MASTER OF SCIENCE IN IMMUNOLOGY

Vision
A dynamic, inclusive and globally competitive centre of excellence in teaching, research and service to humanity.

Mission
To provide quality education and training, and promote scholarship and community service for sustainable development.

Identity
A community of scholars’ committed to the generation and dissemination of knowledge and cultivation of wisdom for the welfare of society.

Philosophy
Sensitivity and responsiveness to societal needs and the right of every person to knowledge.
ENTRY REGULATIONS

The common regulations for all master’s degree in the University shall apply.

The general regulations for master’s degrees in the school of Pure and Applied Sciences shall apply.

The following shall be eligible for registration for the Master of Science degree in immunology.

A holder of a Bachelor of Science degree with at least an upper second class honours with any of the Biological science disciplines studied to Bachelor of Science degree level.

A holder of Bachelor of Education degree who has studied Zoology to degree level either as a major or as regular subject and has attained at least an upper second class honours degree and has studied another science subject to degree level.

Holder of a Bachelor of Science or Bachelor of Education degree a lower second class honours degree and has majored in Zoology may be accepted provided he can produce evidence of proven postgraduate research ability.

Holders of Bachelor of science degree must have done minimum of two units of immunology nand passed with a minimum score of a C.

Duration and pattern of the Course

The Department of Zoology offers M.Sc Immunology programme by coursework and examinations and thesis.

The Master of Science degree in Immunology shall extend up to a period of at least eighteen months.

In the first year of study, students with take nine units of which all are core

In the second year, students will concentrate on their research work and present a thesis.

Course units

SZL841: Cellular immunology

SZL842: Immunochemistry

SZL843: Molecular immunology and immunogenetics

SZL844: Immunohaematology

SZL845: Clinical Immunology
SZL846: Immunology of parasitic and infections diseases
SZL847: Reproductive immunology
SZL848: Immunochemical techniques
SZL 800: Research methodology
SZL 801: Scientific data Analysis

UNITS DESCRIPTION

SZL 841: Cellular Immunology

Purpose: To expose learners to cellular. The course is intended to provide knowledge of cellular immunology as required at MSC levels for students of Immunology

Learning Outcomes
By the end of this course, the student should be able to:

1. Have abroad picture of immunology as discipline at Msc level
2. Understand cellular immunology as foundation for all the other Msc units

Course Content

Practical series covering: Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

Mode of Delivery
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.
**Instructional Material/Equipment**
LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class hand outs

**Course Assessment:**
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

**Core Reading Material**

**Further reading**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

**SZL 842: Immunochemistry**

**Purpose:** To expose learners to immunochemistry as applied in immunology. The course is intended to provide knowledge of chemistry as applied in immunology

**Learning Outcomes**
By the end of this course, the learners should be able to:

1. Understand chemistry principles as applied in immunology
2. Principles of antigen/ antibody interactions

**Course Content**
Practical series covering: Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

Mode of Delivery
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.

Instructional Material/Equipment
LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

Course Assessment:
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.
Core Reading Material

Further reading

Practical series covering: Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

SZL 843: Molecular immunology and immunogenetics

Purpose: To expose learners to principles of immunogenetics. The course is intended to provide knowledge of molecular immunology

Learning Outcomes
By the end of this course, the learners should be able to:

1. Understand molecular biology as applied in immunology
2. Principles of genetics as applied in immunology

**Course Content**

Molecular genetics: Structure of DNA, genomic DNA, extrachromosomal DNA and cDNA, MRNA and RNA. Transcription, Mutations. Principles of protein biosynthesis and analysis. Hybridization techniques, DNA sequencing, restriction enzymes, southern and northern blot techniques, Principle of immunogenetics: MHC genes structure, organization and polymorphism. Immunoglobulin and T cell receptor genes: generation, diversity, isotype, switching, immunoglobulin superfamily. Molecular mechanism involved in cellular responses to external stimuli

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

gene cloning, restriction fragment length polymorphism (RFLP) analysis, PCR.

**Mode of Delivery**

Lectures. Group assignments, Class discussion, Literature search and Practical sessions.

**Instructional Material/Equipment**

LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

**Course Assessment:**

Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

**Core Reading Material**


**Further reading**


**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

**SZL 844: Immunohaematology**

**Purpose:** To expose learners to principles of Immunohaematology. The course is intended to provide knowledge of immunology as it relates to blood

**Learning Outcomes**
By the end of this course, the learners should be able to:

1. Understand immunology as applied in hematology
2. Have knowledge on principles of immunology as applied in blood, blood products and blood transfusion

**Course Content**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

gene cloning, restriction fragment length polymorphism (RFLP) analysis, PCR.

**Mode of Delivery**
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.

**Instructional Material/Equipment**
LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class hand outs,
**Course Assessment:**
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

**Core Reading Material**

**Further reading**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

**SZL 845: Clinical Immunology**

**Purpose:** To expose learners to principles of clinical immunology. The course is intended to provide knowledge of immunology in diseases

**Learning Outcomes**
By the end of this course, the learners should be able to:

1. Understand immunology relevant for management of diseases
2. Have knowledge on principles of immunology as applied in both infectious and non infectious diseases

**Course Content**
antibody and complement defects, malignancies of the immune system, diagnosis and evasion of host immune surveillance.

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

gene cloning, restriction fragment length polymorphism (RFLP) analysis, PCR.

**Mode of Delivery**
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.

**Instructional Material/Equipment**
LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

**Course Assessment**
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

**Core Reading Material**

**Further reading**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

**SZL 846: Immunology of parasitic and infectious diseases**
**Purpose:** To expose learners to principles of Immunoparasitology. The course is intended to provide knowledge of immunology during parasitic infection relevant for their management.

**Learning Outcomes**
By the end of this course, the learners should be able to:

1. Understand immunoparasitology as discipline
2. Have knowledge of immunology relevant in management parasitic infection

**Course Content**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

gene cloning, restriction fragment length polymorphism (RFLP) analysis, PCR.

**Mode of Delivery**
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.

**Instructional Material/Equipment**
LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

**Course Assessment:**
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

**Core Reading Material**

**Further reading**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

**SZL 847: Reproductive immunology**

**Purpose:** To expose learners to principles of reproductive immunology. The course is intended to provide knowledge of immunology relevant in reproduction

**Learning Outcomes**
By the end of this course, the learners should be able to:

1. Understand principles of reproductive immunology
2. Have knowledge of immunology relevant in human reproduction

**Course Content**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum plasma, semen and embryos. Basic anatomy of organs of
immune system and of reproduction in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

Mode of Delivery
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.

Instructional Material/Equipment
LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

Course Assessment:
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

Core Reading Material

Further reading

SZL 848: Immunochemical Techniques

Purpose: To expose learners to principles of immunological techniques. The course is intended to provide knowledge of immunology diagnoses reagents preparation and research

Learning Outcomes
By the end of this course, the learners should be able to:

1. Understand principles of Immunology in diseases diagnoses
2. Have knowledge of immunology as applied in disease diagnoses, reagents preparation and research
Course Content

**SZL 848: Immunochemical techniques**


**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions gene cloning, restriction fragment length polymorphism (RFLP) analysis, PCR.

**Mode of Delivery**
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.

**Instructional Material/Equipment**
LCD projector and computers, Black/white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

**Course Assessment:**
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

**Core Reading Material**

**Further reading**
Practical series covering: Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

BACHELOR OF SCIENCE PROGRAMMES

Immunology units

SZL 307: Fundamentals of Immunology

Purpose: This course will introduce the immunology as discipline to learners. The course is intended to provide basic concepts and knowledge of immunology which is required for understanding of body functions in relation to the environment which is a preliquisite in study of biological systems

Learning Outcomes

By the end of this course, the student should be able to:

1. Appreciate immunology as a discipline
2. Understand basic principles of immunology
3. Understand how immunology fits in biological systems

Course Content


Mode of Delivery

Lectures . Group assignments, Class discussion, Literature search and Practical sessions.
Instructional Material/Equipment
LCD projector and computers, Black /white boards, smart board, Chalk, white board markers, dusters, Class handouts,

Course Assessment:
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

Core Reading Material

Further reading

Practical series covering: Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

SZL 407: Advanced of Immunology
Purpose: To expose learners to advanced concepts in immunology. The course is intended to provide more knowledge of immunology for learners in sciences inclined to deep understanding of body biological functions in relation to the environment

Learning Outcomes
By the end of this course, the student should be able to:

1. Understand advanced concepts of immunology
2. Understand how immunology fits in many other disciplines relevant in sciences for education, environment human and animal health

Course Content
Advanced concept in innate and adaptive immunity. Reticuloendothelial system, phagocytesa nd killing mechanisms. T and B cells interactions and effectors

Mode of Delivery
Lectures. Group assignments, Class discussion, Literature search and Practical sessions.

Instructional Material/Equipment
LCD projector and computers, Black/white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

Course Assessment:
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

Core Reading Material

Further reading

SZL 408: Applied Immunology
Purpose: To expose learners to application of immunology in life sciences. The course is intended to provide practical knowledge of immunology in sciences relevant for learners and practitioners of biology as applied discipline

Learning Outcomes
By the end of this course, the student should be able to:

1. Apply of immunology knowledge and skills in teaching, research and practice
2. Understand the application of immunology in related disciplines relevant in sciences for education, environment, human and animal health

Course Content
and transfusions. Reproductive immunology. Maternal, foetal and neonatal immune responses. Applications of Immunological techniques in diagnosis, research, and clinical medicine:-, Antigen/antibody reactions etc, hybridoma technology, gene cloning, Western blotting SDS-PAGE, DNA probes, polymerase chain reaction.

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

**Mode of Delivery**
Lectures . Group assignments, Class discussion, Literature search and Practical sessions.

**Instructional Material/Equipment**
LCD projector and computers, Black/white boards, smart board, Chalk, white board markers, dusters, Class hand outs,

**Course Assessment:**
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

**Core Reading Material**

**Further reading**

**Practical series covering:** Handling of laboratory animals and bleeding, Preparation of serum and plasma. Basic anatomy of organs of immune system in laboratory animals, Blood cells and microscopy, cells identification, differential counts, antibody antigen reactions

**KAS205 Immunology II**
Purpose: This course introduces the learner to specific roles of the structures and cells of the immune system. The interaction of the cells of the immune system leading to lymphocyte activation following antigen processing and presentation is a core information important to the learner to understand the immune system and how it controls infection. Immune response to specific disease causing pathogens is part of this course.

Learning Outcomes

By the end of this course, the student should be able to:

1. Understand the complement activation pathways and biological roles.
2. Describe the ontogeny and phylogeny of cells of immune system and associated lymphoid organs
3. Explain the role of reticuloendothelial system
4. Describe Antigen Presenting Cells, Antigen processing and Presentation of peptides to T lymphocytes in the context of Major Histocompatibility Complex (MHC) Class I and Class II Molecules.
5. Explain effector functions of T lymphocytes
6. Describe Hypersensitivity reactions, Transplantation, Tolerance and Autoimmunity.
7. Describe Tumours, their types, causes, immunity, immune evasion and immunotherapy.
8. Explain immunodiagnostic techniques and their applications in research and disease diagnosis
9. Describe conventional and current approaches to vaccine development and their applications.

Course Content

Complement system: structure, activation pathways and biological roles, Phagocytes and the reticuloendothelial system, Phagocytosis, Ontogeny and Phylogeny of the lymphoid architecture, Cellular interactions during immune response: Class I and Class II pathways of antigen processing and presentation, T cell effector functions: cytotoxicity, and cytokine, Hypersensitivity reactions, Transplantation, Tolerance, Autoimmunity, Tumour Immunology, Vaccine production.
Mode of Delivery

Lectures, Group assignments, Class discussion, Literature search and Practical sessions.

Instructional Material/Equipment

Course Assessment:
Take away assignments, Practical session reports, Sit-in CATs and Final Examination.

Core Reading Material


Further reading