creation
2. analyze a profitable and innovative business idea.
3. examine the capacity of the student to develop a business plan to start a business.
4. demonstrate the preparation of a proposal on a remarkable and innovative business idea/plan in different fields of study.

Learning Outcomes:

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

1. explain at least one model of wealth creation
2. prepare a profitable and innovative business idea.
3. develop one business plan to start a business.

4. prepare a proposal on a remarkable and innovative business idea/plan in their field of study

Course Contents
Models of wealth creation. Requirements in preparing an innovative business plan. Business funding. Sustainability strategies. Managing business growth. Managing time. Managing personnel. Finance management. Self-management. Management of losses. Business growth forecast. Preparation of business plan by students. Defence of the prepared business plan where the winner gets an award.

Minimum Academic Standards

Equipment

1. Water Bath (Thermostatic)
2. Drying Oven (Thermostatic)
3. Spectrophotometers and Colorimeters
4. pH Meters
5. Electrophoresis Units
6. Centrifuges (Bench- Top & High Speed)
7. Incubators
8. Hot Plates and Heaters
9. Test-Tube Mixers
10. Gas Cylinders, Valves and Tubings
11. Distillers (All Glass)
12. Deionizers
13. Fraction Collector
14. Micro-Kedhjal Apparatus
15. Column Chromatography Equipment
16. Thin Layer Chromatography Equipment
17. Rotary Evaporator 18. Glass wares

Staffing

Professor/Reader	1
Senior Lecturer	2
Lecturers 1 and below	3 (at least 2 with PhD)
Laboratory Technologist	2
Laboratory Assistant	3
Laboratory Attendants	3
Secretary	1
Office Assistant	1

Library

The University Library is expected to stock at least 3 copies each hard-copy text books on biochemistry (both general and specialized), depending on number of students on the

programme. There should also be hard copies of subject specific journals, both national and international. The library is also expected to subscribe to data bases that will make numerous text books and journals on biochemistry available as e-resources.

Classrooms, Laboratories, Workshops and Office Space

The NUC recommends the following physical space requirements:

Description Size	m^2
Professor's Office	18.50
Head of Department's Office	18.50
Tutorial Teaching Staff's Office	13.50
Other Teaching Staff Space	7.00
Technical Staff Space	7.00
Secretarial Space	7.00
Research Laboratory	16.50
Seminar Space/per student	1.85
Laboratory Space per FTE	7.50
Conference Room	37.0

APPENDIX

List of Reviewers

Title	Surname	First Name	Institution	Programme
Professor	AKANJI	Musbau	University of Ilorin	Chairman/Biochemistry
Professor	MAFIANA	Chiedu	National Open University of Nigeria	Co-Chairman
Professor	OSILIKE	Micah	University of Nigeria, Nsukka	Representative National Academy of Science
Professor	ONIYE	Sonnie	Ahmadu Bello University, Zaria	Biology
Professor	OKIGBO	Raphael	Nnamdi Azikiwe University, Awka	Botany
Professor	EKPO	Uwemedimo Friday	Federal University of Agriculture, Abeokuta	Zoology
Professor	ILORI	Matthew Olusoji	University of Lagos	Biotechnology
Professor	ADEJUMO	Timothy Olabisi	Adekunle Ajasin University Akungba-Akoko	Brewing Science
Professor	ODOKUMA	Lucky	University of Port Harcourt	Microbiology
Professor	ALIYU	Adetutu	National Defence Academy	Chemistry
Professor	LAWAL	Abdulazeez	Fountain University Osogbo	Industrial Chemistry
Professor	YAKASSAI	Ibrahim Adamu	Bayero University Kano	Medicinal Chemistry
Professor	OSUJI	Leo Chigbu	University of Port Harcourt	Petroleum Chemistry
Professor	OLAYINKA	Adewoye	Ladoke Akintola University of Technology, Ogbomoso	Environmental Management and Toxicology
Professor	OJO	Sola	Federal University Oye-Ekiti	Geology
Professor	ISAAC	Aigbedion	Ambrose Alli University Ekpoma	Geophysics
Professor	IBRAHEEM	Mohammed	University of Ilorin	Mathematics
Professor	BAKARI	Harun	University of Maiduguri	Statistics
Professor	ALAO	Felix	Federal University of Technology Akure	Industrial Mathematics
Professor	UGWUMBA	Adiaha Alda	University of Ibadan	Marine Science
Professor	AMA-ABASI	Daniel	University of Calabar	Maritime Science
Professor	MATAZU	Mansur Bako	Federal University Dutsin-ma	Meterology
Professor	DARMA	Tijjani Hassan	Bayero University Kano	Physics

Professor	EKPUNOBI	Azubike Joshua	Nnamdi Azikiwe University Awka	Industrial Physics
Professor	AWOJOYEGBE	Bamidele O.	Federal University of Technology Minna	Medical Physics
Professor	MBOTO	Clement Obi	University of Calabar	Science Laboratory Technology
Professor	ARZAI	Auwalu Halliru	Bayero University Kano	Forensic Science
Professor	TIJJANI	Auwal Musa	Abubakar Tafawa Balewa University Bauchi	Physics with Electronics

List of NUC Representatives

Title	**Surname**	**First Name**	**Programme**
Mrs.	Sambo	Sa'adiya	Discipline Representative/ Biology and geology
Mr.	EBEGUNA	Ikechukwu Paul	Biochemistry
Miss	ETIM	Okoho	Botany
Miss	SANI	Zainab Onayi	Zoology and Chemistry
Dr.	IRENE	Angela	Biotechnology
Mrs.	DADA	Olayemi	Brewing Science &Technology and Industrial Chemistry
Mrs.	ODAODU	Oluwabukunmi	Microbiology
Mr.	MOHAMMED	Abubakar Tanko	Medicinal Chemistry
Mr.	KOLAWOLE	Banji	Petroleum Chemistry and Forensic Science
Miss.	ODUDU	Gloria	Environmental Management & Toxicology
Mr.	ONI	Abimbola	Applied Geophysics
Mr.	MOHAMMED	Abubakar S.	Mathematics
Mr.	TOBRISE	Peter	Meteorology & Statistics
Mr.	OCHALA	Solomon	Industrial Mathematics
Mrs.	SULE	Olufunke	Marine Science
Dr.	AUDU	Bridget	Maritime Science
Mr.	BAKO	Audu	Physics
Mr.	OKAFOR	Ikechukwu David	Industrial Physics
Mr.	DAUDA	Nehemiah	Medical Physics
Miss.	EKWUEME	Amuche	Science Laboratory Science
Mr.	ADELEKE	Adeyemi	Physics with Electronics