

GUIDEBOOK

DOCTOR OF PATHOLOGY IN MEDICAL MICROBIOLOGY PROGRAMME



This page intentionally left blank

**GUIDE BOOK FOR
DOCTOR OF PATHOLOGY IN
MEDICAL MICROBIOLOGY
PROGRAMME
FACULTY OF MEDICINE
UNIVERSITI KEBANGSAAN MALAYSIA**

COPYRIGHT

1st edition © 2026

Department of Medical Microbiology & Immunology

Faculty of Medicine

Universiti Kebangsaan Malaysia

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic or mechanical, without prior written permission from the publisher.

Disclaimer This guidebook is intended for academic and training purposes. While every effort has been made to ensure the accuracy and relevance of its contents, Universiti Kebangsaan Malaysia shall not be held liable for any errors, omissions, or changes in policy. The contents are subject to revision in accordance with institutional and national regulatory updates.

This page intentionally left blank

Contents

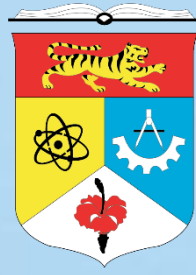
UKM – Philosophy, Vision and Mission.....	4
Background of the Faculty of Medicine UKM.....	5
Faculty of Medicine – Vision and Mission.....	6
Background of UKM's Clinical Specialist Programme.....	7
Faculty Administration.....	10
List of Teaching Staff.....	11
How to use this Guide Book.....	16
Programme Management Committees.....	17
Doctor of Pathology in Medical Microbiology Programme	
1. Programme Summary.....	19
2. Programme Description.....	19
3. Entry Requirements.....	20
4. Programme Educational Objectives (PEO).....	21
5. Programme Learning Objectives (PLO).....	21
<i>Mapping of PLO with MQF Clusters.....</i>	22
6. Programme Structure.....	23
7. Progressive Knowledge & Skills Syllabi in Medical Microbiology.....	25
8. Framework of Programme Structure.....	46
9. Summary: Courses & Credit hours.....	48
10. Course Structure	
<i>Stage 1 (Year 1) : Structure & Course description.....</i>	49
<i>Stage 2 (Year 2 – 4) : Structure & Course description.....</i>	55
<i>List of Recommended Materials and Resources.....</i>	69
11. Research Courses.....	71
<i>Research Course Description.....</i>	74
12. Case reports Write-up.....	76
Sample of Evaluation form.....	78
13. Trainees Assessments	
Stage 1: <i>Formative Assessment.....</i>	79
<i>Assessment Blueprint & Summary.....</i>	81
<i>Summative assessment.....</i>	82
Stage 2: <i>Formative Assessment & Summary.....</i>	83
<i>Exit Process.....</i>	85
<i>Summative / Exit examination.....</i>	86
14. Graduation Requirement.....	87
15. Roles & Responsibilities of DrPath Trainees.....	88
16. Regulations & Monitoring.....	89
17. Trainee Support Services.....	90
18. Programme Monitoring & Review.....	91
19. Quality Assurance & Accreditation.....	92
Glossary.....	93



*Universiti Kebangsaan ini merupakan
puncak dari usaha kita ke arah
memenuhi tuntutan dan aspirasi rakyat
yang ingin melihat bahawa bahasa ibunda
mempunyai kedaulatan dan kedudukan
yang sewajarnya di dalam usaha
memenuhi keperibadian nasional*

(Ucapan Tun Abdul Razak di Konvokesyen Pertama UKM, 1973)





Emblem

The Emblem of Universiti Kebangsaan Malaysia (UKM) is a shield with four quadrants. Each quadrant contains an image and a specific background colour which bears a definite meaning. An open book is placed on top of the shield. The images found in the quadrants on the shield are:

- A tiger in royal yellow charging courageously towards the right side, on a background colour of red.
- An atomic symbol on a background of yellow.
- A symbol of technology, on a blue background.
- A red hibiscus flower on a white background.

Book

The book symbolises knowledge, which is UKM's main role as an institution of higher learning and research centre.

Shield

The shield is a symbol of strength. It symbolises UKM's capability in upholding its role as an institute of higher learning in the country.

Tiger

The tiger is a symbol of courage and power. The tiger reflects a Malaysian society with the Malay culture as its basis. A courageous charging tiger embodies the readiness of UKM to fight ignorance, evil and dishonesty.

Atom and Technology

The atomic and technology symbol highlights the notion of national advancement based on modern science and technology. UKM as a knowledge centre is responsible in producing knowledgeable human capital in all fields to meet the needs of the country's development.

Hibiscus

The hibiscus is the national flower of Malaysia. The five petals of the flower are the five pillars of Rukun Negara which are always upheld by the people of Malays



Philosophy, Vision, Mission and Motto of UKM

Philosophy

UKM affirms the integration of faith in Allah and constructive knowledge; along with the amalgamation of theory and practice as the core fundamentals in the advancement of knowledge, the building of an educated society and the development of the university

Vision

UKM is committed to be ahead of society and time in leading the development of a learned, dynamic and moral society

Mission

To be the learning centre of choice that promotes the sovereignty of Bahasa Melayu and internationalises knowledge rooted in the national culture

Motto

FAITH KNOWLEDGE DEEDS
ILMU MUTU BUDI

BACKGROUND OF THE FACULTY OF MEDICINE UKM

The Faculty of Medicine was established on 30 May 1972, with Dato' Dr. Amir Abas serving as its first Dean. The faculty was founded to provide students from the national education stream with the opportunity to pursue medical studies and to produce a significant number of local and Malay doctors. Pre-medical courses commenced at the UKM Faculty of Science (located at Jalan Pantai Baharu, Kuala Lumpur) in May 1973, with an initial intake of 44 students (39 male and 5 female). Pre-clinical medical courses began in May 1974 at the Faculty's temporary premises on Jalan Raja Muda Abdul Aziz, within the Kuala Lumpur Hospital complex. On 27 February 1975, the Minister of Health, Tan Sri Lee Siok Yew, designated Kuala Lumpur Hospital as the teaching hospital for the UKM Faculty of Medicine for clinical-year training.

During its early years, the Faculty of Medicine engaged teaching staff on loan from Indonesia for pre-clinical teachings and from Commonwealth countries for clinical instruction, pending the return of UKM's own trainee lecturers from medical training abroad. The first Final Professional Examination for the Doctor of Medicine degree was held from 19 to 31 March 1979; of the 42 students who sat for the exam, 37 passed and were awarded the Doctor of Medicine degree. This marked a momentous occasion for the Faculty of Medicine specifically, and for UKM generally, as it successfully produced its first cohort of Doctor of Medicine graduates. The faculty also launched medical specialization master's programs starting in the 1981/82 academic session—beginning with the Master of Surgery (General Surgery) and Master of Surgery (Orthopaedics)—followed by the Master of Medical Science and Doctor of Philosophy programs.

In early 1990, the faculty proposed establishing its own teaching hospital, and on November 2nd, 1993, construction of Hospital UKM (HUKM) began on a 23-hectare site at Jalan Tenteram, Bandar Tun Razak, Cheras. HUKM was completed and commenced operations on July 1, 1997. The Dean's Office and clinical departments relocated to the HUKM complex, while preclinical departments remained at the Jalan Raja Muda Abdul Aziz campus—with students residing at Kolej Tun Dr. Syed Nasir on Jalan Temerloh, Kuala Lumpur—whereas Year III, IV, and V studies took place at HUKM, with students staying at Kolej Tun Dr. Ismail. HUKM has a floor area of 200,000 square meters, was built at a cost of RM327,822,000.00, and has a capacity of 1,054 patient beds. The faculty also offers nursing programs such as the Bachelor of Nursing (Honours), Diploma in Nursing, and Advanced Diploma in Midwifery. Furthermore, the Faculty has taken significant strides by offering advanced specialist Master's programs, such as the Master of Advanced Medical Science in Dermatology, Cardiology, and Child and Adolescent Psychiatry. To date, the Faculty of Medicine has produced 4,423 medical doctors and over 2,100 clinical specialists.



FACULTY OF MEDICINE

THE NATIONAL UNIVERSITY OF MALAYSIA

Vision

To become a knowledgeable and competitive medical academy hub based on knowledge, innovation and a team of dedicated medical professionals in building a healthy and informed society.

Mission

To provide education in medical professionals and high quality services based on research, medical arguments, innovation and social sensitivity.

Mempelopori Perubatan, Melahirkan Cendekiawan.
Pioneering Medicine, Nurturing Scholars.

BACKGROUND OF UKM'S CLINICAL SPECIALIST PROGRAM

Pathology comes from the Greek words "*pathos (suffering)*" and "*logos (study)*", and translates as the study of suffering. Pathology is the study of disease at the structural (organ), cellular (tissue and cell), and molecular (gene and protein) levels, providing an understanding of the manifestations and complications of disease. Therefore, Pathology is described as the "foundation of medicine" and the "science behind healing." In Malaysia, the field of Pathology has developed into several specialties, such as Anatomic Pathology, Forensic Pathology, Hematology, Chemical Pathology, Medical Microbiology, Medical Immunology, and Genetic Pathology.

When the country achieved independence, there was a major shortage of medical specialists in the healthcare services in Malaysia. Initially, the Faculty of Medicine Universiti Malaya (UM) was given the mandate in 1973 to train medical specialists to meet the country's needs. Three of the first specialty programs were established, namely (1) Master of Pathology (MPath), (2) Master of Psychological Medicine, and (3) Master of Public Health. The original MPath program was a 2-year course. In 1987, it was changed to a 4-year program with specialization in various fields to meet the development and advancements in medical practice.

In the early establishment of the Medical Microbiology field at the UKM Faculty of Medicine, the first group of trainees in this field consisted of Dr. Victor Lim, Dr. Farida Jamal, and Dr. Faridah Moosedin. They obtained their MSc (Med.Microbiology)(London) under the London School of Hygiene and Tropical Medicine, United Kingdom. This was followed by Dr. Ilina Isahak and Dr. Sabiha Pit. Between 1984-1985, the third group, including Dr. Yasmin A. Malik, Dr. Salasawati Hussin, and Dr. Nordiah Awang Jalil, continued their studies to the MSc (Med.Microbiology)(London) level, and Dr. Marlyn Mohammad obtained an MSc (Med.Immunology)(London), United Kingdom. Dr. Victor KE Lim, Dr. Yasmin A. Malik, and Dr. Sabiha Pit also obtained FRCPath(UK) qualifications.

The MPath program at Universiti Kebangsaan Malaysia (UKM) was started in 1988 and Universiti Sains Malaysia (USM) in 1992. The first intake of the UKM MPath program began in 1988, while the first MPath(Med.Microbiology) program started in 1992, with 2 candidates graduating in 1996.

In 1995, a joint curriculum and examination were established under the Joint Committee for Master of Pathology (JBSP Pathology- which is the National Conjoint Specialty Committee overseeing Pathology, appointed by Jawatankuasa Bersama Ijazah Lanjutan Perubatan (JBILP). and the Ministry of Higher Education (MoHE) to ensure standardized training and qualifications for Pathology specialists. Membership of this committee consists of representatives from Universiti Malaya (UM), Universiti Kebangsaan Malaysia (UKM), Universiti Sains Malaysia (USM), the Ministry of Health (KKM), and the College of Pathologists, Academy of Medicine Malaysia (CPath AMM). In 2007 and later in 2012, Universiti Putra Malaysia (UPM) and Universiti Teknologi MARA (UiTM) respectively started MPath programs and joined this joint committee.

The program provides efficient and sufficient medical specialty training to deliver quality and comprehensive Pathology laboratory services aligned with the development of Malaysia's medical and public health services. Graduates of the UKM MPath (Med.Microbiology) program from the first batch in 1996 to 2012 totalled 45 graduates. Following the name change of the program to Doctor of Pathology (Medical Microbiology) (DrPath (Med.Microbiology)), graduates from 2013 to 2025 totalled 49 graduates, bringing the total number of graduates of this program to 94 so far.

As of June 2026, the total number of specialists in all Pathology disciplines registered with the National Specialist Register (NSR) is 1170. Clinical Microbiologists make up 252 (21.5%) of the total listed Pathology specialists. The occurrence of infectious disease outbreaks emphasizes the need for Clinical Microbiologists nationwide. Advances in knowledge and technology in disease detection have further increased the scope and important role of this specialty. Significant increases in the number of teaching hospital laboratories, private labs, and Ministry of Defence facilities also increase the need for clinical microbiologists.

In 2022–2023, a comprehensive review of the Pathology curriculum was undertaken as part of the National Postgraduate Medical Curriculum (NPMC) initiative. The development of the revised Pathology curricula was a collaborative effort led by the Joint Board of Specialists in Pathology (JBSP-Pathology), comprising representatives from all Malaysian universities offering Master of Pathology programmes, the Ministry of Health (MOH), and the College of Pathologists, Academy of Medicine of Malaysia (CPath-AMM).

As part of this initiative, the committee agreed to restructure postgraduate pathology training by establishing separate curricula for each pathology subspecialty. Consequently, dedicated curricula were developed for Anatomical Pathology, Chemical Pathology, Haematology, Medical Microbiology, Forensic Pathology, and Medical Genetics.

Universiti Kebangsaan Malaysia (UKM) admitted its first cohort under the revised curriculum in June 2026. The programme, now renamed the **Doctor of Pathology in Medical Microbiology**, with the inaugural cohort expected to complete their training in May 2030.

Medical Microbiology

Medical Microbiology is a diagnostic specialty involving the diagnosis of infectious diseases based on the application of various diagnostic modalities to detect etiological agents. Diagnostic microbiology services include bacteriology, virology, mycology, parasitology, and clinical immunology. Clinical Microbiologists are involved in the diagnosis, treatment and prevention of diseases caused by microorganisms, namely bacteria, viruses, fungi, and parasites. They advise on the best samples to collect for diagnosing infections, such as blood, swabs, and respiratory samples. They then work with scientists in the laboratory to identify the organisms causing the infection, as well as identify the best antimicrobial treatment for infectious diseases and monitor patient treatment.

Clinical Microbiologists play an important role in ensuring antibiotics are prescribed and used appropriately by advising on patient management and producing treatment guidelines. This is partly to minimize the emergence and spread of antimicrobial resistance. Close collaboration is established with infection control units and Antimicrobial Stewardship programs. They also promote measures to prevent and control the spread of diseases in hospitals and at the public health level, including involvement in the field of vaccines. Apart from clinical duties, Clinical Microbiologists are also involved in research activities and work closely with scientists and technical staff in laboratory management.

The specialty of Medical Microbiology requires both laboratory and clinical skills. It is a progressive discipline with the rapid evolution of new technology in diagnosis. The emergence and re-emergence of infectious diseases add dynamics and exploration to the specialty, as well as the possibility of new, unpredictable infectious diseases. Their role in surveillance and outbreak management emphasizes the importance of this specialty.

Clinical Microbiologists work closely with various healthcare professionals such as biomedical scientists, pharmacists, general practitioners, and infection control nurses, as well as attending multidisciplinary team meetings. They also work with non-clinical parties and hospital management on various issues of infection prevention, patient facilities, and infrastructure maintenance. Global spread of infection means clinical microbiologists need to work collaboratively with colleagues overseas to contain the threat of global infection.

FACULTY ADMINISTRATION

Dean of Faculty of Medicine

Prof. Dr. Marina Mat Baki
MD (UKM), MS ORL-HNS (UKM), PHD (UCL)

Deputy Dean (Undergraduate Studies)

Prof. Dr. Norazlina Bt. Mohamed
BSc.(Hons.)(UKM), Ph.D(Pharmacology)(UKM)

Deputy Dean (Postgraduate Studies)

Prof. Datin Dr. Norlinah Mohamed Ibrahim
MBBCh (Ire), BMedSci (Ire), MRCPI, FRCPE

Deputy Dean (Research & Innovation)

Prof. Dr. Syahrul Sazliyana Shaharir
MD(UKM), MRCP (UK), MMED (UKM)

Deputy Dean (Industry & Community Partnership)

Prof. Madya Dr. Ruslinda Mustafar
MD(UKM), MMed(UKM), Nephrology (MAL)

Assistant Dean (Entrepreneurship)

Prof. Madya Dr. Azlan Helmy Abd Samat
MBBChBAO(UCD), DrEmMed(UKM), PhD(UK)

Assistant Dean (Quality & Strategy)

Prof Madya Dr Teoh Seong Lin
B.Biomed.Sc.(Hons.)(UKM), M.Med.Sc.(Anat)(UKM), PhD(Monash)

Assistant Dean (Student & Alumni Affairs)

Dr Syamsa Rizal Abdullah
B.Biomed.Sc (UKM), MSc.MBPDV (Liverpool), Ph.D (UKM)

Assistant Dean (Teaching & Citra)

Prof. Madya Dr. Noor Akmal Shareela Ismail
BSc. (Hons.)(UKM), MSc. (Aberdeen), MMED Medical Education (UKM), PhD (Dundee)

Assistant Dean (Clinical Services)

Prof. Madya Dr. Adli Ali
MD (UKM), MBBCh (UUM), MSc. (UK), PhD (UK)

Head of Administration

En. Zansyuwari Mohamad Sharullail

Senior Assistant Registrar (Undergraduate Studies)

En Muhammad Aizuddin Saharudin

Assistant Registrar (Postgraduate Studies)

Puan Rosmiza Musa

LIST OF TEACHING STAFF

DEPARTMENT OF MEDICAL MICROBIOLOGY & IMMUNOLOGY

Head

Prof. Madya. Dr. Asrul Abdul Wahab
MBBS (IIUM), Mpath (Med.Microbiology)(UKM)
MMC reg: 43314 NSR reg: 135832

Deputy Head

Professor Dr. Alfizah Hanafiah
BSc Biomed.Sci(Hons.)(UKM), PhD (Microbiology)(UKM) (*Adjunct Trainer*)

Lecturers

Prof. Madya Dr. Tzar Mohd Nizam Khaithir
LRCPSI, MBBCh,BAO(Ireland), MPath (Med.Microbiology)(UKM)
MMC reg: 36111 NSR reg: 135830

Prof. Madya Dr. Ramliza Ramli
MD (USM), MPath (Med.Microbiology)(UKM)
MMC reg: 33288 NSR reg: 135809

Prof. Madya Datin Dr. Noor Zetti Zainol Rashid
MBChB (Manchester), MPath (Med.Microbiology)(UKM), AM(Mal)
MMC reg: 36960 NSR reg: 134091

Prof. Madya Dr. Ding Chuan Hun
MBBS (IMU), DrPath (Med.Microbiology)(UKM)
MMC reg: 43773 NSR reg: 130331

Dr. Zalina Ismail
MBBCh,BAO (Ireland), MPath (Med.Microbiology)(UKM)
MMC reg: 37423 NSR reg: 133856

Datin Dr. Anita Sulong
MD (UKM), MPath (Med.Microbiology)(UKM)
MMC reg: 35843 NSR reg: 133855

Dr. Siti Norlia Othman
MBBCh,BAO (Ireland), MPath (Med.Microbiology)(UKM)
MMC reg:40680 NSR reg: 135831

Dr. Umi Kalsom@Satariah Ali
MBBCh,BAO (Ireland), MPath (Med.Microbiology)(UKM)
MMC reg: 43343 NSR reg: 133858

Dr. Muttaqillah Najihan Abdul Samat
MBBCh,BAO (Ireland), DrPath (Med.Microbiology)(UKM)
MMC reg: 45424 NSR reg: 135833

Dr Asiyah Nordin
MBBS (IIUM), DrPath (Med.Microbiology)(UKM)
MMC reg: 66512 NSR reg: 143076

Dr Jauhary Effendy Juma'at
MD (UKM), DrPath(Med.Microbiology)(UKM)
MMC reg: 69817 NSR reg: 142347

Dr. Wong Kon Ken
BSc. (Microbiology)(Hons.)(UKM), MSc (Med.Microbiology)(UKM), PhD (Med.Microbiology)(UKM)
(*Adjunct Trainer*)

DEPARTMENT OF PATHOLOGY

Head

Prof. Madya. Dr. Suria Hayati Md Pauzi
MD(UKM), DrPath (Anatomic Pathology) UKM, AM(Mal)
MMC reg: 37751 NSR reg: 130388

Deputy Head

Dr. Dian Nasriana Nasuruddin
MBBCh,BAO(Ireland), MPath(Chemical Pathology)UKM
MMC reg: 42618 NSR reg: 135549

Lecturers

Prof. Dr. Faridah Mohd Nor
MD (UKM), MPath (Forensic) (UKM), PhD (Forensic Anthropology) (Bradford, UK), Courtesy Research Associate (Forensic Anthropology) (Oregon, US)
MMC reg: 27706 NSR reg: 127072

Prof. Dr. Raja Zahratul Azma Raja Sabudin
MBBS(Mal), MPath(Haematology)(UKM), AM(Mal)
MMC reg: 31911 NSR reg: 125986

Prof. Dr. Reena Rahayu Md Zin
BMedSc.(St. Andrew), MBChB(Manchester), MPath(UKM), Ph.D(UWA), AM(Mal)
MMC reg: 43503 NSR reg: 132802

Prof. Dr. Tan Geok Chin
MBBS(India), MPath(UKM), Ph.D(Imperial,UK), PedPath Fellowship(Int.Scholar,US), FAMM(Mal)
MMC reg: 35089 NSR reg: 125768

Prof. Madya. Dr. Hafiza Alauddin
MBBS(London), MPath(Haematology)(UKM), CFMGHD(FPer, UKM), PG Cert (Imperial, UK), AM(Mal)
MMC reg: 39335 NSR reg: 133152

Prof. Madya. Dr. Nurasyikin Yusof
MBChB(Bristol), MPath(Haematology)UKM, FRCPA(Australia), AM(Mal)
MMC reg: 37432 NSR reg: 125741

Prof. Madya. Dr. Suria Abdul Aziz
BMed.Sc.(Australia), MBBS(Australia), MPath(Haematology)UKM
MMC reg: 37450 NSR reg: 134903

Prof. Madya. Dr. Nordashima Abd Shukor
MD(USM), MPath(UKM), AM(Mal)
MMC reg: 34009A NSR reg: 130391

Prof. Madya. Dr. Wong Yin Ping
MD(UKM), DrPath(UKM), FIAC, FAMM(Mal)
MMC reg: 45171 NSR reg: 130389

Dr. Azlin Ithnin
MBBCh,BAO(Ireland), MPath(Haematology)(UKM), AM(Mal)
MMC reg: 38393 NSR reg: 125931

Dr. Nurwahyuna Rosli
MBBS (Melbourne), BMedSc (Melbourne), DrPath (UKM)
MMC reg: 63189 NSR reg: 139043

Dr. Wan Muhammad Azfar Wan Shuaib
MBBS(Manipal,India), DrPath (UKM)
MMC reg: 62916 NSR reg: 139931

Dr. Izzatul 'Aliaa Badaruddin
MBBS(India), DrPath (UKM), AM(Mal)
MMC reg: 62276 NSR reg: 139932

Dr. Asyraff bin Md Najib
MD (USU), DrPath (UKM)
MMC reg: 64512

Dr. Badrul Iskandar Abdul Wahab
MBBS (UiTM), DrPath (UKM)
MMC reg: 74721 NSR reg: 145776

Dr. Nasiha Abu
MBBCh (Alexandria), MPATH (UPM)
MMC reg: 72726

Dr. Priyatharisini A/P Durganaudu
MUDr (Prague), DrPath (UKM)
MMC reg: 63839

Dr. Mohamad Afiq Hidayat B. Zailani
MBBCh (Cairo), MMedSc (Pathology) (UKM), PhD (UKM)

DEPARTMENT OF DIAGNOSTIC LABORATORY SERVICES HOSPITAL CANSELOR TUANKU MUHRIZ

Dr. Azyani Yahaya
MBBCh BAO (Ireland), DrPath(UKM)
MMC reg: 45247 NSR reg: 134174

Dr Munirah Md Mansor
MBBS (Mal), DrPath (Chemical Pathology) (UKM), AM(Mal)
MMC reg: 45688 NSR reg: 135550

Dr. Mohd Fikri Mustapa
MD (UGM), DrPath (Haematology)(UKM)
MMC reg: 64294 NSR reg: 141735

Dr. Qhasmira Abu Hazir
MBBS (UiTM), DrPath (Haematology)(UKM)
MMC reg: 65110 NSR reg:141730

Dr. Lailatul Hadziyah Mohd Pauzy
BMed Sci (Nottingham), BMBS (Nottingham), DrPath (Haematology)(UKM)
MMC reg: 67156 NSR reg: 141745

Dr. Muhammad Faiz Mohd Ali
MBBCh (Ain Shams University), DrPath (Medical Microbiology)(UKM)
MMC reg: 60473 NSR reg:141746

DEPARTMENT OF DIAGNOSTIC LABORATORY SERVICES HOSPITAL TUNKU AMPUAN BESAR TUANKU AISHAH ROHANI

Dr Alia Suzana binti Asri
MD (UKM), DrPath (Haematology)(UKM)
MMC reg: 63037 NSR reg: 140738

DEPARTMENT OF PARASITOLOGY & MEDICAL ENTOMOLOGY

Head

Prof. Madya. Dr. Emelia Osman
BSc. (UKM), MSc. (London), PhD (USM)

Deputy Head

Dr. Zulkarnain Md Idris
BSc. (UKM), MSc. (USM), PhD (Karolinska Institutet, Sweden)

Lecturers

Dr. Anisah Nordin
DVM (UPM), M.Med.Sc. (UKM)
No. MVC reg: 534

Prof Madya Dr. Aishah Hani Azil
B. Biomed. Sc (UKM), MSc.BCPDV (Liverpool), Ph.D (South Australia)

Dr. Syamsa Rizal Abdullah
B. Biomed. Sc (UKM), MSc.MBPDV (Liverpool), PhD (UKM)
Reg. No: MAHPC(ENT)00179

Dr. Azlin Muhammad @ Mohd. Yasin
MBBChBAO (Ireland), MPH (Tropical Medicine, Australia)

Dr Vinoth Kumarasamy
BSc. (UM), Ph.D (UM)

Dr. Wathiqah Wahid
MBBS (UM), M.Med.Sc. (UKM)
No. MMC : 61239

Dr. Anizah Rahumatullah
Bsc. (AIMST University), MSc (USM), Ph.D (USM)

INFECTION CONTROL UNIT HOSPITAL CANSELOR TUANKU MUHRIZ

Doktor Pakar

Dr. Sharifah Azura Salleh
MB,BCh,BAO, BMedSc(Ireland), MPath(Med.Microbiology)(UKM)
MMC reg: 45452 NSR reg: 127387

UKM MEDICAL MOLECULAR BIOLOGY INSTITUTE (UMBI)

Lecturer

Dr. Nor Adzimah Johdi

BBMedSc (Hons) (UM), MSc (Oncology) (Nottingham), PhD (Imperial College London)

DEPARTMENT OF MEDICINE

Lecturers / Infectious Disease Specialists

Prof. Madya Dr. Petrick @ Ramesh K.Periyasamy

MD (USM), DrIntMed. (UKM)

MMC reg: 35072 NSR reg: 127669

Dr. Najma Kori

MBBS (Malaya), DrIntMed. (UKM)

MMC reg: 48425 NSR reg: 136672

Dr. Cheong Xiong Khee

MBBS (Manipal University) , DrIntMed. (UKM)

MMC reg: 56855 NSR reg: 139752

Social Media Links:

1. Official Faculty of Medicine UKM Website: <https://www.ukm.my/medicine/>
2. Official Department Website: <https://www.ukm.my/mikrobiologifper/>
3. Secretariat of Postgraduate Studies: <https://www.ukm.my/spsfper/>

HOW TO USE THIS GUIDE BOOK

This guide book serves as a resource that contains information on the training of Doctor of Pathology in the Medical Microbiology programme. It provides detailed information on every aspect of the program, from the philosophy and mission of UKM to specific course structures, assessment methods, rules and regulations as well as available support services. To make the most of this guidebook, trainees may start by familiarizing with the table of contents to easily navigate to relevant sections. The full syllabus and curriculum guide for components of medical microbiology are outlined here. Trainees should also refer to the National Postgraduate Medical Curriculum – Medical Microbiology Postgraduate Training 2023. All of these guides should be used as a reference tool to understand program requirements, teaching and learning plan, assessments and evaluation criteria, as well as the specific university requirements to be fulfilled to graduate as a specialist in the Medical Microbiology field.

ADMINISTRATION COMMITTEE FOR DOCTOR OF PATHOLOGY IN MEDICAL MICROBIOLOGY PROGRAMME

Head of Programme	Associate Prof Dr. Asrul Abdul Wahab kjmikro@hctm.ukm.edu.my
Programme Coordinator	Dr. Siti Norlia Othman coordinator.drpathmicrob@ukm.edu.my
Deputy Program Coordinator	Dr. Umi Kalsom @ Satariah Binti Ali
Part 1 Coordinator	Associate Prof Dr. Ramliza Ramli drpath1microb@ukm.edu.my
Postgraduate Officer-in-charge	Puan Wan Norhanis Nabila Wan Rosli wan.norhanis.nabila.wan.rosli@hctm.ukm.edu.my

**POSTGRADUATE PROGRAM MANAGEMENT COMMITTEE
DEPARTMENT OF MEDICAL MICROBIOLOGY AND IMMUNOLOGY**

1. Postgraduate Program Quality Committee

Chairman	Associate Prof. Dr Tzar Mohd Nizam Bin Khaithir
Deputy Chairman	Dr. Muttaqillah Najihan Bin Abdul Samat
Committee members	Associate Prof. Dr. Alfizah Binti Hanafiah Dr. Umi Kalsom @ Satariah Binti Ali Datin Dr. Anita Binti Sulong Dr. Zalina Binti Ismail Dr. Jauhary Effendy Bin Juma'at

2. Postgraduate Program Accreditation Committee

Chairman	Dr. Siti Norlia Binti Othman
Deputy Chairman	Dr. Umi Kalsom @ Satariah Binti Ali
Committee members	
Area 1: Programme Development and delivery	Dr. Zalina Binti Ismail
Area 2: Assessment of Student Learning	Associate Prof. Dr. Ding Chuan Hun
Area 3: Student Selection and Support Services	Associate Prof. Dr. Ramliza Binti Ramli
Area 4: Academic Staff	Associate Prof. Datin Dr. Noor Zetti Binti Zainol Rashid
Area 5: Educational Resources	Dr. Asiyah Binti Nordin
Area 6: Program Management	Associate Prof. Dr. Asrul Bin Abdul Wahab
Area 7: Program Monitoring, Review and Continual Quality Improvement	Associate Prof. Dr. Tzar Mohd Nizam Bin Khaithir
MSc/PhD programme	Dr. Wong Kon Ken

3. Postgraduate Program Review Committee

Chairman	Dr. Umi Kalsom @ Satariah Binti Ali
Deputy Chairman	Dr. Siti Norlia Binti Othman
Committee members	Associate Prof. Dr. Ramliza Ramli Associate Prof. Dr. Ding Chuan Hun Associate Prof. Datin Dr. Noor Zetti Binti Zainol Rashid Associate Prof. Dr. Asrul Bin Abdul Wahab Dr. Wong Kon Ken

DOCTOR OF PATHOLOGY IN MEDICAL MICROBIOLOGY UKM

1. PROGRAMME SUMMARY

<i>Name of Programme</i>	Doctor of Pathology in Medical Microbiology
<i>Malaysian Qualifications Framework Level</i>	7
<i>National Education Code (NEC)</i>	0912 (Medicine)
<i>Mode of Programme</i>	Coursework
<i>No. of Credits</i>	160
<i>Mode of study</i>	Full time
<i>Mode of Delivery</i>	Conventional
<i>Duration of programme</i>	Minimum: 4 years (8 semester) Maximum: 7 years (14 semester)
<i>MQR Reference no.</i>	MQA/FA16765

2. PROGRAMME DESCRIPTION

The Doctor of Pathology in Medical Microbiology UKM is a four-year programme for training of qualified doctors to become specialists in the field of Medical Microbiology. The programme is currently offered by UKM and a few other training Universities as Master of Pathology (Medical Microbiology). The running of the programme is governed by the Ministry of Higher Education-based Jawatankuasa Bersama Sarjana Perubatan – Patologi [JBSP-Patologi] to ensure uniformity in training and assessments.

The curriculum structure is now designed to support the development of competencies based on learning domain clusters of the Malaysian Qualification Framework (MQF) as follows:

1. Knowledge and Understanding
2. Cognitive skills
3. Functional work skills with focus on:
 - a. Practical skills.
 - b. Interpersonal skills
 - c. Communication skills
 - d. Digital skills
 - e. Numeracy skills
 - f. Leadership, autonomy and responsibility
4. Personal and entrepreneurial skills
5. Ethics and professionalism

The DrPath in Medical Microbiology programme is critically relevant to addressing the healthcare needs of the Malaysian population. The graduates of the program are specialists with the expertise to diagnose, treat, and prevent infectious diseases, which are significant public health concerns in Malaysia. By focusing on the core fields of general pathology in Stage 1 and medical microbiology namely bacteriology, virology, mycology, parasitology, infection control and immunology, the program ensures that trainees gain comprehensive knowledge and skills to manage diagnostic laboratory and competent in diagnosis and control of infections.

The medical microbiology expertise is especially crucial in the context of epidemics and pandemics, where rapid identification and control of infections are vital to prevent widespread outbreaks. Additionally, rapid population growth, increased economic activity, and heightened migration have led to the emergence and re-emergence of various infectious agents both within the nation and globally, highlighting the crucial need for clinical microbiologists. Hence, graduates of this program play a vital role in hospitals, laboratories, and public health institutions, contributing to the overall improvement of healthcare standards and the containment of infectious diseases within the community.

The programme's structure allows for in-depth study of specific areas, such as advanced diagnostic techniques, antimicrobial resistance, and infection control practices. This extensive training ensures that graduates are well-rounded specialists and equipped with the foundational knowledge required for pursuing further subspecialisation. The programme's emphasis on continuous learning and professional development prepares trainees for leadership roles and advanced practice in specialized fields of medical microbiology, ultimately enhancing the overall quality of healthcare delivery.

3. ENTRY REQUIREMENTS

Candidates who wish to pursue Doctor of Pathology (UKM) need to:

- (a) have a valid medical Degree from a university recognized by Malaysian Medical Council (MMC).
- (b) be registered with the MMC with a current annual practicing certificate (APC).
- (c) complete at least 3 years of medical service after obtaining a medical degree, comprising of:
 - a. satisfactory completion of TWO (2) years housemanship, and
 - b. post-housemanship clinical experience of at least ONE (1) year duration.
- (d) pass the entrance examination with the result of band 4 to band 6 (Medical Specialist Pre-entrance Examination- MEDEX)
- (e) pass a screening process (e.g. interview) determined by the board of specialty training.

For **foreign candidates**, requirements (a)-(e) above are applied, *plus*

- a. Possess a Temporary Practicing Certificate (TPC) issued by the MMC before starting practice.
- b. Undergo clinical or laboratory attachment at a minimum of 3 months before joining the programme with a satisfactory supervisor report.
- c. Proof of proficiency in the English language. Candidates must obtain a minimum score of 6.5 in IELTS or 550 in TOEFL (obtained within 2 years prior to date of enrolment)

4. PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The objective of this programme is to produce:

1. Medical Microbiology Pathologists who are knowledgeable and highly skilled in their field.
2. Medical Microbiology Pathologists who can communicate effectively, are competent to address and collaborate effectively in local and international environments.
3. Medical Microbiology Pathologist who demonstrates a positive attitude, entrepreneurial mindset, and is committed to personal development and lifelong learning and innovation in the field of pathology.
4. Medical Microbiology Pathologists who demonstrate good ethics and professionalism in their careers.

5. PROGRAMME LEARNING OUTCOMES (PLO)

At the end of the programme, trainee will be able to:

1. Explain medical microbiology knowledge in patient diagnosis and care.
2. Apply scientific knowledge and approaches as well as critical thinking in making decisions on patient diagnosis and care.
3. Demonstrate good diagnostic and clinical skills based on standard operating procedures.
4. Demonstrate the ability to interact and work in a team.
5. Demonstrate the ability to effectively convey knowledge and provide oral and written advice to peers and the community.
6. Demonstrate skills in using digital technology in the field of medical microbiology.
7. Utilise numerical skills in conducting research, diagnosis and patient care.
8. Demonstrate leadership qualities and the ability to make decisions in all situations.
9. Demonstrate good personal management and continuous learning in a career.
10. Display the trait of innovation in the field of medical microbiology.
11. Display high medical ethics and professional attitude.

MAPPING OF PLO WITH CORRESPONDING MQF CLUSTERS OF LEARNING OUTCOMES

PROGRAMME LEARNING OUTCOME <i>At the end of the programme, trainee will be able:</i>		MALAYSIAN QUALIFICATIONS FRAMEWORK (MQF) CLUSTERS OF LEARNING OUTCOME
PLO 1	<i>Explain medical microbiology knowledge in patient diagnosis and care.</i>	Corresponds to MQF Cluster 1: Knowledge and Understanding
PLO 2	<i>Apply scientific knowledge and approaches as well as critical thinking in making decisions regarding patient diagnosis and care.</i>	Corresponds to MQF Cluster 2: Cognitive skills
PLO 3	<i>Demonstrate good diagnostic and clinical skills based on standard operating procedures.</i>	Corresponds to MQF Cluster 3a: Practical skills.
PLO 4	<i>Demonstrate the ability to interact and work in a team..</i>	Corresponds to MQF Cluster 3b: Interpersonal skills
PLO 5	<i>Demonstrate the ability to effectively convey knowledge and provide oral and written advice to peers and the community.</i>	Corresponds to MQF Cluster 3c: Communication skills
PLO 6	<i>Demonstrate skills in using digital technology in the field of medical microbiology.</i>	Corresponds to MQF Cluster 3d: Digital skills
PLO 7	<i>Utilize numerical skills in conducting research, diagnosis and patient care.</i>	Corresponds to MQF Cluster 3e: Numeracy skills
PLO 8	<i>Demonstrate leadership qualities and the ability to make decisions in all situations.</i>	Corresponds to MQF Cluster 3f: Leadership, autonomy and responsibility
PLO 9	<i>Demonstrate good personal management and continuous learning in the career.</i>	Corresponds to MQF Cluster 4a: Personal skills
PLO 10	<i>Display the trait of innovation in the field of medical microbiology.</i>	Corresponds to MQF Cluster 4b: Entrepreneurial skills
PLO 11	<i>Display high medical ethics and professional attitude.</i>	Corresponds to MQF Cluster 5: Ethics and professionalism
<i>*Interdependent areas such as patient safety, patient-centredness, principles of equality and diversity, healthcare economics, operational perspectives and workforce safety are incorporated in the training curriculum.</i>		

6. PROGRAMME STRUCTURE

The Medical Microbiology programme is an apprenticeship style training programme which consist of two stages: Stage 1 and Stage 2.

Stage 1

During the initial stage (Year 1), trainees will undergo introductory courses in foundational medical microbiology. The curriculum encompasses essential knowledge in bacteriology, virology, parasitology, mycology, and clinical immunology.

Trainees enrolled in the programme will also undergo postings in Principles of Chemical Pathology, Principles of Haematology, and Principles of Anatomic Pathology as part of the general pathology training.

Trainees are required to sit for the Stage 1 examination upon completion of the Year 1 training requirements.

Stage 2

The Stage 2 (Year 2 – 4) extends over three years, provides advanced specialty training across the various fields of Medical Microbiology. The training adopts a spiral learning approach, enabling trainees to progressively develop the knowledge, skills, and professional competencies required to manage increasingly real-life clinical scenarios.

During this stage, trainees are required to register for designated courses in the Doctor of Pathology (DrPath) in Medical Microbiology programme, including Fundamental, Clinical and Advance Medical Microbiology, Laboratory Management, Research, and Personal and Professional Development. Teaching and learning are centred on guided self-directed learning and are delivered through seminars, small-group discussions, journal clubs, laboratory result validation, clinical consultations, and ward visits.

Practical bench-work is instrumental in honing laboratory skills, specimen handling, and processing procedures, fostering a critical understanding of laboratory processes particularly in managing non-conformities. Trainees will also actively participate in quality management systems, hospital and community infection prevention and control activities, continuous medical education, and research projects. Progress is monitored through continuous workplace-based assessments, while overall competency is evaluated through summative assessments at the completion of the programme (exit exam).

Upon successful completion of Stage 2, graduates are expected to be competent, independent clinical microbiology specialists who are well equipped to provide expert laboratory services, contribute effectively to multidisciplinary clinical teams, and advance the practice of Medical Microbiology.

Duration of the programme

The total duration of training programme is 4 years or 48 months (maximum 7 years).

Competence Progression*

The syllabus is designed such that the trainee undergoes a spiral progression of competence achievement in Medical Microbiology and is expected to progressively acquire a range of knowledge, skills and values during the 4-year period of training. This progression starts at Level 1 up to Level 5 when the trainee who has satisfactorily completed training is ready to present themselves for the Final (exit) examination.

The competence levels are shown below. These reflect the achievement of a combination of knowledge and skills. At each level, knowledge would precede and usually exceed skills but should always be appropriate and adequate to support skills competence.

Level	Description
1	Observer status only
2	Assistant status
3	Able to perform under close and direct supervision
4	Able to perform under indirect supervision
5	Able to perform unsupervised

It is expected that the trainee will retain and build on what has been achieved earlier as they reach the new targets set for the next stage in the chart.

The knowledge and skills syllabi will support the development of the trainee in the various modalities of Medical Microbiology throughout the training programme.

7. PROGRESSIVE KNOWLEDGE AND SKILLS SYLLABI IN MEDICAL MICROBIOLOGY

BACTERIOLOGY			
	Stage 1	Stage 2	Assessment methods
Competence level	1-2	3-5	
Contents	Knowledge		
Various classes, morphology, characteristics of bacteria • Bacterial classification, structure and replication • Bacterial metabolism and genetics • Mechanisms of bacterial pathogenesis • Bacterial pathogens including (but not limited to): <i>Staphylococcus</i> and related Gram-positive cocci <i>Streptococcus</i>, <i>Enterococcus</i> <i>Bacillus</i>, <i>Coryneform</i> bacteria, <i>Listeria</i> and <i>Erysipelothrix</i> <i>Nocardia</i>, <i>Actinomyces</i> and related bacteria <i>Mycobacterium</i> <i>Neisseria</i> and related bacteria Enterobacterales <i>Vibrio</i> and <i>Aeromonas</i> Campylobacter and Helicobacter <i>Pseudomonas</i>, <i>Burkholderia</i> and related bacteria <i>Haemophilus</i> and related bacteria <i>Bordetella</i>, <i>Francisella</i> and <i>Brucella</i> <i>Legionella</i> Miscellaneous Gram-negative rods <i>Clostridium</i> and Other anaerobic bacteria <i>Treponema</i>, <i>Borrelia</i>, <i>Leptospira</i> <i>Mycoplasma</i> and <i>Ureaplasma</i> <i>Rickettsia</i> and <i>Orientia</i> <i>Ehrlichia</i>, <i>Anaplasma</i> and <i>Coxiella</i> <i>Chlamydia</i> and <i>Chlamydophila</i>	Describe biology, virulence, disease and epidemiology of different bacteria	Demonstrate a progressive increase in knowledge commensurate with practical experience Apply current evidence-based information to support the knowledge Outline the strategies to reach bacterial identification	CBD ECE Stage 1 Exam Stage 2 (Exit) Exam
Knowledge on the aetiology, epidemiology, pathogenesis, clinical manifestation, laboratory diagnosis, principles of management, prevention and control of bacterial infections	Describe common bacterial infections of the organ systems	Demonstrate a progressive increase in knowledge commensurate with practical experience to cope with progressive complexity of cases	CBD ECE Stage 1 Exam Stage 2 (Exit) Exam

- Bacterial infections by body system / Important clinical syndromes - Systemic inflammatory response syndrome, sepsis and septic shock, including bloodstream infection with a broad range of pathogens - Fever of unknown origin - Infection of the heart and vascular system - Infection involving mucosal surfaces, skin, soft tissue, and muscle, including those associated with surgery or trauma - Systemic infection syndromes presenting with rash - Infection of bone and joint - infection of the respiratory tract - Intra-abdominal and hepatobiliary infection - infection of the central nervous system - Infection of the urogenital system, including sexually transmitted infections - Infection of the eye, sinuses, and ear - Infection associated with medical devices - Principles and applications principles of molecular techniques in diagnosis of infectious diseases	Explain the aetiology, epidemiology, pathogenesis, clinical manifestation, laboratory diagnosis, principles of Management, prevention and control of bacterial infections	Demonstrate a progressive increase in knowledge and able to provide a microbiological opinion with due Consideration of its contribution to clinical care	
	Skills		
Clinical and environmental specimens	Identify different clinical and environmental specimens. Outline the principles of specimen reception, screening and labelling	Apply the principles and practice of specimen reception, screening and labelling Justify the criteria for specimen rejection and the implications Plan corrective and preventive actions to be taken	DOPS ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
Microscopy techniques - proper use of the light microscope - proper use of the UV microscope	Identify the various components and function of the light and UV microscope Display the ability to operate light and UV microscope	Display the competency to perform and interpret using light and UV microscopy	DOPS Stage 1 Exam Stage 2 (Exit) Exam

Microscopic examination and staining methods that include: • direct examination e.g. wet mount, India ink • differential stains e.g. Gram stain • acid-fast stains e.g. Ziehl-Neelsen, Kinyoun, modified acid-fast • spore stains • fluorescent stains e.g. direct fluorescent antibody stain	Demonstrate the ability to perform, read and interpret common staining methods Demonstrate the ability to identify common bacterial morphology	Demonstrate the ability to perform, read and interpret common and specialised staining methods	DOPS Stage 1 Exam Stage 2 (Exit) Exam
Culture, identification and antimicrobial susceptibility test for common bacterial pathogens • types of culture media • biochemical tests • commercial kits e.g. API, Vitek®, MALDI-TOF • antimicrobial susceptibility testing methods	Perform/observe (where appropriate), bacterial culture, biochemical tests, other identification methods and antimicrobial susceptibility test Identify different culture media, biochemical tests, identification methods and their uses	Display competency in performing bacterial culture, biochemical tests, other identification methods and antimicrobial susceptibility test Analyse microscopy, culture and non-microscopy characteristics to achieve identification Analyse antimicrobial susceptibility testing and able provide clinical interpretation	DOPS ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
Serologic diagnosis • rapid serological test and their interpretation (e.g. dipstick/ICT/LA/RPR/TPPA) • enzyme/chemiluminescence immunoassay and their interpretation	Observe and interpret serological test	Analyse serological test and validate the results	DOPS ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
Molecular methods and their interpretation	Describe molecular tests	Display competency in interpreting molecular test for species identification and antimicrobial resistance	DOPS ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
Laboratory automation and information system	Demonstrate ability to navigate the LIS		DOPS

Virology			
	Stage 1	Stage 2	Assessment Methods**
Competence Level	1-2	3-5	
BASIC VIROLOGY			
THEORY			
Medically-important viruses: structure and function, morphology, replication, transmission	Demonstrate knowledge of ●virus structure & function ●virus classification and phylogeny Describe replication of virusesDescribe and explain the routes of transmission of virusesSpecific viral infections and diseases caused: • DNA viruses • RNA viruses Prions & transmissible spongiform encephalopathyVirus-host cell interactionsHost immune response to virus infections & immunopathology		Stage 1 Exam
Aetiology, epidemiology, pathogenesis, host susceptibility and immune response, and clinical manifestation of common viral infections	• Describe pathogenesis of virus infections and diseases • Describe & explain the role of the immune response in pathogenesis of viral diseases	Discuss specific viral infections, in terms of • Virulence mechanisms • Epidemiology and transmission • Clinical manifestations • Laboratory diagnosis • Treatment and prevention (including anti-viral treatment and resistance)	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
	Demonstrate knowledge of key clinical syndromes including community-acquired and healthcare-associated infections e.g.: • Respiratory infections • GIT infections • CNS infections • Skin / rashes / viral exanthems • Urogenital & sexually-transmitted infections • Congenital & perinatal infections (TORCHES) • Viral haemorrhagic fevers • Viral hepatitis • Blood-borne viruses including HBV, HCV, HIV • Infections in immunocompromised Explain the types of immunodeficiency and how they affect susceptibility to & control of infections		

Pharmaceutical agents that affect virus replication and disease processes	Anti-viral drugs: Principles and mechanisms of activity Antiviral drugs and relevant sections for antiviral treatment for individual viruses	Critically discuss the management of important viral infections Justify the treatment modalities, antimicrobial resistance and implications, based on clinical presentations and test findings. Explore methods for detection of antiviral resistance Explain how to assess infection risk and recommend appropriate prophylactic or pre-emptive therapy.	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
CLINICAL VIROLOGY			
General laboratory management: THEORY			
<i>Pre-Analytical Phase</i>	Health and biosafety in preparation and handling clinical specimens and reagents. Identify: - the range of tests for diagnosis of viral infections; specimen types, collection, storage, transport requirements and selection of laboratory tests. - the range of tests for diagnosis of important clinical syndromes and indications for tests in various clinical settings - specimen types, collection, storage, stability at various temperatures and transport requirements. - specimen acceptance and rejection criteria and management of rejected specimens. - factors affecting turn-around-time		ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
		Risk assessment and laboratory safety. Outline criteria for safe collection of specimens together with appropriate categorisation of risk, packaging, and transportation. Apply the knowledge of virology diagnostics to select appropriate testing methods and testing algorithms in diagnosis and management of infectious diseases, including referral to other labs or units where appropriate. Critically appraise laboratory management aspects in terms of cost and budgeting considerations. Experience in instrument and test validation, reagent validation. Identify the ways in which service users can be involved in establishing the test repertoire.	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam

<i>Analytical phase</i>	Outline the importance of laboratory quality assurance programme.	Undertake quality assurance activities in ensuring the accuracy and reliability of results. Manage laboratory quality assurance programme including experience in laboratory accreditation. Explain the types of assay controls and how they are used in a laboratory setting. Solve practical and technical problems in the laboratory and trouble-shoot in relation to sample preparation, testing, result interpretations and validation. Formulate strategies for addressing challenges such as quality assurance and result validation issues.	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
<i>Post-analytical phase</i>	Interpret laboratory results and communicate this information clearly and promptly. Be familiar with reporting mechanisms and how to use them securely and confidentially.	Critically appraise, validate and interpret the results of virology diagnostic tests, in relation to the relevant clinical scenarios and provide clinical consultations. Prioritise result reporting, identifying critical results that need urgent discussion with other clinicians. Recognise tests and results that have potential ○ infection prevention and control implications ○ public health significance ○ medicolegal significance Ensure chain of evidence is maintained for medicolegal specimens. Identify the need for confidential handling of patient data. Awareness of existing reference facilities and their appropriate roles.	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
General Laboratory Management: PRACTICAL SKILLS			
	● Communicate with users of laboratory services of appropriate test selection and specimens for different clinical scenario	● Communicate with users of laboratory services of appropriate test selection and specimens for different clinical scenario ● Communicate clearly requirements of the laboratory including transport of samples	DOPS ECE CBD Stage 1 Exam Stage 2 (Exit) Exam MSF

	- Communicate clearly requirements of the laboratory including storage and transport of specimens. - Demonstrate understanding of laboratory information system (LIS)	- Engage with users and encourage their involvement in maintaining and expanding the existing test repertoire according to needs - Demonstrate ability to identify errors and near-misses in lab procedures and/or results reporting, as part of patient safety. - Communicate effectively in a laboratory setting, including interpretations and reporting of results, use of Laboratory Integrated System (LIS) and proper record-keeping. - Collaborate with colleagues and healthcare professionals in team-working to integrate diagnostic findings into clinical decision-making. - Explain complex diagnostic concepts and findings to other healthcare professionals in a clear and understandable manner. - Recognise self-limitations and seek advice or consultations from various sources as appropriate	
Principles of virology tests: THEORY			
Viral culture method (where available)	Outline cell culture principles, importance and applications.	Understanding of cell culture techniques including: - Principles - Specimen types, collection, transport requirements - Aseptic techniques - Factors influencing virus susceptibility in cell culture - Types of cell lines: Primary, Continuous, and Stem Cells. - Quality control - Cytopathic effects: definition and significance - Viral identification methods in cell culture - Haemagglutination (HA) principles and techniques - Principles of neutralisation assays - Quality assurance (QA) - Results validation and interpretations - Importance and applications of viral culture	Stage 1 Exam Stage 2 (Exit) Exam
Immunofluorescence in virology	Principles and applications of immunofluorescence in virology - IF on clinical specimens - IF on cell culture (viral-infected cells)		CBD/ DOPS Stage 1 Exam Stage 2 (Exit) Exam

<i>Post-analytical phase</i>	Observe tests for blood borne viruses and their interpretation, and understand the diagnostic algorithms including the need for repeat testing.	Interpret results of: • serological assays • tests for confirmation e.g. neutralisation test for HBsAg, HIV p24Ag • confirmation by additional tests e.g. multiple serological assays, PCR • immunoblot assays	
Principles of virology tests: THEORY			
• Molecular methods / nucleic acid tests	• Describe the fundamental principles of molecular diagnostics and its applications in medical microbiology. • Explain the importance of molecular diagnostics in the rapid and accurate identification of pathogens. • Describe the various types of molecular diagnostic techniques, including conventional PCR, real-time PCR, and their specific applications. • Outline the principles and steps in PCR. • Describe conventional PCR vs real-time PCR. • Explain the difference between 'qualitative' and 'quantitative' methods.		CBD Stage 1 Exam Stage 2 (Exit) Exam
	Outline the role of molecular diagnostics in epidemiological investigations and outbreak control. Identify the principles & practice of 'sequencing', the various methods and the applications in infectious diseases. Outline whole-genome sequencing and the importance in infectious diseases, vaccines and outbreak management.	Identify the principles and practice of the range of qualitative and quantitative nucleic acid amplification techniques employed in the diagnosis and management of viral infections. Explain molecular diagnostic methods in Medical Microbiology and Infectious Diseases • common terms and concepts in nucleic acid testing • principles of the various methods (non-amplification and amplification methods) • utility in e.g. – screening – diagnosis – monitoring disease (e.g. HBV, HCV, HIV, CMV, EBV) – resistance testing – epidemiologic purposes and outbreak investigations – healthcare-associated infections • advantages • disadvantages and limitations	CBD Stage 1 Exam Stage 2 (Exit) Exam CBD ECE Stage 1 Exam Stage 2 (Exit) Exam

		Apply knowledge in molecular diagnostics in selecting appropriate tests and algorithms in diagnosis and management of infectious diseases. Explain the diagnostic issues with the following organisms and the role of molecular methods in diagnosis and/or management e.g.: - Hepatitis B - Hepatitis C - HIV, including in neonates - respiratory infections - COVID-19 - Influenza - CMV, particularly in immunocompromised patients - EBV, particularly in immunocompromised patients - Other pathogens e.g. HSV, BK Evaluate the role of nucleic acid tests / molecular methods for ○ Emerging and re-emerging infectious diseases ○ <i>Mycobacterium tuberculosis</i> infections (directly from clinical specimens and from culture) ○ NTM infections and species identification ○ Bacterial infections ○ Fungal infections ○ Parasitic infections Analyze the role of molecular diagnostics in epidemiological investigations and outbreak control e.g. the use of strain-typing. Emphasize the role of molecular diagnostics in public health surveillance and its contribution to disease control and prevention. Value and embrace ongoing research and advances in the field of molecular diagnostics, including emerging technologies, genomic sequencing, next-generation sequencing, microarray.	
--	--	---	--

Principles of virology tests: PRACTICAL SKILLS			
<i>Pre-analytical phase</i> <i>Analytical phase</i>	Observe PCR and real-time PCR procedures for the amplification, detection and quantification of target DNA or RNA sequences.	Observe and outline measures to prevent contamination in the molecular lab. Experience in nucleic acids extraction methods for clinical specimens (manual and automated techniques) Experience in PCR and real-time PCR procedures for the amplification, detection and quantification of target DNA or RNA sequences.	DOPS ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
<i>Post-analytical phase</i>	Interpret the results of molecular diagnostic tests, such as real-time PCR, in relation to the relevant clinical scenarios.	Critically appraise and interpret the results of molecular diagnostic tests, such as real-time PCR amplification curves, in relation to the relevant clinical scenarios and provide clinical consultations.	DOPS ECE CBD Stage 1 Exam Stage 2 (Exit) Exam

MYCOLOGY			
	Stage 1	Stage 2	Assessment methods
Competence level	1-2	3-5	
Contents	Knowledge		
Knowledge on various types of medically important fungi - morphology, cultural characteristics	Describe fungal structures and morphology	Describe in detail fungal morphology Outline strategy to reach fungal identification	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
The aetiology, epidemiology, pathogenesis, clinical manifestation and laboratory diagnosis of fungal infections Important mycoses	Describe important fungal infections in clinical setting	Discuss in detail the important mycoses Support the knowledge with updated, evidence-based information	
Laboratory diagnosis of fungal infections - culture, non-culture methods	Describe modalities in fungal diagnostics	Critically discuss methods for diagnosis of fungal infections Evaluate the advantages and limitations of diagnostic methods	
Antifungal susceptibility testing	Describe antifungal susceptibility testing methods	Critically discuss methods for antifungal susceptibility testing Evaluate the advantages and limitations of antifungal susceptibility testing methods	
	Skills		
Culture and identification of fungi • Culture media for fungal isolation • Microscopy techniques for identification of fungal pathogen • Non-microscopy techniques for identification of fungal pathogen (e.g automated identification, MALDI-TOF)	Demonstrate the ability to identify common fungal structures	Demonstrate the ability to perform microscopic and culture methods Analyse microscopy, culture and non-microscopy characteristics to achieve identification	DOPS CBD Stage 1 Exam Stage 2 (Exit) Exam
Non-culture methods for diagnosis of fungal infections • Antigen detection e.g cryptococcal Ag, galactomannan assay • Molecular method e.g ribosomal RNA gene PCR and sequencing for specific fungal identification	Identify and read antigen detection test/molecular test	Analyse and interpret antigen detection test Analyse and interpret molecular identification method for species identification	

Select the most appropriate investigations for the individual patient/conditions	Discuss the appropriateness of the selected test	Evaluate the need for specific test based on clinical presentation Communicate with managing team with regards to investigations and result interpretation	
--	--	---	--

IMMUNOLOGY			
	Stage 1	Stage 2	Assessment methods
Competence level	1-2	3-5	
Contents	Knowledge		
Knowledge on the organisation of immune system, innate and adaptive immunity. Aberrations of immune responses and management Knowledge of clinical immunologic disorders, their laboratory diagnosis	Describe the organisation of immune system and mechanisms of immune response	Discuss in detail the organisation of immune system and mechanisms of immune response	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam
	Describe the basic mechanism of: Hypersensitivity, Allergy, Immunodeficiency, autoimmune disease and Transplantation	Discuss the wide range of immune response disorders	
	Describe immunologic disorders, laboratory investigations and principle of management	Discuss immunopathology related problems, methods of laboratory diagnosis and management.	
	Skills		
Interpretation of routine immunological tests e.g. RF, ANA, anti ds DNA Interpret specialised immunological tests e.g. ASMA, AMA, ANCA, ENA etc. Consultation on immunological diagnostic tests	Observe and interpret basic immunology laboratory tests with clinical information Briefly discuss regarding specialised immunological tests. Discuss the result of immunological tests based on clinical presentation	Analyse and interpret laboratory investigations for routine immunological tests Evaluate the need for specific test based on clinical presentation Analyse and interpret specialised immunological tests Analyse and interpret immunological diagnostic tests related to clinical information Involve the managing team in communication of results and advise on further investigation when indicated	DOPS CBD Stage 1 Exam Stage 2 (Exit) Exam

PARASITOLOGY			
	Stage 1	Stage 2	Assessment methods
Competence level	1-2	3-5	
Contents	Knowledge		
Knowledge on various types of parasites causing human infections, their morphology and life cycle Knowledge on the aetiology, epidemiology, pathogenesis, clinical manifestation and laboratory diagnosis of common parasitic infections Knowledge on other modality for diagnosis of parasite infections such as histopathology tissue section, culture techniques and radio imaging Knowledge on specimen collection and handling (including preservation of stool samples) for diagnosis of parasitic infection Principles of management, prevention and control of common parasitic infections	Describe important parasitic infections in human	Describe in detail various types of parasites causing human infections, their morphology and life cycle	CBD Stage 1 Exam Stage 2 (Exit) Exam
	Describe the aetiology, epidemiology, pathogenesis, clinical manifestation and laboratory diagnosis of common parasitic infections	Describe in detail the aetiology, epidemiology, pathogenesis, clinical manifestation and laboratory diagnosis of common parasitic infections	
	Describe the principles of management of common parasitic infections	Discuss the management of important parasites infections, vector control and public health measures related to parasitic infections	
	Skills		
Specimen collection and handling, including preservation of stool samples. Perform routine and specialised microscopy techniques for detection and identification of intestinal parasites Perform microscopy technique for detection and identification of blood parasites	Identify various procedures for stool preservation Demonstrate the ability to identify various stages of intestinal parasites Demonstrate the ability to identify various methods for detection and identification of intestinal parasites	Demonstrate the ability to perform concentration techniques, routine and specialised microscopic staining methods from faecal and related samples Analyse parasitic stages based on characteristics to achieve identification	DOPS Stage 1 Exam Stage 2 (Exit) Exam

	Demonstrate the ability to identify various stages of blood parasites Demonstrate the ability to identify various methods for detection and identification of blood parasites	Demonstrate the ability to perform routine and specialised microscopic, staining methods from blood and bone marrow samples Analyse parasitic stages based on characteristics to achieve identification	
Serological tests for diagnosis of common parasitic infections.	Identify and interpret available serological test for parasitic infections	Analyse and interpret serological test for parasitic infections Critically discuss role of serology test in parasitic infection	
Molecular diagnostic tests for parasites diseases and their interpretation	Identify available molecular tests for parasitic infections	Analyse and interpret molecular identification method for species identification and anti-malarial drug resistance	

QUALITY ASSURANCE IN MEDICAL MICROBIOLOGY			
	Stage 1	Stage 2	Assessment methods
Competence level	1-2	3-5	
Contents	Knowledge		
Quality management system in medical microbiology laboratory Quality assurance and quality control	Describe the principles of quality management system in medical microbiology laboratory	Evaluate the salient elements in quality management system and apply relevant elements to ensure adequate and reliable performance of diagnostic tests Apply elements of quality management system in laboratory activities e.g. • Quality assessment on culture media and reagents • Quality assessment on cell culture and preparation • Validating and reporting results (infectious and immunological diseases)	ECE CBD STAGE 1 EXAM STAGE 2 (EXIT) EXAM

		• Solving technical problems in the laboratory • Activities relating to accreditation and QA	
--	--	---	--

INFECTION PREVENTION AND CONTROL			
	Stage 1	Stage 2	Assessment methods
Competence level	1-2	3-5	
Contents	Knowledge		
Legislative and organisational frameworks of infection prevention and control (IPC) • Explain the responsibilities of healthcare institutions for IPC according to the national guideline • Describe the roles and responsibilities of individual members of Hospital Infection and Antibiotic Control Committee (HIACC) in monitoring, responding to, and resourcing IPC needs	Describe the need, organisation and responsibilities of IPC	Justify the responsibilities of institutional IPC authorities according to national requirement Assess the need for individual members of HIACC in order to suit IPC requirements and ensure effective IPC activities	ECE CBD STAGE 1 EXAM STAGE 2 (EXIT) EXAM
Epidemiological and clinical aspects of healthcare-associated infections (HCAIs) • Surgical site infections • Catheter-associated urinary tract infection • Hospital-acquired pneumonia • Central-line associated bloodstream infection • Concept of 'bundles' in the prevention of common HCAIs	Describe various types HCAIs	Analyse the epidemiology, clinical aspects and impact of HCAIs Apply and analyse the concept of 'bundles'	
Principles of infection prevention and control of HCAIs • Basic biology of common agents implicated in the various HCAIs and their pathogenesis • Mode of spread and optimum prevention and control strategies of HCAI • Concept of the following in the prevention and control of HCAIs: ○ Standard precaution - Hand Hygiene - Personal Protective Equipment (PPE)	Explain common agents in HCAIs including their pathogenesis, spread and principles of prevention and control	Analyse the clinical implications of HCAIs and evaluate the concepts of HCAIs prevention and control Plan and justify the types of precautions appropriate for different HCAIs threat in clinical settings	

- Environmental Hygiene - Waste Management - Linen Management - Spillage Management - Injection safety & Sharps management - Respiratory Hygiene & Cough Etiquette • Transmission-based precaution - Contact - Droplet - Airborne • Aseptic non-touch technique (ANTT) • Single use items			
Principles of Environmental Infection Control • Infection Control During Construction & Renovation • Operation Theatre Commissioning • Environmental Cleaning • Engineering aspect of Isolation Rooms • Protective Environment Room • Airborne Infection Isolation Room Principles of disease outbreak management in the hospital • Role of the laboratory in the investigation of outbreaks including molecular, epidemiological methods utilised for outbreak investigations and how to assess them • Steps involved in recognising, investigating and controlling outbreaks of infection • Statistical methods used in outbreak recognition, investigation and management	Demonstrate an understanding of Environmental infection control Demonstrate an understanding in the principles of outbreak management	Apply the principles of environmental infection control in preventing HCAs following construction and renovation in clinical settings Justify the need and application of isolation rooms in clinical settings Apply the principles of outbreak management in various clinical settings Plan and justify steps in outbreak recognition, investigation and management	
Infection Control requirement in specialised areas/units. Occupational Safety and Health for Healthcare Workers • Sharps and Splash injuries • Post exposure prophylaxis in blood borne infections • Exposure to patients with tuberculosis • Vaccination in Healthcare workers		Demonstrate an understanding on the requirement aspect of infection control in the following areas: • Intensive Care Unit • Neonatal Unit • Burn Unit • Nephrology Haemodialysis Unit • Operation Theatre	ECE CBD Stage 2 (Exit) Exam

Principles of Public Health Management in matters related to prevention and control of communicable diseases • Key principles of outbreak investigation in the community • Principles of hypothesis-generation and testing when investigating an outbreak • Microbiology and epidemiology of food and waterborne infections • Microbiology and epidemiology of respiratory infections (airborne and droplet infections) • Microbiology laboratory support in a public health emergency • Features of agents of deliberate release in terms of clinical presentation, potential for spread and methods for detection and control Principles of Antimicrobial Stewardship (AMS) • Regulatory bodies' requirements for antimicrobial stewardship • Importance of antimicrobial formularies, and prescribing control policies and processes • Application of local antimicrobial resistance patterns to direct antimicrobial usage • Role of the Medicines Management Committees (or equivalent) and the clinical pharmacist in AMS		• Scope Room • Mortuary • Laboratory Demonstrate understanding in principles of outbreak management in community Demonstrate understanding in principles and implementation of antimicrobial stewardship	
---	--	--	--

ANTIMICROBIAL AGENTS			
	Stage 1	Stage 2	Assessment methods
Competence level	1-2	3-5	
Contents	Knowledge		
The key properties of the classes of antimicrobial agents active against bacteria, fungi, parasites and viruses, including: • mechanism of action • spectrum of activity • route of administration • dosing regimen • penetration • side-effects • resistance patterns • cost Concept of broad and narrow spectrum antibiotics Concept of bactericidal and bacteriostatic Mechanism of action and role of monoclonal antibodies, antitoxins, and immunoglobulins in prophylaxis and treatment of infections Pharmacodynamic and pharmacokinetics of antimicrobials, and how these affect choice and dosing of antimicrobials Mechanisms of resistance to antimicrobial agents In vitro methods used to detect antimicrobial resistance and their limitations	Describe the factors that influence the choice of antibiotics Describe the mechanism of actions of common antimicrobial agents in clinical practice Describe the common mechanism of resistance to antimicrobial agents	Evaluate the key properties of the classes of antimicrobial agents active against bacteria, fungi, parasites and viruses to formulate antimicrobial usage guide, including: • Mechanism of action • Spectrum of activity • Route of administration • Dosing regimen • Penetration • Cost Evaluate the host factors that influences selection of antimicrobial agents and the antimicrobial alternation/management accordingly • Renal impairment patient • Hepatic impairment • Allergic reactions • Adverse effects Describe in detail the pathogen factors in selection of antimicrobial agents, their detection methods and management, including • Resistance patterns • Heteroresistant subpopulation • Inducible, including repressed and derepressed, resistance • Borderline resistance Describe in detail the concept of broad and narrow spectrum antibiotics, their uses and limitations Evaluate the advantages and limitation of selective targeted therapy. Describe in detail the concept of bactericidal and bacteriostatic, their uses and limitations Describe in detail the mechanism of actions and roles of monoclonal antibodies and immunoglobulins in prophylaxis and treatment of infections infectious diseases	ECE CBD Stage 1 Exam Stage 2 (Exit) Exam

		Describe in detail the mechanism of actions and roles of antitoxins in prophylaxis and treatment of infections Describe the clinical microbiology advice for MDR pathogens and/or persistent infection management beyond 'susceptible', 'intermediate' and 'resistant' Describe the selection of antimicrobial agents based on the pharmacokinetics and pharmacodynamic profiles of antimicrobial agents Describe the differences of pharmacokinetics profiles according to different mode of administrations Explain the association of MIC with PK/PD Indices Apply the best indices for pharmacology effects of antimicrobial agents according to their classes Apply the strategy of dosing regimens based on PK/PD indices Describe in detail the common and other potential mechanisms of resistant of antimicrobial agents Describe common gene mutations encoded for resistant development Apply the use of molecular epidemiology and continuous surveillance in antimicrobial management Describe the phenotypic methods to detect antimicrobial resistance and their limitations Describe the inhibitors/antagonists of the bacterial resistance mechanisms	
	Skills		
Methods for antimicrobial susceptibility testing (AST) Interpretation of AST and breakpoints determination Therapeutic drug monitoring and clinical antimicrobial management support	Progressive competency in applying antimicrobial susceptibility testing (AST) methods i.e. • Agar-based AST • Broth dilution and microdilution Demonstrate progressive skills in: • Interpreting AST and analysing breakpoints • In vitro synergy test of antimicrobial combination for MDR organism • Interpret therapeutic drug monitoring for vancomycin and aminoglycoside • Serum bactericidal test		DOPS Stage 1 Exam Stage 2 (Exit) Exam

BEHAVIOURS / PPD			
Elements	Stage 1	Stage 2	Assessment methods
Effective communication and rapport	Demonstrate effective communication and good interpersonal relationships; respecting diversity in communicating with colleagues, superiors, staff and other healthcare personnel Demonstrate the ability to communicate results verbally, electronically, and in written form Demonstrate an increasing clinical involvement including attending rounds & provision of consults, & support in the management of patient care		ECE MSF
Professional conduct and attitude	Display professional conduct and attitude as a competent clinical microbiologist in-training Appreciate integrity, accountability and compassion which supersedes self- interest towards patient care as well as relationship with society and other health care professionals		
Enthusiastic approach to learning.	Demonstrate enthusiasm and willingness to learn from members of a multidisciplinary team and accept constructive feedback Attend training & CPE/CME sessions.		
Independent learning and continuous medical education	Demonstrate the ability as an independent learner and continuous medical education Integrate ethical principles of medicine, leadership, organisational management, digital literacy and ability to reflect transparently towards sound self-improvement and lifelong learning		

8. FRAMEWORK OF PROGRAMME STRUCTURE

STAGE 1		STAGE 2	
YEAR 1 2 semesters 48 weeks of T&L; log book 4 weeks of leave	YEAR 2 2 semesters 48 weeks of T&L; in-service training, research activities, WBAs; log book 4 weeks of leave	YEAR 3 2 semesters 48 weeks of T&L; in-service training, research activities, WBAs; log book 4 weeks of leave	YEAR 4 2 semesters 48 weeks of T&L; in-service training, research activities, WBAs; log book 4 weeks of leave
Semester 1 & 2	Semester 3	Semester 5	Semester 7
TCL: Lectures SCL: Seminar, Practical, Case study, Journal critiques SDL Principles of Medical Microbiology course – 4 weeks Principles of Chemical Pathology course – 4 weeks – Orientation week (1 week) – Revision week Sem 1 (1 week) – Revision week Sem 2 (1 week) – Self-study week (2 weeks) – Examination weeks (2-3 weeks) – Annual leave (2 weeks/sem)[total 4 weeks]	SCL: in-service training in laboratory/ward/clinics. Practical, Seminar, Case study, Group Discussions, Journal critiques TCL: Research methodology and preparation of research proposal. Principles of Anatomic Pathology course – 4 weeks SDL: Case book writing / research proposal writing	SCL: in-service training in laboratory/ward/clinics. Practical, Seminar, Case study, Group Discussions, Journal critiques Principles of Haematology course – 4 weeks Elective postings (10 weeks in Year 3) SDL: Carrying out research activity / writing case report (completed 4 cases in Year 3)	SCL: in-service training in laboratory/ward/clinic/mortuary at University Hospital or MOH Hospital with WBAs SDL: writing up of manuscript / dissertation** / writing case book - completed 5 case reports**
STAGE 2			
	Semester 4	Semester 6	Semester 8
	SCL: in-service training in laboratory/ward/clinics. Practical, Seminar, Case study, Group Discussions, Journal critiques SDL: Carrying out research activity / writing case report (completed 2 cases in Year 2)	SCL: in-service training in laboratory/ward/clinics. Practical, Seminar, Case study, Group Discussions, Journal critiques Elective postings (10 weeks in Year 3) SDL: Carrying out research activity / writing case report (completed 4 cases in Year 3)	SCL: in-service training in laboratory/ward/clinics. Practical, Seminar, Case study, Group Discussions, Journal critiques **Submission and assessment of dissertation, and compiled case book to examiner(s) – at the beginning of sem 8
Formative assessments: WBAs Summative assessment: Stage 1 Examination (2 weeks)	Formative assessments: WBAs, MSF	Formative assessments: WBAs, MSF	Formative assessments: WBAs (Sem 7) Summative assessment (Sem 8): Stage 2 Exit Examination (2 weeks)

TCL: Teacher-centred Learning WBAs: Workplace-Based Assessments SCL: Student-centred Learning SDL: Self-directed Learning

PROGRAMME TIMELINE:

DOCTOR OF PATHOLOGY IN MEDICAL MICROBIOLOGY

PRE-ENTRANCE



Pre-entrance: MEDEX & Interview

The initial entry requirements that must be completed before official enrollment in Year 1.

YEAR 1

Year 1: Sem 1 & Sem 2

The first year consists of Semester 1 and Semester 2.



CORE POSTINGS: Fundamental Medical Microbiology, Lab Management

Core clinical and laboratory training occurring throughout the first year.

Minor posting (Sem 1)

A specialized short-term posting during the first semester.



PART 1 EXAM

A critical academic milestone occurring at the end of the first year.

YEAR 2

Year 2: Sem 3 & Sem 4

The second year consists of Semester 3 and Semester 4.

CORE POSTINGS: Fundamental Medical Microbiology, Lab Management

Continuation of core training in fundamental microbiology and laboratory management.

Minor posting (Sem 3)

A specialized short-term posting during the third semester.



MSF 1

The first Multi-Source Feedback milestone at the end of Year 2.

YEAR 3

Year 3: Sem 5 & Sem 6

The third year consists of Semester 5 and Semester 6.

CORE POSTINGS: Clinical Microbiology, Lab Management

Advanced focus on clinical aspects of microbiology and management.

Minor posting (Sem 5)

A specialized short-term posting during the fifth semester.



MSF 2

The second Multi-Source Feedback milestone at the end of Year 3.

10-weeks elective postings

Dedicated elective training time occurring during Year 3.

YEAR 4

Year 4: Sem 7 & Sem 8

The final year consists of Semester 7 and Semester 8.

CORE POSTINGS: Advanced Medical Microbiology, Lab Management

The highest level of specialized microbiology and management training.



Submission of Case Reports

Documentation of clinical cases required in Semester 8



Manuscript submission

The final research output submitted during Semester 8.



EXIT EXAM

The final qualifying examination at the conclusion of the programme.

LONGITUDINAL TRACKS (CONTINUOUS SUPPORT)



ACADEMIC SUPERVISOR

Continuous supervision spanning Year 1 through Year 4.



PERSONAL AND PROFESSIONAL DEVELOPMENT

A continuous development track spanning Year 1 through Year 4.



FORMATIVE ASSESSMENTS (WBA)

Word-in-ced assessments occurring continuously across Year 1, Year 2, Year 3, and Year 4.



RESEARCH SUPERVISOR

Research-specific mentorship spanning Year 2, Year 3, and Year 4.



RESEARCH COURSES

Academic research training spanning Year 2, Year 3, and Year 4, culminating in the Semester 8-manuscript.

9. SUMMARY: COURSES AND CREDIT HOURS

	COURSES CODE	NAME OF COURSES	YEAR/ SEMESTER	CREDIT HOURS
PART 1				
1.	FFPM 6113	Principles of Medical Microbiology	YEAR 1 SEMESTER 1	3
2.	FFPK 6413	Principles of Chemical Pathology		3
3.	FFPM 611D	Fundamentals of Medical Microbiology I		13
4.	FFFQ 6611	Personal and Professional Development I		1
5.	FFPM 612F	Fundamentals of Medical Microbiology II	YEAR 1 SEMESTER 2	15
6.	FFPM 6424	Laboratory Management I		4
7.	FFFQ 6621	Personal and Professional Development II		1
PART 2				
8.	FFPA 6313	Principles of Anatomic Pathology	YEAR 2 SEMESTER 1	3
9.	FFPM 6138	Fundamentals of Medical Microbiology III		8
10.	FFPM 6434	Laboratory Management II		4
11.	FFPM 6334	Research I: Research Proposal		4
12.	FFFQ 6631	Personal and Professional Development III		1
13.	FFPM 614F	Fundamentals of Medical Microbiology IV	YEAR 2 SEMESTER 2	15
14.	FFPM 6444	Laboratory Management III		4
15.	FFFQ 6641	Personal and Professional Development IV		1
16.	FFPH 6213	Principles of Haematology	YEAR 3 SEMESTER 1	3
17.	FFPM 615C	Clinical Microbiology I		12
18.	FFPM 6454	Laboratory Management IV		4
19.	FFFQ 6651	Personal and Professional Development V		1
20.	FFPM 616B	Clinical Microbiology II	YEAR 3 SEMESTER 2	11
21.	FFPM 6364	Research II: Data Collection and Analysis		4
22.	FFPM 6464	Laboratory Management V		4
23.	FFFQ 6661	Personal and Professional Development VI		1
24.	FFPM 617B	Advance Clinical Microbiology I	YEAR 4 SEMESTER 1	11
25.	FFPM 6474	Laboratory Management VI		4
26.	FFPM 6374	Research III: Research Report and Manuscript Writing		4
27.	FFFQ 6671	Personal and Professional Development VII		1
28.	FFPM 618F	Advance Clinical Microbiology II	YEAR 4 SEMESTER 2	15
29.	FFPM 6484	Laboratory Management VII		4
30.	FFFQ 6681	Personal and Professional Development VIII		1
	TOTAL CREDIT HOURS			160

10. COURSES STRUCTURE & TEACHING-LEARNING METHODS

A. COURSE STRUCTURE FOR STAGE 1

Objectives

By the end of Year 1, trainee should be able to:

- i. Acquire basic theoretical knowledge in Pathology.
- ii. Acquire basic practical competence in the performance
- iii. Interpret common laboratory tests and results.
- iv. Acquire basic knowledge in laboratory management including laboratory organization, quality control and laboratory safety.

During Year 1, trainee will undergo two (2) postings in Principles of Chemical Pathology, as part of the general pathology training. Subsequent minor postings in Principles of Anatomic Pathology & Haematology are scheduled in Year 2 and 3, respectively.

Upon completion of the first two (2) minor postings, trainees will transition to core courses in Medical Microbiology. These courses focus on developing foundational knowledge and practical skills, ensuring trainees possess a robust competency base before progressing to the patient-centered and practice-focused training of Stage 2.

Teaching Programme Stage 1

a. Student-Teacher Ratio

Within the programme, student-teacher ratio is 1:4, to allow trainees to receive individualized guidance and support throughout their study.

b. Trainees must register for the designated courses in both Semester 1 and Semester 2 of the academic year. The registration process will be conducted online and must be completed within the specified timeframe.

c. The syllabi and timetable for the Medical Microbiology courses are outlined in the individual Study Guide Book.

d. Structured Learning Opportunities

Teaching activities include series of lectures, case presentations, interactive seminars, case-based discussions and bench work. Collaborative learning, an educational approach involving joint intellectual effort by students working in groups to achieve a common goal is strongly encouraged. Various instructional methods such as case studies, small group discussions, peer teaching, simulations are employed during the training.

Trainees will be required to follow the specific posting schedule arranged by the Department of Medical Microbiology & Immunology.

e. Hands-On Training

Trainee will actively partake supervised laboratory activities.

f. Supervision and monitoring of trainee's progress

In Year 1, an academic supervisor will be appointed to guide and support the trainee throughout the 4 years training period. Regular meetings between the supervisor and trainee will be conducted to review and discuss the trainee's overall academic achievements and requirements. At the end of each semester, the trainee's performance and progress will be evaluated and discussed in a program management meeting to ensure they are meeting the necessary milestones and objectives.

g. Logbooks

Trainees are required to meet the requirements as delineated in the provided logbooks. Progress of logbook entries will be monitored regularly by the program coordinator, science officers and academic staff.

h. Workplace-based Assessments (WPBA) records

Trainees must complete the minimum number of WPBA as part of the formative assessment.

i. Performance evaluation to proceed to the next level of training will be conducted at the end of semester 2.

j. Trainees need to fulfil the requirement to sit for Part 1 examination and pass the examination to proceed to Year 2 of training (see “*Stage 1 exam*” section).

FRAMEWORK OF TEACHING-LEARNING FOR STAGE 1

	COURSES / SUBJECTS	DURATION
Introduction / Orientation		1 week
MINOR POSTINGS	Principles of Medical Microbiology	4 weeks
	Principles of Chemical Pathology	4 weeks
CORE POSTINGS IN MEDICAL MICROBIOLOGY	<u>Semester 1:</u> Fundamentals of Medical Microbiology I	
	Bacteriology	8 weeks
	Virology	5 weeks
	Immunology	3 weeks
	<u>Semester 2:</u> Fundamentals of Medical Microbiology II	
	Mycology	3 weeks
	Parasitology	2 weeks
	Systemic	11 weeks
	Laboratory Management I	4 weeks
	<u>Semester 1:</u> Personal and Professional Development I <u>Semester 2:</u> Personal and Professional Development II	(throughout the training period)
Revision / Assessment weeks		2 weeks (1 week/sem)
Self-study week		2 weeks
Stage 1 Examination		2 – 3 weeks
	TOTAL	52 weeks**

**Annual leave: 2 weeks/semester (4 weeks/academic year)

FFPM 6113 PRINCIPLES OF MEDICAL MICROBIOLOGY**Year & Semester: YEAR 1 SEM 1**

This course is one of the basic DrPath Part 1 (DrPath) courses. This course introduces the basic knowledge of Medical Microbiology and the basic principles of microbiology laboratories. The duration of the teaching session is for 1 month (4 weeks). Teaching sessions include lectures, laboratory bench exercises, and self-study related to medical microbiology.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	<i>Describe the basic principles for diagnosis, antimicrobial treatment, prevention, and control of infectious diseases.</i>	C3, PLO1 (C1)	Lectures, Tutorials, Seminar	Quiz
CLO 2	<i>Demonstrate skills in interpreting basic laboratory tests for the diagnosis of infectious diseases.</i>	P2, PLO3 (C3A)	Laboratory Demonstration	Direct-observation practical (DOPS)

C1 = Knowledge & Understanding (PLO1), C3A = Practical Skills (PLO3)

PRINCIPLES OF CHEMICAL PATHOLOGY**Year & Semester: YEAR 1 SEM 1**

This course is one of the basic Doctor of Pathology Part 1 (DrPath) courses. This course introduces the basic knowledge of Chemical Pathology and the basic principles of chemical pathology laboratories. The duration of the teaching session is for 1 month (4 weeks). Teaching sessions include lectures, laboratory bench exercises, case discussions and self-study related to chemical pathology. Student assessment is done formatively based on assessment of the student's portfolio which records student involvement in teaching and learning sessions.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Describe the basic principles of clinical biochemistry for the diagnosis and monitoring of human diseases.	C3, PLO1 (C1)	Tutorials	Presentation (CBD)
CLO 2	Demonstrate skills in interpreting basic laboratory tests of basic routine and specialised chemical pathology tests.	P2, PLO3 (C3A)	Practical, Lab demonstrations	Direct-observation practical (DOPS)

C1 = Knowledge & Understanding (PLO1), C3A = Practical Skills (PLO3)

FFPM 611D FUNDAMENTALS OF MEDICAL MICROBIOLOGY I**Year & Semester: YEAR 1 SEM 1**

The Fundamentals of Medical Microbiology for the Part 1 Doctor of Pathology Medical Microbiology program of semester 1 consists of an 18-week teaching session. The core components involved are Bacteriology, Virology, Mycology, Immunology and Parasitology. Teaching sessions involve lectures, flipped classrooms, self-learning, seminars, and case discussions related to the components involved. Students will also undergo practical training in the respective diagnostic laboratories to gain direct exposure to the components involved. Assessment is done by Direct Observation of Practical Skills (DOPS) and Case-Based Discussion (CBD).

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO (MQF)	Teaching Methods	Assessment Methods
CLO 1	Apply the principles of infectious diseases, its diagnosis and patient's management.	C4, PLO2 (C2)	Tutorial, case study & group discussion	Quiz
CLO 2	Describe the human immune system and its response to infection.	C3, PLO1 (C1)	Lecture, tutorial, case study & group discussion	Quiz
CLO 3	Demonstrate basic skills in interpreting laboratory tests for the diagnosis of infectious diseases.	P3, PLO3 (C3A)	Practical, laboratory demonstration	OSPE

C1 = Knowledge & Understanding (PLO1), C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3)

FFFQ 6111 PERSONAL AND PROFESSIONAL DEVELOPMENT I**Year & Semester: YEAR 1 SEM 1**

This course aims to enable candidates to analyse and correctly choose various methods of decision-making according to the medical and health regulations.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	To critically evaluate the best practices in decision-making based on current and relevant theories, evidence and sustainability considerations; in particular, respecting the diversity of individuals involved in the process.	C4, PLO2 (C2) (Sustainability Competency : Critical Thinking)	Project	Report

C2 = Cognitive Skills (PLO2)

FFPM 612F FUNDAMENTALS OF MEDICAL MICROBIOLOGY II**Year & Semester: YEAR 1 SEM 2**

The Fundamentals of Medical Microbiology II is for the Part 1 Doctor of Pathology in Medical Microbiology program of semester 2. The core components involved are Bacteriology, Virology, Immunology, Mycology and Parasitology. Teaching sessions involve flipped classrooms, self-learning, seminars, and case discussions. Students will also undergo practical training in the respective diagnostic laboratories to gain direct exposure to the components involved.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO (MQF)	Teaching Methods	Assessment Methods
CLO 1	Differentiate the mechanisms of infectious diseases, the diagnosis and antimicrobial treatment.	C4, PLO2 (C2)	Tutorial, case study & group discussion	Written theory exam
CLO 2	Demonstrate increasing competency in the interpretation of basic laboratory tests for the diagnosis of infectious diseases and immunological diseases.	P4, PLO3 (C3A)	Practical, laboratory demonstration	Written practical exam
CLO 3	Display good personal management and professional development skills.	A5, PLO9 (C3A)	Case study & group discussion, project	Portfolio

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3); C4A = Personal Skills (PLO9)

FFPM 6424 LABORATORY MANAGEMENT I**Year & Semester: YEAR 1 SEM 2**

This course introduces the fundamental principles and concepts of pathology laboratory management. It covers topics such as laboratory organization, quality management system introduction, and safety and risk management. This course is included in Year 1 semester 2 as a preparation for trainee to build strong fundamental to function as a laboratory manager upon finishing the programme. The teaching and learning activities are designed to be dynamic mainly involve interactive seminar, group discussion and hands-on laboratory postings. Assessment mainly done in the form of group task and presentation.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Describe the important aspects of management of the diagnostic laboratory.	C4, PLO2 (C2)	Tutorial, Case studies	Presentation
CLO 2	Discuss the importance of quality assurance, quality control and continuous improvement in laboratory management.	C4, PLO2 (C2)	Tutorial, Case studies	Presentation

C2 = Cognitive Skills (PLO2)

Year & Semester: YEAR 1 SEM 2

This course aims to enable candidates to integrate and maintain the core and moral values required as a clinical practitioners, during treatment of patients and beyond.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Demonstrate ethically grounded and value- based interpersonal skills in patient management, guided by professional standards, empathy, and respect for human dignity.	A4, PLO4 (C3B) (Sustainability Competency: Normative)	Project	Report

C3B = Interpersonal Skills (PLO4)

B. COURSE STRUCTURE FOR STAGE 2

Objectives

By the end of Stage 2, trainee should be able to:

- i. To evaluate the quality of specimen and to perform specimen reception/rejection for microbiological diagnosis.
- ii. To acquire knowledge and skill in quality assessment of culture media, cell culture and reagents.
- iii. To acquire knowledge and skill in performing and interpreting the laboratory diagnosis in bacteriology, virology, mycology, parasitology and immunology.
- iv. To acquire knowledge and skill in performing and interpreting antimicrobial susceptibility tests (AST) and managing drug resistant pathogens.
- v. To acquire knowledge and skill in performing and interpreting molecular diagnosis for infectious diseases.
- vi. To acquire knowledge and skill in infection control and outbreak management.
- vii. To acquire knowledge and skill in the laboratory management system.
- viii. To acquire skill in performing research in clinical microbiology.

STAGE 2 BREAKDOWN OF TEACHING-LEARNING TIME

YEAR 2			
Re-orientation (1 week)	Research Methodology Workshop (1-2 weeks)	Laboratory and clinical work (45 weeks). Completion of 2 case reports at the end of the academic year.	4 weeks of leave (2 weeks every 6 months)
Research Project: Proposal presentation			
YEAR 3			
Laboratory and clinical work (38 weeks) Elective postings (10 weeks) Completion of another 2 case reports at the end of the academic year.			4 weeks of leave (2 weeks every 6 months)
Research Project : Presentation of research progress.			
YEAR 4			
Laboratory and clinical work (40 weeks) Submission of compiled case reports (5 cases)		Mock exam (1 week) Study leave (4 weeks) Examination (2-3 weeks)	4 weeks of leave (2 weeks every 6 months)
Research Project : Submission of dissertation / manuscript			

Teaching Programme Stage 2

a. Student-Teacher Ratio

Within the programme, student-teacher ratio is 1:4, to allow trainees to receive individualized guidance and support throughout their study.

- b. Syllabus of the curriculum: Refer courses description and '*Progressive Knowledge & Skills Syllabi*' section in this guidebook.

c. Quality Management

It is imperative that trainees become well-versed in, and adhere to, the quality management system requirements, including standards such as MS ISO15189 and ISO 9000.

d. Structured Learning Opportunities

Trainees will actively participate in a diverse range of educational activities, including case presentations, interactive seminars, journal reviews, and small group discussions. These sessions are to deepen trainees' comprehension of selected topics and foster active involvement.

e. Hands-On Training

Trainees will actively partake in routine duties, including laboratory rounds, clinical consultations, on call, outbreak management, laboratory administration, and quality assurance activities. These responsibilities will be carried out under the supervision of clinical microbiologists.

f. Research Project

University will appoint a research supervisor in year 2. Trainees will be tasked with planning, executing, and documenting a research project, with the requirement to submit it at least **THREE (3)** months before their Final Stage 2 (Exit) examination. (refer '*Research Courses*' section)

g. Continuous Medical Education (CME)

Active engagement in Continuous Medical Education (CME) activities within each posting in the department or other institutions are highly encouraged. These activities will help trainees stay abreast of the latest developments in the field and contribute to their professional development.

h. Elective Postings

Trainees will have the opportunity to go for elective postings in both laboratory and clinical fields. Trainees are expected to submit reports for each elective posting. For now, trainees are sent to these facilities:

	KKM and other Health Facilities*	Duration (weeks)
1.	National Institute of Health, Malaysia (NIH), Setia Alam Selangor	3
2.	National Public Health Laboratories (NPHL), Sungai Buloh Selangor	2
3.	Hospital Tunku Azizah, Kuala Lumpur (Paediatric Infectious Diseases Unit)	2
4.	Makmal Vektor, Jabatan Kesihatan Negeri Selangor, Klang	1
5.	Hospital Canselor Tuanku Muhriz (Infectious Diseases Unit)	1
6.	Hospital Sungai Buloh (Infectious Diseases Unit)	1

*This list is subject to change.

i. Case Reports

Trainees will be required to submit **FIVE (5)** case reports **TWO (2)** months before the final examination.

j. Logbooks

Trainees are required to meet the training requirements as delineated in the provided logbooks. Progress of logbook entries will be monitored regularly by the program coordinator, science officers and academic staff.

k. Active Participation in the Academic and Management activities

Trainees are required to engage in the teaching and learning activities of the academic programs and management activities in the laboratory. This participation enriches their overall educational experience and contributes to their well-rounded development.

l. Supervision

An academic and research supervisor will be appointed to assist the trainee during the period of training

m. Workplace-based Assessment (WBA)

Continuous trainee assessment will be conducted using Workplace-based Assessment (WBA). This is a structured and comprehensive evaluation approach designed to assess the practical skills, competencies, and professional behaviours of trainees in their actual working environment. It involves direct observation and feedback on day-to-day activities, ensuring that trainees are meeting the required standards for the profession. All trainees will be provided with appropriate information about the frequency, methods and criteria of the assessments at the beginning of the semester.

n. Case load requirements

The case load of the programme training centres must collectively be able to accommodate the following minimum requirements:

Areas	Minimum Quantity (cases/ trainee/ year)
Cultures	1000
Serological tests	500
Cases discussions or consultations	200

The case mix shall include Bacteriology, Virology, Immunology, Mycology and Parasitology cases.

o. Trainee in the open system:

- i. The university shall appoint an academic supervisor/honorary lecturer from the host institution to monitor and periodically provide progress reports (every six monthly) to the university.
- ii. Following an unsatisfactory report, trainees will be recalled to the university for counselling and appropriate corrective measures.
- iii. Trainees should attend formal teaching at the university, whenever possible.

COURSE DESCRIPTION: Year 2

FFPM 6313 PRINCIPLES OF ANATOMIC PATHOLOGY

Year & Semester: YEAR 2 SEM 1

This course is one of the basic Doctor of Pathology (DrPath) Part 1 courses which introduces the basic knowledge of Anatomic Pathology and the basic principles of histopathology laboratories. The duration of the teaching session is for 1 month (4 weeks). Teaching sessions include lectures, laboratory visits, case discussions and self-study.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Describe the principles of diseases in anatomic pathology.	C3, PLO2 (C2)	Group tasks	Presentation
CLO 2	Demonstrate skills in interpreting basic laboratory tests in anatomic pathology.	P2, PLO3 (C3A)	Laboratory Demonstration	Direct-observation practical (DOPS)

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3)

Year & Semester: YEAR 2 SEM 1

This course is an extension of the core components of medical microbiology introduced in year 1. The components involved are Bacteriology, Virology and Immunology. Self-learning based on specific objectives and the assistance of lecturers is the main requirement of Fundamentals of Medical Microbiology III. The need for self-learning under the supervision of lecturers is provided in the form of seminars, journal presentations, confirmation of laboratory results, clinical consultations and ward visits. Training while working in the laboratory provides an opportunity for students to acquire skills in carrying out laboratory work and procedures to understand the handling and processing of microbiological specimens as well as enabling students to be critical of laboratory processes and ward visits. The course assessment is determined through workplace-based assessment (WBA).

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO (MQF)	Teaching Methods	Assessment Methods
CLO 1	Outline the aspects of infectious diseases and immunological diseases and its management and infection control.	C4, PLO2 (C2)	Case Study, tutorial	Presentation (CBD/ECE)
CLO 2	Identify the pre-analytical, analytical and post-analytical phases in laboratory methods and procedures.	C4, PLO2 (C2)	Case Study, tutorial	Presentation (CBD/ECE)
CLO 3	Demonstrate competency in the interpretation of laboratory tests for the diagnosis of infectious diseases and immunological diseases.	P4, PLO3 (C3A)	Practical, Laboratory demonstration	Direct-observation practicals (DOPS)
CLO 4	Select infectious disease cases for case report write up	A3, PLO8 (C3F)	Case study	Presentation (CBD/ECE)

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3), C3F = Leadership, Autonomy & Responsibility (PLO8)

Year & Semester: YEAR 2 SEM 1

This course is an extension of the laboratory management course in Year 1. This course is included in Year 2 semester 1. Trainees will focus on personnel management and effective leadership in the pathology laboratory. It covers topics such as team building, staff training, and fostering a positive work environment. Teaching and learning activities are designed to be dynamic especially involving interactive seminars, group discussions and laboratory practice. Assessment is done with multi-source feedback from lecturers, officers, staff and colleagues as well as self-assessment and professional assessment by supervisors.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Demonstrate proficiency in personnel management, effective leadership, and fostering a positive work environment.	A4, PLO4 (C3B)	Case studies, Group task	Report (ECE)
CLO 2	Display effective communication skills to work effectively in the laboratory.	A4, PLO5 (C3C)	Case studies, Project	Presentation

C3B = Interpersonal Skills (PLO4), C3C = Communication Skills (PLO5)

Year & Semester: YEAR 2 SEM 1

This course aims to enable candidates to implement safe and professional steps for advancement in practical skills when treating patients.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Apply safe and appropriate clinical skills through integrated problem-solving that synthesises medical regulations, patient context, and interprofessional considerations in patient management.	P5, PLO3 (C3A) (Sustainability Competency: Integrated Problem Solving)	Project	Report

C3A = Practical Skills (PLO3)

Year & Semester: YEAR 2 SEM 2

This second-year course expands upon the fundamental aspects of medical microbiology covered since the first year, including Bacteriology, Virology, Immunology, and Mycology components. Fundamental Medical Microbiology IV emphasizes self-directed learning with the guidance of lecturers. This includes attending seminars, presenting research papers appraisals, verifying laboratory findings, clinical consultations, and hospital wards visits. Through hands-on laboratory work, students can develop the necessary skills and techniques to manage microbiological samples and develop critical thinking in laboratory procedures and ward observations. The course assessment is determined through workplace-based assessment (WBA).

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO (MQF)	Teaching Methods	Assessment Methods
CLO 1	Evaluate the whole aspects of infectious diseases, immunological diseases and its management and infection control	C5, PLO2 (C2)	Tutorial, Case studies	Reports (CBD/ECE)
CLO 2	Demonstrate competency in the interpretation and reporting of laboratory tests based on established procedures	P4, PLO3 (C3A)	Practical	Direct-observation practicals (DOPS)
CLO 3	Utilize the digital platforms in the Medical Microbiology field	P4, PLO6 (C4A)	Project	Portfolio

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3), C3D = Digital Skills (PLO6)

FFPM 6444**LABORATORY MANAGEMENT III****Year & Semester: YEAR 2 SEM 2**

This course is an extension of the laboratory management course in previous semester. This course is included in Year 2 semester 2. Trainees will learn about quality control and quality assurance activities to maintain accuracy and reliability of laboratory tests. It covers topics such as quality management systems, equipment and instrumentation, and continuous quality improvement. Teaching and learning activities are designed to be dynamic especially involving interactive seminars, group discussions and laboratory practical sessions. The course assessment is determined through workplace-based assessment (WBA).

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	<i>Perform quality control tests using appropriate laboratory equipment and procedures.</i>	P4, PLO3 (C3A)	Practical	<i>Direct-observation practicals (DOPS)</i>
CLO 2	<i>Organize quality management system activities in the laboratory.</i>	P4, PLO3 (C3A)	Practical	Reports (ECE)

C3A = Practical Skills (PLO3)

FFFQ 6641**PERSONAL AND PROFESSIONAL DEVELOPMENT IV****Year & Semester: YEAR 2 SEM 2**

This course aims to enable candidates to practice the right ethics and professionalism according to the code of professional conduct in medicine.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Demonstrate ethical and professional conduct in patient care through continuous self-awareness, reflection on personal values, and adherence to the medical code of professional practice.	A5, PLO11 (C5) (Sustainability Competency: Self-Awareness)	Project	Report

C5 = Ethics & Professionalism (PLO11)

COURSES DESCRIPTION: Year 3

FFPM 6213 PRINCIPLES OF HAEMATOLOGY

Year & Semester: YEAR 3 SEM 1

General Haematology component for Part I DrPath program consist of 4 weeks of teaching and learning session. Teaching methods include lectures, seminars, bench work and case discussion. The 4-week formal program consists of the following components:

Components	Duration (weeks)
1. FBP	1
2. Hb Analysis	1
3. Transfusion	1
4. Haemostasis	1

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Describe the principles for diagnosis and treatment of haematological diseases and transfusion medicine.	C3, PLO2 (C2)	Project	Presentation (ECE)
CLO 2	Interpret basic laboratory tests for the diagnosis of haematological diseases and transfusion medicine.	P2, PLO3 (C3A)	Laboratory Demonstration	Direct-observation practical (DOPS)

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3)

FFPM 6454 LABORATORY MANAGEMENT IV

Year & Semester: YEAR 3 SEM 1

This course is an extension of the laboratory management course in previous semester. This course is included in Year 2 semester 2. Trainees will learn about quality control and quality assurance activities to maintain accuracy and reliability of laboratory tests. It covers topics such as quality management systems, equipment and instrumentation, and continuous quality improvement. Teaching and learning activities are designed to be dynamic especially involving interactive seminars, group discussions and laboratory practical sessions. The course assessment is determined through workplace-based assessment (WBA).

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	<i>Demonstrate leadership and accountability in the management of equipment and reagents in the laboratory. (A4)</i>	A4, PLO6 (C3D)	Case study	Report (ECE)
CLO 2	<i>Utilize digital laboratory information systems for efficient digital data management. (P5)</i>	P5, PLO8 (C3F)	Group Discussion, Case study	Report (ECE)

C3D = Digital Skills (PLO6); C3F = Leadership, Autonomy & Responsibility (PLO8)

Year & Semester: YEAR 3 SEM 1

This course aims to enable candidates to demonstrate ability to communicate with empathy, effectively and professionally whilst managing patients.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Demonstrate effective, empathetic and collaborative communication with patients, families and healthcare team members to support shared understanding and joint decision-making in patient care.	A5, PLO5 (C3c) (Sustainability Competency: Collaboration)	Project	Report

C3C = Communication Skills (PLO5)

Year & Semester: YEAR 3 SEM 2

This course provides an extension of comprehensive clinical microbiology principles and practices. Course is delivered in the form of hands-on-teaching sessions and laboratory sessions, case studies and elective postings. The students will be trained to achieve increasing competency in managing laboratory, emphasize quality assurance and control, and understand the role of clinical microbiology in infection prevention and control. Students critical thinking and problem-solving skills will be further developed with exposure to laboratory management activities which adds to build solid foundation in clinical microbiology. The course assessment is determined through workplace-based assessment (WBA).

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO (MQF)	Teaching Methods	Assessment Methods
CLO 1	Summarize the essential aspects infectious disease, and its management and infection control.	C5, PLO2 (C2)	Tutorial, Case studies	Presentation (CBD/ECE)
CLO 2	Demonstrate increasing competency in implementing and monitoring laboratory testing methods and important procedures in laboratories.	P5, PLO3 (C3A)	Practical	Direct-observation practicals (DOPS)
CLO 3	Organize the relevant findings of cases related to infectious diseases.	A5, PLO9 (C4A)	Project	Portfolio

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3), C4A = Personal Skills (PLO9)

FFPM 6464**LABORATORY MANAGEMENT V****Year & Semester: YEAR 3 SEM 2**

This course is an extension of the laboratory management course in previous semester. This course is included in Year 3 semester 2. The focus of this course is on safety and risk management in diagnostic laboratory. Trainees will develop skills in identifying, assessing, and managing risks while ensuring a safe working environment and patient safety, and practicing ethics and professionalism accordingly. Teaching and learning activities are designed to be dynamic especially involving interactive tutorials, group discussions and laboratory practical sessions. Assessment is via practical/technical reports of risk assessment.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Relate biosafety and biosecurity principles to ensure a safe and secure laboratory environment in accordance with international guidelines and regulations	C5, PLO2 (C2)	Case study	Report (ECE)
CLO 2	Demonstrate leadership and accountability in risk assessment and risk management for laboratory procedures.	A5, PLO8 (C3F)	Group Discussion, Case study	Report (ECE)

C2 = Cognitive Skills (PLO2), C3F = Leadership, Autonomy & Responsibility (PLO8)

FFFQ 6661**PERSONAL AND PROFESSIONAL DEVELOPMENT VI****Year & Semester: YEAR 3 SEM 2**

This course aims to enable candidates to lead him/herself and others in the team towards best care of patients.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Demonstrate strategic leadership within the healthcare team by anticipating clinical needs, coordinating roles, and guiding collective actions to ensure safe and effective patient management.	A5, PLO8 (C3F) (Sustainability Competency: Strategic Thinking)	Project	Report

C3F = Leadership, Autonomy & Responsibility (PLO8)

COURSES DESCRIPTION: Year 4

FFPM 617B ADVANCE CLINICAL MICROBIOLOGY I

Year & Semester: YEAR 4 SEM 1

The Advance Clinical Microbiology Course is designed for the final year students of the DrPath Part II program. This course is a preparation for students to become clinical microbiologists upon completion of the study program. The course provides in-depth covers of topics in clinical microbiology, including emerging infectious diseases, molecular diagnostics, antimicrobial resistance, infection control and laboratory management. Upon completion of the course, students will have gained an in-depth understanding of the new technologies and latest developments in clinical microbiology. The course assessment is determined through workplace-based assessment (WBA).

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO (MQF)	Teaching Methods	Assessment Methods
CLO 1	Summarize all the aspects infectious disease, and its management and infection control.	C5, PLO2 (C2)	Tutorial, Case studies	Report (CBD, ECE)
CLO 2	Demonstrate competency in performing laboratory tests according to standard operating procedures.	P5, PLO3 (C3A)	Practical	Direct-observation practical (DOPS)
CLO 3	Solve the case reports related to infectious diseases.	A5, PLO9 (C4A)	Discussion	Portfolio

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3), C4A = Personal Skills (PLO9)

FFPM 6474 LABORATORY MANAGEMENT VI

Year & Semester: YEAR 4 SEM 1

This course is included in Year 4 semester 1. Laboratory Management VI is an advance course designed to equip trainees with the knowledge and skills necessary to implement and adapt continuous quality improvement (CQI) activities in diagnostic laboratory practices. This course also focuses on leveraging recent evidence and cutting-edge technologies to enhance the quality and efficiency of laboratory diagnostics. Teaching and learning activities are designed to be dynamic especially involving interactive tutorials, group discussions and laboratory practical sessions. Assessment is via practical/technical reports.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Adapt continuous quality improvement activities in the diagnostic laboratory practices.	A5, PLO2 (C2)	Case study, Group work	Report (ECE)
CLO 2	Appraise recent evidence and technologies for application in laboratory diagnostics.	C5, PLO8 (C3F)	Case study, Group work	Presentation (ECE)

C2 = Cognitive Skills (PLO2), C3F = Leadership, Autonomy & Responsibility (PLO8)

FFPM 618F**ADVANCE CLINICAL MICROBIOLOGY II****Year & Semester: YEAR 4 SEM 2**

The Advance Clinical Microbiology II course is for final year students of the DrPath Part II program. This course is the final preparation before trainee becomes a clinical microbiologist. This course provides in-depth coverage for all important topics in clinical microbiology, laboratory management, as well as new technologies and the latest developments in clinical microbiology. The final examination of Part 2 is held at the end of the semester to ensure that the students' have achieve a level of mastery that allows to become a specialist who is able to work without supervision.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO (MQF)	Teaching Methods	Assessment Methods
CLO 1	Summarize all the aspects infectious disease, its management and infection control.	C6, PLO2 (C2)	Tutorial, Case studies	Theory Examination
CLO 2	Demonstrate competency in performing laboratory tests and procedures with adherence to standard protocols.	P6, PLO3 (C3A)	Practical	Practical Examination
CLO 3	Effectively communicate knowledge and expert advice to the stakeholders.	A5, PLO5 (C3C)	Tutorial, Case studies	Viva-voce Examination

C2 = Cognitive Skills (PLO2), C3A = Practical Skills (PLO3), C3C = Communication Skills (PLO5)

FFPM 6484**LABORATORY MANAGEMENT VII****Year & Semester: YEAR 4 SEM 2**

In this course, trainees will learn ways to actively participate in the development of strategic plans for the allocation of resources in the laboratory to improve operational efficiency. Among the topics discussed are methods to optimize resource utilization, ensure effective laboratory operation and cost savings. At the end of the course, participants will be provided with skills and knowledge to contribute to the successful optimization of resource allocation and budget planning in the diagnostic laboratory.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Lead in laboratory strategic plan to optimize operational efficiency	A5, PLO8 (C3F)	Seminar, Case study, Group work	Report (ECE)
CLO 2	Display entrepreneurial skills in financial management process and budgeting of diagnostic laboratory.	A5, PLO10 (C4B)	Seminar, Case study, Group work	Presentation (ECE)

C2 = Cognitive Skills (PLO2), C4B = Entrepreneurial Skills (PLO10)

Year & Semester: **YEAR 4 SEM 2**

This course aims to enable candidate to evaluate data related to patient's care and perform risk management in medical practice.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Critically evaluate patient progress data safely and accurately by understanding the interrelationships between clinical parameters, healthcare processes, and system-level factors influencing patient outcomes.	C6, PLO7 (C3E) (Sustainability Competency: Systems Thinking)	Project	Report

C3E = Numeracy Skills (PLO7)

List of Recommended Materials and Resources *(updated 2026)*

Medical Microbiology	1. Barer M., Irving W. 2018. Medical Microbiology: A Guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Investigation and Control. 19th Ed. Elsevier Health Science. 2. Bennett, J.E., Dolin, R. and Blaser, M.J. 2026. Mandell, Douglas, and Bennett's principles and practice of infectious diseases 10th Edition. E-book. Elsevier Health Sciences. 3. Cheesbrough, M. 2006. District Laboratory Practice in Tropical Countries. Part 1&2, 2nd Edition, Cambridge University Press Publication 4. Goering R.V., Dockrell H. I, Zuckerman M., Wakelin D., Roitt I., Mims C., Chiodini P. 2024. Mims' Medical Microbiology. 7th Ed. Elsevier Saunders. 5. Levinson W., Peter C.H., Joyce E.A., Nussbaum J., Schwartz B. 2024. Review of Medical Microbiology and Immunology: A Guide to Clinical Infectious Diseases. 18th Ed. New York: McGraw-Hill Education. 6. Murray, P. R. 2023. Murray's Basic Medical Microbiology: Foundations and Clinical Cases. 2nd Edition. Elsevier Health Sciences 7. Murray, Patrick R., Ellen Jo Baron, James H. Jorgensen, Michael A. Pfaller, Robert H. Tenover. 2003. Manual of Clinical Microbiology (2 volumes), 8th ed. ASM Press, Washington, DC 8. Riedel S, Hobden, J.A, Morse S.A, Mietzner T, Detrick, B. 2026. Jawetz, Melnick & Adelberg's Medical Microbiology. 29th Edition. McGraw Hill. 9. Sastry, A.S. and Bhat, S., 2021. Essentials of Medical Microbiology 3rd Ed. JP Medical Ltd.
Recommended Guidelines	1. Latest Edition of Clinical and Laboratory Standards Institute (CLSI) or other reference laboratory documents e.g. Performance Standards for Antimicrobial Disk Susceptibility Tests 2. Clinical and Laboratory Standards Institute. 2022. Performance standards for antimicrobial susceptibility testing, 32th ed. CLSI supplement M100. CLSI, Wayne, PA. 3. Malaysian Clinical Practice Guidelines
Virology	1. Specter, S. C., Hodinka, R. L., Wiedbrauk, D. L., & Young, S. A. (Eds.). (2009). Clinical Virology Manual. American Society for Microbiology Press. 2. Wallace, P., & McCulloch, E. (2021). Quality Assurance in the Clinical Virology Laboratory. Encyclopedia of Virology, 64–81.
Immunology	1. Karen C. Carroll, Stephen A. Morse, Timothy Mietzner, Steve Miller. Jawetz, Melnick & Adelberg's Medical Microbiology. 28th Edition. 2019. 2. Stevens CD. Clinical and Immunology Serology. 3rd Edition. 2009. 3. Abbas A, Lichtman AH , Pillai S. Cellular and Molecular Immunology. 10th Edition. 2021.
Mycology	1. Walsh TJ, Hayden RT, Larone DH. 2018. Larone's Medically Important Fungi: A Guide to Identification. 6th Edition. ASM Press. 2. Kidd S, Halliday C, Alexiou H, Ellis D. 2016. Descriptions of Medical Fungi. 3rd Edition. Newstyle Printing. 3. CLSI. 2020. Performance Standards for Antifungal Susceptibility Testing of Yeasts. 2nd Edition. CLSI Supplement M60. Clinical and Laboratory Standards Institute.

Chemical Pathology	1. Bishop, M. L., Fody, E. P., & Schoeff, L. E. 2022. Clinical Chemistry: Principles, Techniques, and Correlations 9th Ed. Lippincott Williams & Wilkins. 2. Harmening, D. M. (Ed.). 2020. Laboratory Management: Principles and Processes 4th Ed. D.H. Publishing & Consulting Inc. 3. Laposata, M. 2025. Laboratory Medicine: The Diagnosis of Disease in the Clinical Laboratory 4th Ed. McGraw-Hill Education. 4. Lieberman, M., & Peet, A. 2022. Marks' Basic Medical Biochemistry: A Clinical Approach 6th Ed. Wolters Kluwer. 5. Marshall, W. J., Lapsley, M., Day, A. P., & Shipman, K. 2021. Clinical Chemistry 9th Ed. Elsevier.
Haematology	1. Bain, B.J., Bates, I. and Laffan, M.A. 2017. Dacie and Lewis Practical Haematology. 12th Edition. Elsevier. 2. Harmening, D.M. 2024. Modern Blood Banking and Transfusion Practices. 8th Edition. F.A. Davis Company. 3. Hoffbrand, A.V., Vyas, P., Campo, E., Haeflrich, T., Gomez, K. 2019. Color Atlas of Clinical Hematology: Molecular and Cellular Basis of Disease. 5th Edition. Wiley. 4. Murphy, M.F., Roberts, D.J., Yazer, M.H. and Zhong, S. 2022. Practical Transfusion Medicine. 6th Edition. Wiley-Blackwell. 5. Hoffbrand, A.V., Steensma, D.P., Cappellini, M.D., Chen, F.E. and Victor, N.M. 2024. Hoffbrand's Essential Haematology. 9th Edition. Wiley-Blackwell.
Anatomic Pathology	1. Goldblum, J.R., Lamps, L.W., McKenney, J.K. & Myers, J.L. 2023. Rosai and Ackerman's Surgical Pathology. 12th Edition. Elsevier. 2. Kumar, V., Abbas, A. & Aster, J. 2024. Robbins & Cotran Pathologic Basis of Disease. 11th Edition. Elsevier. 3. Lester, S. 2022. Manual of Surgical Pathology. 5th Edition. Elsevier. 4. O'Dowd, G., Bell, S. & Wright, S. 2023. Wheater's Pathology: A Text, Atlas and Review of Histopathology. 7th Edition. Elsevier. 5. Mills S.E. 2024. Histology for Pathologists. 6th Edition. Wolters Kluwer.
PPD	1) Blake, T., & Whallett, A. 2021. Leadership and the medical registrar: How can organisations support these unsung heroes? Postgraduate Medical Journal, 97(1145), 735–740. 2) Herring, J. 2022. Medical Law and Ethics (9th Ed.). Oxford University Press. 3) Malaysian Medical Council. 2022. Code of Professional Conduct. Retrieved from https://mmc.gov.my 4) Peter Tate & Francesca Frame. 2020. The Doctor's Communication Handbook 8th Edition. CRC Press Taylor & Francis Group 5) World Medical Association, Williams John Reynold. 2015. Medical Ethics Manual. World Health Communication Associates, UK.

11. RESEARCH COURSES

The Research Courses are compulsory for the Doctor of Pathology Medical Microbiology programme. The research component is designed to develop trainees' ability to:

- 1) Apply appropriate **research methodology** in biomedical research
- 2) Conduct research in accordance with **Good Clinical Practice (GCP)** and ethical standards
- 3) Perform **statistical analysis** and interpret research data
- 4) Critically evaluate scientific findings
- 5) Communicate research outcomes through **scientific writing and presentation**

The research component is structured into three (3) progressive course:

- FFPM 6334 **Research I: Research Proposal**
- FFPM 6364 **Research II: Data Collection and Analysis**
- FFPM 6374 **Research III: Research Report and Manuscript Writing**

Each course carries four (4) credit hours and must be completed sequentially.

At the commencement of Stage 2 training, each trainee will be assigned a research supervisor who will provide guidance, supervision, and academic support throughout the duration of the research project. The trainee is required to complete the research within the stipulated candidature period and submit the dissertation manuscript for assessment at **least three (3) months** prior to the final examination.

Research Courses and Activities Throughout Stage 2 Training

Courses	Research Project Activities	Year
Research I : Research Proposal (FFPM 6334)	Title selection, proposal preparation and presentation	Year 2
	Ethical application	Year 2
Research II: Data Collection and Analysis (FFPM 6364)	Laboratory works / Data collection	Year 2 & 3
	Statistical analysis	Year 3
	Research report presentation and write-up	Year 3
Research III: Research Report and Manuscript Writing (FFPM 6374)	Manuscript preparation	Year 3
	Dissertation / Manuscript submission	Year 4

Supervision

A designated research supervisor must oversee the research project and dissertation writing. Co-supervisors from within or outside the department may also be appointed where applicable. For off-campus trainees, an additional co-supervisor from the respective training hospital may be assigned to assist with the project.

Trainees must schedule meetings with the supervisor(s) at least one meeting per semester. Written documentation for the progress is required.

Research Proposal and Ethical Approval

At the end of **Year 2 Semester 1**, trainees are required to prepare and present a **research proposal** within the department. The proposal must subsequently be submitted to the **Research Ethics Committee** for ethical approval.

The proposal should include the following components:

- 1) Background of the study
- 2) Research question(s)
- 3) Objectives of the study
- 4) Detailed methodology and proposed experimental work
- 5) Expected outcomes and potential significance of the study

Ethical approval is a mandatory prerequisite for all research conducted within the DrPath UKM programme. Compliance with institutional research governance standards ensures protection of patient rights, data confidentiality, and scientific integrity. Trainees must adhere strictly to Faculty Research & Ethics Committee regulations before, during, and after the conduct of their study.

- Proposal must be submitted to Faculty Research & Ethics Committee UKM (and
- NMRR if applicable).
- No data collection is allowed prior to ethical approval.
- Amendments in the proposal must be addressed by the trainee following
- comments made by the Ethics Committee.
- Confidentiality and data security must be maintained.

Assessment of Research Courses

Assessment for research courses in **Year 2 and Year 3** will include Supervisor's reports, research reports and presentations (proposal & progress presentations).

Trainees must obtain a **minimum passing mark of 50%** for each course in order to **progress to the next semester**.

Dissertation Format and Submission

The dissertation must be written **in English**. Trainees may submit their dissertation in either of the following formats:

- **Manuscript-ready format** suitable for submission to a **peer-reviewed scientific journal, following UKM Journal Medicine & Health format**.

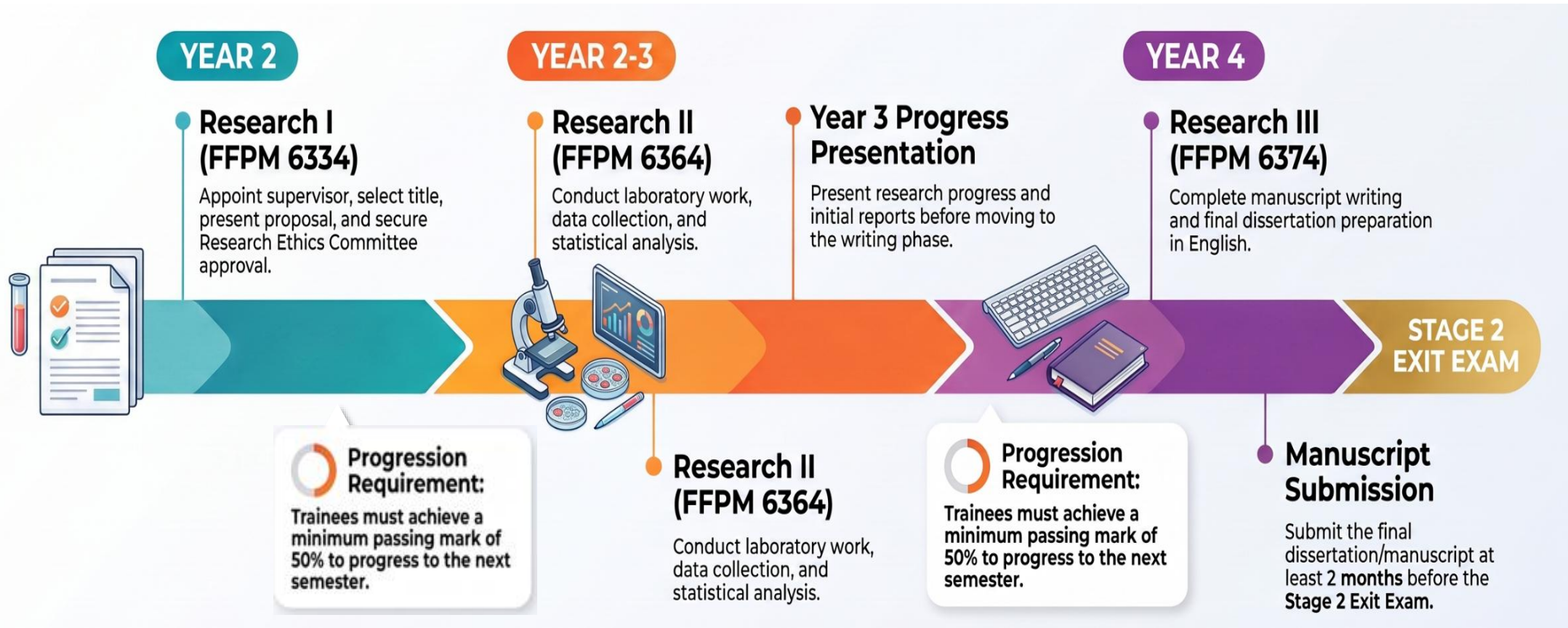
The manuscript will be examined by **two (2) appointed examiners**, and the marks will contribute 10% to the final examination marks.

The overall standard of the research project should be suitable for publication in a professional peer-reviewed scientific journal.

***** If the student's manuscript write-up is not satisfactory, the supervisor can request for correction before final submission to the Department. Final manuscript shall be submitted **at least three (3) months before the final exam**.***

\$Trainee is required to present a proof of submission an article to a peer-reviewed journal **OR** present the research at scientific conference (either local or international) **OR** publish an article in a journal as requirement for graduate by the UKM (refer section 14).

RESEARCH COURSES: ROADMAP



RESEARCH COURSE DESCRIPTION

FFPM 6334 RESEARCH I: RESEARCH PROPOSAL

Year & Semester: YEAR 2 SEM 1

Self -study with the guidance of a lecturer is the main method of the Research I course. This course includes main aspects of research including literature review exercises to identify the latest fields in medical microbiology research. Research topic is selected after presentation and discussion with the supervising lecturer. This course also comprises writing a research proposal according to the selected topic and presentation at the departmental level. Review of "research design" as the basis for preparation/planning of data collection according to the recommendations of department members after the presentation. Research proposals must be presented at the department and submitted to the Faculty Research and Ethics Committee for approval before the end of semester 2 year 2.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / *MQF	Teaching Methods	Assessment Methods
CLO 1	Organize a comprehensive literature review using a range of digital tools and resources.	P4, PLO6 (C3D)	Project	Supervisor Report
CLO 2	Propose appropriate research budget in the preparation of research proposal.	A4, PLO10 (C4B)	Project	
CLO 3	Present the research proposal to the Ethics Committee.	A5, PLO11 (C5)	Project	Progress Presentation

*MQF Domains: C3D = Digital Skills (PLO6), C4B = Entrepreneurial Skills (PLO10), C5 = Ethics & Professionalism (PLO11)

FFPM 6364 RESEARCH II: DATA COLLECTION AND ANALYSIS

Year & Semester: YEAR 3 SEM 2

Self -study with the guidance of a supervisor is the main method of the Research II course. This course includes:

- Conducting research after obtaining the approval from Faculty Research and Ethics Committee
- collecting and analyzing data using statistical tools.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / *MQF	Teaching Methods	Assessment Methods
CLO 1	Conduct a research based on the proposed methodology.	P5, PLO3 (C3A)	Project/ Laboratory works	Supervisor Report
CLO 2	Analyse data based on appropriate statistical analysis tools.	C4, PLO7 (C3E)	Project	Report/ Presentation

*MQF Domains: C3A = Practical Skills (PLO3), C3E = Numeracy Skills (PLO7)

Year & Semester: YEAR 4 SEM 1

Self -study with the guidance of a supervisor is the main method of Research III course. This course includes reviewing and updating literature and reference studies. It also includes presentation of the findings and writing up of the research report in the format of manuscript for journal publication.

Course Learning Outcome (CLO)	At the end of the module, trainee will be able to:	Taxonomy level / PLO / MQF	Teaching Methods	Assessment Methods
CLO 1	Produce scientific writing in the form of manuscript based on data analysis.	C5, PLO2 (C2)	Project	Manuscript
CLO 2	Present research results using digital platforms with creative and innovative.	P5, PLO6 (C3D)	Project	Portfolio

C2 = Cognitive Skills (PLO2), C3D = Digital Skills (PLO6)

12. CASE REPORTS WRITE UP

As part of the programme requirements, trainees are required to prepare and submit five (5) case reports as part of their continuous assessment and professional training. These case reports aim to develop students' ability to integrate theoretical knowledge with clinical and laboratory findings, as well as to demonstrate competence in case analysis, interpretation, and scientific reporting.

1. Number and Scope of Case Reports

Each trainee must submit a total of **five (5) case reports**. The selected cases must cover the following core disciplines in medical microbiology:

- Bacteriology
- Virology
- Mycology
- Immunology

Students may select the fifth case from any of the above disciplines or another relevant area (e.g.: Parasitology) approved by the Programme Coordinator.

If the case report is **accepted for publication**, the total number of case report submissions will be **FOUR (4)** including the accepted case report.

2. Case Selection and Report Preparation

Students are responsible for selecting appropriate cases encountered during their training. Each case report must be written according to the prescribed case report format outlined below. Reports should demonstrate clear clinical reasoning, appropriate laboratory interpretation, and relevant discussion supported by current scientific literature.

All case reports must follow the format and submission requirements of the Medicine & Health Journal case report guidelines, as follows:

- maximum of two photographs
- at least five references may be cited
- Having a unique lesson in the diagnosis, pathology or management of the case is more valuable than mere finding of a rare entity. Being able to report the outcome and length of survival of a rare problem is more valuable than merely describing what treatment was rendered at the time of diagnosis.

Case Reports must have these sections:

Summary (abstract <250 words, no reference in this section)

Keywords

Introduction

Case Summary (no need subheadings)

Discussion

Acknowledgments (if applicable)

References

Tables/Figures

3. Draft Submission and Review Process

All **draft case reports** must be submitted to the office for administrative processing. The office will distribute the drafts to the assigned lecturer(s) for review and evaluation.

Following the review process, the drafts will be returned to the students with comments and recommendations for improvement. Students are required to revise and correct the reports accordingly before preparing the final submission.

Upon submission of the final draft, the assigned lecturer will complete the evaluation form for assessment. The evaluation form will be retained by the office administrator for record-keeping.

Students are also required to maintain a record of their case report progress. This progress will be reviewed and discussed periodically with the Academic Supervisor and/or Programme Coordinator.

The marking scheme for each case report is provided in the evaluation form.

**Students are encouraged to publish their case report*

4. Final Submission

The final version of the case reports, must be compiled and submitted during Year 4 (Semester 2). All case reports must be submitted at least two (2) months prior to the final examination.

5. Programme Requirement

Submission and acceptance of the completed case reports is a **prerequisite for sitting the final exam**. Students who fail to submit the required case reports or whose submissions are deemed incomplete may **not be permitted to sit for the exit examination**.

REVIEW OF PROGRESSION: CASE REPORTS COMPILATION (total 5 cases)

Trainee's name : _____
 Matriks no : _____
 Expected year of graduation : _____

Academic Year	Cases/Title	Draft 1 (Date)	Draft 2 (Date)	Draft 3 (Date)	Completed (Date)
Year 2 <i>To complete two (2) cases</i>	1.				
	2.				
Year 3 <i>To complete two (2) cases</i>	3.				
	4.				
Year 4 Sem 1 <i>To complete one (1) case</i>	5.				
Year 4 Sem 2 <i>Submission of completed case reports compilation to Department Office</i>	Received by: Date:				

Note: Please keep this record in your portfolio, and bring it during Progress Meeting with Academic Supervisor and Programme Coordinator.

	JABATAN MIKROBIOLOGI DAN IMUNOLOGI PERUBATAN FAKULTI PERUBATAN UKM	NO. DOKUMEN: UKM/FPER/JMIP/PT(PdP)04/AK01/ CR/B02
	CASE REPORT EVALUATION	TARIKH KUATKUASA: 1 DISEMBER 2025

EVALUATION OF CASE REPORT *(please print out both sides)*

Trainee's name : _____
 Matrix no. : _____
 Case report no. : _____
 Case report title : _____

Please assess the following criteria and tick (✓) according to the scale provided.

Criteria <i>(please refer the marking scheme on Page 2)</i>	Weightage (%)	Poor (1)	Acceptable (2)	Good (3)	Excellent (4)	MARKS
Case selection	10	(2.5%)	(5.0%)	(7.5%)	(10.0%)	
Abstract / Introduction	10	(2.5%)	(5.0%)	(7.5%)	(10.0%)	
Case summary	20	(5.0%)	(10.0%)	(15.0%)	(20.0%)	
Discussion:						
i) Literature review	10	(2.5%)	(5.0%)	(7.5%)	(10.0%)	
ii) Clinical & Laboratory aspects	10	(2.5%)	(5.0%)	(7.5%)	(10.0%)	
iii) Implications / Learning points	20	(5.0%)	(10.0%)	(15.0%)	(20.0%)	
Text	10	(2.5%)	(5.0%)	(7.5%)	(10.0%)	
References	10	(2.5%)	(5.0%)	(7.5%)	(10.0%)	
Total (%)	100					

Signature & Name of Examiner:

Date:

13. TRAINEES ASSESSMENTS

13.1 STAGE 1 ASSESSMENT

Stage 1 (year 1) of the programme focuses on foundational knowledge and practical skills in Medical Microbiology. This must be sound enough as the basis on which to build on, prior to entry into the more patient-centred and practice-focused training of Stage 2. To assess that the required level has been achieved, there is a formal Part I examination at the end of Stage 1 which must be satisfactorily passed in order to progress to Stage 2.

13.1.1 Formative / Continuous Assessment

The formative assessment is primarily by Workplace-based assessments (WBAs). Trainee's practical skills and attitudes will be assessed based on their actual performance in the workplace. Various assessment methods, including Direct Observed Practical Skills (DOPS), Case-Based Discussions (CBD), Evaluation of Clinical Events (ECE), and Multisource Feedback (MSF) will be utilised. The purpose of such tests is to detect deficiencies so that remedial action may be undertaken. The marks will contribute 10% of the final marks for Stage 1 Examination. (Refer 13.1.1)

Supervisory reports (academic) will be part of the assessment process. These reports provide feedback on the trainee's academic progress, performance, and areas for improvement. They are completed by the trainee's academic supervisor and contribute to the overall assessment of the trainee's readiness to progress to the next stage of training.

The WBAs that are involved in DrPath in Medical Microbiology training are as follows:

1. **DOPS** are used to assess the trainee's ability to demonstrate the skills required for the different stages of training. The assessor provides immediate feedback to the trainee and further develops the trainee's strengths as well as identifying areas for improvement.
2. **ECE** are used to assess the trainee's ability to perform tasks which involve teamwork and interacting with other professional colleagues.
3. **CBD** is used to assess the trainee's ability to apply their medical knowledge in decision making for patient care, and running a safe, efficient and reliable Medical Microbiology service.
4. **MSF** is used to assess the trainee's behavioural characteristics. Generally, the supervisor's report provides the main feedback. The supervisor may also take into consideration comments from other staff who have had the opportunity to work with the trainee. The trainee may conduct a self-appraisal and discuss this with their supervisor, with the objective of ensuring the trainee is guided to reach the conduct level required at the professional level of a medical specialist.

The trainee is expected to participate in regular WBAs, which serve to track and oversee their educational progress throughout the training program. These assessments also offer ongoing feedback to the trainee regarding their progress. Consequently, any deficiencies in the trainee's education should be promptly addressed. Generally, the trainee should demonstrate "satisfactory" progress before advancing to the next stage of training.

Conduct of Workplace-based Assessment (WBA) during training

The conduct of Workplace-based Assessment (WBA) during training encompasses several key steps to ensure a systematic evaluation and support system for trainees:

1. **Introduction to WBA:** Trainees will be introduced to the purpose and structure of WBAs at the beginning of academic year. Assessment methods, frequency, and criteria will be informed to trainees.
2. **Initial Assessment Planning:** Coordinators and supervisors will work closely with trainees to set objectives and goals for the assessment period. This is to ensure alignment between trainee expectations and assessment tools, and to facilitate effective planning and execution of the assessments.
3. **Ongoing Assessment:** Regular WBAs are conducted throughout the training period according to the predetermined schedule. Trainees are expected to keep track of the schedule and able to fulfil the requirements for the semester.
4. **Assessment Methods:** DOPS, CBD, ECE, and MSF are utilized to evaluate different aspects of trainees' performance. Trainee must achieve 100% of at least satisfactory level. A satisfactory re-assessment after remedial action can replace an unsatisfactory initial assessment.
5. **Feedback and Coaching:** Feedback sessions will follow each assessment, to provide guidance for improvement.
6. **Remediation:** If weaknesses are identified during assessments, remedial actions are promptly implemented. Trainees are expected to be prepared for the remediation sessions.
7. **Progress Review:** Periodic reviews will be conducted to assess trainees' overall progress. The review committee will be headed by the Head of the programme. Decisions regarding trainees' readiness to progress to the next stage of training, based on their performance outcomes will be informed to trainees before the commence of the new academic year.
8. **Documentation and Reporting:** Records of training activities, assessments, feedback, and progress are maintained throughout the training period. Trainees are expected to keep the training records and safely and securely in an individual portfolio.
9. **Continuous Improvement:** The assessment process is subject to periodic reviews and refinements to ensure its effectiveness. Feedback from trainees and supervisors will be collected to identify areas for enhancement, with strategies implemented to optimize the WBA process continually.

BLUEPRINTS OF FORMATIVE / WPBA FOR STAGE 1

COURSES	Quiz/ OSPE	DOPS/ Data Interpretation	CBD	ECE	SV Assessment	Notes
Principles of Medical Microbiology	1	1				
Principles of Chemical Pathology		1	1			
Fundamental of Medical Microbiology I	3 (Bacte, Viro, Immuno)					10% will be carried to final marks of Stage 1 Exam
PPD I					1	
Fundamental of Medical Microbiology I	3 (Myco, Parasito, Systemic)					
Laboratory Management I				1		
PPD II					1	

Prerequisites for sitting the Stage 1 Examination

To be eligible to sit the Stage 1 Examination the trainee must have:

- Satisfactorily completed all Medical Microbiology postings in Stage I (Year 1).
- Fulfil the minimum attendance requirement (at least 85%).
- Satisfactorily completed all related formative assessments (WPBAs).
- Achieve satisfactory evaluation by the department.

Summative assessment (Stage 1 Examination)

The Part I examination comprises (i) Theory and (ii) Practical components.

The allocation of marks in the Stage 1 examination shall be as follows:

- Theory 45% (Theory 1 = 60% + Theory 2 = 40%)
- Practical 45% (OSPE)
- Continuous assessment 10%

The breakdown of each component of examination are as follows:

Component	Number of questions	Duration of examination	Weightage	Total Weightage
Theory 1	50 MCQ questions • 15 EMQ • 35 SBA (with 3 stems)	1 hour 15 minutes	60%	45%
Theory 2	3 short notes 3 MEQ / SAQ	2 hours	40%	
Practical - OSPE	20 stations (8 minutes / station)	3 hours	100%	45%
Continuous Assessment	Quiz & DOPS		100%	10%

Criteria for passing Stage 1 examination:

To pass the Part I examination, the trainee must satisfactorily pass both the theory and practical components of the examination. The trainee must achieve:

- an overall score of 50% AND
- a pass ($\geq 50\%$) in BOTH theory and practical components

Repeat Examination:

1. A trainee who has failed may be allowed to repeat the examination after SIX (6) months.
2. A trainee is allowed a maximum of TWO (2) repeat examination to pass the Stage 1 examination.
3. The components of the repeat examination and their weightings shall be as in the main Stage 1 examination.

Note: Trainees who do not pass the examination on the first attempt may nevertheless progress to Year 2 of training. A repeat examination may be undertaken at the end of the first semester of Year 2. Should the trainee fail the second attempt, a third and final attempt may be undertaken during the second semester of Year 2. Trainees who fail to pass the examination after three attempts will be withdrawn from the programme.

13.2 STAGE 2 ASSESSMENT

The assessments are structured around the curriculum, which covers areas of bacteriology, virology, mycology, parasitology, immunology, and infection control practices training. Trainees will undergo both formative and summative assessments.

13.2.1 FORMATIVE ASSESSMENT

In stage 2, the same approach of WPBAs is continued to gauge trainees' professional skills and attitudes based on their actual performance. WPBAs utilize various assessment methods, including Direct Observed Practical Skills (DOPS), Case-Based Discussions (CBD), Evaluation of Clinical Events (ECE), and Multisource Feedback (MSF), adapted from the Royal College of Pathologists, UK. (Refer 13.1.1 for details of WPBAs)

BLUEPRINTS OF WPBAs FOR STAGE 2

Year / Semester	COURSES	DOPS/ Data Interpretation	CBD	ECE	Presenta tion	SV Assess ment	MSF
Year 2 Semester 1	Fundamental of Medical Microbiology III	2	1	1			
	Principle of Anatomic Pathology	1*		1*			
	Laboratory Management II			1			
	Research I				1		
	PPD III					1	
Year 2 Semester 2	Fundamental of Medical Microbiology IV	2	2	1			1
	Laboratory Management II						
	PPD IV			1		1	
Year 3 Semester 1	Clinical Microbiology I	2	2	1			
	Principle of Haematology	1*					
	Laboratory Management III			1			
	PPD V					1	
Year 3 Semester 2	Clinical Microbiology II	3	1				1
	Laboratory Management IV			1			
	Research II				1		
	PPD VI					1	
Year 4 Semester 1	Advance Medical Microbiology I	3	3				
	Laboratory Management VII			1			
	Research III				1		
	PPD VI					1	
Year 4 Semester 2	Advance Medical Microbiology I	FINAL EXIT EXAM					
	Laboratory Management V			1			
	PPD VIII					1	
	TOTAL	12*	9	9*	3	6	2

*Principle courses not included

13.2.2 EXIT PROCESS

Trainees may only sit for the Final (exit) examination on completion of a minimum of FOUR (4) years of supervised training in Medical Microbiology, in a diagnostic laboratory approved for Medical Microbiology training by the local governing body for postgraduate training and the university. Trainee must show evidence of the progressive competence to reach the level of unsupervised practice as a clinical microbiologist. The progressive acquisition of the following criteria and the evidence are as follows:

Criteria of progressive acquisition of competence at the end of the training	Evidence of training
Medical and scientific knowledge relevant to Medical Microbiology	Part I examination result WBA assessment records
Medical Microbiology practice-based skills	WBA assessment records, Laboratory Competency records
Interpersonal and communication skills	WBA/PPA Assessment records
Professionalism and ethical principles in practice	WBA/PPA Assessment records
Confidence in providing patient care as a clinical microbiologist and effectiveness in a systems-based practice	Supervisor report, Progress review report
Participate in health promotion and preventive medicine activities related to medical microbiology	Attendance records of conference, seminars, CME, Infection control programs/ activities etc.
Laboratory management skills such as with regards to laboratory information systems, safety, quality assurance and laboratory accreditation, and aspects of health economics	WBA assessment records Supervisor report, Progress review report
Ability to appraise the scientific literature and conduct research	Research supervisor report, Research courses assessments, manuscript assessment

Prerequisites for sitting the Stage 2 (Exit) Examination

To be eligible to sit for the Final Examination the trainee must have satisfactory progression in the training programme is a training prerequisite for admission to the Final (exit) examination. Satisfactory progression encompasses all of the following criteria as follows:

Requirement	Criteria
Completion of Training Period	Completed the designated training period of 4 years at least 85% of attendance
Formative Assessment	100% at least at satisfactory level
Research project	Submitted a research project report/ dissertation accompanied by the supervisor's report. The research project report should be submitted at the end of Year 3 but not later than 2 months before the Final Examination. A revision of the research project report may have to be undertaken if necessary.
Case reports	Submitted all case books, case summaries and any other assignments required by the department. The deadline for submission of these reports shall be 2 months before the Final examination
Supervisor report	100% at least at satisfactory level
Performance Review Report	Overall performance is reviewed and deemed satisfactory by program administration committee

13.2.3 SUMMATIVE ASSESSMENT

FINAL STAGE 2 EXAMINATION (EXIT EXAMINATION)

The Stage 2 examination will be held at the end of Year 4 and comprises:

1. theory papers
2. practical papers
3. viva-voce

Allocation of marks:

The allocation of marks in the Stage II examination shall be as follows:

Component	Description	Weightage
Theory	Paper I & II: essays/MEQ/problem solving questions	40%
Practical	Long practical, Data Interpretation & OSPE	40%
Viva-voce		10%
Research	Dissertation/manuscript	10%
	Total	100%

Criteria for pass:

- a. Candidate must obtain an overall score of 50%
- b. Candidate must pass BOTH the theory and practical components (The pass mark for each component is 50%).
- c. Attending the viva is **COMPULSORY**

Repeat examinations:

- a. Repeat examination after six (6) months

A candidate may be allowed to repeat the examination after six months if he has an overall score of 50% or more but has failed either the theory OR the practical component

In this repeat examination, the candidate will be examined in the failed component and be given a viva-voce. The trainee must achieve satisfactory continuous assessment to be eligible to sit for examination.

The candidate is only allowed to repeat examination twice consecutively for the same component (theory or practical). Upon failure of the second repeat attempt, the candidate is required to repeat both theory and practical components after a period of 6 months to 1 year based on conjoint exam board decision.

- b. Repeat examination after one year.

A candidate may be allowed to repeat the examination after one (1) year if:
obtained an overall score of less than 50% OR

- i. failed BOTH the theory and practical components OR
- ii. failed to attend the viva voce OR
- iii. an overall score of 50% or more, but has failed either the theory or the practical component and the conjoint exam board found that overall performance of the candidate is not satisfactory.

In this repeat examination, the candidate will be examined in the theory and practical components and be given a viva-voce. The trainee must achieve satisfactory continuous assessment to be eligible to sit for examination. To pass this repeat examination, the candidate must obtain a pass mark of at least 50% in the theory or practical component that they have sat for AND obtain an overall score of at least 50%.

- c. A candidate is allowed a maximum of **four repeat examinations**.

The **maximum duration** permitted for the completion of the entire course is **SEVEN (7) years**.

14. GRADUATION REQUIREMENT

As a requirement for the award of the Doctor of Pathology in Medical Microbiology, trainees must fulfil at least one of the following scholarly dissemination requirements:

- provide proof of submission of at least one manuscript to a peer-reviewed journal;
- present their research at a scientific conference (oral or poster presentation); or
- publish an article in a peer-reviewed journal.

Prior to the award of the degree, trainees are required to complete the prescribed verification form and provide supporting evidence that the graduation requirement has been fulfilled.

(Refer Circular Postgraduate Studies Secretariat no. 1/2019 (Jadual Penyelarasan Penulisan, Syarat Menduduki Viva Dan Syarat Bergraduat Program Pascasiswazah Fakulti Perubatan UKM) - petikan Mesyuarat Fakulti Perubatan ke-370 dated 5 December 2018)

15. ROLES & RESPONSIBILITIES OF DRPATH TRAINEES

i. *Registration*

Trainee must register within the period prescribed by the University. They must submit all required documents as required during the registration process. For existing students, registration for courses is must be completed early of every semester.

ii. *Orientation and Familiarisation:*

Trainee are required to participate in the orientation program provided by the university and department. They are expected to be familiar with the program structure, faculty, facilities, and expectations, and to thoroughly understand the curriculum, course schedule, and program policies.

iii. *Responsibilities:*

It is the responsibility of trainee to attend all lectures, seminars, and practical sessions as outlined in the program curriculum, actively engage in academic discussions, complete assignments, projects, and assessments within specified deadlines, and maintain a high standard of academic integrity and ethical conduct. Each candidate will be assigned one academic and research supervisor at the beginning of year 2.

iv. *Laboratory Training:*

Trainee should actively participate in laboratory training sessions, and follow the regulations and safety protocols. Throughout laboratory and clinical rotations, trainee is expected to collaborate with healthcare professionals, maintaining professionalism, confidentiality, and effective communication. Candidate's performance in the daily routine work in the laboratory will be observed and monitored.

v. *Continuing medical education:*

Trainee should engage in continuous learning, attend workshops, conferences, and seminars to enhance their knowledge and skills, and seek opportunities for additional certifications or specialized training to stay updated with the latest advancements in medical microbiology.

vi. *Professionalism and Ethics:*

Trainee must adhere to the highest standards of professionalism, integrity, and ethical conduct. This includes respecting patient confidentiality and privacy in clinical, laboratory, and research activities, and following the professional code of conduct and standards set by the university, hospital and medical professional bodies.

vii. *Progress Monitoring:*

Trainee are expected to attend all progress meetings with the programme coordinator. Trainee must engage regularly with academic/research supervisors to discuss progress and updates, as well as address any concerns that arise.

viii. *Completion of Programme Requirements:*

Trainee must fulfil all program requirements, including logbooks completion, laboratory/clinical rotations, and research components, preparing and submitting case reports and a dissertation as required. Failure to complete may result in candidates being barred from sitting examinations.

ix. *Post-Graduation Commitments:*

Graduates are urged to seek professional growth and specialisation in medical microbiology while contributing to the field through ongoing research, publications, and participation in relevant professional organizations.

x. *Alumni Engagement:*

Graduates are encouraged to stay connected with the program, contribute to the alumni network, share experiences and insights with current students, and attend alumni events while supporting the program's initiatives.

16. REGULATIONS AND MONITORING

i. *ANNUAL LEAVE*

Trainees are entitled to twenty-eight (28) days annual leave with a maximum of fourteen (14) days per semester. Remaining days of annual leave cannot be carried forward to the next semester.

ii. *SICK LEAVE*

Trainees are allowed to take fourteen (14) days for sick leave per year or seven (7) days per semester, inclusive of weekends and public holidays. If the sick leave exceeds the maximum allocated, the remaining days will be deducted from the annual leave. Sick leave can only be claimed for the current year/semester of training and cannot be carried forward.

iii. *LEAVE APPROVAL*

All leaves are subjected to approval by the Programme Coordinator / Head of Programme. Students are not allowed to be absent from the course for more than FORTY-TWO (42) days per year (combined annual leave and sick leave). If this exceeds 42 days per year, the student will need to defer his/her study.

iv. *REGISTRATION (Excerpt from UKM Regulations for Graduate Studies 2021)*

Students must register within the period prescribed by the University.

Existing students shall register within the prescribed period at the beginning of each semester/session.

Existing students who fail to register within four (4) weeks of the commencement of the semester/session without obtaining permission in writing from the Dean/Director will be given the status of "Dismissed due to failure to register". Students may appeal in writing to the Dean/Director to continue their studies, subject to a period not exceeding two (2) consecutive semesters and will be charged the processing fee and late registration fine as prescribed by the University.

v. *DEFERMENT OF PROGRAMME*

A trainee may apply for deferment of the programme based on acceptable reasons. The duration of deferment will not be counted as part of the programme. The trainee must submit in writing, together with supporting documents (where appropriate) the request to defer to the Dean/ Deputy Dean of Graduate Studies with the approval of the Head of Department. The letter must be accompanied by a completed request for deferral form.

Trainees are allowed to defer for not more than two semesters (12 months) throughout the duration of the course. For any deferment for more than 12 months, the appeal shall be subjected to the university senate's approval. It is the responsibility of the candidate to inform his/her sponsor (i.e. Ministry of Health) about their decision.

vi. *WITHDRAWAL FROM THE PROGRAMME*

A trainee who wishes to withdraw from the program must submit in writing the decision to withdraw to the Dean/Deputy Dean of Graduate Studies with the approval of the Head of Department. The letter must be accompanied by the submission of a completed withdrawal form (refer Appendix IV). It is the responsibility of the candidate to inform his/her sponsor (i.e. Ministry of Health) about their decision.

vii. DISMISSAL OF STUDENTS (Excerpt from UKM Regulations for Graduate Studies 2021)

- (1) The Senate reserves the right to take appropriate action including suspending or dismissing a student at any time if the student is found to have:
 - (a) Provided false information during admission or during the study period or to obtain a degree;
 - (b) A mental or physical disability certified by a physician;
 - (c) Failed to maintain good academic performance as prescribed by the University;
 - (d) Exceeded the study period allowed under sub-regulation 8(1).
- (2) Each student is subject to the Universities and University Colleges Act 1971, the Constitution of Universiti Kebangsaan Malaysia, other rules and regulations in force or applicable including the Universiti Kebangsaan Malaysia (Discipline of Students) Regulations 1999, the Universiti Kebangsaan Malaysia Intellectual Property Policy 2010, the Universiti Kebangsaan Malaysia Publishing and Writing Integrity Ethics Policy and other regulations related thereto.
- (3) Any student who commits a disciplinary offense including harassing or threatening a supervisor or a member of the graduate secretariat, contacting or harassing or threatening the External Examiner and/or Internal Examiner in connection with the evaluation of their dissertation/thesis and/or committing research misconduct is subject to action under Universiti Kebangsaan Malaysia (Discipline of Students) Regulations 1999.

viii. APPEAL

All trainees are entitled to exercise their right to appeal in situations, as delineated in Part VII, the UKM Regulations for Graduate Studies 2021. Trainees must adhere to and comply with all regulations stipulated therein.

ix. DISABILITIES

Candidates who have a documented disability or medical conditions are strongly encouraged to inform the Program Coordinator in advance of their enrolment so that accommodations, if needed, can be made.

17. SUPPORT SERVICES AVAILABLE FOR TRAINEES

Support services are available for trainees to utilise. These services aim to address various needs and challenges encountered during training, ensuring trainees receive adequate support and guidance. Examples of available support services include; campus facilities such as study spaces, libraries, cafes, shops, ATM as well as academic support such as academic mentorship programs, access to learning materials and resources, counselling service, research facilities, students' representation council etc. Trainees are encouraged to utilize these services as needed to enhance their learning experience, address any concerns or difficulties, and foster personal and professional growth.

18. PROGRAMME MONITORING & REVIEW

The Doctor of Pathology in Medical Microbiology programme is subject to continuous monitoring and periodic review in accordance with the quality assurance requirements of Universiti Kebangsaan Malaysia (UKM) and the Ministry of Higher Education (MOHE). These processes ensure that the programme remains relevant, responsive to current developments in the discipline, and aligned with national standards for postgraduate medical education.

Curriculum review is conducted at both the departmental and faculty levels through the relevant curriculum committees, with input from the National Postgraduate Medical Curriculum (NPMC) Committee. Proposed revisions are evaluated by the Faculty before being submitted to the University Planning and Academic Development Committee (*Jawatankuasa Perancangan dan Pembangunan Akademik, JPPA*), which is responsible for overseeing the planning, monitoring, and review of academic programmes. Following approval by the UKM Senate, the revised curriculum is submitted to the Ministry of Higher Education (MOHE) for final approval prior to implementation.

Programme monitoring is undertaken through multiple mechanisms. Trainee feedback is obtained via the online Course Teaching Evaluation System (*Sistem Penilaian Pengajaran Kursus, SPPK*), which enables trainees to evaluate each course with respect to its content, delivery, teaching effectiveness, and learning facilities. Completion of the course evaluation is a prerequisite for registration in the subsequent semester. Additional information for programme monitoring and continuous quality improvement is obtained through internal self-review processes, external examiner reports, accreditation exercises, and feedback from relevant stakeholders, including trainees, graduates, employers, professional bodies, and clinical training institutions.

19. QUALITY ASSURANCE AND ACCREDITATION

The programme has established a Quality Assurance Committee to coordinate and implement quality assurance activities in accordance with the policies and directives of the Faculty and University Quality Assurance Units. The committee is responsible for overseeing programme quality initiatives and coordinating institutional quality assurance exercises at both the faculty and university levels. These include compliance with the MS ISO 9001 Quality Management System, institutional quality audits, programme evaluation, and accreditation and reaccreditation exercises conducted by the relevant professional and regulatory bodies.

Accreditation and reaccreditation of the programme are conducted in accordance with the policies of Universiti Kebangsaan Malaysia (UKM), which require a formal review every five (5) years or at such intervals as stipulated by the Malaysian Qualifications Agency (MQA), the Malaysian Medical Council (MMC), and other relevant professional or regulatory bodies.

MAPPING OF THIS GUIDEBOOK TO MALAYSIAN STANDARD FOR MEDICAL SPECIALIST TRAINING

AREA	PURPOSE & SCOPE	DRPATH MEDICAL MICROBIOLOGY UKM CURRICULUM GUIDE
1	Programme Delivery and development	Overview (<i>Latarbelakang Program</i>)
2	Assessment of trainee learning	General criteria Assessment format
3	Trainee selection and support	Trainee selection and recruitment (<i>refer Prospectus</i>) Trainee support Trainee Responsibility
4	Trainers	List of trainers (<i>Senarai Pengajar</i>)
5	Educational Resources	List of courses and references Syllabus Guide for research course Assessment forms* List of approved training centres
6	Programme Management	<i>Jawatankuasa Pengurusan Program Pascasiswazah Peringkat Jabatan Mikrobiologi & Imunologi Perubatan Fakulti Perubatan</i>
7	Programme monitoring, review and quality improvement	Quality assurance and accreditation

GLOSSARY

1. Programme

A planned sequence of educational experiences (aligned rotations or postings) in a specialty with clearly spelt and measurable learning outcomes leading to the conferment of a qualification upon conclusion of training.

2. Trainee

Medical doctors (with full registration with the Malaysian Medical Council) formally enrolled in a recognised postgraduate clinical / medical training programme.

3. Training Centres

Training will be carried out in centres which are accredited for training according to the guidelines of the National Conjoint Specialty Committee - Pathology

4. Transfer trainee

Trainees currently enrolled in another structured specialty programme who apply for transfer and recognition of prior training.

5. Registration

Formal documentation as proof of pursuing postgraduate clinical / medical training programme.

6. Malaysian Qualifications Framework

An instrument that classifies qualifications based on a set of criteria that are approved nationally and benchmarked against international best practices.

7. MQF level

as described in the Malaysian Qualification Framework, is an award level described with generic learning outcomes and qualification descriptors which characterises a typical qualification.

8. Educational Training Provider

An organisation providing postgraduate clinical training and continuing professional development e.g. university, Ministry of Health.

9. JBSP-Patologi

Jawatankuasa Bersama Sarjana Perubatan – Patologi also known as The Conjoint Board of Pathology comprises of members from all the universities offering the Master of Pathology programmes, the Ministry of Health (MOH) and College of Pathologists, Academy of Medicine Malaysia (CPath-AMM). This body has collaboratively established a common and standard training and examination system for the Master of Pathology programmes since 1995

10. Head of Programme

A qualified and experienced specialist, within the organization providing the postgraduate clinical training who oversees the overall planning, implementation and improvement of a training programme for a particular specialty. (e.g. Head of discipline of KKM, Head of conjoint board)

11. Programme Lead

A specialist who oversees the implementation, evaluation and improvement of the specialty training programme at state or regional level. The Programme Lead reports to the Programme Head. (e.g. Head of discipline of KKM at state level, head of department at university)

12. Programme Coordinators

A specialist who oversees the implementation, evaluation and improvement of the specialty training programme at the training site. (e.g. coordinator at a training site)

13. Trainer

A trainer is a specialist Medical Microbiologist registered on the NSR of Malaysia. Trainers must be appointed by the institution offering the programme, based on the requirements of the curriculum. They are responsible for educating, training, supervising and assessing trainees within an environment. Trainers should undergo the train-the-trainer (TtT) courses provided by the respective training.

14. Adjunct trainer

A trainer who may not be a Clinical Microbiologist, but have the relevant expertise to provide value added training experiences for trainees.

15. Academic supervisor

An Academic supervisor for DrPath in Medical Microbiology Programme is a key faculty member from the Department of Medical Microbiology, Faculty of Medicine, UKM. This individual serves as the mentor for trainees, providing guidance on academic performance and career development. The academic supervisor also acts as a liaison between the trainee and the Programme/Course Coordinator, as well as the Programme Director. To ensure quality supervision, an Academic Supervisor should not oversee more than two trainees who are in the same year of training.

16. Clinical supervisor (*Penyelia Kehormat Klinikal*)

The Clinical Supervisor is a Clinical Microbiologist or a specialist Medical Microbiologist of a MOH hospital or any other center that is accredited for training, appointed by UKM. All trainees on the open system must have a Clinical Supervisor. The clinical supervisor also co-supervises the trainee with the Academic Supervisor and Research Supervisor if the research project is conducted in MOH hospitals.

17. Research supervisor

The research supervisor is a key faculty member from the Department of Medical Microbiology, Faculty of Medicine, UKM. The research supervisor can be the same person as the Academic supervisor or a non-Pathologist (PhD). They will be the research advisors to the trainees in matters relevant to the research project.

18. Assessors

Formative Assessment

Formative assessments are carried out by the Academic, Clinical or Research Supervisors who possess the necessary skills in the relevant area. They should have skills in appraisal and feedback and have undergone training in accordance with the accredited training centre's requirement.

Summative Assessment

Summative assessment is carried out by internal and external examiners who are experienced Clinical Microbiologists. External examiners should preferably be invited from overseas and be of professorial status or equivalent. Internal examiners should be lecturers or honorary lecturers of the Department of Medical Microbiology of the training universities in the Conjoint Board and Clinical Microbiologists from MOH. An examiner for the exit level should have at least FIVE (5) years' experience as a Clinical Microbiologist after graduation from the DrPath (UKM)/ MPath programme (or its equivalent).

19. Learning environment

Refers to an educational approach, cultural context, or physical setting in which teaching and learning occur.

20. Stakeholders

Includes trainees, trainers, patients, healthcare workforce and institutions, professional bodies, alumni, related industries and non-governmental bodies, funding bodies.

21. Entrustable Professional Activity

Keys tasks of professional practice entrusted to an unsupervised trainee once he or she has attained specific competency level.

22. Operational perspectives

Refers to activities that ensure the cost- effective and efficient utilisation of resources in the provision of a service. This includes human resource and financial planning, equipment procurement and maintenance and other related matters

23. Value-based Medicine

Related to evidence-based and cost-effective decision-making in healthcare practices which ensures outcomes that matter most to patients

EDITORIAL COMMITTEE
GUIDEBOOK FOR
DOCTOR OF PATHOLOGY IN MEDICAL MICROBIOLOGY
PROGRAMME
FACULTY OF MEDICINE
UNIVERSITI KEBANGSAAN MALAYSIA

Advisor
Prof. Madya Dr. Asrul Abdul Wahab

Chief Editor
Dr. Umi Kalsom @ Satariah Ali

Editors
Dr. Siti Norlia Othman
Prof. Madya Datin Dr. Noor Zetti Zainol Rashid

Design & Graphic
Dr. Siti Norlia Othman