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BAUCHI STATE

UNIVERSITY, GADAU

FACULTY OF SCIENCE

DEPARTMENT OF

MICROBIOLOGY

STUDENTS HANDBOOK

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BRIEF HISTORY OF THE DEPARMENT

The Department of microbiology was established in 2011 as one of the pioneer departments of the new Faculty of Science. At present (2013/2014 session) the

Department has 15 academic staff, 5 non-academic staff and a student population of 63 students.

Philosophy

The programme has been designed to provide a sound understanding of the concept of micro-organism in relation to mankind and the environment. The programme will elaborate the importance of microorganisms in the industry, health and environmental sectors of the society. The Microbiology programme will also emphasize the traditional biotechnology and the linkage to the current modern biotechnology.

Objectives

The main objectives of the programme are to broadly educate students for positions in the industry, health sectors, and research institutions and to prepare them for graduate and professional studies in the applied areas of Microbiology.

Award of Certificates

Student graduate and are awarded degrees upon earning the minimum number of credits required for graduation

Duration

- i. Minimum of four and Maximum of six academic sessions for UTME candidates
- ii. Minimum of three and Maximum of five academic sessions for Direct Entry (DE) candidates

Methods of Instruction

- i. **Lectures:** Lectures are used in courses which involve new concepts and ideas. But such lectures should be included with moments for questions and comments from students.
- ii. **Tutorials:** Tutorials are given to all level(s) Students by graduate Assistant of the Department
- iii. **Field Work/Project Site Visit:** This is the situation where students will be exposed to project site(s) or work field to learn and gather raw data about the project undertaken.

Field Attachment: in this kind of study, students are attached to either private or public organizations, such as companies, ministries, agencies etc in order to acquire practical skills on organizational procedures and processes.



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1 CHAPTER ONE: INTRODUCTION

1.1 The University logo

The approved logo of Bauchi State University is an artist effort to capture the University's vision, mission, philosophy and objectives.

- Stretched hide skin Livestock
- Green colourCrops
- Yellow colour í í í í í í í í í í Mining
- Flameí í í í í í í í í í í í í í ...Learning and Energy

Motto The Hausa inscription *IlimiTushenCigabais* the motto, it simply means *Knowledge is the foundation of progress.*

1.2 Philosophy and Objectives of the University

Vision

The vision of Bauchi State University is to become a center of excellence in scholarship in as many academic disciplines as may be needed in response to intellectual and other development needs of the people of Bauchi State in particular and nation at large.

Mission

Through its teaching and research activities Bauchi State University is expected to be a significant contributor in extending the various frontiers of knowledge for the benefit of its student and society at large.

Philosophy

Bauchi State University will be an environment conducive for freedom of thoughts expression of enquiry for all. To this end, its doors will be open to all staff and students irrespective of creed, gender and religious belief. The overall philosophy is to endeavour in seeking the truth and disseminating same for the good of all mankind.

Objectives

To realize its vision and mission, Bauchi State University must work assiduously to achieve the following objectives as pre-condition:

- Identify, recruit and or attract the finest staff manpower to carry out its vital traditional functions of teaching, research and community service.
- To encourage the advancement of learning and to hold out all person without distinction of race, creed, sex or political conviction, the opportunity of acquiring higher and liberal education.
- To provide courses of instruction and other facilities for the pursuit of learning in all its campuses, and to make those facilities available on proper terms to such persons as are equipped to benefit from them.

CHAPTER ONE: INTRODUCTION

1.1 ADMISSION REQUIREMENTS

B.Sc. Microbiology

i. For entry into 100 level: Unified Tertiary Matriculation Examination (UTME), with five SSCE/NECO/GCE O/LEVEL credits obtained in not more than two (2) sitting in English, Physics, Chemistry and Biology.

ii. For Direct Entry (DE) into 200 level:

- a. Minimum of 8 IJMB points with five O \emptyset level passes in relevant subjects, three of which must be at credit level.
- b. Credit passes in two major subjects in NCE and five ordinary level passes, three of which must be at credit level.
- c. OND at upper credit and five O \emptyset level passes, three of which must be at credit level.

1.2 GRADUATION REQUIREMENTS

In order to satisfy the requirements for the award of degree in B.Sc. Microbiology a candidate must register and pass the following courses.

LEVEL 100

- i. 8 Credits of core courses in chemistry
- ii. 6 Credits of core courses in mathematics
- iii. 8 credits core courses in Physics
- iv. 4 Credits core courses in General Studies
- v. 8 Credits core courses in Biology

Total 34 credits

LEVEL 200

A student at level 200 shall register courses as follows:

- i. 15 credits of core courses in Biology
- ii. 3 Credits core courses in zoology
- iii. 6 credits core courses in microbiology
- iv. 5 credits core courses in Biochemistry
- v. 6 credits core courses in chemistry
- vi. 6 credits core courses in General studies for returning students and in addition GSP2401 for DE students.
- vii. 2 credits core course in computer science

Total 43 credits (UTME) and 47 credits (DE students)

LEVEL 300

A student at level 300 shall register for courses as follows:

- i. 20 credits of core courses in microbiology
- ii. GSP 3201 (2 credits)
- iii. MCB 3699 (6 credit course) Industrial Attachment for six months is compulsory for all students at the end of first semester of level 300.

Total 28 credits

LEVEL 400

A student at level 400 shall register for courses as follows:

- i. 24 credits of core courses in microbiology
- ii. The project, MCB 4699 (6 credit course) shall be undertaken by each student during the second semester of level 400.
- iii. GSP 4201 (2 credits)

Total 32 credits

CHAPTER TWO: LIST OF COURSES AND THEIR DESCRIPTIONS

2.1 LIST OF COURSES FOR B. SC. MICROBIOLOGY

Level 100

First Semester

Course Code	Title	Credits
GSP 1201	Study Skills	2
BIO 1201	General Biology I	2
BIO 1203	General Biology III	2
CHM 1201	Inorganic Chemistry	2
CHM 1203	Organic Chemistry	2
MTH 1301	Elementary Mathematics I	3
PHY 1105	Physics Practical I	1
PHY 1201	Mechanics	2
PHY 1203	Electricity and Magnetism	2
	Total	18

Second Semester

Course Code	Title	Credits
BIO 1202	General Biology II	2
BIO 1204	General Biology IV	2
CHM 1202	Physical Chemistry	2
CHM 1204	Practical Chemistry	2
MTH 1304	Elementary Mathematics IV	3
PHY 1202	Behaviour of Matter	2
PHY 1104	Physics Practical II	1
GSP1202	Use of Library and Computer appreciation	2
	Total	16

Level 200

First Semester

Course Code	Title	Credits
BIO 2201	Genetics I	2
BIO 2203	Introductory Ecology	2
BIO 2205	General Physiology	2

BCH 2301	General Biochemistry I	3
CHM 2201	Organic Chemistry I	2
MCB 2207	General Microbiology I	2
CHM 2203	Physical Chemistry	2
GSP 2201	Foundation of Nigerian Culture	2
GSP 2203	Nigerian Government and Economy	2
GSP 2401	Use of English (DE Students only)	4
CSC 2201	Introductory Computer	2
MCB 2215	Basic Techniques in Microbiology	2
Total		23 - UTME 27 - DE

Second Semester

Course Code	Title	Credits
BCH 2214	General Biochemistry II	2
BIO 2208	Biological Techniques	2
BIO 2204	Cell Biology	2
BIO 2206	Biostatistics	2
BIO 2302	Genetics II	3
ZOO 2314	Invertebrate	3
CHM 2210	Inorganic Chemistry	2
MCB 2212	General Microbiology II	2
GSP 2202	Peace and Conflict Resolution	2
Total		20

Electives

Course Code	Title
BOT 2210	Seedless Plants
BOT 2212	Seed plants
ZOO 2212	Chordata

LEVEL 300

First Semester

Course Code	Title	Credits
MCB 3101	Field Course I	1
MCB 3211	Environmental Microbiology	2
MCB 3209	Food Microbiology	2
MCB 3301	Microbial Genetics & Molecular Biology	3
MCB 3313	Pathogenic Bacteriology	3
MCB 3303	Immunology & Chemotherapy	3
MCB 3305	Microbial Physiology	3
MCB 3307	Pathogenic Mycology	3
GSP 3201	Entrepreneurial studies I	2
Total		22

Elective

Course Code	Title
ZOO 3317	Basic Entomology

Second Semester

Course Code	Title	Credits
MCB 3699	SIWES	6

LEVEL 400

First Semester

Course Code	Title	Credits
MCB 4213	Field Course II	2
MCB 4201	Review Essay	2
MCB 4203	Pharmaceutical Microbiology	2
MCB 4205	Analytical Microbiology and Quality Control	2
MCB 4209	Microbial Ecology	2
MCB 4305	Principles of Epidemiology & Public Health	3
MCB 4307	Industrial Microbiology	3
ZOO 4313	Parasitology	3
GSP 4201	Enterprenueral studies II	2
Total		19

Second Semester

Course Code	Title	Credits
BOT 4306	Plant Pathology	3
MCB 4208	Virology	2
MCB 4699	Project	6
Total		11

2.2 DESCRIPTION OF COURSES

LEVEL 100

BIO 1201 GENERAL ZOOLOGY I

Animal cell structure and organization; functions of the cellular organelles. Diversity, characteristics and classification of animals, Animal reproduction and interrelationship.

BIO 1202 GENERAL ZOOLOGY II

A generalized survey of the animal kingdom based mainly on study of similarities and differences in their external features with examples from Platyhelminthes, Annelids, Arthropods, Fishes, Amphibians, Reptiles, Birds and Mammals.

BIO 1203 GENERAL BOTANY I

Plant cell structure and organization; functions of plant cell organelles , diversity , characteristics and classification of plants . Plant reproduction; heredity and evolution ; elements of ecology and types of habitats .

BIO 1204 GENERAL BOTANY II

A generalized survey of the plant kingdom based mainly on study of similarities and differences in their external features with examples from viruses, bacteria, protozoa, algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms.

CHM 1201 INORGANIC CHEMISTRY

Principles of atomic structure, isotopes, empirical and molecular formulae. Electronic configuration , periodicity and building up of the periodic table. Hybridization and shapes of simple molecules , Extraction of metals. Comparative chemistry of Group IA and IVA elements. Preparation, properties, structure and application of some selected compounds. Introduction of transition metal chemistry and nuclear chemistry.

CHM 1203 ORGANIC CHEMISTRY

Historical survey of the development and importance of organic chemistry. IUPAC Nomenclature and classification of organic compounds, Homologous series, Covalent bonds and hybridization to reflect the tetravalency of carbon in organic compounds, electronic theory in organic chemistry. Qualitative and quantitative organic chemistry; Determination of empirical and molecular formulae: simple techniques of writing structural formulae; Isolation and purification of organic compounds; Saturated hydrocarbons; structural isomerism, Properties and reactions of alkanes and cycloalkanes, mention of their chemistry and uses in petroleum; unsaturated hydrocarbons: alkenes, alkynes, cycloalkenes: cis-trans isomerism; simple electrophilic addition reactions; Polymerization.

CHM 1202 PHYSICAL CHEMISTRY

Principles of atomic structure, isotopes, empirical and molecular formula; nuclear structure, atomic fission and nuclear energy. The electronic structure and arrangement of electrons in atoms; Electronic configuration of 1st and 2nd rows of elements. Properties of gases: equation of state, kinetic and molecular theory of gases, and heat capacities of a gas. Equilibrium and thermodynamics ; Thermochemistry, Enthalpy of reactions , bond energies, thermodynamic cycles, Hess's law, Born Haber cycle, the meaning of K_a , K_p and K_c , Le Chatelier's principle, pH, ionic equilibrium , buffers , indicators, solubility product, common ion effect , redox reactions. Electrode potentials, electrolytes and electrolysis.

Kinetics: The position of equilibrium and the rate at which it is attained. Factors influencing the rate of reactions. Introduction of activation and catalysis.

CHM 1204 PRACTICAL CHEMISTRY

Laboratory instructions and experimental procedure shall be conducted for the candidates from the following subject areas:

Physical: Determination of heats of reaction, effect of solutes on boiling points of solvents, partition coefficient. Determination of molecular mass by Dumas and Victor Meyer methods. Measurements of rate equation and activation energy. Other experiments based on the scope of the lectures and as approved by the Department.

Organic: Safety precaution instructions, classification of organic compounds by their solubilities in common solvents. Qualitative analysis for common elements in organic compounds. Identification and classification of acids and bases functional groups. Identification of the following: neutral functional groups, alcohols, aldehydes, ketones, esters, anhydrides and others. Acetylation of aniline as an example of the preparation of solid aniline derivative. An electrophilic addition reaction.

Inorganic: Qualitative and quantitative analysis; molarity, concentration and percentage purity.

PHY 1201 MECHANICS

Space and time, frames of reference, units and dimension, kinematics; Fundamental laws of mechanics, statics and dynamics; Galilean invariance; universal gravitation; Work and energy; Rotational dynamics and angular moments conservation laws.

PHY 1203 ELECTRICITY AND MAGNETISM

Electrostatics; Conductors and currents; Dielectrics; Magnetic fields and induction; Maxwell's equations; Electromagnetic oscillations and waves and their applications.

PHY 1202 BEHAVIOUR OF MATTER

Molecular treatment of properties of matter, elasticity: Hooke's law; Young's shear and bulk model; Hydrostatics; streamlines, Bernoulli and continuity equations, Turbulence, Reynolds number. Viscosity; Laminar flow, Poiseuille's equation. Surface tension; adhesion, cohesion, capillarity, drops and bubbles; Temperature; the zeroth law of thermodynamics; heat; gas law; laws of thermodynamics; Kinetic theory of gases. Applications.

PHY 1105/1104 PHYSICS PRACTICALS I / II

This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques will be employed. The experiments include studies of matter, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, viscosity, etc, covered in the above physics courses.

MTH 1301 ELEMENTARY MATHEMATICS I (ALGEBRA AND TRIGONOMETRY)

Elementary set theory: subsets, union, intersection, complements, Venn diagram, Real numbers, Integers, Rational and irrational numbers, Real sequences and series, Theory of quadratic equations, Binomial theorem, Circular measure, Trigonometric functions of angles of any magnitude, trigonometric formulae.

MTH 1304 ELEMENTARY MATHEMATICS IV (CALCULUS I)

Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change; Integration as an inverse of differentiation: methods of integration, definite integrals; Application to areas, and volumes.

GSP 1201 STUDY SKILLS

Effective communication and writing in English, Language skills, writing of essay answers, comprehension, sentence construction, outlines and paragraphs, collection and organization of materials and logical presentation, punctuation

GSP 1202 USE OF LIBRARY AND COMPUTER APPRECIATION

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

LEVEL 200

MCB2207 GENERAL MICROBIOLOGY I

Historical aspects, scope of microbiology, general characteristics of microorganisms, growth and reproduction of microorganisms; sterilization and disinfection, brief survey of microbes and friends and foes.

MCB 2212 GENERAL MICROBIOLOGY II

Systematic classification of bacteria, fungi, viruses, etc. Microbial variation and heredity; biological and biochemical reactions of microorganisms; cycles of elements in nature; Nitrogen fixation.

MCB 2215 BASIC TECHNIQUES IN MICROBIOLOGY

Microscope and microscopy techniques, colorimetry/spectrophotometry, chromatography techniques, culturing of microorganisms; preparation of media for microbial growth. Isolation of pure culture; streaking, pour plates

etc; subculturing procedures. Staining techniques for differentiation of microorganisms. Enumeration of microorganisms, direct and indirect procedures. Identification of microorganisms to include colonial and cellular morphology and biochemical procedures.

BCH 2301 GENERAL BIOCHEMISTRY I

Acidity and alkalinity: pH and pKa values and their effects on cellular activities; Buffers. Chemistry / structures of carbohydrates, lipids and nucleic acids. Chemistry of amino acids, proteins and their derivatives; methods of isolation and identification; Primary, secondary, tertiary and quaternary structures of proteins; determination and biochemical applications of the structures of proteins; Nomenclature of nucleosides and nucleotides; Effects of acid and alkali on hydrolysis of nucleic acids; Structures of DNA and RNA; prokaryotic versus eukaryotic organisms.

BCH 2214 GENERAL BIOCHEMISTRY II

Introduction to enzymes: types, properties, classification and nomenclature, enzyme catalysis; Factors affecting the rate of enzyme catalysed reaction. Biological oxidations and bioenergetics: Gibbs equation, chemical coupling, phosphorylations, ATP and NADPH cycles; Metabolism, Introduction to metabolism of carbohydrates and lipids

BIO 2201 GENETICS I

Hereditary and non-hereditary characteristics; Chromosome theory of inheritance; the chromosome of eukaryotes; bacteria and viruses; Linkage, crossing over, sex linkage, sex chromosome and sex determination. The mechanisms of genetic recombination. Introduction to population genetics.

BIO 2208 BIOLOGICAL TECHNIQUES:

The Microscope: types of microscopes and their uses. Preparation of microscope slides; Photometry; Colorimetry; Chromatography; Electrophoresis; Conductimetry; Experimental designs.

CHM 2210 INORGANIC CHEMISTRY

Stereochemistry and molecular orbital theory of simple molecules including homo- and hetero-atoms; Comparative group relationships of the elements in the periodic table. Chemistry of group IIIA (Boron group), VA (Nitrogen group), noble gases, and first row of transition metals. Concepts of hard and soft acids and bases. Chemistry in aqueous and non-aqueous media. Oxidation and reduction reactions.

CHM 2201 ORGANIC CHEMISTRY

Factors affecting structure and physical properties of organic compounds (atomic orbitals, bonding and hybridization); Factors affecting availability of electrons, inductive, mesomeric hyperconjugation and steric effects; Introductory stereochemistry (optical activity, conformational isomers, chirality etc): Methane, energy of activation and free radical substitution reactions in alkanes; Alkyl halides preparation, properties and nucleophilic



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reactions; Aromaticity and electrophilic substitution reactions. Elimination reactions.

CHM 2203 PHYSICAL CHEMISTRY:

The laws of thermodynamics, entropy, free energies; Feasibility of chemical systems, phase rule and productive uses, phase equilibrium; Reaction rates, rate laws, molecularity and order of reactions; Mechanism and theories of elementary processes, photochemical reactions.

BIO 2206 BIOSTATISTICS

Sampling; Methods of collection and presentation of biological data; Standard deviation; Probability, Correlation and regression; Correlation coefficient; Inferential statistics.

GSP 2201 FOUNDATION OF NIGERIAN CULTURE

The heritage of the past African political development and governments; The European impact and westernization; Contemporary Nigeria, its legal system, ethics and society, educational challenges, media, language and culture.

GSP 2203 NIGERIAN GOVERNMENT AND ECONOMY

Problems and challenges of nationhood and development in a changing world; Government and stability; Religious tensions ó causes and solutions; Military government in Nigeria and Africa; Budget and development planning; Developmental goals for Nigeria, strategic foreign policy issues, mobilization for national development; Economic potential of Nigeria, mineral resources in Nigeria.

GSP 2202 PEACE AND CONFLICT RESOLUTION

Basic concepts in peace studies and conflict resolution, peace as a vehicle of unity and development, Conflict issues, Types of conflicts e.g. ethnic/religious/political/economic conflicts, Root causes of conflicts and violence in Africa, Indigene/settler phenomenon, peace building, Management of conflict and security. Elements of peace studies and conflict resolution, developing a culture of peace, Peace mediation and peace ó keeping. Alternative dispute resolution (ADR), Dialogue/arbitration in conflict resolution, Role of international organizations in conflict resolution e.g. ECOWAS, African Union, United Nations etc.

CSC 1201/2201 INTRODUCTION TO COMPUTER SCIENCE

Types of computer; Hard and soft wares; Operations of computer; Practical involving the usage of basic computer programs.

LEVEL 300

MCB 3301 MICROBIAL GENETICS AND MOLECULAR BIOLOGY

A survey of the current status of microbial genetics (bacteria, viruses, protozoa and fungi) including discussion on methods and findings in the area of mutagenesis, inductions, isolation and biochemical characterization of mutants; adaptation, transformation, transduction, conversion and conjugation.

General and specialized methods and techniques in microbial genetics. Experiments with virulent phages, temperate phages and lysogenic bacteria. Fungal and other lower eukaryotic genetics.

MCB 3313 PATHOGENIC BACTERIOLOGY

Host parasite relationships, pathogenic microorganisms and disease, virulence, spectrum and symptoms of infection, treatment and control. Koch's postulates. Methods of isolation of pathogens. Bacterial infections.

MCB 3303 IMMUNOLOGY AND CHEMOTHERAPY

Basic concepts of immunology; structure of antigens, antigenic determinants, cellular response, genetics of response to antigenic stimulation. Structure and classification of immunoglobulins and antibodies. Mechanisms of antibody formation. Antigen-antibody interactions; role of lymphoid tissues and thymus in immunoresponses. Hypersensitivity, immunopathology, autoimmunology, tumor and transplantation immunology, immunoprophylaxis; modern techniques in immunology and immunochemistry.

Principles of Chemotherapy: History of chemotherapy. Basic pharmacodynamics and pharmacokinetics. Chemotherapeutic agents: antibacterial, antifungal, antiviral antiprotozoan and antihelminths. Modes of actions of antimicrobials. Chemotherapy of specific diseases. Drug bio-assays and sensitivity tests.

MCB 3211 ENVIRONMENTAL MICROBIOLOGY

Microorganisms and other organisms of importance in aquatic systems and disposals. Ecology of microorganisms in freshwater. Pollution and self-purification of water, purification of water. Brief studies of marine microbiology. Water-borne diseases. Microbiological examination of waters. Microbiology of waste disposal. Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), tests for sewage and water.

MCB 3305 MICROBIAL PHYSIOLOGY AND METABOLISM

Aspects of microbial physiology, review of cell structure and function; growth and death of microorganisms. The nutritional types of different bacteria in relation to their energy metabolism and biosynthetic activity.

MCB 3307 PATHOGENIC MYCOLOGY

Structure, reproduction and classification of pathogenic fungi. Laboratory methods of study; pathology and immunology of superficial systemic mycoses and actinomycoses.

MCB 3209 FOOD MICROBIOLOGY

The distribution, role and significance of microorganisms in food, intrinsic and extrinsic parameters of food that affect microbial growth, food spoilage and food borne diseases. Microorganisms as indices of food sanitary quality, microbiological standards of foods. Diseases of animals transmissible to man via animal food products



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GSP 3201 ENTREPRENEURIAL STUDIES I

Introduction to entrepreneurship and new venture creation, Entrepreneurship in theory and practice; The opportunity, Forms of business, Staffing, Marketing and the new venture; Determining capital requirements, raising capital, Financial planning and management; Starting a new business, Feasibility studies, Innovation, Legal issues; Insurance and environmental considerations; Possible business opportunities in Nigeria.

MCB 3699 STUDENTS' INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

Industrial Attachment in Medical/Public Health or Industrial establishment during the long vacation.

LEVEL 400

GSP 4201 Entrepreneurial Studies

Some of the ventures to be focused upon include the following:

Soap/detergent, Tooth brushes and Toothpaste making; Photography, Brick, nails, screw making; Dyeing/Textile blocks paste making; Rope making; Plumbing, Vulcanizing, Brewing; Glassware production/Ceramic production, Paper production, Water treatment/conditioning/packaging; Food processing/packaging/preservation; Metal working/Fabrication of steel and aluminium door and window; Training industry; Vegetable oil and salt extractions; Fisheries/Aquaculture; Refrigeration/Air conditioning; Plastic making, Farming (crop); Domestic Electrical wiring, Radio/TV repairs, Carving, Weaving, Bricklaying/making, Bakery, Tailoring, Iron welding, Building drawing, Carpentry, Leather tanning, Interior decoration, Printing, Animal husbandry (poultry, piggery, goat etc), Metal craft of Blacksmith, Tinsmith etc., Sanitary wares, Vehicle maintenance, Bookkeeping.

MCB 4201 REVIEW ESSAY

Collection of literature on contemporary issues in Microbiology from various sources and organisation of same in form of a scientific report.

MCB 4213 FIELD COURSE II

Collection of literature on contemporary issues in Microbiology from various sources and organisation of same in form of a scientific report.

MCB 4203 PHARMACEUTICAL MICROBIOLOGY

The chemistry of synthetic chemotherapeutic agents and antibiotics. Production and synthesis of antibiotics and antimicrobial agents. Quality control of pharmaceutical products. Concepts of growth and death in microorganisms. The mode of action and assay of anti microbial agents. Concepts of antibiotic sensitivity and resistance as related to microbial physiology.

MCB 4205 ANALYTICAL MICROBIOLOGY AND QUALITY CONTROL

Microorganisms agents in quantitative analysis. Selection of test organisms for assay (antibiotics, amino acids, vitamins, etc, etc). Response of microorganisms used in assays. Obtaining and measuring responses. Preparation of assay samples. Methods of assays. Interpretation of results. Aspects of quality control. Plant and equipment sanitation. Microbiological and specifications.

MCB 4209 MICROBIAL ECOLOGY

Microbes and Ecological theory, Physiological, morphological and genetic adaptations of microorganism to their environment, microbial interactions, microorganisms in ecosystems. Microbial bio-conversions.

MCB 4305 PRINCIPLES OF EPIDEMIOLOGY AND PUBLIC HEALTH

Statistical application to epidemiology. Nature of epidemiological investigations. Spectrum of infections. Hard immunity. Latency of infections. Multi factorial systems in epidemics. Zoonosis, Antigenic drifts. Biological control of infections diseases.

MCB 4208 VIROLOGY

Viruses pathogenic to man and animals, with emphasis on virulence, types of diseases caused, methods of control. Experiments with bacteriophages and representative animal viruses to demonstrate characteristics of viruses and viral virulence. Methods of viral cultivation and identification, with special reference to tissue culture techniques.

MCB 4307 INDUSTRIAL MICROBIOLOGY

Nature of Industrial Microbiology, Microorganisms of industrial importance. Aspects of the biology of molds, yeasts. Actinomycetes and viruses of importance in various fermentations. Culture techniques and maintenance of selected cultures. Mutation, strain selection and development, hybridization, media formulation and economics. Optimization of fermentation media at laboratory scale. Perimeter design operation. Antifoams. Aspects of biochemical engineering patents and patent laws.

MCB 4699 RESEARCH PROJECT

A short supervised research project on a topic relevant to the area of Microbiology and the findings to be presented at a seminar and reports submitted for assessment.

CHAPTER THREE: EXAMINATION ADMINISTRATION AND MISCONDUCT

3.1 EXAMINATION ADMINISTRATION

Admission into Examination

- i. In order to be admitted into an examination, student must have been registered for the relevant course, and must satisfy any University and Faculty requirements regarding attendance, the performance of assignments connected with the course taught, and the payment of fees.
- ii. A student must have at least a 75% attendance record in order to be eligible to sit for an examination in a course. This provision can only be implemented if the Department is satisfied that proper attendance record has been kept.

Discipline during Examination

1. It shall be the responsibility of each student to make sure that he/she is registered for the appropriate examinations for which he is registered; also to ensure that he/she is in possession of any identity document prescribed for the examination.
2. Each candidate should be at the examination room at least twenty minutes before the advertised time of the examination.
3. He/she is required to supply his/her own writing and drawing instrument. He/she is also required to supply any other examination aid to which the provision is prescribed in the rubric of the question paper as being his own responsibility.
4. A student shall bring his identity document to each examination and display it in position on his desk.
5. Any book, paper, document, examination aid (except as may be provided for in the rubric of the question paper and announced to the candidate in advance), handbag or brief case is to be deposited at the invigilator's desk, or a desk designated for the purpose, before the start of the examination. In no circumstances must they be placed on or near any candidate's writing desk.
6. Each student shall complete an attendance sheet bearing his number and name, which shall be collected by the Invigilator.
7. A student shall write his examination number, but not his name, distinctly at the top of the cover of every answer booklet or separate sheet of paper.
8. The use of scrap paper,; question paper, toilet tissue, etc. for rough work is not permitted. All rough work must be done in answer books and crossed neatly through, or in supplementary answer sheet, which must be submitted, to the invigilator.
9. A candidate arriving late shall be admitted up to thirty minutes after start of the examination, but he/she shall not be allowed extra time. If he/she arrives more than thirty minutes late but before one half of the total duration of the examination has elapsed, the invigilator may at his discretion admit him if he is satisfied that the candidate had good reason for his lateness, and provided that no candidate has already left.

- No candidate shall be admitted after half the duration of the examination has elapsed.
10. A student may be permitted by the invigilator to leave the examination room provide that:
 - a. No student shall normally be allowed to leave during the first thirty minutes or last ten minutes of the examination. He must hand in his script to the invigilator before leaving if he does not intend to return.
 - b. A student who leaves the examination room shall not be readmitted unless throughout the period of his absence he has been continually under the supervision of the invigilator or Examination Attendant.
 11. No student shall speak to any other student or except as essential, to the invigilator or make any noise or disturbance during the examination.
 12. Smoking is not permitted in the examination hall during any examination.
 13. A student must not directly or indirectly give assistance to any other student or permit any other student to copy from or otherwise use any other student's papers. Similarly, a student must not directly or indirectly accept assistance from any other student in what ever form.
 14. At the end of the time allotted, each student shall stop writing when instructed to do so and shall gather his scripts together. He/she shall then remain at his desk until all candidates' scripts have been collected, and he has been given permission by the invigilator to leave. It shall be candidate's responsibility to ensure that a University Official in the examination venue collects his answer script before he/she leaves.
 15. If any student is found to be or is suspected of infringing the provisions of these regulations, or in any way cheating or disturbing the conduct of the examination, the invigilator shall take possession of any relevant evidence, obtain statement(s) from the student(s) concerned and/to make the student(s) concerned available for action by the Examination Malpractice Committee.
 16. Except for the printed question paper, a student may not remove from the examination room or mutilate any paper.

3.2 EXAMINATION MISCONDUCT

Category of Offences, which invite Expulsion from the University

- i. Impersonation at Examination
- ii. Exchange of name and/or numbers on answer sheets
- iii. Introduction and use of relevant unauthorized materials in the Examination Hall
- iv. Exchange of materials in Examination Hall such as question papers, containing jottings relevant to the on-going examination
- v. Theft or illegal removal of Examination script
- vi. Any kind of mischief likely to hinder the smooth conduct of examination e.g. fire, flooding or physical violence etc as determined by the Senate.
- vii. Collaboration with or copying from another candidate

- viii. Cheating outside the Examination Hall, e.g. in the toilet
- ix. Use of mobile phones (GSM) text messages and/or other such communication or electronic gadgets during examinations
- x. Any other misconduct deemed by Senate to warrant expulsion.
- xi. Introduction of fake examination card or identity card in the examination hall

Category of offences which invite rustication for one year

- i. Non ó submission or incomplete submission of answer scripts
- ii. Introduction, but not use of relevant unauthorized materials to the examination hall
- iii. Introduction without use of mobile phone(s) and/or other such communication or electronic gadgets to examination hall
- iv. Any student that insults an invigilator, examination officer or any constituted authority during examination

Category of offences, which invite warning

- i. Introduction of unauthorized irrelevant material to Examination Hall.
- ii. Writing on question paper/script
- iii. Any other malpractice(s) deemed by the Senate to warrant warning.
- iv. Failure to write name, registration number, signature on the attendance register
- v. Speaking/conversation during examination except with the permission of the invigilator
- vi. Unruly behaviour in the examination hall that does not affect the conduct of the examination
- vii. Partial mutilation of the answer script by alteration, cancellation, overwriting of name, examination number, identity number, examination code, torn ó off pages etc on the answer script.

Offences involving Staff

Any act of commission or omission amounting to examination misconduct e.g. loss of scripts, continuous assessment, projects, alteration of mark etc by a member of staff shall be referred to Staff Disciplinary Committee for appropriate punishment.

CHAPTER FOUR: GRADING EXAMINATIONS

4.1 SYSTEM OF GRADING

Degrees are classified based on the Cumulative Grade Point Average (CGPA) earned by students at the end of the degree programme.

Some Frequently Used Terminologies

Registered Credit Unit (RCU):- This is the aggregation of the credit units of various courses registered by the students during the entire semester.

Earned Credit Unit (ECU):- This is the aggregation of all courses passed by a student during the semester examination.

Total Registered Credit Unit (TRCU):- This is the aggregation of all the courses registered by a student from the first year of the study to the study to the aggregation of the credit units of all the courses passed by a student from the first year of the study to the particular semester under consideration.

Grade Point (GP):- This is the point system replacing the F to A classification. The table below shows the classification.

Mark Range (%)	Letter Grade	Grade Point
0 - 39	F	0
40 - 45	E	1
45 - 49	D	2
50 - 59	C	3
60 - 69	B	4
70 -100	A	5

Weighted Grade Point (WGP):- This is the product of the Grade Point and the number of Credit Units carried by the courses, thus,
WGP = GP multiplied by the number of credit units

Grade Point Average (GPA)

GPA = Total Point Scored/Total Credit Units Registered
Total WGP/Total Credits units Registered

Cumulative Grade Point Average (CGPA)

CGPA = Total Point so far Scored/Total Credit Unit

Similarly, the calculation goes the same way:

RCU (First Semester) = 25

ECU (First Semester) = 25

RCU (Second Semester) = 20

TRCU = 25 + 20 = 45

TECU = 25 + 20 = 45

A student is said to be in good academic standing if he/she has a CGPA of 1.00 or above.

Examination and Results

- ⇒ Examination shall consist of CA (40%) and semester examination (60%)
- ⇒ However, student must have 75% attendance lectures.

Probation and Withdrawal

Probation: A student shall be in probation if his/her CGPA is below 1.00 for two consecutive semesters.

Withdrawal:- students shall be withdraw if he/she remains in probation for two consecutive semester.

Meanwhile, withdrawal can also be on the grounds of absence. That is when student refuses to register two consecutive semesters.

Calculation of GPA and CGPA

Let assume that, a 100 level student Microbiology student had the following scores in the first semester examination as shown in the Table below;

Course	Credit Unit	Score (%)	Letter Grade	GP	WGP
GSP 1201	2	60	B	4	8
BIO 1201	2	70	A	5	10
BIO 1203	2	65	B	4	8
CHM 1201	2	50	C	3	6
CHM 1203	2	59	C	3	6
MTH 1301	3	60	B	4	12
PHY 1105	1	73	A	5	5
PHY 1201	2	80	A	5	10
PHY 1203	2	91	A	5	10
Total	18				

$$\text{GPA} = \frac{8 + 10 + 8 + 6 + 6 + 12 + 5 + 10 + 10}{18} = \frac{75}{18} = 4.16$$

Assuming that, the same student registered 16 credit units in second semester and earned 14 credit units with WGP total 60, then

$$\text{GPA (second semester)} = \frac{60}{14} = 4.28$$

$$\text{CGPA} = \frac{75 + 60}{18 + 16} = \frac{135}{34} = 3.9705$$

= 3.97 (to two decimal places)

Classification of Degrees

Classification of degrees is based on the Cumulative Grade Point Average (CGPA) at the point of graduation. The system shown in the table below is adopted.

CGPA	Class of Degree
4.50 ó 5.00	First Class



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3.50 ó 4.49	Second Class Upper
2.40 ó 3.49	Second Class Lower
1.50 ó 2.39	Third Class
1.00 ó 1.49	Pass Degree
Below 1.00	Fail

CHAPTER FIVE: LIST OF STAFF

5.1 LIST OF ACADEMIC AND NON ACADEMIC STAFF

S/N	NAME	QUALIFICATION	RANK
1	Dr. Aminu Bukar	B. Sc., M.Sc., PhD Microbiology	Lecturer I (Visiting Lecturer)
2	Prof. Auwalu Uba	B. Sc., M.Sc., PhD Microbiology	Professor (Visiting Lecturer)
3	Prof. M.D. Mukhtar	B. Sc., M.Sc., PhD Microbiology	Professor (Visiting Lecturer)
4	Prof. Fatima Tahir	B. Sc., M.Sc., PhD Microbiology	Professor (Visiting Lecturer)
5	Ibrahim Musa Moi	B.Sc. Microbiology, M.Sc.(Public Health)	Asst. Lecturer
6	Kabiru Ibrahim Karamba	B.Sc., M.Sc. Microbiology, PhD (in view)	Asst. Lecturer
7	Hauwa Yakubu	B. Tech. (Microbiology), M.Sc (in view)	Graduate Asst.
8	Nazeef Idris Usman	B. Tech. Microbiology	Graduate Asst.
9	Abdullahi Ayuba	B.Sc. Microbiology	Graduate Asst.
10	Abdussamad Abubakar	B. Tech. Microbiology, M. Sc (in view)	Graduate Asst.
11	Adam Ibrahim Abdullahi	MBBS, M. Sc. (in view)	Asst. Lecturer
12	Abba Mustapha	B.Sc. Microbiology, M.Sc. (in view)	Graduate Asst.
13	Umar Haruna Adamu	B.Sc. Microbiology	Graduate Asst.
14	Ismail Ahmed	B.Sc. Microbiology, M. Sc. (in view)	Graduate Asst.
15	Ismail Haruna	B.Sc. Microbiology	Graduate Asst.

SUPPORT STAFF

S/N	NAME	RANK
1	Mohammad A. Ibrahim	Snr. Lab. Technologist
2	Muhammad Abdul	Lab. Technologist
3	Dauda Muhammad Sagir	Lab. Assistant
4	Isah Usman	Lab. Assistant



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5	Hashim Adamu Zakari	Lab. Assistant
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CHAPTER SIX: PHYSICAL FACILITIES AND EQUIPMENTS

Departmental offices: HOD's office, Secretary's office, Staff offices and convenience rooms.

The Department has four lecture venues, a large microbiology laboratory and a central laboratory complex.

The HOD's office is fully air conditioned and equipped with Computers (Desktop and Laptop), printer, fridge, cabinets and photocopier.

6.1 LIST OF SOME EQUIPMENT AVAILABLE IN THE MICROBIOLOGY LABORATORY AND CENTRAL LABORATORY COMPLEX

S/N	Equipment
1	Animal cages
2	Analytical weighing balance
3	Atomic Absorption Spectrophotometer (AAS)
4	Autoclave (bucket)
5	Beam balance
6	Binocular light Microscope
7	Bunsen burner
8	Cathode ray oscilloscope
9	Centrifuge
10	Chromatography gas complete
11	Colony counter
12	Colorimeter
13	Conductivity meter
14	Deep freezer
15	Deionizer
16	Demonstration Board
17	Digital counter Geiger Muller
18	Flame photometer
19	Flask shaker
20	Fridge
21	Furnace
22	GCMS/HPLC
23	GM Tube protected with rod
24	Heating mantle
25	High speed refrigerator centrifuge
26	Hot air oven
27	Hot plate
29	Ice cube maker
30	Incubator (Large)

31	Inoculation chamber
32	IR Lamp
33	IR spectrophotometer
34	Khedhjal Distillation apparatus
35	Laminar flow unit
36	Magnetic shaker
37	Metal racks
38	Mettler balance
39	Microscope with digital camera
40	Nitrogen digestion apparatus
41	NMR
42	Overhead projector
43	pH meter
44	pH Meter digital
45	Portable Autoclave
46	Portable Centrifuge
47	Refrigerator
48	Rotary evaporator
49	Shaking water bath
50	Soxhlet extractor
51	Still CO ₂ incubator
52	Test tube shaker
53	Thermometer
54	UV/Visible Spectrophotometer
55	Vortex mixer
56	Water bath
57	Water deionizer
58	Water distiller

SOME MEDIA AND REAGENTS

59	Salmonella ó shigella agar
60	Simons citrate agar
61	Mac Conkey agar
62	Nutrient agar
63	Triple sugar iron agar
64	Blood agar base
65	Saboraud dextrose agar
66	Malt extract agar
67	Desoxycholate citrate agar
68	Iodine crystals
69	Safarantine
70	Kovacø reagent
71	Crystal violet
72	Potassium citrate
73	Potassium dichromate
74	Hydrogen peroxide 50%
75	Acetone 2.5L

76	Ethanol absolute 2.5L
77	Potassium iodide
78	Canada balsam
79	Phenol detached crystals
80	Hydrogen peroxide 30%

CHAPTER SEVEN: SPECIALIZATIONS AND CAREER OPPORTUNITIES IN MICROBIOLOGY

7.1 SPECIALIZATIONS IN MICROBIOLOGY

Modern Microbiology is a large discipline with different specialized areas. This is because the entire ecosystem depends on the activities of microorganisms and microorganism influence human society in countless ways. Microbiology

The Basic Aspect of Microbiology:

The basic branch of microbiology is concerned with the study of the biology of microorganisms. Fields of study here include:

- 1. Bacteriology:** this is the study of bacteria.
- 2. Mycology:** The study of fungi such as yeasts and molds.
- 3. Algology:** The study of algae
- 4. Virology:** The Study of Viruses
- 5. Protozoology:** The study of protozoa; a branch of protozoology called parasitology deals exclusively with the parasite or disease-producing protozoa and other parasitic micro and macro organisms.
- 6. Microbial Cytology:** Studies the structures of microbial cells.
- 7. Microbial Physiology:** studies the nutrients that microorganisms require for metabolism and growth and the products that they make from nutrients.
- 8. Microbial Genetics:** focuses on the nature of genetic information in microorganisms in microorganisms and how it regulates the development and functions of cells and organisms.
- 9. Microbial Ecology:** the study of microorganisms in their natural environment. It also studies the global and local contribution to nutrient cycling. In addition, it employs microorganisms in bioremediation to reduce pollution.

10. Microbial Taxonomy: this is the study of the classification of microorganisms or the grouping of microorganisms.

11. Microbial Biochemistry: deals with the discovery of microbial enzymes and the chemical reactions they carry out.

The Applied Aspects of Microbiology

The applied aspect of microbiology deal with practical application of microorganisms to solve problems related to diseases, water and waste water treatment, food spoilage, food preservation and food production. The various fields of study in applied microbiology include:

1. Medical Microbiology: Studies the causative agents of diseases, diagnostic procedures, diagnostic procedures for identification of the causative agents and preventive measures.

2. Agricultural Microbiology: This is the study of microbial processes in the soil to promote plant growth. It involves the study of soil microorganisms which has led to the discovery of antibiotics and other important chemicals. It also deals with the methods of combating plant and animal diseases caused by microbes, methods of using microbes to increase soil fertility and crop yields. Currently much work is being done on using bacterial and viral insect pathogens to substitute chemical pesticides.

3. Industrial Microbiology: this is the large scale growth of microorganisms for the production of medicinal products such as antibiotics and vaccines; fermented beverages; industrial chemicals; production of hormones and proteins by genetically engineered microorganism.

4. Aquatic Microbiology and Marine Microbiology: deals with microbial processes in lakes, rivers, and the oceans. It also examines issues that concerns water purification; microbiology examination; biological degradation of waste.

5. Public Health Microbiology: is closely related to medical microbiology. It deals with the identification and the control of the spread of communicable diseases. It involves monitoring of community food establishments and waste supplies so as to keep them safe and free from infectious agents.

6. Immunology: deals with how the immune system protects the body from pathogens and the response of infectious agents. It also involves practical health problem such as the nature and treatment of allergies auto immune diseases like rheumatoid arthritis.

7. Food and Dairy Microbiology: deals with the use of microbes to make foods such have cheese, yoghurt, wine and beer. It also deal with the methods of preventing microbial spoilage of food and the transmission of food borne diseases such as Botulism and Salmonellosis. Microorganisms are also used as single cell protein, which is an important source of protein or nutrients to livestock and humans.

8. Aeromicrobiology: Advances thought in the dissemination of diseases in the air, contamination and spoilage.

9. Exomicrobiology: Exploration for life in outer space.

10. Petroleum Microbiology: Coal, mineral and gas formation; prospecting for deposits of coal, oil and gas and recovery of minerals from low-grade ores.

7.2 CAREER OPPORTUNITIES IN MICROBIOLOGY

Microbiology has a great impact on Medicine, agriculture, food science, ecology, genetics, biochemistry and other fields. A graduate of microbiology can get employed in a number of industries/establishments in Nigeria and outside which include:

1. **Research Institutes** e.g. medical and agricultural research institutes
2. **Pharmaceutical Industries** e.g. Beecham, Ugolab, ASAD generic etc
3. **Academic Institutions** e.g. University, Polytechnics, Colleges of Education etc
4. **Water Treatment Plants** e.g. Gubi water treatment plant, Challawa water treatment plant etc.
5. **Food and Dairy Industries** e.g. Nasco biscuits, SWAN Table water, Farm fresh yoghurts etc
6. **Sewage Treatment Plants** e.g. Aminu Kano Teaching Hospital Sewage Treatment plant
7. **Petroleum Industries** e.g. NNPC, Shevron oil company, SHELL oil company etc
8. **Waste Treatment and Disposal industries**
9. **Regulatory Agencies** e.g. NAFDAC, Standard Organization of Nigeria (SON) etc.
10. **Biotechnology Research Centres** e.g Jigawa State Research Institute