"This prospectus is made under the provisions of the Universities Act, the Postgraduate Institute of Medicine Ordinance, and the General By-Laws No. 1 of 2016 and By-Laws No. 2 of 2016 for Degree of Doctor of Medicine(MD) and Board Certification as a Specialist"

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO, SRI LANKA

Prospectus
DOCTOR OF MEDICINE (MD)
AND BOARD CERTIFICATION
IN MEDICAL PARASITOLOGY

(To be effective from the year 2016)

BOARD OF STUDY IN MICROBIOLOGY

Contents

PGIM BOARD OF STUDY IN MICROBIOLOGY
MD AND BOARD CERTIFICATION IN MEDICAL PARASITOLOGY

1. NOMENCLATURE

Full title:	MD and Board Certification in Medical Parasitology
Abbreviated title:	MD (Med Parasit) and Board Certification
University:	University of Colombo
Institute:	Postgraduate Institute of Medicine
Department:	Board of Study in Microbiology

2. BACKGROUND AND JUSTIFICATION OF AMENDMENTS

The MD Medical Parasitology and Board Certification are the second and third stages of a three-part training programme conducted by the PGIM's Board of Study in Microbiology for those who wish to specialize in the field of Medical Parasitology. The first stage of the training programme, the Diploma in Medical Microbiology, lays the foundation for MD training in several specialities including Medical Microbiology, Medical Virology, Medical Parasitology and Medical Mycology.

The first MD Medical Parasitology training programme was launched in 1992. Since then it has been reviewed and revised to serve the evolving needs of the country in relation to the field of Medical Parasitology. The last set of amendments incorporated several changes recommended by the Board of Study with regard to the training programme and the assessments subsequent to receipt of the External Examiner's Report in 2009.

The current amendments incorporate new assessment formats adopted by the Board of Study in Microbiology in the period since 2009, as well as changes recommended by the Board of Management of the PGIM with regard to all programmes of study. It is placed at Level 12 of the Sri Lanka Qualifications Framework (the highest level) and requires a minimum period of 5 years of training: 3 years pre-MD and 2 years post-MD.

3. ELIGIBILITY FOR ENTRY INTO TRAINING PROGRAMME

Applicants should have

i. A medical degree registered with the Sri Lanka Medical Council and
ii. Completed an internship recognized by the Sri Lanka Medical Council and
iii. Completed one year work experience in Sri Lanka, after internship and
iv. The Postgraduate Diploma in Medical Microbiology examination conducted by the PGIM. Not more than 4 years should have elapsed after the trainee has passed the examination.

4. SELECTION PROCESS

All those who fulfill the entry criteria stated in Section 2 will be considered eligible for admission to the MD training programme provided they are released for training by their employers (Director-General Health Services, University Vice-Chancellors, private sector institutions etc).

If the number of available training slots is less than the number who fulfill the entry criteria and apply for admission to the training programme, selection of those to be released for training should be on the basis of merit order at the PGIM's Postgraduate Diploma in Medical Microbiology examination. In the event that such selections must be made from among those who fulfill the entry criteria but have passed the said Diploma examination at different points in time, those who have passed most recently at the first attempt will be given priority, and those who passed in previous years or in a second or subsequent attempt will be placed at the bottom of the merit order.

5. NUMBER TO BE SELECTED FOR TRAINING

The exact number will be decided by the BOM on the recommendation of the BoS in Microbiology (which will depend on the available facilities, training sites and trainers in Parasitology) and in consultation with the Ministry of Health. Not more than 5 trainees will be selected for training in any given year.

6. LEARNING OUTCOMES AND COMPETENCIES

Those who are Board Certified as Specialists in Medical Parasitology should be:

- able to organise, manage and direct a diagnostic laboratory for Medical Parasitology
- able to provide clinicians with advice regarding diagnosis and treatment of parasitic infections, when requested
- able to plan and carry out a research project in the field of Medical Parasitology
- conversant with modern developments in the field of Medical Parasitology
- able to teach Medical Parasitology to undergraduates, post-graduates and paramedical personnel

The following learning outcomes are expected of a MD holder:

A. *Scientific Basis of Medical Parasitology*

- aetiology, pathogenesis, epidemiology and prevention of parasitic infections
- laboratory investigations for the diagnosis of parasitic diseases
- antiparasitic agents

B. Laboratory skills

- process samples sent for routine parasitological investigations in a clinical diagnostic laboratory
- report on parasitic pathogens in clinical samples
- work with due attention to quality assurance and laboratory safety
- instruct on collection and transportation of samples for parasitological diagnosis

C. Laboratory Management

- manage the Parasitological laboratory services and the work environment of a Medical Parasitology laboratory

D. Patient management

- advise clinicians on the investigation and management of patients with parasitic infections, including those who are immunocompromised
- rational use of antiparasitic agents and evidence-based practice

E. *Public Health*

- work in an interdisciplinary team to investigate and control parasitic and vector-borne diseases of public health importance

F. Research

- design, conduct and report on a medical parasitology related research project

G. Professionalism and ethics

- Work in accordance with the highest standards of medical professionalism, adhering to ethical behavior at all times

H. Evidence based practice

- Critical evaluation of scientific literature and application to practice as a Medical Parasitologist

7. CONTENT AREAS

The broad content areas are as listed below. More details are provided in Annex 1.

1. General Parasitology
2. Immunological and molecular techniques in the diagnosis of infectious diseases
3. Medical Protozoology
    a. Malaria and Malaria elimination
    b. Leishmaniases and trypanosomiases
    c. Intestinal protozoa, trichomoniasis and toxoplasmosis
4. Medical Helminthology
    a. Filarial infections and their control
    b. Intestinal nematodes, cestodes & trematodes
5. Medical Entomology
    a. Vectors of disease and epidemiology of vector-borne diseases
6. Parasitic zoonoses

8. STRUCTURE OF PRE-MD TRAINING PROGRAMME

The pre-MD training programme is conducted over a total period of 3 years.

8.1 Overview of Training Programme

The training programme is organized into **three** stages.

A. **In-service training block 1**: 9 months, with 5 appointments in specified Parasitology departments in the universities and Health Ministry institutions
B. **Research project and dissertation** to be conducted at an approved training centre of the trainee's choice and completed in 21 months
C. **In-service training block 2**: 6 months, with five appointments in specified Parasitology departments in the universities and Health Ministry institutions

Outline of training programme

Year 1											
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
In-service training block 1								LE1	Research project		

Year 2											
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Research project											

Year 3											
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Research project						In-service training block 2					LE2

Year 4											
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
MD exam	Post MD training										

Year 5											
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Post-MD training											

8.2 Details of Training Stages

8.2.1 In-service training

In service training will be provided in the form of 10 appointments in a range of institutions, each of which has staff with a distinct area of expertise in relation to parasitic and vector-borne infections. The training site, area of study, and relevant training period shall be as follows:

Appointment	**Training site**	**Training period (weeks)**
Training Block 1		
1. General Parasitology	Dept of Parasitology, Faculty of Medical Sciences, SJPU	4
2. Malaria	Part 1 in Malaria Research Unit, Faculty of Medicine, University of	8

	Colombo	
	Part 2 in Anti Malaria Campaign HQ	4
3. Leishmaniases and trypanosomiases	Dept of Parasitology, Faculty of Medicine, University of Colombo	4
4. Filariasis	Part 1 in Filariasis Research Unit, Faculty of Medicine, University of Ruhuna	8
	Part 2 in Anti Filariasis Campaign HQ	4
5. Medical Entomology	Entomology Dept MRI	4
	Total	36
Training Block 2		
6. Intestinal protozoa and trichomoniasis	Dept of Parasitology, Faculty of Medicine, University of Peradeniya	4
7. Intestinal nematodes, cestodes & trematodes	Dept of Parasitology, Faculty of Medicine, Ragama	8
8. Parasitic zoonoses including toxoplasmosis	Dept of Parasitology, MRI	4
9. Epidemiology of vector-borne diseases in Sri Lanka	Epidemiology Unit, Ministry of Health	4
10. Molecular diagnosis of parasitic and vector-borne diseases	Molecular Medicine Unit, Faculty of Medicine, Ragama	4
	Total	24

The content areas in relation to the learning outcomes for each appointment are set out in Annex 1.

8.2.2 Research Project and Dissertation

A research project approved by the Board of Study must be carried out by each trainee under a designated supervisor. The objective of this training component is to enable trainees to gain experience in planning, carrying out and presenting a research study. The findings are expected to contribute to existing knowledge regarding parasitic infections in Sri Lanka. The study proposal and dissertation should therefore show evidence of originality and / or discovery of new facts in the area under study, as judged by independent, critical assessment.

The project proposal is expected to enable trainees to show their ability to:

- Clearly define a topic for study
- Define the questions to be asked and investigated
- Put the research question into context nationally and internationally, and

- Apply appropriate research methods

The dissertation is expected to enable trainees to show their ability to

- Write clearly and succinctly
- Find and summarise relevant published literature
- Gather and analyse primary data from microbiology laboratory-based investigations
- Present findings in an orderly and coherent fashion
- Discuss, clearly and coherently, the significance of the findings as applied to the national and international contexts
- Justify conclusions in terms of findings
- Provide a properly cited, complete and orderly bibliography

Guidelines for supervisors are provided in **Annex 2**. The research project may be carried out on a subject of the trainees's choice.

Trainees are expected to submit the Supervisor's Consent Form (**Annex 3**) to the Board of Study, **by the end of the 4th month of the training period**, for Board approval of the title of the study and the designated supervisor.

Trainees are expected to participate in a PGIM workshop on research methodology and scientific writing during the first year of training.

After obtaining approval for the title of the project, trainees are expected to formulate a complete research proposal **(Annex 4)** and submit it for Board approval **by the end of the 7th month of the training programme**. Trainees are also expected to make 10-minute presentations of their project proposals at a seminar, in order to obtain feedback from other trainers prior to commencing work on the project.

Trainees are expected to engage in sample collection, benchwork, data analysis and writing up of the dissertation during the 21-month period extending from the 10th to the 30th months of training. Supervisors are expected to submit a progress report at the end of each 6-month period (**Annex 5**).

In 5th month of the 3rd year, trainees are expected to make another presentation on their findings, in order to obtain feedback from other trainers. Trainees must submit their dissertations, written according to the guidelines set out in **Annex 6**, **before the end of the 6th month in the 3rd year of training**. Trainees must submit the completed dissertation by this deadline in order to be eligible to sit for the MD examination.

9. LEARNING ACTIVITIES DURING TRAINING

During the two blocks of in-service training, trainees are expected to engage in regular on-going activities within the assigned training centre, with a particular focus on the stipulated content area for the period of training. There will be some formal classroom based teaching-learning activities, which will mainly take the form of tutorials conducted by MD trainers on a weekly or fortnightly basis. The topic may be related to the training component, or other areas such as laboratory management, quality assurance etc. Some of these tutorials will be common to those on the MD Medical Microbiology and Medical Virology training programmes.

Trainees are required to maintain a portfolio as indicated in Annex 8 in order to document learning activities.

The training component involving a research project and dissertation is meant to develop the trainee's capability to plan, carry out and present research findings. The dissertation should comprise the trainee's own account of his/her research. It must contribute to existing knowledge in parasitic or vector-borne diseases relevant to Sri Lanka and afford evidence of originality as shown by independent, critical assessment and / or discovery of new facts in the area under study.

Trainees are expected to participate in a PGIM workshop on research methodology and scientific writing during the first year of training, as well as in the Professionalism module conducted by the PGIM for all MD trainees.

Trainees are also expected to participate in continuing professional development activities conducted by professional colleges, and to participate in scientific conferences.

10. TRAINERS AND TRAINING UNITS

Trainers recognized by the Board of Study for the MD in Microbiology should have at least three years experience after Board Certification in the field of Medical Parasitology, Medical Microbiology, Community Medicine or Molecular Biology, or at least five years experience after obtaining a PhD degree. Supervisors of research projects must fulfill the same criteria.

The roles and responsibilities of a trainer are identified in **Annex 7**.

11. MONITORING PROGRESS

A trainee's progress through the MD (Medical Parasitology) training programme is monitored by several means, including regular assessment of the training portfolio, completion of Peer Team Rating requirements, progress reports from the research supervisor, and two in-course laboratory examinations.

11.1 Training Portfolio

Trainees are required to maintain a reflective portfolio which will be reviewed by the relevant trainer at the end of each module. The purpose of this is to make the trainee reflect on the process of training and professional development as a medical parasitologist and to get effective feedback on their progress through the training programme. It should be composed of a series of documents that record progress. Details of required portfolio entries and the scheme of assessment are given in **Annex 8.**

11.2 Peer Team Rating

This should be carried out as required by the PGIM of all MD trainees

11.3 6-Monthly Progress Reports

This should be completed by the Research Supervisor using the form given in Annex 5 and submitted to the BoS

11.4 In-Course Laboratory Examinations

These are conducted at the end of In-Service Training Blocks 1 and 2, as described below.

11.4.1 Laboratory Skills Examination 1 will be conducted at the end of the first in-service training block. It will consist of two sessions. For each session, there will be at least 2 examiners appointed by the Board of Study. The marks awarded at this examination will contribute to 10% of the final marks.

1. **Lab Exam Session 1**: Examination of **blood films** for parasites, specimens at 3 stations, to be processed within 3 hours.
2. **Lab Exam Session 2**: **Entomological specimens** at 3 stations to be identified or dissected within 3 hours.

11.4.2 Laboratory Skills Examination 2 will be conducted at the end of in-service training block 2. It will also consist of two sessions. For each session, there will be at least 2 examiners appointed by the Board of Study. The marks awarded at this examination will contribute to 10% of the final marks.

3. **Lab Exam Session 3**: Examination of **faecal samples** for parasites, specimens at 5 stations, to be processed within 3 hours
4. **Lab Exam Session 4**: Examination of **pathological specimens, cultured parasites, Rapid Diagnostic Tests, ELISA plates, and/or PCR gels** at 6 stations, to be processed within 3 hours

12. MD EXAMINATION

12.1 Eligibility to Sit for MD Examination

In order to be eligible to sit for the final examination, trainees must

1) Show at least 80% attendance in each of the in-service training appointments and during the research project
2) Obtain a satisfactory progress report from trainers for each appointment
3) Submit Peer Team Rating forms as required by the PGIM
4) Submit the dissertation
5) Submit the training portfolio

12.2 Components of The MD Examination

The final MD examination will be conducted at the end of the training period of 3 years. There shall be at least 3 examiners who are specialists in Medical Parasitology, including one from overseas.

The final examination shall have four parts, as set out below:

Part 1 – Theory examination
Part 2 – Laboratory examination 3
Part 3 – Assessment of Training portfolio
Part 4 – Assessment of Dissertation

12.3 Part 1. Theory Examination

This will comprise of two theory papers, Paper I and Paper II. Together, these papers will contribute towards 30% of the final mark.

Theory Paper I will have 5 essay type questions to be answered in 3 hours. The number of questions from each sub-specialty will be as follows:

Sub-specialty	**No of questions**	**Marks**
Medical Protozoology	2	200
Medical Helminthology	2	200
Medical Entomology	1	100
Total	**5**	**500**

Theory Paper II will have 5 structured essay and/or short answer questions to be answered in 3 hours.

Sub-specialty	**No of questions**	**Marks**
Diagnosis of infection	1	100
Patient management	2	200
Prevention and control	2	200
Total	**5**	**500**

Each answer will be marked independently, out of 100, by two examiners. Together, the theory papers will contribute towards 30% of the final mark.

12.4 Laboratory examination 3

This will consist of 30 spots to be identified in 90 minutes. The number of questions from each sub-specialty will be as follows:

Sub-specialty	**No of questions**	**Marks**
Medical Protozoology	12	60
Medical Helminthology	12	60
Medical Entomology	6	30
Total	**30**	**150**

Each answer is marked by 2 examiners out of total of 5 marks, to derive a final mark out of 150. This will contribute toward 10% of the final mark.

12.5 Assessment of training portfolio

The training portfolio must be submitted at least one month ahead of the final examination. It will be assessed by one local examiner and the foreign examiner using the format shown in Section 4 of Annex 8. The trainee will be questioned for 30 minutes on the portfolio at the final MD examination. This component will carry 10% of the final mark.

12.6 Assessment of the dissertation

The dissertation must be submitted at least four months ahead of the final examination. It must conform to the format given in the guidelines shown in **Annex 6.** The dissertation will be assessed by one local examiner and the foreign examiner, using the format shown in **Annex 9.** The candidate is expected to make a 15 minute presentation on the dissertation, which will be followed by an oral examination by the two examiners for 30 minutes. The marks awarded for the dissertation will contribute to 30% of the final mark.

12.7 The final computation of marks shall be as follows:

Examination component	**Marked out of**	**Percentage of final mark**
Theory paper I	500	15
Theory paper II	500	15
Laboratory examination I	300	10
Laboratory examination II	300	10
Laboratory examination III	150	10
Dissertation	100	30
Portfolio	250	10
Total		**100**

12.8 Requirements to pass the MD Examination

To pass the MD in Medical Parasitology Examination, a candidate will be required to obtain the following:

- A final percentage mark of **60%** or more

  AND
- A minimum of 50% or more for the theory part of the examination (Theory Papers I and II together)

  AND
- A minimum of 50% or more for the laboratory part of the examination (Laboratory Examinations 1, 2 and 3)

  AND
- A minimum of 50% or more for the dissertation

12.9 Repeat attempts

1. If a candidate obtains 50% or more in the written papers, the laboratory component and the dissertation, but fails to obtain an overall mark of 60%, the candidate will be required to retake all components of the MD examination, including all three laboratory examinations.
2. If a candidate's dissertation is passed (is awarded 60% or more), but he / she fails to obtain an overall mark of 60%, the candidate will not be required to carry out a fresh research project or re-submit the dissertation. However, the candidate will be required to re-take the component(s) (written papers and / or the practical examinations) in which he/she failed to obtain a mark of 60%. The mark awarded for the dissertation and for the portfolio will be the same as for the first attempt. If the candidate fails again, he / she will be required to re-take all components of the MD examination, including re-submission of the dissertation and the portfolio.
3. If the candidate passes in the written papers and the practical examinations, but the dissertation is unsatisfactory (is awarded less than 60 marks by the 2 assessors), the results will be withheld and the candidate required to re-submit the dissertation, corrected as recommended by the examiners, within a period of not more than 6 months. The dissertation will be marked again by the previous examiners. If it is then found satisfactory, the candidate shall be deemed to have passed the MD examination, provided he / she has obtained an overall mark of 60%. In this event, the date of passing the MD (Parasitology) examination shall be the date of re-submission of the dissertation.
4. If, however, the re-submitted dissertation is again awarded less than 60 marks, the candidate will be required to carry out a fresh project and submit a new dissertation, as well as re-take the entire examination again. If the candidate fails to re-submit the corrected dissertation within the period allowed, he/ she shall be deemed to have failed the entire examination.
5. If the candidate passes the MD examination, but the examiners recommend corrections to the dissertation, the candidate shall not be allowed to leave for post-

MD overseas training until such corrections have been made, and at least one examiner has certified that the corrections are satisfactory.

12.10 Permitted number of attempts

A candidate is allowed a maximum of 6 attempts (including those with a part assessment) within 8 years from the date of first attempt at the MD examination.

13. POST MD TRAINING

This will consist of 12 months of local training as a Senior Registrar, and 12 months of training at a recognized centre overseas, approved by the PGIM. The 12 months of local training can be done en bloc or in 2 parts before or after the period of overseas training.

During the post MD training period, progress reports will have to be submitted as specified by the PGIM with reports based on the format shown in **Annex 10**. Certification of satisfactory completion of local and overseas training should be forwarded to the Director, PGIM by the respective supervisors.

Trainees are also expected to compile a post-MD portfolio, which will form the basis of the Pre-Board Certification Assessment (PBCA). Guidelines for compilation of this portfolio are given in **Annex 11**.

14. ELIGIBILITY FOR PRE-BOARD CERTIFICATION ASSESSMENT

Upon completion of the prescribed period of post-MD training, the trainee should apply to the PGIM for Board Certification in Medical Parasitology, together with the post-MD training portfolio compiled in accordance with the guidelines given in Annex 11.

15. FORMAT OF PBCA

The PBCA will take the form of a final, summative assessment of the trainee's portfolio, carried out by 3 independent examiners appointed by the Board of Study in Microbiology, and approved by the Senate of the University of Colombo. Two examiners shall be Specialists in Medical Parasitology, and the third, a Specialist in Clinical Microbiology or Medical Virology.

The trainee will be called for an oral examination, during which he/she will be questioned on the portfolio. The trainee will be required to start with a presentation of 10 – 15 minutes, regarding the post-MD training period.

The overall assessment will be based on each of the main sections, which will be assessed as satisfactory or not, on an overall basis.

If the examiners are of the view that the trainee's performance is unsatisfactory, and the trainee should not be given immediate Board Certification, the examiners must provide the trainee with written feedback on how the portfolio should be improved in order to reach the required standard. The trainee should then re-submit the portfolio within a specified period of time (up to 3 – 6 months), and face another oral examination based on the re-submitted portfolio. If the trainee is successful at this 2nd oral examination, the date of

Board Certification should be backdated as done routinely. If unsuccessful again, the date of Board Certification will be the date of passing the subsequent PBCA following further training for a minimum period of six months in a unit selected by the Board of Study.

16. BOARD CERTIFICATION

A trainee who has successfully completed the Pre-Board Certification Assessment as stipulated in Section 15 above, is eligible for Board Certification as a Specialist in Medical Parasitology on the recommendation of the Board of Study in Microbiology.

17. RECOMMENDED READING

Text books

- Gordon C Cook and Alimuddin I Zumla (eds) *Manson's Tropical Diseases*, 22nd ed. London, Saunders- Elsevier, 2009
- Guerrant RL, Walker DH, Weller, PF (eds). *Tropical Infectious Diseases: Principles, Pathogens and Practice* 3rd edition. Edinburgh, Saunders Elsevier 2011
- R Muller. *Worms and Human Disease* 2nd ed. Wallingford, Oxford, UK, CABI Publishing, 2001.
- S Yamaguti. *Systema Helminthum* Vol. 3. The Nematodes of Vertebrates, Parts I and II. New York, Interscience Publishers Inc. 1963.
- MW Service. *Medical Entomology for Students*. 4th ed. Cambridge University Press, 2008
- DA Warrell & HM Gilles. *Essential Malariology* 4th ed. BookPower, Hodder Education, 2002
- Thomas B Nutman (ed) *Lymphatic Filariasis*. Tropical Medicine Science and Practice Series, Volume 1. Imperial College Press, 2000.
- Yezid Gutierrez. *Diagnostic Pathology of Parasitic infections with clinical correlates*. 2nd ed. Oxford University Press, USA (2000).
- F Konradsen, FP Amerasinghe, W. van der Hoek and PH Amerasinghe. *Malaria in Sri Lanka: Current Knowledge on Transmission and Control*. International Water Management Institute, 2000.

Atlases

- W Peters & G Pasvol. *Atlas of Tropical Medicine and Parasitology*. 4th ed. Mosby, 2006
- T Yamaguchi. *A Colour Atlas of Clinical Parasitology*. London, Mosby Wolfe Medical Publications, 1981
- Thomas C Orihel & Lawrence R Ash. *Parasites in Human Tissues*. ASCP Press, 1995

- Lawrence R Ash & Thomas C Orihel. *Atlas of Human Parasitology*. 5th ed ASCP Press, 2007

Laboratory Manuals

- Lawrence R Ash, and Thomas C. Orihel. *Parasites: A Guide to Laboratory Procedures and Identification*. Chicago, ASCP Press, 1987.
- Monica Cheesbrough. *Medical Laboratory Manual for Tropical Countries* Vol.1. 2nd ed. Tropical Health Technology, 1987.
- Lynne S Garcia. *Diagnostic Medical Parasitology* 5th ed. ASM Press 2006
- World Health Organization. *Manual of basic techniques for a health laboratory*. Geneva, WHO 1980

18. CONTRIBUTORS TO REVISION OF PROSPECTUS (2016)

The following members of the Board of Study in Microbiology and trainers in Medical Parasitology contributed towards the current revision of the prospectus:

- Prof Nilanthi de Silva, Senior Professor of Parasitology, Faculty of Medicine, University of Kelaniya
- Prof Nadira Karunaweera, Senior Professor of Parasitology, Faculty of Medicine, University of Colombo
- Prof Renu Wickremasinghe, Professor in Parasitology, Faculty of Medical Sciences, University of Sri Jayawardenepura
- Dr Sagarika Samarasinghe, Consultant Parasitologist, Medical Research Institute

ANNEX 1. COURSE CONTENT

C.1 CONTENT AREAS TO BE COVERED DURING EACH APPOINTMENT

Appointment 1. General Parasitology

Principles of taxonomy, classification and nomenclature
Definitions and concepts of animal associations
General biology of protozoa, nematodes, cestodes, trematodes and arthropods

Appointment 2. Malaria

Biology and life cycle of *Plasmodium* spp.
Pathology and pathogenesis
Clinical features
Immunology, vaccine development
Laboratory diagnosis
Transmission and epidemiology
Chemotherapy and drug resistance
Chemoprophylaxis
Malaria control, elimination and eradication
Prevention of re-introduction

Anopheline mosquitoes
Identification
Parasite development in vector
Vector-parasite interactions
Vectorial competence and capacity
Species complexes
Detection of parasite in vector
Vector control in malaria
Chemical control
Bednets
Evaluating control

Appointment 3. Leishmaniases and Trypanosomiases

Leishmaniases

Life cycle and biology *of Leishmania*
Clinical features
Immunology
Diagnosis
Epidemiology
Treatment and control
Infections in the immunocompromised

Sandflies
Life cycle
Morphology and identification
Ecology
Control

Trypanosomiases

Life cycle and biology of African trypanosomes
Clinical features
Immunology
Diagnosis
Epidemiology
Treatment and control

Tsetse flies
Life cycle
Morphology and identification
Ecology
Control

Life cycle and biology of S. American trypanosomes
Clinical features
Immunology
Diagnosis

Triatomine bugs
Life cycle
Morphology and identification
Ecology

Epidemiology
Treatment and control

Control

Appointment 4. Filarial infections

Lymphatic filariasis
Biology and life cycle of *Wuchereria bancrofti* and *Brugia* spp.

Pathology and pathogenesis
Laboratory diagnosis
Transmission and epidemiology
Chemotherapy
Control

Vectors of lymphatic filariasis
Biology and morphology
Vector-parasite interactions
Detection of parasite in vector

Vector control in filariasis
- Chemical control
- Non-chemical

Other filarial infections and dracunculosis
Dirofilaria spp.
- Morphology and transmission
- Clinical features
- Epidemiology and transmission

Vectors of Dirofilaria

Onchocerca volvulus
- Clinical features
- Epidemiology
- Diagnosis
-Chemotherapy

Simulium spp.

APOC in West Africa

Loa loa
Clinical features
Diagnosis

Chrysops

Dracunculus medinensis
-Clinical features
-Diagnosis
-Control

Cyclops

Appointment 5. Medical Entomology
Mosquito vectors of arboviruses
Vectors of dengue and Japanese encephalitis
Ecology of vectors,
development of virus in vectors,
virus isolation from vectors

Flies, fleas, lice
Morphology,
Transmission of disease

Ticks, Mites

Hard ticks, soft ticks, *Sarcoptes scabiei, Leptotrombidium, Dermatophagoides*

Morphology,
Transmission of disease

Control of arthropod vectors

Use of insecticides,
environmental control,
biological control,
genetic control,
insecticide resistance

Appointment 6. Intestinal protozoa and miscellaneous protozoa

Intestinal protozoa

Entamoeba histolytica, Giardia intestinalis, Cryptosporidium spp*., Balantidium coli*, other Coccidia, non-pathogenic intestinal protozoa

Life cycle and biology,
Pathogenesis,
Clinical features
Epidemiology,
Laboratory diagnosis,
Chemotherapeutic agents

Infections in the immunocompromised

Miscellaneous protozoan infections

Trichomoniasis, Pathogenic free-living amoebae, *Babesia* and *Theileria* spp.

-Morphology,
-life cycle and transmission
-Clinical features
-Diagnosis
-Treatment

Infections in the immunocompromised

Appointment 7. Intestinal nematodes, cestodes and trematodes

Intestinal nematode infections

Ascaris lumbricoides, Necator americanus, Ancylostoma duodenale, Trichuris trichiura, Strongyloides stercoralis, Enterobius vermicularis

Life cycle and biology
Clinical features
Pathogenesis
Diagnosis, estimating intensity of infection,
Epidemiology,
Treatment,
Prevention and Control

Infections in the immunocompromised

Cestode infections

Adult cestode infections – *Taenia solium* , *T, saginata, Hymenolepis nana, H. diminuta, Diphyllobothrium latum, Bertiella studieri, Dipylidium caninum*

Life cycles and transmission,
Clinical features
Epidemiology,
Diagnosis,
Treatment,
Prevention and Control

Larval cestode infections – cysticercosis, hydatidosis, sparganosis

Life cycles and transmission,
Clinical features
Pathogenesis
Epidemiology,
Diagnosis,
Treatment,
Prevention and Control

Trematode infections

Schistosomiases, Paragonimus spp. Opisthorchis spp. Fasciola hepatica, Fasciolopsis buski, Heterophes heterophyes, Metagonimus yokogawai

Life cycles and transmission,
Clinical features
Pathogenesis
Epidemiology,
Diagnosis,
Treatment,
Prevention and control

Appointment 8. Parasitic zoonoses including toxoplasmosis

Toxoplasmosis

Life cycle and biology,
Clinical features
Diagnosis,
Epidemiology,
Treatment
Infection in the immunocompromised

Trichinella spp. , Visceral larva migrans, Cutaneous larva migrans, Eosinophilic meningo-encephalitis, Capillariasis

Life cycles and transmission,
Clinical features
Epidemiology,
Diagnosis,
Treatment,
Prevention and control

Appointment 9. Epidemiology of vector-borne diseases in Sri Lanka

Malaria
Lymphatic filariasis
Dengue, Chikungunya and Japanese encephalitis
Leishmaniasis

Appointment 10. Molecular diagnosis of parasitic and vector-borne diseases in Sri Lanka

Introduction to molecular biology
General materials and methods used in molecular biology
Sample preparation
Genetic engineering and cloning DNA
Detection of specific nucleic acid sequences
Restriction fragment length polymorphism analysis
In situ hybridization
Nucleic acid amplification
Current applications in medical parasitology
Other applications of molecular biology in medicine

C.2 LEARNING OUTCOMES AND CONTENT AREAS FOR EACH APPOINTMENT

Appointment 1. General Parasitology

Scientific Basis	Taxonomy, classification and nomenclature of parasites Host-parasite relationships and other animal associations General biology of protozoa, helminths and arthropods
Laboratory skills	
Laboratory Management	
Patient Management	
Public Health	
Professionalism and ethics	
Evidence-based practice	

Appointment 2. Malaria

Scientific Basis	Biology and life cycle of malaria parasites Pathology and pathogenesis of malaria Clinical manifestations Diagnostic techniques Transmission and epidemiology of malaria Antimalarials and drug resistance Vector bionomics Species complexes and sibling species Parasite-vector interactions: vectorial competence and capacity

Laboratory skills	Parasitological diagnosis: preparation and staining of thin and thick blood films; quantification of parasitaemia Rapid diagnostic tests Molecular diagnostics Identification of principal vector spp using taxonomic keys Identification of parasites in vectors: dissection of Anopheles spp for sporozoites; Immunodiagnostic techniques**;** Molecular diagnostics
Laboratory Management	Laboratory supplies Quality Assurance in context of pre-elimination
Patient management	Chemotherapy of uncomplicated and complicated malaria Chemoprophylaxis
Public Health	Strategies for control, elimination and prevention of re-introduction Vector control strategies Trends in malaria incidence in SL over the past century Malaria vaccine development Health Education for the public International quarantine regulations
Professionalism and ethics	Professionalism in patient management
Evidence based practice	Critical review of scientific literature

Appointment 3. Leishmaniases and trypanosomiases

Scientific Basis	Biology and life cycle of haemoflagellates Pathology and pathogenesis of leishmaniases, HAT and Chagas disease Clinical manifestations Epidemiology of leishmaniases, HAT and Chagas disease Drugs used for treatment of cutaneous, visceral and muco-cutaneous leishmaniasis; HAT and Chagas disease Vector bionomics Species complexes and sibling species Parasite-vector interactions: vectorial competence and capacity
Laboratory skills	Parasitological diagnosis Immunodiagnostic techniques Molecular diagnostics
Laboratory Management	Laboratory supplies Quality Assurance
Patient management	Treatment options for cutaneous leishmaniasis: chemotherapy, cryotherapy, thermotherapy Diagnosis and treatment of infections in the immunocompromised
Public Health	Strategies for control of leishmaniasis, HAT and Chagas
Professionalism and ethics	Professionalism in patient management
Evidence based practice	

Appointment 4. Filarial infections

Scientific Basis	Biology and life cycle of lymphatic and tissue filarial worms Pathology and pathogenesis of LF, onchocerciasis Clinical manifestations Epidemiology of LF and onchocerciasis Drugs used for treatment of LF and oncho Vector bionomics Species complexes and sibling species Parasite-vector interactions: vectorial competence and capacity
Laboratory skills	Parasitological diagnosis: thick films, concentration techniques, quantification of microfilaraemia; identification of microfilariae and adult worms Immunodiagnostic techniques Molecular diagnostics Identification of principal vector spp using taxonomic keys Identification of parasites in vectors: dissection of Culex spp for larvae; Immunodiagnostic techniques**;** Molecular diagnostics
Laboratory Management	Laboratory supplies Quality Assurance in surveillance programmes
Patient management	Morbidity management of filarial lymphoedema Management of occult filariasis
Public Health	Strategies for control and elimination of LF and onchocerciasis: MDA, vector control strategies Trends in the LF epidemiology in the past 100 years Health education for the public; social marketing
Professionalism and ethics	Professionalism in patient management
Evidence based practice	Critical review of scientific literature

Appointment 5A. Medical Entomology (disease vectors)

Scientific Basis	Bionomics of vectors of arboviruses Species complexes and sibling species Parasite-vector interactions: vectorial competence and capacity Strategies for vector control: insecticides and alternatives
Laboratory skills	Identification of principal vector spp using taxonomic keys: adults and larvae of medically important mosquitoes, ticks, mites and fleas Identification of arboviruses in vectors: Immunodiagnostic techniques**;** Molecular diagnostics
Laboratory Management	Principles of maintaining an insectory
Patient management	
Public Health	Vector control strategies International quarantine regulations Health Education of the public

Professionalism and ethics	
Evidence based practice	

Appointment 5B. Medical Entomology (diseases caused by athropods)

Scientific Basis	Biology and life cycle of *Sarcoptes scabiei*; *Pediculus* spp Transmission and epidemiology Pathology and pathogenesis Clinical manifestations
Laboratory skills	Identification of adults and larvae
Laboratory Management	
Patient management	Treatment of scabies, head louse and body louse infestations
Public Health	School medical inspections
Professionalism and ethics	
Evidence based practice	

Appointment 6. Intestinal protozoa, trichomoniasis and pathogenic free-living amoebae

Scientific Basis	Biology and life cycle of intestinal protozoan spp , Trichomonas vaginalis, Acanthamoeba and Naegleria spp Clinical manifestations Epidemiology and transmission of infection Drugs used for treatment of infections
Laboratory skills	Parasitological diagnosis - techniques for examination of faecal samples; direct wet smears, concentration techniques; preparation and staining of permanent smears Immunodiagnostic techniques Molecular diagnostics
Laboratory Management	Laboratory supplies
Patient management	Treatment of intestinal protozoan infections Treatment of trichomoniasis Diagnosis and treatment of infections in the immunocompromised
Public Health	Food and water safety Sanitation for safe disposal of faeces
Professionalism and ethics	Professionalism in patient management
Evidence based practice	

Appointment 7. Intestinal nematodes, cestodes and trematodes

Scientific Basis	Biology and life cycle of soil-transmitted helminths, pinworm, adult and larval cestodes that cause human infections; schistosomes and food-borne trematodes Clinical manifestations Epidemiology and transmission of infection Drugs used for treatment of infections
Laboratory skills	Parasitological diagnosis - techniques for examination of faecal samples; direct wet smears, concentration techniques;

	faecal egg counts; peri-anal swabs Immunodiagnostic techniques in cestode and trematode infections
Laboratory Management	Laboratory supplies
Patient management	Treatment of soil-transmitted helminths; adult and larval cestode infections; trematode infections Diagnosis and treatment of infections in the immunocompromised Treatment of enterobiasis
Public Health	Preventative chemotherapy Sanitation for safe disposal of faeces Food safety
Professionalism and ethics	Professionalism in patient management
Evidence based practice	Critical review of scientific literature

Appointment 8. Toxoplasmosis and parasitic zoonoses

Scientific Basis	Biology and life cycle of *Toxoplasma gondii* Clinical manifestations Epidemiology and transmission of infection Drugs used for treatment of toxoplasmosis *Trichinella* spp. , Visceral larva migrans, Cutaneous larva migrans, Eosinophilic meningo-encephalitis, Capillariasis: Life cycles and transmission, Clinical features, epidemiology, diagnosis, treatment, prevention and control
Laboratory skills	Immunodiagnostic techniques
Laboratory Management	Laboratory supplies
Patient management	Treatment of acquired and congenital infections; Diagnosis and treatment in pregnancy Diagnosis and treatment of infections in the immunocompromised
Public Health	Food safety Health education
Professionalism and ethics	Professionalism in patient management
Evidence based practice	

Appointment 9. Epidemiology of parasitic and vector-borne infections in Sri Lanka

Scientific Basis	
Laboratory skills	
Laboratory Management	
Patient Management	
Public Health	Trends in the epidemiology of parasitic and vector-borne infections in Sri Lanka over the past century Surveillance mechanisms for parasitic and VBD in Sri Lanka

Professionalism and ethics	
Evidence-based practice	

Appointment 10. Molecular Biology

Scientific Basis	Genetic engineering and cloning DNA Detection of specific nucleic acid sequences Restriction fragment length polymorphism analysis *In situ* hybridization Nucleic acid amplification Current applications in medical microbiology Other applications of molecular biology in medicine
Laboratory skills	General materials and methods used in molecular biology Sample preparation
Laboratory Management	
Patient Management	
Public Health	
Professionalism and ethics	
Evidence-based practice	

ANNEX 2. INFORMATION & GUIDELINES FOR SUPERVISORS

1. The dissertation for the MD Parasitology is based on a 21-month research project.
2. Acceptance of the dissertation is a requirement to sit the MD examination. The trainee is required to write up the project work as a dissertation, conforming to the format approved by the Board of Study in Microbiology.
3. The objective of this training component is to prove the trainee's capability to plan, carry out and present own research. The purpose of this training is to ensure maturation, discipline and scholarship in research. The dissertation should comprise the trainee's own account of his/her research. It must contribute to existing knowledge in parasitic or vector-borne diseases relevant to Sri Lanka and afford evidence of originality as shown by independent, critical assessment and / or discovery of new facts in the area under study. It should be satisfactory as regards literary presentation.
4. The supervisor is expected to:
   a. guide the trainee in planning and implementing the project and in presentation of the work.
   b. obtain recommendation of the research proposal from a reviewer.
   c. forward Progress Report(s) in the prescribed form at the end of 6 and 12 months after the trainee commences work on the research project.
   d. certify the dissertation as suitable for submission.
5. Ethics: trainees are expected to confirm and document that procedures followed were approved by the Ethics Review Committee of the institution where the work was carried out and ethical approval must be obtained by a recognized Ethics Review Committee.
6. Trainees are required to make a short presentation (15 – 20 minutes) of their project research to BOS members and other invitees prior to commencement of data collection. This will give the trainee an opportunity to discuss their work and to get a feedback from peers and colleagues but it will not be used for evaluation in any form. The supervisors are invited for this presentation.
7. Trainees are also expected to make another short presentation to BoS members and other invitees after data collection and analysis, before submission of the dissertation. This will give trainees the opportunity to discuss their findings and obtain feedback on how best to interpret their results.
8. If at any time the supervisor is not satisfied with the work progress of the trainee, the trainee should be made aware of the deficiencies and corrective measures suggested. This should be conveyed in writing with a copy to the BOS. In such instance a follow-up report should be forwarded within three months or earlier if necessary to the BOS.
9. General Comments on the contents of the dissertation: The objectives should be clearly stated and should be feasible to achieve within the time frame. Other published work relevant to the problem (both international and local) should be comprehensively covered and critically evaluated. The research methodology should be the best available

to achieve the objectives stated. The results should be presented effectively. The discussion should include comments on the significance of results, how they agree or differ from published work and theoretical / practical applications of the results, if any. The conclusions should be valid and be based on the results obtained on the study.

ANNEX 3. SUPERVISOR'S CONSENT FORM

1. **Name of Trainee:**

2. **Training Centre:**

3. **Name of Supervisor:**

4. **Title of Project:**

I agree to supervise the above named trainee for the MD (Medical Parasitology) research project and dissertation, for the project indicated above.

……. ……..
Signature of supervisor Date

This form must be submitted by the trainee to the Board of Study in Microbiology by the end of the 4th month of the 1st year of pre-MD training.

Tabled at the Board of Study in Microbiology meeting on ……..

…….
Signature of Chairman / BOS

ANNEX 4. FORMAT FOR MD RESEARCH PROJECT PROPOSAL

To be submitted by trainee to Board of Study in Microbiology by the end of the 7th month in the 1st year of pre-MD training

1. **Name of Trainee:**

2. **Training Centre:**

3. **Name of Supervisor:**

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4. **Reviewer:**

   Name:

   Designation:

   Address:

   Tel / Email:

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5. **Title of Project:**

---

6. **Brief description of project* (*see footnotes*):**

   6.1 Background and justification

   6.2 Objectives

   6.3 Research Plan

7. **Institution(s) where work would be carried out:**

8. **Ethics approval to be obtained from:**

9. Recommendation of supervisor:

Signature date

10. Recommendation of reviewer:

I certify that it is feasible to complete this project within a period of 21 months, the methodology is scientifically valid and ethically acceptable.

Signature date

11. Trainee's signature date

12. Recommendation of the MD Course Coordinator

Signature date

13. Recommendation of the BOS:

***Notes**

6.1 Brief technical description of subject, rationale of proposed research, brief literature review with explicit reference to earlier or ongoing work

6.2 Should give concise statements of what you propose to achieve

6.3 *Hypothesis to be tested. Methodologies and activities to be carried out; outline of work plan indicating time frame.*

ANNEX 5. MD DISSERTATION PROGRESS REPORT

To be forwarded by the supervisor to the BoS through the Course Co-ordinator at 6 months, 12 months and 18 months after commencing work

1. **Name of trainee**

2. **Training Centre**

3. **Supervisor**

4. **Title of project**

5. **Description of work carried out to date**

To be filled in by trainee: briefly describe progress in lab / field work and dissertation writing

---

Supervisor's comments

6. **Is the work on schedule**? Yes / No

7. **Progress in dissertation writing**: satisfactory / unsatisfactory

8. **Constraints** (if any)

9. **Recommendation of supervisor**:

Signature Date

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10. Recommendation of MD Co-ordinator

Signature Date

11. Date of BoS approval

ANNEX 6. MD DISSERTATION GUIDELINES

General instructions

It is essential to start writing the dissertation early and in all cases before the experiments / field work is finished. At the same time, you should make arrangements to have your manuscript word-processed. Your supervisor should be consulted before you start to write and thereafter at regular intervals. It is much easier to make corrections if the draft is double-spaced and printed on only one side of the paper.

The past tense should be used as far as possible. To avoid much exceeding the given word limit, it is suggested that an approximate running total is kept. The metric system and the International System (SI) of units should be used whenever possible.

Length

An ideal length of text is approximately 40 000 words, which equals to about 160 pages. With figures, references, etc., the total length is likely to be in the region of 200 pages.

Number of copies

Three copies should be submitted to the Director/ PGIM, spiral-bound in the first instance. One will be retained in the PGIM, one will be sent to the internal examiner and one to the overseas examiner. After acceptance (and necessary corrections), all three copies should be bound in hard covers (black) with the author's name, degree and year printed in gold on the spine. The front cover should carry the title, author's name and year printed in gold. One copy will be returned to the student, one retained by the supervisor, and the third housed in the PGIM library.

Layout

The dissertation should be word-processed and printed single-side only, on A4-size photocopying paper.

Layout of typescript

There should be 1.5" on left-hand and top margins, and 1.0" on right-hand and bottom margins. It is especially important that the left-hand (binding) margin is of the regulatory size.
Line spacing should not be less than 1.5.
Lettering should be in Times New Roman, font size 12.
All pages should be numbered consecutively throughout, including appendices. Page numbers should be inserted in the bottom right hand corner.

Tables, diagrams, maps and figures

Wherever possible, these should be placed near the appropriate text. Tables should be numbered in continuous sequence throughout the dissertation. Maps, graphs, photographs, etc., should be referred to as Figures. Each of these should also be numbered in a continuous sequence. Colour should be avoided in graphic illustrations (unless it is essential) because of the difficulty of photographic reproduction; symbols or other alternatives should be used instead.

Notes

Notes, if essential, should be inserted, in reduced font, at the foot of the relevant page. If too voluminous for this to be practicable, they should be placed in an Appendix. Notes may be typed in single spacing.

Abbreviations

Where abbreviations are used, a key should be provided.

Preliminaries
The preliminaries precede the text. They should comprise the following:

1. Title page

<Title of dissertation>
<Author's name>
MD (Medical Microbiology)
Post Graduate Institute of Medicine
University of Colombo
<Year of submission>

2. Statement of originality: This is a declaration that the work presented in the dissertation is the candidate's own, and that no part of the dissertation has been submitted earlier or concurrently for any other degree. The statement should be signed by the author, and countersigned by the supervisor.
3. Abstract: This should consist of a brief summary of not more than 350 words describing the objectives of the work, the materials and methods used, the results obtained, and the conclusions drawn. This may be in a structured format if helpful.
4. Table of contents: The table of contents immediately follows the abstract and lists in sequence, with page numbers, all relevant divisions of the dissertation, including the preliminary pages.
5. List of tables: This lists the tables in the order in which they occur in the text, with the page numbers.
6. List of figures: This lists all illustrative material (maps, figures, graphs, photographs etc) in the order in which they occur in the text, with the page numbers.
7. Acknowledgments

Text
The dissertation should be divided into clearly defined chapters. Chapters may be subdivided and a decimal number system can be helpful to identify sections and subsections. You should avoid mixing the topics of the chapters, e.g. no results should appear in the Materials and Methods.

Chapter 1 – Introduction: The aim of this section is to state briefly the current position and the reasons for carrying out the present work. Generally, only a few references should be cited here.

Chapter 2 – Literature Review: This section should be reasonably comprehensive, and most of the references to be quoted normally occur here. The relevant references dealing with the general problems should be reviewed first and this is followed by a detailed review of the specific problem. The review is in many cases approached as a historical record of the

development of knowledge of the subject. This chapter should conclude with a brief statement of what you propose to find out.

Chapter 3 – Materials and Methods: These should be described so that a reader could repeat all the experiments. Where specific details are available in the literature, reference should be made to the original papers, and comments kept to a minimum. If modifications have been made to the published techniques, these should be described in full.

Chapter 4 – Results: Much of the data should be given in tables and figures and these should be inserted in the text at the appropriate place. The results must be fully described in the text. It is not sufficient to merely present the tables and figures without any comment. The tables and figures should be clear without references to the text, and this requires concise explanations in legends. Where possible, data presented in the text should have already been analyzed and the complete 'raw' figures should not be included in this section but should be contained in tables in the Appendix.

Only data from the present work should be included in this section and in particular no comparison should be made at this stage with results from other workers.

Chapter 5 – Discussion: The discussion is the most difficult part of the dissertation to write because the author has to compare **critically** the present results with those of other workers and to draw valid conclusions from these studies. Descriptions of other workers findings which already appear in the Literature Review should not be repeated in the Discussion. Instead, refer to the Review.

The limitations of the study and recommendations for future research on the subject should also be included in this chapter.

As your project proceeds, keep notes of your thoughts and discussions relevant to this section.

References

These are given so that the reader can refer to the original papers for further study. Uniformity is essential, but errors and inconsistencies are very common and authors are advised to check the references most carefully. Examiners will mark students down for inconsistencies in their references, either omissions or failure to follow the recommended format as given in the following section.

References are very important and must be complete and accurate. All literature referred to should be listed in a consistent form and style, and must contain sufficient information to enable the reader to identify and retrieve them.
There are different styles of citing sources, listing references and compiling a bibliography. The Harvard style (author, date) is widely accepted in scholarly and scientific writings, and is recommended for students on the MD (Medical Microbiology) course.

The Harvard style

The Harvard style is often known as the 'author-date' system. Generally, when using the Harvard system, a citation in your paper requires only the surname of the author (or authors) and the year of publication. If there are only two authors give both names; for more than two authors use *et al*. Citations should, whenever possible, be placed at the end of a sentence (before the concluding punctuation). For example:

There is consistent urban bias in the provision of health services (Sawyer, 1999).

Alternatively, the author's surname may be integrated into the text, followed immediately by the year of publication in parentheses.

Sawyer (1999) observes that .....

If there is more than one reference by the same author(s), the references should be listed chronologically in order of year of publication. If there is more than one reference by an author in the same year, label with lower case letter, 'a' before 'b', 'c', etc.

Other researchers (Tang 1998a; Cleg, 1999) have highlighted this inadequacy, while Tang (1998b) argues that .....

References cited only in tables or in legends to figures should be in accordance with a sequence established by the first identification in the text of the particular table or illustration.

The arrangement of the references at the end of the dissertation should be alphabetical.

The order of the items in each reference should be:

(a) for journal references: name(s) of author(s), year, title of paper, title of journal, volume number, page numbers.

(b) for book references: name(s) of author(s), year, title of book, edition, volume, chapter and/or page number, town of publication, publisher.

Authors' names should be in roman letters, and arranged thus:

Smith, C.O., James, D.E. & Frank, J.D.

Note the use of the ampersand (&) and omission of comma before it. Where an author's name is repeated in the next reference it should also be spelt out in full.

The year of publication should be surrounded by parenthesis like this: (1999)

The title of the paper is then included, without quotation marks: e.g., Child health promotion in developing countries.

The journal title should be unabbreviated, underlined, and be followed by volume number in bold, the issue (part) number, and the page numbers (first and last page numbers). It should read like this:

Health Policy and Planning **14**:1; 1-10.

Examples:

Ehiri, J.E. & Prowse, J.M. (1999) Child health promotion in developing countries: the case for integration of environmental interventions? Health Policy and Planning **14**:1; 1-10.

Tuku, A.B. James, D.E. & Okada, F.C. (1999) The response of factor B to factor C. Biochemical Journal **151**:2; 1049-1053.

Harris, G.W. (1955) Neural Control of the Pituitary Gland. London: Arnold.

Sloper, J.C. (1966) The experimental and cyto-pathological investigation of neurosecretion in the hypothalamus and pituitary. In The Pituitary Gland, eds. Harris, G.W. & Donovan, B.T. Vol. 3. Ch.7 London: Butterworth.

Websites

Author's name (if available) must be listed first, followed by the full title of the document in italics (underline if handwritten), the date of publication or last revision (if available), the full http address (URL) enclosed within angle brackets, and the date of visit in parentheses

Example:

Schettler, T., Solomon, G., Burns, P. & Valenti, M. *Generations at risk: how environmental toxins may affect reproductive health in Massachusetts.* <http://www.igc.apc.org/psr/genrisk.html > (24/08/99).

ANNEX 7. ROLES AND RESPONSIBILITIES OF A TRAINER

The roles and responsibilities of a PGIM trainer in Microbiology, Virology or Parasitology are multiple:

A. Diploma / MD trainer
B. Academic Appraiser
C. Supervisor of a research project
D. Reviewer/assessor of a research project
E. Role model
F. Examiner

A. As a Diploma /MD trainer, she/he should

1. be involved in teaching and ensure trainees learn on the job.
2. allocate time for trainees to discuss academic as well as personal issues.
3. in instances of unsatisfactory behavior, attitude or problems of the trainee, first warn the trainee and if the situation persists, inform the academic appraiser of the trainee to sort out the problem at grass root level. As a last resort, inform the Director PGIM and Board of Study in microbiology so that remedial action can be taken. Communications on such issues should be copied to the trainee's academic appraiser.
4. consult the Board of Study and inform the academic appraiser of the trainee, if a trainee is required to repeat any duration of a clinical appointment or any other appointment.
5. send progress reports to the BoS in Microbiology , once for every clinical appointment in the MD including the 3 month appointments in LRH and CIM and twice for the post MD training programme. (annexe) In the Virology and Parasitology training programmes, the consultant in charge of the particular segment of training should send a progress report for each trainee.
6. supervise the leave arrangements of trainees. (Warn the trainees if in excess and remind them that leave is not a right but a privilege, but give their due)
7. encourage trainees to participate in continuing medical and professional development activities such as time to visit the library, participate in other clinical meetings, work shops, critical appraisal of journal articles etc.
8. encourage presentations by the trainees in clinical meetings, CPD activities etc.
9. conduct workplace based assessments – DOPS and CbD as indicated in the portfolio guidelines.
10. inform the BoS in Microbiology if more than 2 weeks of leave is to be taken by you.
11. arrange for cover up of leave for training purposes (since this may be different from work cover up)
12. inform the BoS in Microbiology and give adequate time for the trainee to be moved to another training site if more than 1 month leave is to be taken, since off site cover is not acceptable in such a situation.
13. preferably take trainees, only after you take up your post fulltime and not during acting or visiting posts.

14. as far as possible, try to complete the appointment period of the trainees before reporting for duty in the next post when on transfer orders. If an immediate transfer cannot be avoided, the trainer should inform the BoS in time and get suggestions regarding the ongoing training of any trainees in the station.
15. handover the required letters of release/ attest to the satisfactory completion of training in the log book of the trainees on completion of an appointment by the trainee (it might be difficult for them to come later)
16. give constructive feedback continuously, which will help the trainees to improve both academically and professionally. Feedback on negative aspects of a trainee should be dealt with in a confidential manner.
17. make sure that a pregnant trainee does not handle specimens from high risk patients including tuberculosis.
18. provide a pleasant and disciplined environment in your laboratory for the trainee to work.

B. <u>As an academic appraiser</u>, the trainer should

1. have regular meetings with the trainees.
2. be accessible to the trainee and give your contact number and convenient times for meetings.
3. develop an approachable, friendly relationship so that trainees are not hesitant to contact you in times of need.
4. supervise the entries and ensure regular updates of your appraisee's portfolio.

C. <u>As a supervisor of a research project</u>, the trainer should

1. be realistic and ensure the trainee gets hands on experience to do research on his or her own.
2. not have too many goals which will burden the trainee who will find it difficult to finish the project within 4 months.
3. make sure that trainees submit duly filled forms and suggest the name of a reviewer to review the project proposal.
4. assist and advice trainees regarding obtaining funds in time for project commencement.
5. correct the trainee's presentation and writing (including spelling and grammar) before it is presented or sent to the reviewer or submitted for evaluation.
6. encourage them to publish or present in national and international scientific sessions.

D. <u>As a reviewer and assessor of a research project dissertation</u>, the trainer should

1. review the work done in the Sri Lankan context.
2. write a detailed report including the corrections and changes that a trainee has to attend to .
3. complete the review within the allocated time, otherwise trainees will face difficulties in attending to the corrections

4. remember that a delay in submission of your assessor report will delay the procedure of sending all the dissertations to the foreign examiner by the PGIM.

E. **<u>As a role model</u> the trainer should**

1. be exemplary in your dealings with colleagues of other disciplines and all personnel in the health care team.
2. always be punctual
3. be sympathetic to the trainees appreciating that they too have problems.
4. avoid criticizing other trainers and training sites.

F. **<u>As an examiner</u> the trainer should** read and abide by the PGIM guidelines and code of conduct for examiners.

ANNEX 8. GUIDELINES FOR PRE-MD TRAINING PORTFOLIO

SECTION 1

1.1 INTRODUCTION

The purpose of developing a portfolio is to make a trainee reflect on the process of training and professional development as a medical parasitologist and to get effective feedback on their progress throughout the training programme. It should be composed of a series of documents that record this process.

1.2 OBJECTIVES

The portfolio should demonstrate that trainees have

1. used a wide and appropriate range of learning methods effectively to develop their knowledge, skills and attitudes in parasitology.
2. reflected on their own personal and professional practice and development, assessed their future development needs and made plans for continuing professional development.
3. developed personal and professional strategies appropriate to the constraints and opportunities of their working environment .
4. evaluated their own work with self, peer- and supervisor-based monitoring and evaluation techniques.
5. designed methods and techniques to improve the practice of diagnostic medical parasitology.
6. provided support to their colleagues, peers and allied staff in providing training in parasitology
7. performed effectively their support and administrative tasks.
8. shown a commitment to work with, and learn from colleagues, practiced equal opportunities and continued reflection on professional practice.

1.3 CONTENTS OF THE PORTFOLIO:

The following are suggestions regarding the documents that could be included when compiling the portfolio:

1.3.1 An introduction to self, in the 1st person

- Who are you?
- Where do / did you work? (Present and past)
- Current work place - special interests you may have regarding your specialty.

1.3.2 Statement about your mission and vision as a Medical Parasitologist

- Duties and responsibilities as a trainee in Parasitology.
- Your vision of a professional career in Parasitology.

1.3.3 Records of activities and practices that you have undertaken as a trainee in Parasitology to achieve the objectives mentioned above

This should include the following:

A. Record of training:

This should include a **record of each appointment** (dates, training centre/s, supervisor/s)

B. ***Reflective reports:***

At least 3 reflective reports (500 – 750 words each) should be included. The **1st report** should be written within the 1st three months of the 1st year of training and document what you hoped to achieve at the beginning of the training programme. The **2nd report** should include a self-evaluation carried out at the end of the period set aside for the research project with reflection on the challenges you faced during this training component and how you dealt with these challenges. The **3rd report** should be written during last half of the 3rd year of training. It should review your achievements to date, identify problems that prevented you from reaching your goals (as set out in the 1st report), and what you plan to do to correct these deficiencies.

C. Formative assessments

C.1 ***Direct observation of practical skills (DOPS)***

During each of the 7 modules listed below, one or more of the relevant laboratory techniques enumerated in the list that follows should be assessed by the supervisor. A description of the procedure together with the formative assessment in the structured format (see Section 2 of this Annex) should be included in the portfolio.

i. Malaria (1 parasitological diagnostic technique; 1 entomological technique)
ii. Leishmaniases and trypanosomiases (1 parasitological diagnostic technique)
iii. Filarial infections (1 parasitological diagnostic technique; 1 entomological technique)
iv. Medical entomology (1 entomological technique)
v. Intestinal protozoa, trichomoniasis and free-living protozoa (2 parasitological diagnostic techniques)
vi. Intestinal nematodes, cestodes and trematodes (2 parasitological diagnostic techniques)
vii. Toxoplasmosis and parasitic zoonoses (2 immuno diagnostic techniques)

Laboratory techniques

1. Preparation, staining and examination of a thin blood film for malaria parasites and estimation of parasitaemia
2. Preparation, staining and examination of a thick smear for malaria parasites and estimation of parasitaemia
3. Staining and examination of a lesion aspirate for leishmaniasis
4. Preparation, staining and examination of a thick smear for mf, and estimation of microfilaraemia
5. Nuclepore membrane filtration for mf and estimation of microfilaraemia
6. Salivary gland dissection of mosquitoes
7. Dissection of mosquitoes for filarial larvae
8. Preparation of faecal smears in saline and iodine
9. Trichrome staining of faecal smears
10. Formol-ether concentration of faecal samples
11. Kato-Katz technique for quantification of faecal egg counts
12. Harada-Mori technique for faecal culture
13. Faecal culture in charcoal
14. Peri-anal cellophane strips for enterobiasis
15. ELISA for leishmaniasis
16. PCR for leishmaniasis or malaria
17. Rapid Diagnostic Tests for parasitic infections

C.2 Case-based Discussions (CbDs)

Include **a minimum of 6 cases**, one from each of the following: malaria, leishmaniasis, lymphatic filariasis, intestinal protozoa, intestinal nematodes, and toxoplasmosis. These will demonstrate how you have worked towards *Objective 1* of the learning portfolio (i.e. used a wide and appropriate range of learning methods to enhance your knowledge of Medical Parasitology, and improved your bench, clinical and management skills). The cases you discuss should deal with problems of diagnosis, management, or public health issues. The case reports should also demonstrate how you worked towards *Objective 3* (i.e. developed personal and professional strategies appropriate to the constraints and opportunities of your working environment), by describing situations where you encountered problems, the strategies you identified to deal with these problems, and how your improved these strategies with advice from your peers and supervisors. Documents pertaining to CbD should include a description of the clinical case as well as the completing the CbD form (see Section 3 of this Annex). In compiling the documents for each case, you should try to provide answers to the following questions:

- What was the learning experience?
- What did I learn from that experience?

- What more do I have to learn?
- How can I learn it?
- Evidence for such learning?

C.3 Critical evaluation of journal articles related to Parasitology.

A total of three critical evaluations should be written up (one each during the modules on malaria, filarial infections, and intestinal nematodes, cestodes and trematodes).

Each evaluation should have (1) an introduction, with the authors' name(s), the title of the paper, a brief explanation of the topic, and a brief statement regarding the trainee's evaluation of the work; (2) a summary of the paper, explaining the authors' aims, and the key points regarding the work; (3) a critique of the paper; and (4) a conclusion, which restates the overall opinion, presents recommendations and further explanations, if necessary. References should be included if other sources have been used.

The critique should evaluate the significance of the paper and its' contribution to the field of study, through assessment of the extent to which the authors' aims have been achieved, the extent to which the work adds to current knowledge and its relationship to other work in the field, together with assessment of what is missing or not stated in the paper. It should also mention the approach used in the methods, the objectiveness of this approach, the validity and reliability of the results, and the analytical framework used to discuss the results. In evaluating a paper, you should also note if a clear statement of the problem or hypothesis has been presented, what claims are made by the authors and if arguments in support of such claims are consistent.

The portfolio entries may include any presentations you have made in relation to any of the above, and feedback received from peers or supervisors on such occasions.

1.4 GUIDELINES FOR PREPARING THE LEARNING PORTFOLIO

The trainer should review and sign off on each entry after discussing it with the trainee. The entries should be printed on A4 size paper, with a font size of 12 in Times New Roman (or 11 in Arial or Calibri) and 1.15 line spacing. It should consist of ***40 to 50 pages*** when completed (inclusive of learning contracts, other documents of evidence etc.), and collected into a ring binder or spiral bound. The completed portfolio should be submitted after completion of training, together with the application for the MD Medical Parasitology examination.

1.5 ASSESSMENT OF THE PORTFOLIO

At the end of each module, the relevant portfolio entries should be discussed with

and signed off by the trainer to ensure completion/achievement of set goals of identified component/s and to take remedial action if any deficiencies are observed.

The completed portfolio will be assessed by a panel of two examiners appointed by the BOS, using a structured marking scheme set out in Section 4 of this Annex. The panel will sit at a formal discussion with the trainee over a period of 30 minutes during the final oral examination in order to arrive at a final mark for the portfolio. This mark will contribute to 10% of the total mark.

SECTION 2. RECORDING FORM FOR DOPS

Board of Study in Microbiology
Post Graduate Institute of Medicine

WORKPLACE- BASED ASSESMENT FORM
MEDICAL PARASITOLOGY

Direct observation of practical skills (DOPS)

Trainee's name:	
Trainers's name	

Procedure Tick category of procedure below or describe in space available.	

☐ Sample handling & preparation ☐ Staining and microscopy ☐ Culture

☐ Serology ☐ Molecular ☐ Methodologies ☐ Safe disposal

Other (specify)

Specimen

☐ Blood ☐ Tissue aspirate ☐ Faeces ☐ Serum ☐ Other

	Please grade the following areas using the scale provided. **This should relate to the standard expected for the end of the appropriate stage of training:**	Below expectations	Borderline	Meets Expectation	Above expectation	Unable to comment
		1	**2**	**3**	**4**	
1	Understands the scientific principles of the procedure, including the basic biology underpinning it					
2	Complies with health and safety requirements: Safe lab practice, standard precautions, hazard group, containment levels, safe disposal, etc					
3	Has read and understands the appropriate SOP					
4	Understands the principles of internal and external quality control associated with the test					
5	Is aware of the limitations of the test					
6	Overall technical ability and correct use of equipment					
7	Overall ability to perform procedure					
8	Communication of results (written and verbal					

	reports), including report validation					
9	Is aware of importance of patient/ specimen identification checks & appropriate documentation					

PLEASE COMMENT TO SUPPORT YOUR SCORING	**SUGGESTED DEVELOPMENTAL WORK:** (particularly areas scoring 1-3)
Outcome **Satisfactory** **Unsatisfactory** (Please circle as appropriate)	Signature of Assessor
Date of assessment:	Signature of Trainee

SECTION 3. RECORDING FORM FOR CbD

Board of Study in Microbiology
Post Graduate Institute of Medicine

WORKPLACE- BASED ASSESMENT FORM
MEDICAL PARASITOLOGY

Case-based Discussion (CbD)

Trainee's name:	
Trainer's name	

Setting:	☐ Hospital in-ward ☐ Ambulatory care ☐ Community ☐ Public Health Surveillance

Infection:

☐ Malaria ☐ Leishmaniasis ☐ Lymphatic filariasis

☐ Intestinal protozoa ☐ Intestinal nematode ☐ Toxoplasmosis

Complexity of case: ☐low ☐average ☐high

Focus of case: ☐ parasitological assessment ☐clinical management ☐ Public health

	Please grade the following areas using the scale provided. This should relate to the standard expected for the end of the appropriate stage of training:	Below expectations	Borderline	Meets Expectation	Above expectation	Unable to comment
		1	**2**	**3**	**4**	
1	Medical record keeping					
2	Clinical / parasitological assessment					
3	Clinical management – selection of appropriate investigation(s), reporting and interpretation of results					
4	Clinical advice, including recommendations for anti-parasitic agents for treatment and prevention of re-infection					
5	Health protection / public health advice					
6	Follow up					
7	Overall laboratory and clinical judgment					
8	Overall professionalism					

PLEASE COMMENT TO SUPPORT YOUR SCORING	**SUGGESTED DEVELOPMENTAL WORK:** (particularly areas scoring 1-3)

Outcome **Satisfactory** **Unsatisfactory** (Please circle as appropriate)	Signature of Assessor
Date of assessment:	Signature of Trainee

SECTION 4. MARKING SCHEME FOR ASSESSMENT OF PORTFOLIO

Area	Maximum mark
1. Introduction to self, and complete record of training appointment with signatures (as described in sections 1.3.1, 1.3.2 and 1.3.3 A above)	30
2. Commitment to reflective practice: reflected on their own personal and professional practice and development at each stage of training, assessed their future development needs and made plans for continuing professional development (as described in section 1.3.3 B above)	30
3. Direct Observation of Practical Skills (DOPS) 14 x 5 (section 1.3.3 C1)	70
4. Case based discussions (CbD) 6 x 10 (section 1.3.3 C2)	60
5. Critical evaluation of journal articles 3 x 10 (1.3.3 C3)	30
6. Used a wide and appropriate range of learning methods effectively to develop their knowledge, skills and attitudes in Parasitology	15
7. Presentation, originality , organization of portfolio	15
Total mark	**250**

ANNEX 9. MARKING SCHEME FOR ASSESSMENT OF DISSERTATION

10. The dissertation will be marked using the following scheme:

Component	mark
Introduction	5
Literature review	20
Materials & Methods	15
Results	15
Discussion and conclusions	20
Presentation of dissertation	10
Oral presentation and viva voce	15
Total	**100**

CRITERIA FOR ASSESSMENT OF DISSERTATION AND PRESENTATION

Introduction:

- Content and structure of the project has been set out clearly.
- Has identified the problem to be examined clearly.

Literature Review

- Evidence of in depth reading, covering historical and current literature on the topic.
- Inclusion of locally available data
- Presentation of a critical review of relevant literature.

Materials and methods

- The design of the study and the appropriateness of the research methodology.
- The systematic conduct of the study and the accurate collection and recording of
- data and/or information.
- Use of appropriate statistics

Results

- Clear and coherent presentation of the findings with statistical significance indicated where relevant
- Clear tables and figures with appropriate legends

Discussion and conclusions

- The interpretations of results are appropriate and valid from the work
- Conclusions and recommendation are drawn from the work.
- Critical comments made on the extent and limitations of the study.

Presentation of dissertation

- General syntax and writing style.
- Inclusion of References quoted

- Typography.
- Appropriate use of appendices and completeness of list of abbreviations

11. Two assessors (one local examiner + foreign examiner) should mark the dissertation. Examiners are expected to submit the dissertation marks (except for the viva voce exam component) at least two weeks before the commencement of the final exam.
12. The candidate will be questioned on his / her dissertation during the viva voce examination at the main exam.
13. If the difference in the total mark (out of 100) awarded by the two assessors is more than 10 marks, the assessors are expected to discuss the dissertation and come to an agreed mark at the viva voce examination.
14. Candidates are expected to carry out the changes recommended by the examiners within 3 months of the examination. The local assessor should certify that the corrections have been carried out satisfactorily. Candidates will not be permitted to proceed with their post-MD overseas training until they have submitted the corrected dissertation and the local assessor has certified that the corrections are satisfactory.

ANNEX 10. FORMAT FOR POST-MD PROGRESS REPORTS

(To be submitted by Supervisor to Director PGIM at 6 months and 12 months)

1. Name of trainee
2. Name of supervisor
3. Training institution and unit
4. Period covered by progress report: …….. (dd/mm/yy) to …… (dd/mm/yy)
5. Description of work carried out by trainee in training institution
    a. Course work
    b. Teaching activities
    c. Research projects
    d. Any other
6. Any work carried out away from main training institution?
7. Meetings / conferences / seminars attended by trainee
8. Any publications / presentations by trainee
9. Interaction with colleagues and other staff
10. Overall progress
    a. General comments
    b. Summary:

       Highly satisfactory / satisfactory / unsatisfactory / very unsatisfactory

Signature of supervisor

Date

ANNEX 11. GUIDELINES FOR POST-MD TRAINING PORTFOLIO

As recommended by the PGIM, the PBCA in Medical Parasitology will be based on assessment of a portfolio maintained by the trainee during the period of post-MD training. The contents of the portfolio should be divided into 6 sections based on the six learning outcomes common to all PGIM trainees, followed by a final section that contains evidence of reflective practice.

The following list sets out the type of evidence recommended by the Board of Study in Microbiology.

1. **Expertise in Medical Parasitology:**
    - Six progress reports from supervisors (essential, should be according to prescribed format):
        - two 6-monthly reports from the local supervisor and
        - four quarterly reports from overseas supervisor.
    - Evidence for the development of clinical parasitology skills
        - Minimum of 2 case based discussions (excluding those presented in the pre-MD training portfolio)
    - Evidence for making use of new knowledge and latest available methodology to plan and introduce a new technique for diagnosis of parasitic infection

2. **Teaching**
    - Evidence for conducting lectures, tutorials and laboratory classes in Medical Parasitology for any of the following categories of students (either in pre- or post-MD training period)
        - undergraduates
        - postgraduates
        - ancillary health staff

3. **Research relevant to Medical Parasitology**
    - Research papers published or accepted for publication (this may be based on the MD dissertation)
    - Abstracts of presentations at international or national conferences
    - Evidence of at least 2 presentations at journal clubs in the post-MD training period

4. **Ethics and Medico-legal Issues**
    - Evidence of participation in the professionalism workshop carried out by the PGIM (this may have been in the pre-MD period)
    - Completed Professionalism Observation Forms (from integrated learning

component of Professionalism Strand)
- Completed PTR forms during post-MD training

5. Information Technology
- Familiarity in using laboratory information systems.
- Evidence of searching for information and application of findings in practice

6. Life-long learning
- Participation in conferences and meetings- evidence of participating in a minimum of 3 CME programmes and one conference during the post MD training period.

7. Reflective practice
- Narration of at least one learning event experienced by the trainee, in relation to each of the above outcomes, with reflection on what and how the trainee learned from this experience

Portfolio assessment

The portfolio should be reviewed at least every 6 months by the appraiser with regular feedback to the trainee on how the portfolio may be improved. When the trainee is eligible for PBCA, 3 copies of the completed portfolio should be submitted to the PGIM Examinations Branch.