

SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DEPARTMENT OF MICROBIOLOGY & PARASITOLOGY
Courses and curricula for MS in Microbiology

Course Code	Course Title	Credits Hour
Compulsory Courses		
MIPA 601	General Bacteriology, Mycology & Mycoplasmaology	3
MIPA 602	Systematic Bacteriology, Mycology & Mycoplasmaology	3
MIPA 603	Immunology, Serology & Vaccinology	3
MIPA 604	General Virology, Rickettsiology & Chlamydiology	3
MIPA 605	Systematic Virology, Rickettsiology & Chlamydiology	3
MIPA 606	Microbial Genetics & Molecular Microbiology	3
Elective courses		12
MIPA 607	Zoonotic Microbiology & One Health	3
MIPA 608	Microbial Toxins	3
MIPA 609	Laboratory Techniques in Microbiology	3
MIPA 610	Environmental Microbiology	3
MIPA 611	Advanced Animal, Poultry Health & Hygiene	3
MIPA 612	Food Microbiology, Food Borne Infection & Intoxication	3
MIPA 613	Food hygiene, Laws & Regulation	3
MIPA 614	Industrial Microbiology & Food Plant Sanitation	3
	or related courses from other disciplines / Department	
MIPA 619	Seminar	1
MIPA 620	Research Work for Thesis	16
Total Credit Hour		47

January-June Semester

(Elective courses may be changed in different semesters)

Course Code	Course Title	Credits Hour
Compulsory Courses		
MIPA 601	General Bacteriology, Mycology & Mycoplasmaology	3
MIPA 602	Systematic Bacteriology, Mycology & Mycoplasmaology	3
MIPA 603	Immunology, Serology & Vaccinology	3
Elective courses (Any Two)		
MIPA 607	Zoonotic Microbiology & One Health	3
MIPA 608	Microbial Toxins	3
MIPA 609	Laboratory Techniques in Microbiology	3
MIPA 610	Environmental Microbiology	3

July-December Semester

(Elective courses may be changed in different semesters)

Course Code	Course Title	Credits Hour
Compulsory Courses		
MIPA 604	General Virology, Rickettsiology & Chlamydiology	3
MIPA 605	Systematic Virology, Rickettsiology & Chlamydiology	3
MIPA 606	Microbial Genetics & Molecular Microbiology	3
Elective courses (Any Two)		
MIPA 611	Advanced Animal, Poultry Health & Hygiene	3
MIPA 612	Food Microbiology, Food Borne Infection & Intoxication	3
MIPA 613	Food hygiene, Laws & Regulation	3
MIPA 614	Industrial Microbiology & Food Plant Sanitation	3
	or related courses from other disciplines / Departments	

Course Code: MIPA 601

Course Title: General Bacteriology, Mycology & Mycoplasma

Credits Hour: 3

Introduction: Historical introduction. Prokaryotes and their difference from Eukaryotes. Taxonomy of Bacteria.

Bacterial morphology: Bacterial cell, structural components and functions. Dynamics of bacterial growth and physiology of bacteria.

Bacterial genetics: Pathogenicity and infections. Mechanisms of infection.

Microbial virulence: Factors influencing virulence.

Physical, Chemical, Chemotherapeutic agents: Physical, Chemical, Chemotherapeutic agents and their effects in bacteria, fungi and mycoplasma.

Fungi and mycoplasma: Definition general properties, Classification, cultural and general diagnostic aspects of fungi and mycoplasma.

Recommended books

- 1) Essentials of Veterinary Microbiology (Fifth Edition)
By G.R.Carter, M.M.Chengappa and C.A.W.Roberts
- 2) Veterinary Bacteriology and Virology
By I.A.Merchant and R.A.Packer
- 3) Text Book of Veterinary Microbiology
By S.N.Sharma and S.C.Adlakha
- 4) Jawetz, Melnick and Adelberg's Medical Microbiology (Twenty-first Edition)
By G.F.Brooks, J.S. Butel and S.A Morse
- 5) Pathogenesis of Bacterial Infections in Animals
By C.L.Gyles and C.O.Thoen
- 6) Topley and Wilson's Microbiology and Microbial Infections (Volume-3; 9th Edition)
By L.Collier, A.Balows and M.Sussman

MIPA 602

Systematic Bacteriology, Mycology & Mycoplasmaology

Credit hour : 03

Systematic Bacteriology: Studies on morphological, cultural and biochemical properties, antigenic, structures, bacterial products, pathogenicity, diagnosis, immunity and ecology of important bacteria (*Streptococcus*, *Staphylococcus*, *Bacillus*, *Clostridium*, *Campylobacter*, *Escherichia*, *vibrio*, *Salmonella*, *Shigella*, *Corynebacterium*, *Pasteurella*, *Brucella*, *Actinobacillus*, *Actinomyces*, *Mycobacterium*, *Pseudomonas*, etc.). Pathogenic to animals, avians and men with special reference to Bangladesh.

Mycology & Mycoplasmaology: History, natural habitat, transmission, morphology & staining properties, cultural & biochemical properties, pathogenicity, immunity, serological and molecular identification of important fungi and mycoplasma.

Recommended books

- 1) Essentials of Veterinary Microbiology (Fifth Edition)
By G.R.Carter, M.M.Chengappa and C.A.W.Roberts
- 2) Veterinary Bacteriology and Virology
By I.A.Merchant and R.A.Packer
- 3) Text Book of Veterinary Microbiology
By S.N.Sharma and S.C.Adlakha
- 4) Jawetz, Melnick and Adelberg's Medical Microbiology (Twenty-first Edition)
By G.F.Brooks, J.S. Butel and S.A Morse
- 5) Pathogenesis of Bacterial Infections in Animals
By C.L.Gyles and C.O.Thoen
- 6) Topley and Wilson's Microbiology and Microbial Infections (Volume-3; 9th Edition)
By L.Collier, A.Balows and M.Sussman

MIPA 603

Immunology, Serology & Vaccinology

Credit hour: 03

Immunology: General feature and mechanisms of immune response. Basic features of immune response, innate immunity, Antigens and Immunoglobulin, Cells and organs of the immune system. Cellular basis of humoral and cell mediated immune response, Th1, Th2 and Th17 immune system, Major Histocompatibility Complex, Hypersensitivity, Complement system and their role in immune mechanism and body defense, Microbial products influencing acquired immunity, Induction of immune response and immune effector mechanisms, Chemical mediators of the immune system. Regulation of immune response, Factors responsible for immune tolerance and immune response against tumor.

Serology: Principles and procedure of different serological tests. Detection and measurement of antigens and antibodies by serological methods. Preparation and purification of antigens, Reagents employed in serological tests detection and measurement of antibody, Procedures and uses of common serological tests, Concepts of protection against infecting agents.

Vaccinology: Vaccines and vaccination, Types of consequences of vaccination, vaccination failure. Types of vaccines and their production. Studies of different aspects of vaccines and vaccination with special reference to safety, purity, stability and potency. New approaches to vaccine development including subunit synthetic vaccines and important livestock vaccines.

Recommended books

1. Cellular and Molecular immunology- Abul K Abbas and Andrew H Lichtman
2. Veterinary Immunology – An Introduction- Ian R. Tizard
3. Immunobiology – The Immune System in Health and Disease- Charles A Janeway, Jr, Paul Travers, Mark Walport, J Doanld Capra
4. Essential Immunology- Ivan M Roitt
5. Kuby Immunology- Judy Owen, Jenni Punt and Sharon Stranford
6. Practical Immunology- Frank C. Hay, Olwyn M.R. Westwood

MIPA 604

General Virology, Rickettsiology & Chlamydiology

Credit hour: 03

Virology: Historical introduction Nature of viruses, Physicochemical properties of virus, Classification and Nomenclature of viruses, inactivation and preservation of viruses, Biology of RNA and DNA viruses, Replication, Purification and characterization of viruses, Viral genetics, Epidemiology and ecology of Viral infection, Host-virus interactions, persistent viral infection, Interfere & Interference phenomenon, Antiviral agents, viral vaccines and Viral oncogenesis.

Rickettsiology & Chlamydiology: Definition, general properties, Classification, common cultural and diagnostic aspects of Rickettsia and Chlamydia.

Recommended books

1. Veterinary Virology- Frederick A. Murphy et al-1999
2. Veterinary viruses- P.H. Russel & N. Edington,1987
3. Veterinary Virology- F. J. Fenner & others, 1987
4. Veterinary Virology- S. Mohanty & S. Dutta, 1980
5. Fields Virology- Bernard N. Fields & et al
6. Medical virology- F. J. Fenner & D.O. White 2nd edition, 1976.
7. Biology of animal viruses-F. J. Fenner & others, 1974.
8. Viruses of vertebrates- S. C. Andrews, H. G. Perira, P. Wildy, 4th Edition, 1978.
9. Animal microbiology Vol II- A. Buxton & G. Fraser, 1977.
10. Principles of Animal Virology-W.K. Joklik,1988
11. A laboratory guide in virology- C. H. Cunningham, 1968
12. Topley & Wilson's Microbiology & Microbial Infection- Leslie Collier et al

MIPA 605

Systematic Virology, Rickettsiology & Chlamydiology

Credit hour: 03

Virology: Physicochemical and biological properties, cultivation, pathogenicity, diagnosis, immunity and ecology of important viruses (Myxo virus, Rhabdo virus Corona virus, Leuko virus. Picorna virus, Reo virus, Herpes virus. Pox virus, Parvo virus, Papova virus, Adeno virus, Calici virus, Onco virus, Diplorna virus, Toga virus, Birna virus, Arena virus, Irrido virus, Unclassified RNA viruses). Pathogenic to animals, avians and men with special reference to Bangladesh.

Rickettsiology & Chlamydiology: History, natural habitat, transmission, morphology & staining properties, cultural & biochemical properties, pathogenicity, immunity, serological and molecular identification of important Rickettsia and Chlamydia.

Recommended books

1. Veterinary Virology- Frederick A. Murphy et al-1999
2. Veterinary viruses- P.H. Russel & N. Edington,1987
3. Veterinary Virology- F. J. Fenner & others, 1987
4. Veterinary Virology- S. Mohanty & S. Dutta, 1980
5. Fields Virology- Bernard N. Fields & et al
6. Medical virology- F. J. Fenner & D.O. White 2nd edition, 1976.
7. Biology of animal viruses-F. J. Fenner & others, 1974.
8. Viruses of vertebrates- S. C. Andrews, H. G. Perira, P. Wildy, 4th Edition, 1978.
9. Animal microbiology Vol II- A. Buxton & G. Fraser, 1977.
10. Principles of Animal Virology-W.K. Joklik,1988
11. A laboratory guide in virology- C. H. Cunningham, 1968
12. Topley & Wilson's Microbiology & Microbial Infection- Leslie Collier et al

MIPA 606

Microbial Genetics & Molecular Microbiology

Credit hour: 03

Microbial Genetics: Introduction to microbial genetics and biotechnology. Microbial gene, genome and genetics. Microbial genome regulations. genetic basis for variation in microbial population. Mechanisms for gene transmission between microbial cells, Mechanisms of regulation of expression. Life cycle of lytic and temperate Bacteriophage. Molecular biology of extrachromosomal genetic elements. Mutations, mutagenesis and molecular mechanisms of antibiotic resistance. Introduction to molecular biology, nucleotide structures bacterial restriction / modification system, DNA/RNA modification enzymes, DNA replication, Plasmids, Markers. Transcription and translation, Operons; DNA foot printing. Protein chemistry methodology, phage, display technology, molecular imprinting. DNA, RNA and cell based diagnostics.

Molecular Microbiology: Molecular structures of different microbes and their isolation, replication, conjugation, purification and characterization. Vector, Insert and Plasmid. Preparation of genomic RNA & DNA from microbes, Preparation of plasmid DNA from microbes and their uses in biotechnological research, Preparation of Purified virus particles, isolation, purification and characterization of viral proteins and nucleic acids, genetic analysis of microbial RNA and DNA. Determination and amplification of nucleic acid and protein by molecular techniques, (e.g SDS-PAGE), Immunoblotting/Western blotting, Southern hybridization, Northern hybridization, PCR, RT-PCR, Inverse PCR, Restriction, enzymes, RFLP analysis, cloning, expression of protein and sequencing technique of nucleic acid and protein, Recombinant DNA technology.

Recommended books

1. Polymerase chain reaction- Principles, Applications And Troubleshooting-
By Prof. Dr. Masroor Ellahi Babar
2. Biology of animal viruses-F. J. Fenner & others, 1974.
3. A laboratory guide in virology- C. H. Cunningham, 1968

MIPA 607

Zoonotic Microbiology & One Health

Credit hour: 03

Definition & scopes of Zoonotic Microbiology & One Health. Role of Microbiologist in the field of Zoonotic Microbiology & one Health.

One Health & it's activities: Historical development of one Health concept. Global One Health activities. Domestic one Health activities.

Emerging, Re-emerging Zoonoses: Methods of Rapid Risk Assessment for Emerging, Re-emerging & Neglected Zoonotic microbes. Emergency Preparedness for Emerging, Re-emerging & Neglected Zoonotic microbes.

Microbes having zoonotic importance: Habitat, Host Range, Transmission Cycle, Outbreak History, Rapid Detection, Emergency Preparedness, public health significance and Epidemiological investigation of the following microbes having zoonotic importance; Bacillus, Mycobacterium, Escherichia coli 057 and other enterohemorrhagic E. coli (EHEC), Salmonella, Shigella, Campylobacter, Brucella, Listera, Leptospira, Yersina, Francisella, Avian influenza virus, Rabies, Ebola virus, Lassa virus, Marburg virus, Pox virus, Herpes Avian Influenza virus, Rabies, Ebola virus, Lassa virus, Marburg virus, Pox virus, Herpes virus, Arbo virus, Hepatitis virus, Lymphocytic chorio-meningitis virus, Vesicular Stomatitis virus, West Nile fever virus, Eastern equine encephalitis virus, Western equine encephalitis virus, Japanese encephalitis virus, Hanta-virus, Rift Valley fever virus, Dermatophytes, Candidia, Basidiobolus ranarum, Cryptococcus neoformans, Histoplasma capsulatum, Malassezia pachydermatis, Paracoccidioides brasiliensis, Sporothrix schenckii, Mycoplasma pneumoniae, Mycoplasma salivarium, Mycoplasma arthritidis, Mycoplasma canis, Mycoplasma bovis, Mycoplasma arginini, Mycoplasma filis, Rickettsia (spotted fever group and typhus group), Orientia tsutsugamushi (scrub typhus), Anaplasma, Ehrlichia, Cowdria, Neorickettsia, Wolbachia, Chlamydia psittaci, Chlamydia trachomatis, Chlamydia pneumonia, Chlamydia abortus, etc.

Recommended books

1. Veterinary Virology- Frederick A. Murphy et al-1999
2. Veterinary Virology- F. J. Fenner & others, 1987
3. Veterinary Virology- S. Mohanty & S. Dutta, 1980
4. Essentials of Veterinary Microbiology (Fifth Edition)- By G.R.Carter, M.M.Chengappa and C.A.W.Roberts
5. Veterinary Bacteriology and Virology- By I.A.Merchant and R.A.Packer

MIPA 609

Laboratory Techniques in Microbiology

Credit hour: 03

Introduction: Collection and transport of microbiological samples, Preservation and preparation for examination in laboratory, Techniques of cultivation, characterization and identification microorganisms, Techniques in immunology and serology

Molecular Microbiology: Extraction of Genomic and plasmid DNA, RNA, PCR, RT-PCR, Gel electrophoresis, SDS-PAGE, Western blotting, etc.

Animal cell culture techniques: Primary and secondary cell culture techniques.

Recommended books

1. Polymerase chain reaction- Principles, Applications And Troubleshooting-
By Prof. Dr. Masroor Ellahi Babar
2. Biology of animal viruses-F. J. Fenner & others, 1974.
3. A laboratory guide in virology- C. H. Cunningham, 1968

MIPA 611

Advanced Animal & Poultry Health & Hygiene

Credit hour: 03

Introduction: Animal & Poultry health, hygiene, sanitation and role of sanitation; Factors influencing health and diseases of livestock, Poultry, zoo and laboratory animal species

Disinfectants: Disposal of carcass, Disinfectants and their application; fumigation and its importance, Microbial safety of animal and poultry feed ingredients,

Hygiene: Hygienic measures for health and disease management of livestock, poultry, zoo and laboratory animals, Maintenance of Avian health; Practice of hatchery, flock hygiene and management;

Disposal: Disposal of wastes, litters and carcasses; Disease transmission cycle; source of disease producing agents; stress; Fumigation preservation of eggs;

Epidemiological and Ecological investigation: of Avian diseases; Spread of infectious agents of important avian diseases; Hygienic and other measures to be adopted for the prevention control, and eradication of important infestations and infections of avian species.

Bio-safety & bio-security: Principles of bio-safety & bio-security. Types of bio-security (conceptual, structural & operational). Bio-security and bio-safety of livestock, poultry, zoo and laboratory animals.

Recommended books

1. Veterinary Hygiene- By R. G. Linton
2. Fundamentals of Animal Hygiene and Epidemiology- By D. C. Thapliyal and D. S. Misra
3. Introductory Animal Hygiene and Management- By Prof. Muhammad Abdur Rahman and Prof. W. I. M. Afzal Hossain
4. Principle of Animal Hygiene and Preventive Medicine- By Leunis Vanes
5. Practical Animal Husbandry- By Miller and Roberts

MIPA 612

Food Microbiology, Food Borne Infection & Intoxication

Credit hour: 03

Introduction: Microorganisms in foods and their significances.

Contamination and spoilage of foods: Contamination and spoilage of different kinds of foods, fermented foods and enzymes produced by microorganisms. Antimicrobial agents in foods of animal origin

Food sanitation: Food sanitation , control and inspection, foods in relation to disease. Food born intoxication, Food safety, quality and microbiological standards HACCP analysis. Malpractices in production and preparation of foods animal origin. Microbial remediation.

Infection and intoxication: Definition and classification of food borne disease of illness (food born infection and intoxication). Factors essential for occurrence of food borne disease outbreak. Major bacteria, virus and parasite involved in food borne diseases.

Mycotoxins and mycotoxicosis: Food borne Mycotoxins and alimentary mycotoxicosis. Naturally occurring poisons in food of animal origin. Microbial toxins and their public health implications, types of food borne disease systems (Passive control system, etc). Microbial risk assessment of foods,

Preventive and control measure: General preventive and control measure of food borne infections and intoxication including and various systems.

Recommended books

1. Meat Hygiene-by Gracey, Collins & Hue
2. Poultry Meat Hygiene and Inspection -by Bremner & Johnston.
3. Fundamental of Meat Hygiene -by Muhammad Mufizur Rahman
4. The Science of Meat & Meat Products -by American Meat Institute Foundation
5. Food Microbiology -by W.C. Frazier, and D. C. Westhoff.
6. Modern Food Microbiology -by J. M. Jay.
7. Food Microbiology -by M. P. de Figueiredo and D. F. Splittstoesser
8. Essentials of Food Microbiology -by Muhammad Mufizur Rahman
9. The Technology of Food Preservation -by Norman W Desrosier
10. Milk Control -by J. G. Davis