

Bachelor of Science in Biomedical Science Honours Degree

COURSE SYNOPSIS

YEAR 1

MBM 1105 Biochemistry I

Biochemistry is a study of the chemical processes in living organisms and is the interface of chemistry and biology of living organisms. Biochemistry and medicine have a reciprocally cooperative connection. Foundational Biochemistry (Biochemistry Module 1) is an introductory module providing the essentials for understanding medical biochemistry. In this module students will study biomolecules, membrane structure and function, nutritional biochemistry and metabolism. Practical sessions will offer students with important hands-on experience, learning key techniques and how to apply them. Students will also be expected to develop research and innovation skills under guidance of their instructors. This module provides the foundation from which students will progress to a higher level module of medical biochemistry.

MBM 1002 Anatomy I

Anatomy I consists of an overall introduction to the basic structural and functional organisation of

the human body, an important foundation to Biomedical Sciences for the Bachelor of Science Biomedical Science (Hon) and Bachelor of Medicine and Bachelor of Surgery degrees as well as other Allied Health Science Programmes. It gives the student a map of where all functional processes of the living human organism take place both in health and disease. All the three major branches of Anatomy are introduced; Gross Anatomy (Macroscopic Anatomy), Histology (Microscopic Anatomy), and Embryology (Developmental Anatomy) as well as international (correct) anatomical terminology. All three courses of the module consist of series of lectures (face to face and online), flipped classes, wet and dry practicals, tutorials, computer interactive lessons, continuous assessments formative and summative quizzes, and final examinations at the end of the module (written and practical). A successful learner will be able to demonstrate effective communication, comprehensive knowledge of anatomical structures, their topographical relations and function from a macroscopic, microscopic, developmental and systemic perspective. The learner will be able to apply this knowledge to clinical scenarios.

Gross Anatomy I

A regional approach is used in this submodule. Macroscopic topographical functional anatomy, including surface and radiological anatomy of the lower limb, upper limb, abdomen, male and female pelvis and perineum and reproductive organs, with their systemic components ie skeletal, muscular, articular, vascular/lymphatic, neurological, integumentary, urinary, reproductive, digestive and endocrinological where applicable.

Histology I

Introduces foundational understanding of basic histological techniques, including tissue preparation, staining, histochemistry, cytochemistry and microscopy giving insight into the structural and functional organisation of the human body. The submodule also involves the introduction of basic histology which examines the fundamentals of cell biology including the comprehensive study of the four basic tissue types; epithelial, connective, muscle and nervous tissue. Students will learn to identify and describe the characteristics of these tissues, understand their roles in the body and recognise their appearances under the microscope.

Embryology I

Introduces the principles of human development through studying the anatomy and physiology of male and female reproductive organs. The course covers gametogenesis, genetic testing (preconception), conception and the beginning of human development. Relevant clinical concepts such as infertility, assistive reproductive technology and contraception are introduced at this stage. Post-conception study involves an analysis of the development of body organs and organ systems and key molecular mechanisms underlying these changes in the pre-embryonic, embryonic and foetal stages of development as well as childhood and adulthood where applicable. Systemic embryology of the body cavities, musculoskeletal, digestive, reproductive and urinary systems with their congenital malformations and relevant genetics are covered. Correlation to final gross anatomical features is fostered through the course.

MBM 1003 Physiology I

Physiology introduces health and allied health students to the foundation upon which knowledge of what “life” is, is built upon. It is taught over a two-year period covering a basic Physiology module (Physiology I) and an advanced Physiology module (Physiology II). In Physiology I, students explore the fundamental principles of body function with a focus on how organisms, organ systems, organs and cells carry out the chemical and physical functions that exist in a living system. The topics covered in Physiology I are cell and molecular Physiology, body fluids and blood Physiology, introduction to neurophysiology: autonomic nervous system, nerve and muscle Physiology (excitable tissue), gastrointestinal Physiology, renal Physiology, endocrine Physiology and reproductive Physiology.

SBS 1101 Language and communication skills

Students will be enabled to learn national/ regional languages; operate as local and global citizens capable of communicating interculturally and appreciate cultural, historical and linguistic diversity; acquire communicative competencies in the languages chosen both in terms of writing and speaking in social, academic and professional contexts

SBS 1002 Sociology and Psychology for health Sciences I

The course introduces basic Sociology and Psychology for health sciences and how these contribute to health or illness. Students are expected to understand key psychological concepts, such as emotion, motivation, education, and aggression, and how these relate to health. The course also introduces learners to the commonest mental disorders, providing foundational knowledge essential for recognizing and understanding these conditions in health settings. The course also focuses on social determinants of health, and how these affect health outcomes. Emphasis is placed on understanding how factors such as socioeconomic status, gender, family dynamics, and cultural norms impact health. Concepts of health and disease in traditional societies are also explored. Students will also be equipped to understand how cultural norms, beliefs, and social networks influence health behaviours and apply health behaviour change theories to promote healthy behaviours.

ILI 1111 Information literacy and Digital Skills

The module will provide students with skills and knowledge on various information sources, search, retrieve, evaluate, process, and apply information resources in University learning using appropriate technology; conducting a literature review and the comfortable and correct use of computers.

CTL 1101 Peace, leadership and transformation

The Leadership and Conflict Transformation course is tailored in a manner to provide students with intellectual skills on the symbiotic relationship that exist on the two tier terms (leadership and conflict). The course attempts to probe into the interplay between these thematic motifs and show their role and complementarities in the process of human development. The course further seeks to provide a skills tool kit on how to analyse conflicts, identify their underlying causes, evaluate how conflict undermines the productive use of resources thereby plaguing development and how responsible leadership transforms adversity into peaceful, equitable and just global society in harmony with nature. It is envisaged that the students who would successfully completed the course will be well grounded in the theory and practice to face the challenges of leadership and conflict at personal, organizational, community, national and global levels.

MBM 1205 Biochemistry II

This module will involve developing the student's knowledge and understanding of the principles and applications of biochemistry, that they may appreciate the scope of biochemistry and its central role in the life sciences, and that biochemistry and medicine are interrelated disciplines. The module will also enable students to appreciate that the biochemistry of living organisms integrates knowledge of the chemical processes in living cells with strategies to maintain health. The prerequisite for this module is Foundational Biochemistry (Biochemistry Module 1). The module will be concerned with studies on: the role of cell processes involved in transmission of genetic information and the roles played by genetics in human function and disease; mechanisms of communication in unicellular and

multi-cellular organisms and the hormonal regulation metabolic activity in the body including associated diseases; and the metabolic specialization of key organs and integration of their metabolic activities in the normal state, in the stressed state, and in disease. The biochemical basis of some major diseases and the effects of xenobiotics on the body will also be covered on this module. Students will be expected to further develop their research and innovation skills under guidance of their instructors.

SBS 1201 Introduction to Heritage-Based Medicine and Medical Sciences

This module introduces students to the complexities of keeping healthy based on traditional and cultural practices, Communication Skills (Humanity) and IT Skills; Logic & Critical Thinking; Integrative Learning; System Dynamics for Health Sciences and applications of Artificial Intelligence in Medicine.

SBS 1202 Introduction to medical ethics and medical law

The course provides an introduction to ethics generally and more specifically to medical ethics, examining in particular the principle of autonomy, which informs much of medical law. The course then considers the general part of medical law governing the legal relationship between medical practitioners and their patients. It considers the legal implications of the provision of medical advice, diagnosis and treatment. Selected medico-legal issues over a human life are also examined. These may include reproductive technologies, foetal rights, research on human subjects, organ donation, the rights of the dying and the legal definition of death.

YEAR 2

MBM 2002 Anatomy II

Anatomy II is a continuation of the introduction and regional anatomy (for Gross Anatomy), fundamental principles of Histology and Embryology from Anatomy I. Equally important to the foundation of the Bachelor of Science Biomedical Science (Hon) and Bachelor of Medicine and Bachelor of Surgery degrees and Allied Health Science Programmes. This module rounds up remaining regions and systems of the human body. Effective communication using correct Anatomical Terminology is emphasised. All three courses of the module consist of series of lectures (face to face and online), flipped classes, wet and dry practicals, tutorials, computer interactive lessons, continuous assessments, formative and summative quizzes and final examinations at the end of the module (written and practical). A successful learner will be able to demonstrate effective communication, comprehensive knowledge of anatomical structures, topographical relations and their function from a macroscopic, microscopic, developmental and systemic perspectives. The learner will be able to apply this knowledge to clinical scenarios. With a holistic understanding of functional anatomy from the cellular level, the learner should be able to brainstorm ways of enhancing

health, detecting diseases, formulating novel treatments as well as developing medical equipment and medical systems and identify areas of research in Anatomy.

Gross Anatomy II

This submodule progresses with macroscopic topographical functional anatomy, including surface and radiological anatomy of the thorax, head and neck, the back, brain and spinal cord, peripheral and cranial nerves (Neuroanatomy). The eye and other special sense organs, and their systemic components ie skeletal, muscular, articular, vascular/lymphatic, neurological, integumentary, and endocrinological are covered.

Histology II

This submodule involves continuous learning of basic histology techniques, including tissue preparation, staining, histochemistry, cytochemistry and microscopy giving insight into the structural and functional organisation of the human body. Systemic Histology will also be introduced focusing on the microscopic anatomy of the body's organ systems using principles of basic histology. Students will examine the histological features of the integumentary, cardiovascular, respiratory, digestive, urinary, reproductive, endocrine and nervous systems (neurobiology). Emphasis will be placed on understanding how tissue structure relates to function within each system. This will equip students with the skills to analyse and interpret histological samples and correlate histological findings with clinical conditions.

Embryology II

This course details the Systemic Embryology of the cardiovascular, respiratory, pharyngeal arch and nervous systems. Developmental anatomy of the heart, lungs, large vessels, head and neck structures including the brain, special sense organs such as the eye, ear and integumentary system are covered. Correlation to final gross anatomical features is fostered through the course and an understanding of the role of genetic, molecular and mechanical factors in the production of common congenital malformations is also fostered.

MBM 2003 Physiology II

In Physiology II, students continue to explore fundamental principles and begin to develop an appreciation of the integrated body systems and functions. The broad topics covered in this module are cardiovascular Physiology, respiratory Physiology, advanced neurophysiology: sensory, motor and integrated functions, exercise Physiology, environmental Physiology and an application topic on aging. Clinically relevant case studies are made use of in this module to develop and enhance problem solving and critical thinking skills.

SBS 2002 Sociology and Psychology for health Sciences II

SBS2002 builds upon the foundational knowledge from SBS1002, focusing on advanced social and psychological factors that influence health within special populations. Students will be equipped with knowledge of social and psychological factors affecting special populations like children, adolescents, older adults, individuals with mental illness and those abusing drugs. Students will acquire the skills to conduct medical enquiries into clients' beliefs and history in a culturally competent manner to enable effective communication. Key models that explain health and well-being are discussed with a view to understanding health issues better. This includes biopsychosocial models, ecological models, and other frameworks that provide comprehensive perspectives on health issues. In level 2 students will also learn about and interact the primary health care facilities, informal and formal health services and their importance as the most widely utilized services in Zimbabwe. Learners will also be expected to learn how to develop public service information packets to educate laypeople about diseases in the community.

MBM 2103 Medical biophysics and Bioengineering

Students are expected to have a holistic appreciation of the human being through application of properties of living matter and energy as well as the effects of the forces upon matter. Making equipment and assistive devices for routine testing and preventative maintenance in health. In this module students will be introduced to medical equipment and how they work.

MBM 2104 Principles of business and entrepreneurship

This course provides instruction in the basic principles of business management, business ethics, marketing principles, and business financing. It also focuses on entrepreneurship, including the role of the entrepreneur and entrepreneurship as a career. The course also focuses on opportunity recognition, assembling the financial and human resources needed to develop a new business idea, and launching a new venture.

MBM 2105 Biomedical Innovation and Translational research

The module will capacitate students to develop skills in the research and innovation cycle with a particular focus on problem identification, subjecting the problem to rigorous intellectual scrutiny and diagnosis, critically appraising published literature, data collection and analysis and intellectual property processes.

MBM 2004 Innovative project to produce a biomedical product/device

The students will do a project, which they can start early during their biomedical training so that they develop patentable medical research outputs in form of Target Product Profiles (TPPs) that can be exploited commercially in line with Education 5.0 to improve the health care of Zimbabweans. The innovative project module capacitates students in translating research into beneficial products.

MPA 2201 Infection and disease

In this course, students will explore core knowledge and skills required to understand determinants of disease, learn about different infectious diseases including drivers and impact of emerging and re-emerging infections, how they are transmitted and be equipped with knowledge and skills relevant to disease and infection control both in the community and in professional practice.

MBM 2203 Basic Pharmacology

The basic pharmacology course introduces drugs to biomedical students. This module is the theoretical basis of drug application to different disease conditions, on which clinical departments then build up practically in ward rounds and clinical rotations. In this course, students learn about drug classification by indication and mechanism of action of drugs, adverse effects, contraindications, and drug interactions. By the time they complete the course students acquire: the ability to apply and analyze basic knowledge of pharmacology in treatment interventions.

SBS 3101 Health governance, policy management and health care financing

Broad understanding of health governance, policy management and basic health care financing' Includes definitions, transparency, integrity, lawfulness, policy formulation and evaluation, participation, accountability, responsiveness, corruption prevention and management, conflict prevention and resolution, information management, meetings, agenda setting and records, staff management, risk management, clinical effectiveness, training and motivation, clinical auditing, effectiveness and efficiency, leadership types, project management, strategic planning, consensus building, teamwork, accountability, responsibility, vision, mission statement, goals and objectives.

MBM 3102 Data Sciences, Robotics and Artificial Intelligence

The course introduces data science as an intercept of programming, statistics, and machine learning. Students will be introduced to data manipulation tools such as using spreadsheets and R/Python tools. Data Extraction, Transformation and Loading techniques will be explored. Statistics foundations using R or Python will be introduced. Robotics and Artificial Intelligence Modules introduces use of computers in modelling and or replicating intelligent behaviour useful in medical diagnosis and treatment.

MPA 3001 Immunology and Methods of Immunology diagnosis

This module introduces the student to clinical immunological concepts. The students are introduced to and expected to understand current advances in immunology of infectious diseases techniques and the application of immunological techniques in disease diagnosis and treatment. The diseases of main focus are HIV, TB, malaria, schistosomiasis, endocrine diseases, eye diseases, skin diseases, cardiovascular diseases, tumour immunology, gastrointestinal diseases, immunity to viruses, bacteria, fungi. Students develop a deeper understanding of basic immunology concepts focusing on humoral and cellular immunity.

Students to critically assess, select and apply appropriate research methods to investigate basic immunological mechanisms and applied issues in the immunology of infection. Students to be able to critically evaluate primary scientific data and the published relevant scientific literature.

MPA 3002 Medical Microbiology and Infectious diseases

Introduces basic medical microbiology to students describing the classification, structure, and physiology of microorganisms that cause infectious diseases in humans. Emphasis is first placed on the importance of pathogenic microbes in human disease with respect to infections and their pathogenesis resulting in disease presentation. It covers both theoretical and practical aspects of virology, bacteriology, parasitology, mycology, molecular microbiology, antimicrobial resistance and infection prevention and control. In this module and the Module on immunology, students will also learn aspects of infectious diseases.

MPA 3003 Histopathology and Tumour science

This course aims to bridge the gap between the theoretical knowledge acquired in the basic sciences and the application of it in clinical medicine thereby acting as the foundation of clinical medicine. At the end of the course students should have a clear understanding of the development of disease processes from their inception to their termination including: aetiology; pathogenesis; micro and macroscopic appearances of the lesion produced; The clinical manifestations of those lesions; An appreciation of the causes of death both natural and unnatural.

MPA 3004 Chemical Pathology and Biochemical Diagnostic methods

Chemical Pathology is the study of biochemical and molecular markers in the diagnosis and treatment of disease. It provides a bridge between concepts taught in the basic sciences and their application in clinical practice. In this biomedical science module, students receive instruction on the following aspects of biochemical disorders: Aetiology; Pathogenesis; Biochemical and molecular markers used in the diagnosis and monitoring of disease; Risk factors and complications of biochemical disorders.

MPA 3005 Haematology and Blood transfusion

Students will learn therapeutics of patients with haematological diseases which include haematology oncology, bleeding disorders, thrombophilia and non-haematological disease. They will also recognise laboratory abnormalities and to some limited extent be able to perform some of the bedside tests.

MBM 4002 Project / Optional Module

This project / optional module defines the field in which the Bachelor of Science Biomedical Sciences Honours Degree is being awarded. (Human Anatomy, Human Physiology, Clinical Pharmacology, Biochemistry, Pathology disciplines, Neuropsychology and others)

MBM 4001 Field Attachment/ Industrial attachment/Optional module

Students are given an option to choose any one of the following focus areas for the attachment. There are suggestions and recommendations to guide students' choice.

1. Rural Attachment (recommended for those who want to have experience on how the overall health system works in the country).
2. Industrial Attachment to Pharmaceutical Industry (Recommended for those pursuing Clinical Pharmacology Honours projects).
3. Industrial Attachment to a Medical Technology Innovation or Production Center (Recommended for those pursuing Biomedical Engineering Honours projects).
4. Private and public diagnostic Laboratories (Recommended for those who will pursue projects in Medical Laboratory Science disciplines, Radiology and Optometry etc).
5. Epidemiology Departments in various health related institutions (Recommended for those pursuing projects in Public Health and Medical BioAnalytics and BioInformatics).
6. Other as it relates to the chosen Honours project.