

SAUDI COMMISSION FOR HEALTH SPECIALTIES (SCHS)

SCIENTIFIC BOARD FOR APPLIED MEDICAL SCIENCES (SBAMS)

Residency Program & Syllabus For Saudi Board in Medical Sciences – Medical Microbiology (SBMS–MM)

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PROGRAM BYLAWS AND SYLLABUS

1. Introduction

The growth in the population and the expansion in the provision of high quality healthcare accompanied by an increase in the number of hospitals, particularly that the infectious diseases are a major cause of morbidity and mortality, necessitates the need for an equivalent growth in the numbers of highly qualified staff specialized in Medical Microbiology. The program is run under the supervision and accreditation of the Saudi Council for Health Specialties referred to hereafter as **SCHS** Therefore the rules and regulations governing the program are those of the **SCHS**, and all parts of this training and syllabus are explained in view of the **SCHS** regulations in this respect.

The purpose of this training program is to give an adequate theoretical and practical knowledge that is required for practicing Medical Microbiology Specialty. The major components of this program include theoretical basis of Medical Microbiology, laboratory component, infection control measures and dissertation writing. The program will spread over a period of four years.

The program recruits only graduates of applied medical sciences (laboratory medicine) who have 2 years of experience in the labs of hospitals or one year of experience in the lab of hospitals with one year of his internal ship of his bachelor degree . Upon completion of this training program and satisfying the examiners, the graduate will be granted the Saudi Board in Medical Sciences-Medical Microbiology (**SBMS-MM**) and will have a degree of competency and experience that are considered adequate to practice Medical Microbiology independently and become eligible for the post of consultant after required years of experience

2. **Duration of Training**

The whole duration of the training program is **Four** calendar years, unless the trainee is exempted from part of the training by the Scientific Board for Applied Medical Sciences (**SBAMS**). Applicants should address the request for approval of training or experience to the **SBAMS**. Approval / disapproval is left at the discretion of **SBAMS**. Trainees are required to keep training records detailing their training experience. This will be inspected regularly by their supervisor (i.e. the Consultant and / or Supervisor in-charge of the training). The trainee must adhere to the rules and regulations of the **SCHS** during the training period.

3. **Approved Training Institutes**

The **SBAMS** accredits particular training centers for the provision of the training to the candidates, thus, only trainees who rotate in those approved centers are entitled to accumulate the period of training necessary prior to the final examination entry.

4. **Syllabus**

The total of **Four** years training includes simultaneous involvement in the various activities of each Medical Microbiology department or training center the candidate is rotating in. Naturally this includes performance of the duties of specialist as applicable to their stage in the program in compliance with the job description available from the respective department or training center).

The details of the syllabus are provided to guide the candidates through the training program.

Weeks	1	6	12	18	24	30	36	42	48
Year 1 (R 1)	General bacteriology and general virology; basic microbiological techniques and the use of instruments; safety in lab; microscopy ; sterilization and disinfection, media preparation; collection, transport, reception and record keeping of specimens; and antimicrobial susceptibility studies.								
Year 2 (R 2)	Bacteriology (18 weeks)		Virology (10 weeks)		Clinical Microbiology (10 weeks)		Environmental Microbiology (4 weeks)		Mycology (6 week)
Year 3 (R 3)	Molecular & Emerging Technique (4 weeks)		Clinical Parasitology (general & systematic): Processing of specimens and reporting & interpretation of lab data. (20 weeks)			Clinical Immunology Processing of specimens, reporting and interpretation of lab data (24 weeks)			
Year 4 (R 4)	a- Infection Control and management of hospital antibiotic policy (12 weeks) b- Laboratory management, data handling, quality control & accreditation and epidemiology (12 weeks)					Research methods and dissertation (24 weeks)			

5. The Departmental Residency Training Committee (RTC)

Functions of this committee are:

- To enforce the general policy for training (selection, admission, evaluation, withdrawal, etc.) in accordance with the Rules and Regulations of **SCHS**.
- To suggest program changes (if necessary) to be discussed by the department concerned, before submission to **SBAMS**.
- To supervise the implementation of all program regulations.
- To review the performance of the residents during the regular meetings (a minimum of one meeting each rotation). Program coordinator should report to the committee on the performance of all residents during these meetings.

6. The Program Coordinator.

The Program Coordinator should be a full –time Consultant in Medical Microbiology, be a member of a departmental approved by RTC and served in this capacity for a minimum of five years. He/she should also be approved by the SCHS via SBAMS and be able to:

- 11.1 Demonstrate commitments to the specialty.
- 11.2 Show the interest, authority and commitment required to fulfill teaching responsibilities in order to develop, implement and achieve the educational objectives of the program.
- 11.3 Maintain active involvement in the practice and research in Medical Microbiology.
- 11.4 Pursue continuing professional development and education in Medical Microbiology.

7. The Supervisor

The supervisor should be a member of the teaching staff and a full-time Consultant in Medical Microbiology. He/she should also be approved by the RTC and **SBAMS**, and be able to:

- 12.1. Demonstrator commitments to the specialty.
- 12.2. Show interest and commitment to full-time teaching and technical responsibilities
- 12. 3. Complete the evaluation form in consultation with the senior registrar etc.
- 12.4. Guide the residents on their performance, and help them in preparation of their assignments.
- 12.5. Report the ongoing performance of the resident(s) to the program coordinator.

8. Structure and format of the examinations:

8.1: The annual examinations consist of:

1. Paper 1 – Essay questions (3 hours)
2. Paper 2 – **MCQs** (3 hours)
3. Practical examination which is a 3 day examination as follows:
 - i) Two-hour objective structured practical exam (**OSPE**).
 - ii) One-hour data interpretation and calculation paper.
 - iii) Three-days “wet” practical consisting of processing of clinical specimens, reporting and interpretation of results.
4. An oral examination:

8.2: The Final examination consists of:

1. Paper 1 – MCQs / EMQs and essays (3 hours).
2. Practical examination which is a three-day examination as follows:
 - i) Two hour OSPE.
 - ii) Tow hour data interpretation and calculation paper.
 - iii) Three-days “wet” practical consisting of processing of clinical specimens, reporting and interpretation of results.
3. Dissertation presentation.
4. An oral examination.

9. Entry Requirements

Applicants to this residency training should have completed a General Professional Training (GPT) of **TWO** years in an approved post(s), preferably in General Laboratory Practice including Medical Microbiology. The objective is to gain experience over a wide field of Clinical Laboratory Practice.

GPT is defined as follows:

A minimum of two years in an approved post(s) with direct involvement in Clinical Laboratory Practice and patient care with a wide range of experience in Clinical Laboratory activities.

10. Selection of the Candidate

Candidates for the residency program are selected based on an interview that is made by the national and / or Regional Committee. The following are required:

- 15.1 Three confidential letters of reference will be solicited.
- 15.2 A written examination and an interview must be conducted to evaluate each candidate.

11. Higher Specialist Training (HST)

Higher Specialist Training will occupy not less than Four years. The first year of practical will be directed towards acquiring a broad general experience in analytical techniques and instrumentation relevant to the clinical practice of Medical Microbiology under the supervision of both formal and informal teaching. During the subsequent two years, the trainee will cover core aspects of Medical Microbiology (Bacteriology, Virology, Mycology, Parasitology and Immunology) including Clinical Interpretation of Laboratory Data and will acquire a greater independence in clinical and laboratory practice. In the first half of the 4th year of training will be involved in infection control and hospital antibiotic policy management, Laboratory Management Quality Control & Accreditation in action to interpret action of laboratory data. In addition, he/she will pursue a research project related to Medical Microbiology during 2nd half of the 4th year. The trainee is required to submit a dissertation of at least 100 pages with single-space writing. There should be some scope for pursuing sub-specialization within Medical Microbiology.

During the four years of HST, part of the training will be spent in a District General Hospital; this will vary and should be at least six months but would not usually exceed two years. This will be approved by the RTC. It can be taken at any stage but the training received would need to be geared to the level of the trainee's previous experience.

12. Detailed Curriculum

12.1: Objectives

12.1.1. General Objectives

The trainee should acquire all the necessary knowledge including biology, pathogenesis, essential symptoms and signs of the disease, principles of laboratory diagnosis and the interpretation of lab results, treatment, prevention and control of the disease. Moreover he/she should acquire knowledge of epidemiology and host response to the spectrum of microorganisms (bacteria, viruses, fungi & parasites) capable of causing diseases in humans including the immunological aspects of diseases. Also the aim is to produce trained clinical microbiologist who can provide specialist opinion in their clinical discipline and who should have developed the appropriate management skills to lead a department, if required.

12.1.2. Specific Objectives.

A graduate pursuing postgraduate training in the field of Clinical Microbiology should acquire or develop:

1. Specialized factual knowledge of the biology, pathogenesis, essential symptoms and signs of the disease caused by different pathogens and parasites. Competence in proper and safe collection, handling and transport of clinical specimens, particularly high-risk specimens and be competent to advise others about these procedures whenever required.
2. Familiarity with all aspects of health and safety requirements for microbiology laboratories.
3. Capability to assess degrees of urgency for the processing of specimens including the provision for an out-of-hours service and the communication of preliminary results as applicable.
4. Capability of laboratory diagnosis of microbial diseases by using the conventional, semi-automated and automated techniques including media preparation and antimicrobial studies.
5. Awareness of all major new technologies available in medical microbiology based on DNA techniques (e.g. PCR) and monoclonal antibodies.
6. Technical knowledge, gained from close acquaintance with laboratory technology, so that methodology appropriate to a clinical problem can be chosen, and so that quality control and quality assurance procedures can be implemented.

- be
- follow-up
7. High standard interpretative skills so that a clinically useful opinion can be derived from laboratory findings and can give opinion to the treating physicians about the diagnosis, management and laboratory help for follow-up of the patient.
 8. A first hand experience of local infection control problems, including, outbreaks of infection and their management both in hospital and community health. Along with understanding of the principles of patient isolation and their application.
 9. Competence in formulating the antibiotic policies in the hospital as a measure to minimize the antimicrobial resistance.
 10. Research and development experience. Original thought and critical assessment of published work are important to allow the trainee to contribute in a team, and individually, to the development of the service.
 11. The life-long habits of reading, literature-searches, consultation with colleagues, attendance at scientific meetings, and the presentation of scientific work as part of continuing education.
 12. Data management skills to evaluate information derived from the population served and from the technical procedures applied in the laboratory. These skills should include familiarity with the use of spreadsheets, databases and statistical packages and be able to apply it for prevention, control and management of infectious diseases in the hospital and community.
 13. Management and communication skills. The trainee must gain experience in planning departmental policies and developing the leadership skills necessary to implement them. The training Must be under the supervision of the department .
 14. Capability to teach undergraduate and graduate students.

12.2. Course Contents

12.2.1. Scientific Basis of Clinical Microbiology (48 weeks)

Trainees should have an understanding of the principles of the following, together with how they may be applied to clinical and research problems:

1. Bacterial taxonomy, classification and typing methods
2. Safety in Microbiology Lab
3. Microscopy.
4. Bacterial cell structure & physiology.
5. Bacterial genetics & gene transfer
6. Smear preparation & Staining (Gram & ZN
7. Bacterial growth requirements & growth curve.

8. Types of culture media & their preparation in lab.
9. Cultivation of bacteria & bacterial count.
10. Normal bacterial flora & bacterial pathogenicity.
11. Sterilization & Disinfection.
12. Collection, transport, reception, distribution & surveillance and control.
13. Handling of specimens: collection, transport, reception, distribution & record keeping of the specimens.
14. Bacterial identification using automated & semi-automated systems..
15. Antimicrobial agents, their mode of action and mechanisms of microbial resistance.
16. Epidemiology of infectious diseases - their surveillance and control.
17. Introduction to virology.
18. Diagnosis of viral infections.
19. Diagnose of viral infection.

Laboratory Training

The trainee will rotate in different sections of the clinical microbiology laboratory including mycobacteriology, mycology and virology. Wherever necessary the trainee may be attached in a different setup for training when not available in local labs. He/she will be given responsibility for processing of different specimens with interpretation of results and reporting (under supervision of the supervisor/consultant). The trainee must acquire a strong theoretical knowledge and technical skills that include:

Laboratory Safety

Before starting the practical work, the trainee should be familiar with the basic safety requirements including correct laboratory dress, laboratory hygiene, handling and disposal of specimens and contaminated articles (e.g. inoculating loops, pipettes) at the laboratory bench, the dangers of aerosols and the procedure for dealing with spillages.

At the end of formal training, the trainee should be familiar with:

- 1 Local procedures for the safe transport of specimens or cultures and also with national and international postal and packaging regulations for such material.
- 2 Current requirements and recommendations of the Advisory Committee on Dangerous Pathogens (ACDP), recommendations for specific diseases e.g. viral hepatitis, HIV, prion diseases, haemorrhagic fevers.
- 3 The principles and operation of microbiological safety cabinets and the procedures for their decontamination and monitoring of air flow.

Sterilisation and Disinfection

At the end of formal training, the trainee should understand the principles and uses of sterilisation and disinfection procedures for the preparation of media and instruments and for microbiological waste disposal. Trainees should be capable of formulating a policy on the use of sterilisation and disinfection in the laboratory, hospital or community.

Handling of Specimens

At the end of formal training, the trainee should be:

- 1 Aware, for each specimen type, of the optimal methods for collection, transport (including transport media), storage, reception, processing, identification, documentation and the issuing of a final report, including the requirements for high-risk specimens.
- 2 Able to assess degrees of urgency for the processing of specimens, including the provision for an out-of-hours service and the communication of preliminary results as applicable.
- 3 Able to decide upon further testing or processing of a specimen as appropriate.
- 4 Aware of existing reference facilities and their appropriate use.

Microscopy

At the end of formal training, the trainee should be:

- 1 Able to understand the principles of light, dark ground, phase contrast, fluorescent and electron microscopy and be able to set up a light microscope with dark ground and phase contrast facilities.
- 2 Able to perform routine staining techniques including fluorescent dyes.
- 3 Familiar with the appearance of stained preparations and be able to recognise artefacts and their possible origin.

Culture Methods

At the end of formal training, the trainee should be:

- 1 Aware of the wide range of selective, enrichment and inhibitory media available for general and specialised use and be able to choose relevant media in common use or in medical and environmental laboratories.

- 2 Familiar with physical growth requirements of micro-organisms including atmosphere and optimal temperature and have an appreciation of the growth characteristics of both solid phase and broth cultures. Also to know those micro-organisms and clinical situations in which detectable growth may require prolonged incubations.
- 3 Familiar with the preparation of media in common use and have an understanding of internal quality control of such preparations.
- 4 Able to process all common specimens, recognise potential pathogens from a mixture of colonies on culture plates, separate such colonies in order to achieve the pure growth necessary for further work.

Further Processing of Cultures

At the end of formal training, the trainee should:

- 1 Be able to perform tests leading to the identification of all common pathogens including the use of commercially produced kits (e.g. kits for enzyme assays) and rapid diagnostic kits, ELISA, latex agglutination.
- 2 Understand the principles of identification media and be able to use them appropriately.
- 3 Be aware of available reference facilities for further identification including serotyping and other typing schemes both phenotypic and genotypic.

Antimicrobial Investigations

At the end of formal training, the trainee should:

- 1 Be able to test the antibiotic sensitivities of an isolate using the common techniques of disc testing and break points and to be aware of the principles behind multipoint sensitivity technology.
- 2 Be able to perform and interpret Minimal Inhibitory Concentration (MIC) and Minimal bacterial Concentration (MBC) tests as appropriate.
- 3 Be able to perform antimicrobial assays using biological and automated techniques.
- 4 Have an understanding of antimicrobial assays and their relationship to the therapeutic and toxic effects on a patient and be able to advise on dosage regimens accordingly.

12.2.2 a- Systematic Bacteriology, Virology, Clinical microbiology, Environmental microbiology (food and water) & Mycology (48 weeks)

The trainee should acquire the specialist level of knowledge about different groups of bacteria, viruses & fungus and processing of the clinical specimens:

Bacteriology (18 weeks)

1. Staphylococci
2. Streptococci
3. Neisseria
4. *Corynebacterium*
5. Listeria
6. *Bacillus*
7. Enterobacteriaceae
8. Pseudomonas
9. Vibrio, Campylobacter & Helicobacter
10. Yersinia
11. Brucella
12. Hemophilus
13. Bordetella
14. Clostridia
15. Bacteroides, Prevotella & Porphyromonas
16. Fusobacteria
17. Mycobacteria
18. Actinomyces & Nocardia
19. Mycoplasma & Ureaplasma
20. Chlamydia
21. Rickettsia
22. Spirochaetes

Virology (10 weeks)

1. Introduction to virology
2. Diagnosis of viral infections
3. Respiratory Viruses
4. Mumps & Measels
5. Rubella
6. Enteroviruses (Polio + Coxsackie + ECHO viruses)
7. Hepatitis viruses
8. Retroviruses (HIV + HTLV)
9. Gastroenteritis viruses (Rota + Adeno)
10. Herpes Viruses (HSV, VZA, CMV, EBV, HHV-8)

Clinical Microbiology (10 weeks)

a) Systemic microbiology (8 weeks)

- 1 Skin Infections (wound)
- 2 Infectious of GIT (Diarrhoea & Food Poisoning)
- 3 Urinary Tract Infection (UTI)
- 4 Pyrexia of Unknown Origin (PUO)
- 5 Infectious of lower respiratory tract (Pneumonia)
- 6 Infectious of CNS (Meningitis)
- 7 Infectious of upper respiratory tract (Sore Throat & Otitis media)
- 8 Sexually Transmitted Diseases (STD)
- 9 Infectious Hepatitis
- 10 Infections In Immunocompromised Patients
- 11 Hospital Acquired Infections
- 12 Infectious of blood (septicaemia)
- 13 Emergent and resurgent infections (H1N1)

b) Prevention and control of infections (vaccination and prophylaxis)(2 weeks)

Environmental Microbiology (4 weeks)

At the end of formal training, the trainee should:

1. Have knowledge of the main concepts underlying food and environmental microbiology.
2. Be able to refer to up-to-date guidelines and statutory requirements concerning the processing and microbiological quality of food, water and milk products.
3. Have knowledge of the methods used for the microbiological examination of common types of food, water and milk products.
4. Have knowledge of the methods used for the detection of parasites and viruses from water and food samples.
5. Be able to select appropriate microbiological tests to carry out on food, water and environmental samples, both routinely and in response to an outbreak of food-borne infection.
6. Be able to interpret the results of microbiological testing of food, water and milk products, with reference to the appropriate standards.
7. Be able to advise environmental health officers and others on appropriate methods of food, water and environmental sampling, both routinely and in response to an outbreak of food-borne infection.

Course Contents

A. Water Microbiology

- Freshwater microbiota.
- Seawater microbiota.
- The role of microorganisms in water quality.
- Infections transmitted through water.
- Water testing and indicator organisms.
- Water treatment.

B. Food Microbiology

- Industrial food canning.
- Microorganisms spoiling food.
- Infections transmitted through food.
- Laboratory testing of food including.

Mycology (6 weeks)

Processing of Clinical Specimens & Interpretation of Laboratory Data

- 1 Fungal structure, metabolism & reproduction
- 2 Fungal classification & pathogenesis
- 3 Diagnosis of fungal infections
- 4 Anti fungal agents
- 5 Dermatophytes
- 6 Candida
- 7 Histoplasma
- 8 Cryptococcus
- 9 Sporotrichosis
- 10 Aspergillus
- 11 Fusarium
- 12 Mucor
- 13 Mycetoma

12.2.3 Molecular & Emerging Technologies (4 weeks)

At the end of formal training, the trainee should:

- 1 Be aware of all major new technologies available in medical microbiology based on **DNA** techniques (e.g. PCR) and monoclonal antibodies.
- 2 Be aware of automated, rapid techniques available to medical microbiology.
- 3 Be able to evaluate critically the need for emerging techniques within the laboratory including cost effectiveness and effects on staffing levels and working practices.

12.2.4 Clinical Parasitology (20 weeks)

Course Contents:

- 1 Host-Parasite Relationship
- 2 Intestinal Parasites
Aetiology, pathogenesis, clinical manifestations, diagnosis, prevention and control of:
 - a) Intestinal Helminthes
 - b) Intestinal Protozoa
- 3 Urogenital Parasites
- 4 Blood and Tissue Parasitic infections:
These mainly include:
Filariasis, dracuntiasis, cysticercosis, creeping eruption, onchocerciasis, cutaneous larva migrans, scabies cutaneous and visceral, leishmaniasis, calabar swelling, leopard skin, malaria, elephantiasis, toxoplasmosis.
- 5 Coccidiosis mainly, cryptosporidium parvum and pneumocystis carinii
- 6 Opportunistic infections
- 7 Emerging parasitic infections
- 8 Allergy in parasitic infections mainly, ground itch, cercarial dermatitis, onchocercal itch.
- 9 Myiasis
- 10 Entomology
- 11 Practicals
Parasites and ova – in stool and urine samples
Blood and tissue parasites in histopathological sections
Serology of parasitic diseases
DNA – based techniques eg. PCR
Culture of parasites
- 12 Tutorials, seminars, journals or workshop are expected to include topics like:
Zoonosis eg. Hydatid disease
Opportunistic infections e.g. Pneumocystic infections in AIDS patients
Parasitic liver diseases
Anaemias induced by parasitic infections
Vaccinational trials
Miscellaneous

12.2.5 Advanced Clinical Immunology (24 weeks)

1 Aims:

The aim of this course is to provide intensive training in clinical immunology with an emphasis on allergic and other immunological diseases, their diagnosis, management and special immunological procedures of relevance in the control of these diseases.

2 Objectives:

A trainee should develop or acquire:

- 1 . Principles of the fundamental immunology.
- 2 . Well informed and able to recognize easily disease presentations and undertake diagnosis and management of allergic and immunological diseases.
3. Capable of drawing relevant differential diagnosis and hence seeking appropriate consultations from others as well as giving expert opinion to others.
4. Competent in handling special immunological diagnostic procedures such as skin tests and their interpretations.
5. Competent in instituting immunotherapy such as hyposensitization procedures.
6. Knowledgeable and experienced in immuno-modulation procedures.
7. Competent clinical immunologist with experience in the immunological aspects of clinical transplantation.
8. Capable of teaching undergraduate and graduate students and of conducting research.

3. Course Contents:

1. Fundamental immunology
2. Immunopathology
3. Immunomodulation with special reference to Immunopotential and
4. Immunosuppression; immunotherapy etc.
5. Allotypic and atopic diseases.
6. Autoimmune diseases; introduction

7. Rheumatic and connective tissue diseases
8. Immunological aspects of skin diseases
9. Immunological aspects of gastrointestinal diseases
10. Immunological aspects of chest and CVS diseases
11. Immunological aspects of kidney diseases
12. Immunological aspects of blood diseases
13. Immunological aspects of neuroimmunology
14. Other diseases including eye diseases, infertility etc
15. Clinical transplantation
16. Immunology of pregnancy
17. Cancer immunology and applications in clinical practice and research
18. Immunodeficiency including AIDS
19. Vaccines, antisera and immunizations, vaccination schedules.

12.2.6. Infection Control in hospital and Community (12 weeks)

At the end of formal training, the trainee should:

- 1 Have had first hand experience of local infection control problems, including, outbreaks of infection and their management.
- 2 Be familiar with the workings of infection control meetings including local and regional infection control committees.
- 3 Be aware of those areas of hospital and community health that require infection control policies.

- 4 Have gained experience of liaison with clinical colleagues through regular ward visits. In particular, a close relationship should be established with:
 - intensive care unit
 - paediatric (including neonatal) units
 - obstetric units
 - haematology
 - organ transplant units (immunosuppressed patients)
 - orthopaedic
 - burn unit
 - renal dialysis
 - pulmonary medicine
 - medical and surgical wards
 - genitourinary medicine departments
- 5 Have worked closely with the infection control team.
- 6 Have an understanding of the principles of patient isolation and their application.
- 7 Have participated in visits to clinical and non-clinical areas to advise on infection control. These should include kitchen inspections especially those conducted by environmental health officers and personnel in the CSSD, pharmacy and laundry.
- 8 Be familiar with any documents relevant to infection control such as reports of Committees of Enquiry.
- 9 Have had some experience of communicable disease control in the community working with Environmental Health Officers.

12.2.7. Laboratory Management (12 weeks)

At the end of formal training, the trainee should have achieved a basic knowledge of important aspects of laboratory management including budget control, personnel management and administration. Attendance at local or national management courses should be strongly encouraged.

1. **Managerial Skills**
2. **Quality Control & Accreditation**
3. **Data Handling**

4. Quality Control & Accreditation

At the end of formal training, the trainee should:

- Have an understanding of quality control and quality assurance.
- Have had experience of the regular processing of the NEQAS distributed specimens.
- Have an understanding of the existing external quality control schemes.
- Have knowledge of the requirements of any existing laboratory accreditation schemes and the process whereby accreditation is conferred.

5 Data Handling

At the end of formal training, the trainee should have a basic understanding of information technology and in particular, computerised data handling and a basic understanding of the need for data protection.

12.2.8. Research Methods & Dissertation (24 weeks)

The trainee will:

1. Develop his/her understanding of the basic principles of scientific research through regular reading of peer-reviewed journals and peer-discussion,
2. Be assigned a research project that can be carried out within the clinical microbiology lab. The project will be preferably in association with one of the clinical departments. This will be in part as fulfillment of the criteria for final certifying exam.

END OF THE COURSE