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PREAMBLE

Bangabandhu Sheikh Mujib Medical University (BSMMU) is the first postgraduate institute in the country established in 1998 for expanding higher medical education and research in the country. The Government of Bangladesh upgraded this institute into Medical University by an Act of Parliament (no. 1, 1998). The BSMMU has prestigious reputation for providing high quality education and health services including a range of investigational facilities. The University faculties are highly experienced and skilled in their respective fields. The University maintains demonstrable professional linkages with different national and international bodies. The faculty of Basic and Paraclinical Sciences is one of the faculties of this University.

The Department of Virology under BSMMU is incorporated within the Basic and Paraclinical Science Faculty. The areas of contribution of this department are teaching, training, routine diagnostic work and research. This department teaches and trains postgraduate medical student of M.Phil, PhD and MD (Virology) courses and provides basic teaching of postgraduate medical student of other courses. The medium of the course will be English. The degrees granted by this department are recognized medical qualifications in accordance with Bangladesh Medical and Dental Council Act. The degree holders of this university are entitled to the same privileges as those awarded by an equivalent awards from any other recognized University of Bangladesh.

RESIDENCY TRAINING PROGRAM IN MD (MEDICAL VIROLOGY)

MD in Medical Virology is a three years residency based program under the faculty of Basic and Paraclinical Science. This program is designed to help residents acquire sufficient level of knowledge, skills, and aptitude in all aspects of the epidemiology, prevention, diagnosis, and management of infections and communicable diseases related to Virology. The 3-year training program includes rotations in various sub-specialties as detailed in the intrinsic and extrinsic rotation as well as suggested schedule of rotation in and out patients department of BSMMU. During the first year, resident will be placed in different sections of

diagnostic laboratory keeping with the philosophy that a good foundation in diagnostic laboratory is the best foundation for a good medical Virologist. Two years are spent in the diagnostic laboratory as well as in Infectious Disease Wards.

Emerging infectious diseases caused by viruses have assumed great public health significance in recent years. During the last three decades, almost 20 new viral pathogens have been detected. Some of these e.g. Human Immunodeficiency Virus (HIV) and hepatitis viruses have already caused substantial mortality, morbidity and economic loss all over the world. Over the past years, medical virologists have been at the forefront in the fight against SARS, Avian Influenza, Swine influenza virus, Nipah virus etc. At present, influenza virus is posing a great threat globally. The pandemic of serious acute respiratory syndrome (SARS) unequivocally demonstrated the rapidity with which new viruses can travel across the world and inflict misery. It is assumed that this trend will continue.

COMMENCEMENT OF COURSE: January of each year.

COURSE DURATION: M.D (Virology) – 3 years

The Goal of the program is to:

- Establish good virological and microbiological services in hospitals and the community in the fields of viral infectious diseases.
- Plan, execute and evaluate teaching assignments in Medical Virology.
- Plan, execute, analyze and present research work in Medical Virology.
- Conduct such clinical and experimental research as would have a significant bearing on human health and patient care.
- Encourage interaction with allied departments by rendering services in advanced laboratory investigations and relevant expert opinion.
- Encourage residents to participate in various workshops / seminars / journal clubs / demonstrations in allied departments, to acquire various skills for collaborative research.
- Uphold the prestige of the discipline amongst the fraternity of doctors.

EDUCATIONAL OBJECTIVES:

A. Knowledge:

At the end of the course the residents shall be able to:

- State the clinical features, etiology, pathogenesis and methods of laboratory diagnosis and apply that knowledge in treatment, prevention and control of communicable diseases caused by viruses and other micro-organisms.
- State the principles of immunity and immunological phenomenon which help to understand the pathogenesis, laboratory diagnosis of infectious and non-infectious diseases.
- Establish and practice "laboratory medicine" for diagnosis of infectious diseases in hospitals and community in the field of virology, bacteriology, parasitology, mycology and immunology.
- Organize the prevention and control of communicable diseases in the community.
- State the recent advances in the field of Medical Virology and apply this knowledge in understanding the etiopathogenesis and diagnosis of diseases caused by new emerging viruses.
- Carry out fundamental or applied research in the branches of medicine involving
- virological and microbiological work.
- Undertake teaching assignments in the subject of virology

B. Skill

At the end of the course the resident shall be able to

- Plan the laboratory investigations for diagnosis of infectious diseases
- Perform laboratory procedures to arrive at the etiological diagnosis of diseases caused by viruses, bacteria, fungi, and parasites.
- Perform and interpret serological and immunological tests.
- Operate routine and sophisticated instruments in the laboratory.

TEACHING/LEARNING METHODS:

Learning in M.D. (Virology) will be essentially self-directed learning. The following teaching-learning methods shall be followed:

A. Programmed Lectures:-

Lecturing program: The lectures will be given by senior academic staffs having experience in teaching, delivering lectures.

Visual aids like transparencies, power point presentations will be used in the lecture. Audio - visual video films will also be used to illustrate and clarify theoretical lectures and make it easier to understand.

B. Group teaching sessions: -

- Group discussion
- Journal review
- Seminar presentation
- Slides seminars
- Presentation of findings of an exercise on any of the sub-specialties
- Participation in CME programs and conferences.

C. Hands on experience (laboratory / clinical training)

Laboratory and clinical training shall be imparted by placing the residents in various sub-specialities (sections) as detailed in the intrinsic and extrinsic rotation. The resident shall be actively involved in day to day working of all the sections. He/she will be trained under the guidance of teachers in all the aspects of Clinical/ Medical Virology and applied aspects of laboratory medicine including clinical diagnosis of patients, collection and transport of specimens, receiving of samples, preparation of requisite reagents, chemicals, media and glassware, processing of specimens and reporting on the specimens, sterilization procedures, bio-safety precautions, maintenance of equipments, record keeping and quality control in Virology.

D. Problem solving sessions. A teacher will chair the sessions and relevant problems will be discussed.

E. Seminar: Elective Seminar will be chosen by the residents, presented and discussed together with other related disciplines.

F. Teaching experience:

The residents shall be actively involved in the teaching of undergraduate and postgraduate residents in future. He/she will be trained in teaching methods and use of audiovisual aids including preparation of power point presentations and transparencies.

G. Suggested schedule of rotation: (Clinical Attachment):

The purpose of the rotation is to allow the fellow to develop an in-depth understanding of the basic and clinical science aspects of viral diseases and understand appropriate therapeutics, prevention, epidemiology, humanistic, moral and ethical aspects of these diseases.

BROAD AREAS OF STUDY:

Virology, Bacteriology, Parasitology, Mycology, Immunology, Clinical Pathology, Medical Education, Biostatistics, Research Methodology.

PHASES

The 3-year Residency program comprises of Phase-A including Part-I & Part-II and Phase-B which includes Part-III. Each part is of one year duration. The whole slot of the course content of Virology department will be customized in four blocks that is typically scheduled as 3-month modules. After completion of each block, residents will sit for a formative exam. A total of 30% of the marks attained during the formative assessment will be added to the final summative assessment. The resident should submit and approve their thesis protocol in the faculty before appearing in the summative exam in Part-II. Submission of at least one article is a pre-requisite to thesis submission.

A. Phase-A**1. Part-I (First year):**

During the first year of the program, the resident will spend designated lengths of time in each of the subspecialty (laboratory)

sections. The expectation is that the resident will become knowledgeable as to the technical and theoretical aspects of the tests used in each section, and the types of problems encountered in the section. After a brief one month orientation in the laboratory, the resident will start doing the laboratory works independently under the guidance of the supervisor.

i. Knowledge

The goals of this part of course are to:

a. Virology (General & Molecular Virology, Diagnostic Virology):

- Acquire a detailed knowledge of viral taxonomy, virus-cell interactions, mechanism of viral replication.
- Learn the epidemiology of viral infections (transmission, susceptibility, patterns).
- Learn the pathogenesis of viral infections including, concepts of latency and persistence and immunologic response to viral infection.
- Learn about appropriate clinical specimens for diagnosing important viral infections, including specimen collection, transportation and storage systems.
- Learn symptoms of viral infections (symptoms that help in diagnosis, how these symptoms relate to disease).
- Learn about prevention including vaccination strategies universally applied and those used in specific circumstances.
- Develop a detailed knowledge of the available antiviral drugs or other treatment options, their mechanism of action, pharmacokinetics and pharmacodynamics, adverse effects and clinical indications.
- Learn about complications (spectrum of disease, other complications of viral infections).
- Learn the usual cell culture lines used in clinical virology laboratories, typical changes seen in cell culture, maintenance and quality control of cell culture lines.
- Learn the principles and interpretation of serological test and molecular methods to diagnose viral infections.

- Learn to perform different microscopy methods used for viral detection (electron, immunofluorescent, phase contrast, inverted).
- Understand the principles associated with viral genotyping, especially as applied to HCV.
- Learn the mechanisms of antiviral resistance and its clinical applications.
- Learn the role of viral infections/diseases in transplantation.

b. Medical Immunology

- Acquire basic concept of Immunology
- Acquire clinical applications of Immunology
- Acquire laboratory applications of Immunology

c. Clinical Pathology

- Acquire a detailed knowledge of routine & special tests of urine
- Acquire a detailed knowledge of Routine & Special tests of stool
- Acquire a detailed knowledge of Routine & Special tests of body fluids
- Acquire a detailed knowledge of Haematopoiesis
- Learn Hematology techniques-PBF, hematology auto analyzer
- Acquire a detailed knowledge of Basic blood group & cross matching
- Develop a detailed knowledge of Safe blood transfusion
- Learn indications of blood transfusion and donor selection
- Learn disorder of erythrocytes - study of morphology & basic methods
- Acquire a detailed knowledge of Anaemia - Classification & Laboratory diagnosis
- Learn Disorder of WBCs - study of morphology & basic methods with interpretation
- Develop a detailed knowledge of myeloma and leukoerythroblastic blood picture

d. Medical Education

- Acquire a detailed knowledge of basic information including terminology, trends in Medical education, current trends
- Acquire a detailed knowledge of Curriculum, learn to design and evaluate course curriculum
- Develop a detailed knowledge of effective learning
- Acquire a detailed knowledge of lesson plan and its different stages and components
- Learn different large group teaching methods, importance, advantages and disadvantages of large group teaching/learning. Planning, management and evaluation of large group teaching/learning.
- Learn importance, advantages and disadvantages of small group teaching and learning, different Small group teaching/learning methods, planning and management of effective small group teaching/learning, (especially emphasizing tutorial and practical classes) Evaluation of small group teaching and learning, importance and methods of self-learning
- Acquire knowledge about self-Learning.
- Acquire a detailed knowledge of designing, preparing and using appropriate teaching/learning materials and tools (Chalkboard, Flip chart, Printed material (handout), Overhead projector (OHP), Slide projector, Video & film, Multimedia models, others)
- Learn how to assess the resident's theoretical knowledge and practical skills
- Learn to assess the residents in an oral examination, advantages and disadvantages of traditional (open) oral examinations, structured oral examination (SOE)
- Acquire a detailed knowledge of OSPE, CAT

ii. Skill

After completion of the first year, residents must develop hands on experience and be able to:

a. Virology (General & Molecular Virology, Diagnostic Virology):

- Operate the autoclave, hot air oven, distillation plant, filters eg, Seitz and membranes and sterility tests.
- Care and maintenance of common laboratory equipment eg, water bath, centrifuge, refrigerators, incubators, etc.
- Perform immunological methods to diagnose viral infection e.g. ELISA, Chemiluminescence, Line Immunoassays (LIA).
- Preparation of glasswares for cell culture (washing, sterilization)
- Preparation of media for cell culture.
- Preparation of clinical specimens for isolation of viruses.
- Prepare and inoculate cell culture specimens.
- Recognition of CPE in cell cultures
- Perform egg inoculation techniques
- Aseptic practices in laboratory and safety precautions
- Disposal of contaminated material e.g. cultures.
- Care and breeding of laboratory animals eg, mice, rats, guinea pigs and rabbits.
- Techniques of withdrawal of blood from laboratory animals, including sheep.
- Inoculation of infective material in animals by different routes.
- Performance of autopsy on animals
- Serological tests HA, PHA, RPHA,
- Develop the ability to perform and interpret fluorescent microscopy, inverted microscopy, phase contrast and electron microscopy and recognize common viruses.
- Perform Western blot, Southern blot, Northern blot
- Perform microlymphocytotoxicity test for tissue typing.
- Perform gel electrophoresis, PCR, NASBA, Hybrid capture, Sequencing.
- Learn to trouble shoot the above methodologies

b. Medical Immunology

- Collection of blood by venepuncture, separation of serum and preservation of serum for short and long periods.

- Preparation of antigens from bacteria or tissues for Widal, Weil-Felix, VDRL, etc. and their standardization.
- Preparation of adjuvants e.g. Freund's adjuvant.
- Raising of antisera in laboratory animals
- Performance of serological tests e.g. Widal, RA, CRP, ASO Brucella tube agglutination, indirect haemagglutination, VDRL, Paul-Bunnell, IFA.
- Immunodiffusion in gels, counter immunoelectrophoresis.
- Enzyme linked immunosorbant assay.
- Latex and staphylococcal co-agglutination tests.
- Haemolysin and complement titration.
- Leucocyte migration inhibition test.
- T-cell rosetting.
- Separation of lymphocytes by centrifugation for gravity sedimentation etc.
- Radial immunodiffusion.
- Immunoelectrophoresis

c. Clinical pathology

- Perform Examination of Urine
- Perform Examination of Stool
- Perform Examination of Body fluid
- Perform Examination of Bone marrow
- Perform basic examination of CBC, PBF and their interpretation
- Develop ability to perform and interpret laboratory diagnosis of all anaemias
- Develop ability to perform and interpret laboratory diagnosis of all leukemias

d. Communications

- Develop effective communications with other members of medical staff, house staff, and members of healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written microbiology related communications.

e. Collaboration

- Learn to work effectively with other members of the laboratory team.

f. Health Advocacy

- Understand the role of the Virology laboratory in the public health system.
- Understand role of the Virology laboratory in population screening.

2. Part-II (Second year):

During the second year of the program, the resident will spend designated lengths of time in each of the subspecialty (laboratory/wards) sections of different departments. The expectation is that the resident will become knowledgeable regarding the technical and theoretical aspects of the tests used in each section, and the types of problems encountered in that section. During the second year of course, the residents shall be placed for clinical attachment and plan a research project that he/she will pursue in Phase -B for his/her thesis work.

i. Knowledge

a. Systemic Virology

The part of the course deals with viruses that cause systemic diseases in human. The goals of this part of course are to :

- Acquire knowledge regarding individual virus and virus families
- Understand the mechanisms of viral infection,
- Acquire knowledge about mode of transmission,
- Acquire knowledge about viral replication of specific virus,
- Understand the pathogenesis of viral diseases,

b. Clinical Virology and Viral Infectious Diseases

- Develop knowledge, skills, and aptitude to practice basic principles of prevention.
- Develop knowledge, skills, and attitudes needed for competent care.

- Acquire knowledge and skills necessary to assist in management of chronic diseases e.g. chronic HBV, HCV, HIV infections.
- Demonstrate sound clinical reasoning.
- Develop knowledge to appropriately assess patients with common signs and symptoms.
- Diagnose and demonstrate basic understanding of common diseases and conditions.
- Understand therapeutic options and participate in the care of patients with common problems.
- Recognize acute life-threatening medical problems and initiate care.
- Develop knowledge, skills, and attitudes to practice basic principles of prevention.
- Use information and educational technology to facilitate patient care.
- Incorporate ethical principles in clinical practice.
- Demonstrate professional behavior.

c. Bacteriology, Parasitology & Mycology

- Acquire knowledge of specific bacteria, parasites and fungi.
- Acquire a practical knowledge of infectious disease pathogenesis.
- Acquire a practical knowledge of disinfection and sterilization and the appropriate handling and disposal of infectious materials.
- Acquire knowledge of common infectious diseases as they relating to body sites.
- Acquire a working knowledge of newer molecular diagnostic methodologies including molecular fingerprinting, resistance determination, and detection of pathogens.
- Acquire knowledge of normal microbiologic flora and pathogens common at various infection sites.

d. Biostatistics

- Acquire a detailed knowledge of Data, types, sources, presentations of data

- Acquire a detailed knowledge of Sampling
- Learn the measures of morbidity (prevalence, incidence)
- Acquire basic concept distribution: frequency, types
- Learn the measures of central tendency (mean, median, mode)
- Learn the measures of dispersion (range, mean deviation, standard deviation, Standard error, co-efficient of variation, multiple regression)
- Acquire basic concept of tests of significance, Null and alternate hypothesis, 't' test, 'Z' test, 'X²' test 'r' test. 'F' test
- Understand concept of Validity

e. Research Methodology

- Acquire a detailed knowledge of definition and types of research
- Develop a detailed knowledge of formulation of hypothesis,
- Understand ethical considerations of biomedical research
- Acquire basic concept of research "strategies and designs".
- Learn to construct a research protocol
- Learn to write a thesis

ii. Skill

After completion of the second year, the residents must develop hands on experience and be able to:

a. Systemic Virology

- Collect handle and preserve of specimens for virological investigations.
- Develop comprehensive view to identify viral disease from a given patients.
- Analyze of specimens sent to the department for diagnosis of viral diseases.
- Develop ability to utilize serologic investigations for the diagnosis of viral infections.

b. Clinical Virology and Viral Infectious Diseases

- Integrate basic science concepts with clinical reasoning.

- Establish and maintain appropriate therapeutic relationships with patients.
- Obtain thorough medical history.
- Perform general clinical procedures.
- Perform physical examination.
- Assess patients with common signs and symptoms.
- Use appropriate tests to help guide diagnostic and therapeutic decisions.
- Diagnose and demonstrate basic understanding of common diseases and conditions.
- Understand therapeutic options and participate in the care of patients with common problems.
- Recognize acute life-threatening medical problems and initiate care.
- Participate in care in a variety of settings.
- Use information and educational technology to facilitate patient care.
- Incorporate ethical principles in clinical practice.
- Demonstrate professional behavior.
- Participate in discussions and decision-making with patients and families.

c. 1. Bacteriology

- Collect specimens for microbiological investigations eg, blood, urine, throat swab, rectal swab, stool, pus, OT specimens.
- Care and operate microscopes e.g. Light, Dark ground, Phase contrast, Fluorescent microscopes.
- Sterilize, prepare stains, reagents, media & storage.
- Acquire ability to prepare and interpret Gram, Albert, Ziehl-Neelson and other special stains for bacteria.
- Prepare liquid and solid media eg, Nutrient agar, Blood agar, MacConkey agar, TSI agar, Robertson's cooked meat, Lowenstein-Jensen, Sabouraud dextrose.
- Develop the ability to perform aerobic and anaerobic culture for the diagnosis of common microbial infections.
- Develop ability to recognize common bacterial species using conventional biochemical tests and commonly used kits.

- Develop ability to perform and interpret susceptibility testing and their interpretation.
- Develop the ability to utilize serologic investigations for the diagnosis of common infections.
- Prepare reagents eg, oxidase, Kovac, etc.
- Test for beta-lactamases.
- Learn techniques of anaerobiosis eg, Gaspack system, anaerobic jars-evacuation & filling with H₂, CO₂.
- Analyze urine by pour plate method and semiquantitative analysis by standard loop test for significant bacteriuria.
- Test motility: hanging drop, Craige's tube, dark ground microscopy for Spirochaetes eg, Treponema & Leptospira.
- Perform In vitro toxigenicity tests eg, Elek's test, Naglar's reaction
- Perform special tests eg, Bile solubility, niacin and catalase tests for mycobacterium, satellitism, CAMP test, and slide agglutination tests.
- Perform Skin tests eg, Mantoux, Lepromin etc.
- Aseptic practices and safety precautions in the laboratory.
- Perform Conjugation experiments for drug resistance
- Perform Phage typing for staphylococci, S.typhi, etc.
- Perform Antimicrobial susceptibility tests for mycobacteria.

2. Mycology

- Collection of specimens.
- Direct examination of specimens by KOH, Gram, Kinyoun's Giemsa stains.
- CSF examination by India ink preparation
- Isolation and identification of common laboratory contaminants and pathogenic yeasts and moulds.
- Maintenance of stock cultures.

3. Parasitology

- Examine faeces for parasitic ova, cysts etc. by direct and concentration methods (salt floatation and formol-ether methods).
- Perform Egg counting techniques for helminths.

- Examine blood for protozoa and helminthes by wet mount, thin and thick stained smears.
- Examine other specimens (urine, CSF, bone marrow) for parasites.
- Perform staining eg, Leishman, Giemsa, Modified Acid Fast Toluidene Blue
- Identify common arthropods and other vectors eg, mosquito, sand fly, ticks, mite and cyclops.
- Preserve parasites eg, mounting, fixing, staining, etc.
- Culture parasites eg, leishmania In-vitro
- Prepare media eg, NIH, NNN, etc.
- Perform Permanent staining techniques e.g. iron haematoxylin
- Perform DIP stick test/ ICT for malaria, Kala-azar, Filaria, etc.

d. Communications

- Develop effective communications with other members of medical staff, house staff, and other members of the healthcare delivery team.
- Engage in shared decision making, conduct family meetings as appropriate, successfully negotiate nearly all difficult outpatient encounters unaided
- Work effectively with other providers in the health care arena.
- Clearly communicate medical information in spoken and written forms.

e. Collaboration

- Learn to work effectively with other members of the laboratory team.

f. Health Advocacy

- Understand the role of the Virology laboratory in the public health system.
- Understand role of the Virology laboratory in population screening.

B. Phase-B (Final year):

a. Thesis work:

The residents should work on a research project in the final year of their residency and they should complete that during the 3rd year of training. Each resident will published at least 2 articles in journals recognized by university authority. They must present their progress of research project as part of their curriculum once in a month..

b. Interpersonal and Communication Skills

- Function as a team leader with minimal reliance upon attending physicians, thoroughly educate patients and their families regarding HIV and chronic hepatitis using education as a form of intervention and partnering, and effectively communicate with referring physicians.
- Demonstrate appropriate consultative principles of communication with other physicians and responsiveness to professional consultative requests.
- Sensitively communicate in a patient centered manner issues concerning drug use and end-of-life care.

c. Professionalism

- Exhibit honesty, trustworthiness and reliability in their clinical duties, as well as demonstrate integrity, compassion, and respect in their interactions with patients and colleagues from the same or different cultures/ages/sexes.
- Be responsible for prompt completion of medical records and proper documentation in the medical record.
- Demonstrate professional service to the infectious disease community through participation on appropriate committees, conferences and outside service.

d. Management

- Develop awareness of resource utilization in the Virology laboratory.
- Understand the principles underlying utilization management.

- Understand how to use information technology to more efficiently manage the laboratory.
- Become familiar with human resource management and budgeting.
- Understand how virology workload is measured.
- Understand principles around quality control, quality assurance, and continued quality improvement related to virology
- Gain experience in directing the activities of laboratory technologists
- Gain experience in evaluating clinical specimens
- Acquire knowledge of employee health and safety issues.
- Understand the process of budget development.

e. Health Advocacy

- Understand the role of the Virology laboratory in the public health system.
- Understand role of the virology laboratory in population screening.
- Learn to match available resources with laboratory priorities and the demands for patient testing.
- Understand when to use laboratory resources for the benefit of individual patients vs. the benefit of the population
- Understand the role of advocacy for a strong public health and diagnostic laboratory system
- Understand the role for advocacy for quality programs at the hospital, provincial and federal levels

OVERVIEW OF THE SYLLABUS

Name of the course: MD, Medical Virology

Duration of the course: 3 years

Comprising, Phase-I (Part-I, II; Two years) & Phase -II (part- III; One year)

Commencement of the course: 1st January of each year

Part-I (One year)

Paper-I (General and Molecular Virology)

Paper-II (Applied and Diagnostic Virology)

Paper-III (Medical Immunology)

Part-II (One year)

Paper-IV (Systemic Virology)

Paper-V (Clinical Virology and Viral Infectious Diseases)

Paper-VI (Medical Microbiology)

A resident should submit and approve their thesis protocol and log book of Clinical Virology Ward Placement before appearing in the summative exam in part-II.

Part-III (One year)

Thesis & Thesis defense

Comprehensive Viva

Course content of MD (Virology)

Total duration of course: 3 Years

Phase-A:

Part-I (1 Year):

Paper - I: General & Molecular Virology

Theory:

General Virology

- Introduction to Virology: terms, definition, classification, general characteristics, structure
- Viral growth and replication
- Transmission and pathogenesis
- Immunity in viral infections
- Control of viral diseases: Viral vaccines, antiviral agents, interferons, gene therapy
- Sterilization, disinfection and laboratory safety
- Infection control, waste disposal
- Bacteriophages

Molecular Virology

- General Introduction of Host/Human genetics
- DNA, RNA, Protein synthesis
- Viral genetics
- Viral application of molecular biology
- Viral vectors and gene therapy

- Molecular techniques:
Polyacrylamide gel electrophoresis, Western blotting, PCR, Restriction endonuclease characterization, Hybridization, Southern blotting, Northern blotting, Sequencing, Restriction fragment length polymorphism.
- Bioinformatics

Practical:

Laboratory safety, Quality assurance, Safe disposal of laboratory products, Maintenance of equipments, Specimen collection and transportation, Sample preparation Laboratory procedures, Record keeping, Preservation of samples, Practice of sterilization and disinfection.

Paper - II: Applied and Diagnostic virology

Theory

- Introduction to the virology laboratory
- Collection, handling, processing, transport and preservation of viral specimens
- Study and handling of microscope: Light microscope, IF microscope, inverted microscope, electron microscope
- Virus isolation: Cell line cultures, inoculation of animals & embryonated eggs
- Virus assays:
Viral antibody measurement/serological tests for viral antibodies: Virus neutralization, HI, IF, CFT, ELISA, IEM, immunoblot assays, immunodiffusion, counter-immunoelectrophoresis, Radioimmunoassay, immunoperoxidase staining,
Viral antigen detection: IF, ELISA, chemiluminescence, RIA, HA,
Assays of others virus properties, e.g. haemagglutination, haemadsorption
- HLA tissue typing
- Flow Cytometry

Practical:

- Carry out all the related laboratory procedures (see curriculum, page 11)
- Bioinformatics

Paper-III: Medical Immunology

Theory

Basic Immunology:

- Introduction to Immunology: structure, organization, cells of the immune system,
- Immunity, immune response, cellular basis, mechanism & regulation of the immune response, mediators
- Antibodies, Immunoglobulins, Humoral immunity
- Cell mediated immunity
- Cytokines
- Antigen-antibody reactions in the laboratory

Applied Immunology

- Complement system
- Hypersensitivity
- Tolerance & Autoimmune diseases
- Major Histocompatibility Complex & Transplantation
- Tumour immunity
- Immunodeficiency
- Immunological diagnostic tests

Practical:

- Carry out all the related laboratory procedures (see curriculum, page 12)

Clinical Pathology: Will be assessed in end block examination.

- Routine & special tests of urine
- Routine & special tests of stool
- Routine & special tests of body fluids
- Haematopoiesis
- Hematology techniques eg. PBF, hematology auto analyzer
- Basic blood group and cross matching
- Safe blood transfusion

- Indications of blood transfusion & donor selection
- Disorder of erythrocytes-study of morphology and basic methods
- Anaemia - Classification and laboratory diagnosis
- Disorder of WBCs - study of morphology and basic methods with interpretation
- Myeloma & leuko-erythroblastic blood picture

Medical Education (will be assessed in end block examination.)

- Introduction to Medical Education
- Curriculum : Utilities, Designing, Evaluation of a curriculum / course
- Effective learning
- Lesson plan
- Large group teaching/learning
- Small group teaching/learning and self-learning
- Designing, preparing and using appropriate teaching/learning materials and tools.
- Assessment of Students
- Assessment of theoretical knowledge
- MCQ/MEQ/SAQ
- Oral examinations:
- Practical examinations
- OSPE

Part-II (1 Year):

Paper-IV: Systemic Virology

Theory

DNA Viruses

- Parvoviridae, Papovaviridae, Adenoviridae, Hepadnaviridae, Herpesviridae, Poxviridae, Others.

RNA Viruses

- Picornaviridae, Caliciviridae, Flaviviridae, Togaviridae, Tumor viruses & oncogenes, Orthomyxoviridae,

Paramyxoviridae, Rhabdoviridae & Slow viruses, Filoviridae, Coronaviridae, Arenaviridae, Bunyaviridae, Others.

Retrovirus

- Retroviridae,

Practical

- Isolation and Identification of unknown virus
- Serological procedures to detect viral antigen or antibody
- Molecular techniques to detect viral DNA or RNA

Paper V: Clinical Virology and Viral Infectious Diseases

(With clinical attachment at different hospital units):

Theory

- Role of viruses in disease
- Viral Hepatitis
- Viral gastroenteritis
- Viral diseases of the CNS
- Viral diseases of the respiratory tract
- Sexually transmitted viral diseases
- Congenital viral diseases
- Paediatric viral diseases
- Arthropod-borne and rodent-borne viral diseases
- Viral exanthemas
- Viral diseases of the heart
- Viral diseases of the eyes
- Slow viral & Prion diseases
- HIV/AIDS

Practical

(Placement in Hospital wards)

Management of Patient with different viral diseases.

Paper VI: Medical Microbiology

Theory

Bacteriology

- Introduction to Bacteriology: Definitions, classification, structure, growth & metabolism
- Host parasite interaction, normal flora in health & disease, bacterial pathogenesis, host defenses
- Concepts in antimicrobial therapy: mechanism of action, resistance, etc.
- Bacterial genetics
- Milk, food and water bacteriology
- Laboratory techniques in bacteriology
- Systemic Bacteriology: Staphylococci, Streptococci, Neisseriae, Enterobacteriaceae, Vibrinioceae, Pseudomoniaeae, Haemophilus, Corynebacteria, Mycobacteria, Anaerobic bacteria, Bacillus, Clostridium, Spirochetes, Rickettsiae, Mycoplasma, Chlamydiae.
- Infection control, Nosocomial infection
- General Parasitology: Introduction to parasitology, definitions, classification, pathogenesis.
- Anti-parasitic agents
- Systemic Parasitology:
- Protozoology: E. histolytica, G. lamblia, Trichomonas, Plasmodium, Cryptosporidium, Toxoplasma Helminthology: Round worm, Tapeworm, Hookworm, Filaria

Mycology

- Basic Mycology: Definitions, classification, structure.
- Anti-fungal agents
- Dermatophytes
- Endemic Mycoses
- Opportunistic Mycoses: Candida, Cryptococcus Neoformans, Aspergillosis, Pneumocystis Jiroveci

Practical

- Carry out all the related laboratory procedures (see curriculum, page 18).

Bio-statistics and Research Methodology

Bio-Statistics & Research methodology related to medical science will be assessed in end block examination.

Biostatistics

- Data:
- Sampling
- Measures of morbidity
- Distribution
- Measures of Central tendency
- Measures of dispersion
- Probability, Significance test
- Validity

Research Methodology

- Definition and types of research
- Identification of research problem
- Formulation of hypothesis
- Ethical considerations of biomedical research
- Research "strategies and designs"
- Construction of research protocol
- Thesis writing

NB: Simulated assignments on various aspects of research methodology shall be given to the residents and evaluated by the teachers.

Phase-B:

Part-III (1 Year): Thesis part

In this phase, resident have to finalize the research proposal that was designed at the 2 nd part of the course. A wide choice of subjects for research is permitted which include any clinical, epidemiologic or basic questions related with virological problems. The research must be designed and specifically performed by the resident with the advice of the faculty mentors. The resident must have a hypothesis which will be finally supported or rejected by data that are generated by the resident. A close working relationship between the resident and faculty members is strongly encouraged. The thesis work will be performed after approval of the research proposal from the Institutional Review Board (IRB) under the guidance of the Departmental Chairman.

Assessment of the resident

Assessment is the process of forming a judgment about the quality and extent of student achievement or performance, and therefore, by inference, a judgment about the learning itself. Assessment inevitably shapes the learning that occurs; that is, what students learn and how they learn should reflect closely the purposes and aims of the course.

Residency assessment examination will be two types: Formative and Summative.

A. Formative evaluation

Formative assessments include Assessment at work place situations, Assessment at rotational placements, End-of-Block or End-of-Module Exams and within-Block or within-Module assessments (Seminar/journal club presentations, other presentations, Written, Practical or Clinical assignments etc. End of Block Exams will be Formative.

End of Block End /Module Examination Format

End-of-block or End-of-Module Exams			
Assessment	Total Marks	Pass Marks	Time
A. Written Exams	50	30	90 minutes
Objective questions	15		
SAQ	35		
B. Oral Exams	50	30	
C. Practical/Clinical Exams	50	30	
D. Grades and Marks from Within-Block or Within-Module Assessments (Log-Book results)	50	30	
	200		

• Examiners of formative examinations

There shall be two examiners (preferably one external) for oral and practical exams. Written script will be examined by either of the examiners.

Departmental examination committee will propose the name of the examiners. The examiners and moderators of the examinations will be of the rank of Professor/Associate Professor. In absence of eligible examiners only, assistant Professor of the respective department of BSMMU, Dhaka, may be appointed as examiners provided he/she has worked as regular assistant professor for at least three years.

- **Eligibility of examinations:** Before sitting for EOB exams all modules of the block must be cleared. If one fails in the End of Block of Exam s/he will have to repeat the exam. Throughout the course, structured assessment will be done for the assessment of students' performance. Log book for every students will be maintained.

B. Summative Examinations

These includes Year 1 & 2

Phase- A

• Eligibility

There are three summative examinations: i) Phase- A, Year- 1 Exams; ii) Phase- A, Year- 2 Exams; iii) Phase- B Exams.

i). Phase- A, Year- 1 Examination is open to any candidate who:

- has undertaken the course of study prescribed for Year- 1, and has attended at least 75% of the classes.
- has completed all the assignments prescribed in the curriculum for Year- 1.

ii). Phase- A, Year- 2 Examination is open to any candidate who:

- has previously passed the Year- I Examination in at least two of the three Papers

Residency Program

- has undertaken the course of study prescribed for Year- 2, and has attended at least 75% of the classes.
- has completed all the assignments prescribed in the curriculum for Year- 2 .

Has undergone a course of study for at least 1 year in the respective subject, and has attended at least 75% of each component of the course composition as prescribed in the syllabus for the course. Before sitting for Year 1 final examinations examinees have to clear the EOB exams.

Year 2 examination shall be open to any candidate who has attended at least 75% of each component of the course composition as prescribed in the syllabus for the course. Before sitting for Year 2 final examinations examinees have to clear the EOB exams and has previously passed the Part I examination in at least two papers.

• Marks distribution

Year ending final result: Part-I

Pass marks 60% in each compartment (Written, Oral and Practical)

Paper and Subject	30% marks of formative examination.	70% marks of summative examination	Total marks obtained
Written Paper-I (General Bacteriology and Basic Immunology) Paper-II (Systemic Bacteriology) Paper-III (Mycology and Parasitology)			
Practical Paper-I (General Bacteriology and Basic Immunology) Paper-II (Systemic Bacteriology) Paper-III (Mycology and Parasitology)			
Oral Paper-I			

Residency Program

(General Bacteriology and Basic Immunology) Paper-II (Systemic Bacteriology) Paper-III(Mycology and Parasitology))			
Medical Education	Satisfactory	Unsatisfactory	
Clinical Pathology	Satisfactory	Unsatisfactory	

Year ending final result: Part-II

Pass marks 60% in each compartment (Written, Oral and Practical)

Paper and Subject	30% marks of formative examination	70% marks of summative examination	Total marks obtained
Written Paper-IV(Systemic Immunology and Virology) Paper-V(Systemic and Applied Immunology) Paper-VI(Paper-VII: Infectious disease & Clinical Microbiology)			
Practical Paper-IV(Systemic Immunology and Virology) Paper-V(Systemic and Applied Immunology) Paper-VI(Paper-VII: Infectious disease & Clinical Microbiology)			
Oral Paper-IV(Systemic Immunology and Virology) Paper-V(Systemic and Applied Immunology) Paper-VI(Paper-VII: Infectious disease & Clinical Microbiology)			
Biostatistics and Research Methodology	Satisfactory	Un satisfactory	

• Examiners of Year ending examinations

Departmental examination committee will propose the name of the examiners to the Faculty of Basic Medical Sciences for recommendation. The Academic Council of BSMMU, Dhaka, will then appoint the examiners based on the recommendation of the departmental examination committee and Faculty of Basic Medical Sciences. The examiners and moderators of the examinations will be of the rank of Professor/Associate Professor. In absence of eligible examiners only, assistant Professor of the respective department of BSMMU, Dhaka, may be appointed as examiners provided he/she has worked as regular assistant professor for at least three years. There shall be two examiners (one external and one internal) for each paper, who will examine the answer scripts along with practical and oral examination.

Each group (A and B) of written exam paper will be examined by one examiner of the oral and practical examination. There shall be two examiners (one external and one internal) for each paper, who will examine the answer scripts along with practical and oral examination.

B. Phase B

Phase B Final examination

• Eligibility

Phase- B examinations are open to any candidate who:

- Has previously passed the Year-1 and Year- 2 Examinations.
- Has conducted an approved research work for at least one year at BSMMU, Dhaka, or any other institute approved by the University, and has submitted a thesis embodying the results of that research.
- has completed all the assignments prescribed in the curriculum for Phase- B.
- Has submitted five unbound copies of the thesis to the University within the stipulated time.
- Has produced a certificate of completion of his/her work from the Supervisor(s) of the thesis countersigned by the Chairman of the Department.

A resident passing in any Paper in any summative examination is not required to appear in the same paper in any subsequent examination.

- A resident who fails in Part I or Part II examination may appear in a subsequent examination (which is held in every 6 months interval) without further pursuing a course of the same studies. The student must clear Part I and Part II within a period of four years of commencement of the course. Otherwise, he/she will be debarred from the course.
- A student who fails in final examination may reappear in a subsequent examination on payment of usual fees without carrying out further new research except that are necessary to correct defects in the existing thesis.
- Thesis examination shall be conducted by Board of Examiners comprising four in number in the area of related specialty, and there will be one Chairman and three members, at least two of which will be the externals, in each board. The supervisor of the research work may be a member of the board, and the internal other than supervisor will be the chairman of the board of examiners.

• Result

	Total mark	Pass mark	Mark received
Thesis	100	60	
Thesis defense	100	60	
Comprehensive viva	100	60	

- The results of the thesis presentation and defense will be consolidated as follows
 - Accepted
 - Accepted with corrections
 - Not accepted
- In case a candidate is unable to satisfy the Viva-voice Board even though the thesis is adjudged adequate, the Board may recommend to the Academic Council that the candidate may be permitted to appear at another oral examination after a

lapse of 6 months from the first oral examination. No candidate shall be allowed to appear at the oral examination of the same thesis for more than two times.

- d. If a thesis is judged inadequate for the award of the MD degree, the examiners may permit the candidate to do more research work in order to improve the standard of the thesis, and may recommend the Academic council that the candidate may be allowed to appear at a new examination after necessary improvement of his/her thesis.

Medical Virology Resident's Responsibilities

A. Phase-A

1. Part-I (First year):

First six months

Orientation to the Virology laboratory should normally be the responsibility of the senior Virology Resident. This should be scheduled to coincide with the learner's first week on residency.

- Begin work when the work begins on the specific bench,
- Attend weekly Journal presentations
- Attend weekly seminars
- Attend all other learning activities of the department
- Laboratory training should covers all sections of the laboratory

Second six months

- On entering into second six month of residency, residents will have to perform the laboratory procedures independently according to their placement schedules. They will perform the preliminary reporting and will be present when senior resident or any faculty evaluates any test procedure.
- Will attend all departmental journal club, seminars, other departmental presentations
- Each resident will have to present at least one journal during this period.

2. Part-II (Second year):

Third six months

- On entering into the third six months of residency, residents will have to perform laboratory procedures in Bacteriology,

Parasitology and Microscopy sections. They will perform the preliminary reports and will be present when senior residents or any faculty/ teachers evaluate the tests or microscopic examinations.

- Will attend the morning session.
- Will carryout all the advised tests for the diagnosis of bacteria in the culture section and follow up
- Will be responsible for collecting Slit skin smear, Bone marrow, Skin scraping, nail shaving, hair, and other laboratory specimen.
- Preliminary microscopy of urine and stool advised for culture, Gram stains of all other specimens sent for microscopy.
- Independently perform Gram stain, Zeihl Nelsen stain, Leishman staining, Giemsta stain, Fluorescent staining, all fungal staining, etc.
- Attend all departmental journal club, seminar, other departmental presentations
- Each resident will have to present at least one journal and/or one seminar during this period
- Will develop one/two research protocols.

Fourth six months

- This period is scheduled for Infectious Disease calls while on service (after second six month introductory block).
- Will regularly visit the ICU, Infectious disease ward, Hepatology, Gastroenterology, Dermatotomy & Venereology and all other departments (will be placed in these departments under the disposal of the chairman. They will work in addition to departmental responsibilities).
- Will present at least two journals and/or one seminar during this period.
- Will perform, interpret and report tests independently.
- Will present two cases of infectious diseases admitted in the hospital during this period
- Will develop a research protocol for thesis under a guide and will present this protocol to the full faculty for approval.

B. Phase-B

- Residents should identify at least one research project in the final year of their residency and are normally expected to complete one project during the third year of training. Each resident will published at least one article in a journal recognized by the University.
- Will present the progress of their research project once a month.
- Acquire knowledge of the essential steps involved in answering research questions by clinical and basic research.
- Participate in a clinical or basic research project in order to develop the potential for a research career.
- Present at least one/two seminars during this period.
- Monitor and help the junior residents to perform, interpret and report test independently.
- Counsel at least four HIV patients.
- Counsel hepatitis patients and patients coming for TORCH screening.
- Before appearing in the final examination, his/her thesis should be approved at the faculty meeting and an article based on his/her research project should be submitted in a journal recognized by the University.

Medical Virology Resident's Code Of Conduct

Academic misconduct is defined as any activity that tends to undermine the academic integrity of the institution. Academic misconduct may involve human, hard-copy, or electronic resources.

Policies of academic misconduct apply to all course, department and university-related activities, including field trips, conferences, performances and exams outside of a specific course structure (such as take-home exams, entrance exams, or auditions and theses exams) and research work outside of a specific course structure (such as lab experiments, data collection, service learning, and collaborative research projects). The faculty member may take into account the seriousness of the violation in assessing a penalty for acts of academic misconduct. The faculty

member must report all cases of academic misconduct to the appropriate official. Academic misconduct includes, but is not limited to, the following:

A. Cheating

Cheating is considered to be an attempt to use or provide unauthorized assistance, materials, information, or study aids in any form and in any academic exercise or environment.

- A resident must not use external assistance on any "in-class", "take-home" or in hall examination, unless the involved faculty member specifically has authorized external assistance. This prohibition includes, but is not limited to, the use of tutors, books, notes, calculators, computers, and wireless communication devices.
- A resident must not use another person as a substitute in the taking of an examination or quiz, nor allow other persons to conduct research or to prepare work, without advanced authorization from the involved faculty member to whom the work is being submitted.
- A resident must not use materials from a commercial term paper company, files of papers prepared by other persons, or submit documents found on the Internet.
- A resident must not collaborate with other persons on a particular project and submit a copy of a written report that is represented explicitly or implicitly as the student's individual work.
- A resident must not use any unauthorized assistance in a laboratory, at a computer terminal, or on fieldwork.
- A resident must not steal examinations or other course materials, including but not limited to, physical copies and photographic or electronic images.
- A resident must not submit substantial portions of the same academic work for credit or honors more than once without permission of the instructor or program to whom he work is being submitted.
- A resident must not, without authorization, alter a grade or score in any way, nor alter answers on a returned exam or assignment for credit.

B. Fabrication

A resident must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citation to the sources of information.

C. Plagiarism

Plagiarism is defined as presenting someone else's work, including the work of other students, as one's own. Any ideas or materials taken from another source for either written or oral use must be fully acknowledged, unless the information is common knowledge. What is considered "common knowledge" may differ from course to course.

1. A resident must not adopt or reproduce ideas, opinions, theories, formulas, graphics, or pictures of another person without acknowledgment.
2. A resident must give credit to the originality of others and acknowledge indebtedness whenever:
 - i. directly quoting another person's actual words, whether oral or written;
 - ii. using another person's ideas, opinions, or theories;
 - iii. paraphrasing the words, ideas, opinions, or theories of others, whether oral or written;
 - iv. borrowing facts, statistics, or illustrative material; or
 - v. offering materials assembled or collected by others in the form of projects or collections without acknowledgment

D. Interference

A resident must not steal, change, destroy, or impede another student's work, nor should the student unjustly attempt, through a bribe, a promise of favors or threats, to affect any resident grade or the evaluation of academic performance. Impeding another resident work includes, but is not limited to, the theft, defacement, or mutilation of resources so as to deprive others of the information they contain.

E. Violation of Course Rules

A resident must not violate course rules established by a department, the course syllabus, verbal or written instructions, or

the course materials that are rationally related to the content of the course or to the enhancement of the learning process in the course.

F. Facilitating Academic Dishonesty

A resident must not intentionally or knowingly help or attempt to help another student to commit an act of academic misconduct, nor allow another student to use his or her work or resources to commit an act of misconduct.