Sher-e-Bangla Agricultural University
Faculty of Animal Science and Veterinary Medicine
Department of Pathology
Courses and Curricula for MS in Pathology

Course Code	Course Title	Credit Hour
Compulsory Courses		**18**
VPATH-601	Advanced General Pathology	3
VPATH-602	Clinical Pathology	3
VPATH-603	Immunopathology	3
VPATH-604	Advanced Necropsy Techniques	3
VPATH-605	Avian Pathology	3
VPATH-606	Molecular Pathology and Biotechnology	3
Elective Courses		**12**
VPATH-607	Pathology of Non Infectious Diseases	3
VPATH-608	Pathology of Infectious Diseases	3
VPATH-609	Pathology of Zoonotic Diseases	3
VPATH-610	Wildlife Pathology	3
VPATH-611	Oncology	3
VPATH-612	Toxicologic Pathology	3
VPATH-613	Aquatic Animal Pathology	3
VPATH-614	Pathology of Emerging and Transboundary Diseases	3
VPATH-615	Surgical Pathology	3
VPATH-616	Laboratory Animal Pathology	3
VPATH-617	Reproductive Pathology	3
VPATH-618	Systemic Pathology	3
	Or related courses from other disciplines/department	
Research Semester		**17**
VPATH-619	Seminar	1
VPATH-620	Research Work for Thesis	16
Total Credit Hour		**47**

Sher-e-Bangla Agricultural University
Faculty of Animal Science and Veterinary Medicine
Department of Pathology
Courses and Curricula for MS in Pathology

January – June Semester
(Elective courses may be changed in different semester)

Course Code	Course Title	Credit Hour
Compulsory Courses		
VPATH-601	Advanced General Pathology	3
VPATH-602	Clinical Pathology	3
VPATH-603	Immunopathology	3
Elective Courses (any two)		
VPATH-607	Pathology of Non Infectious Diseases	3
VPATH-608	Pathology of Infectious Diseases	3
VPATH-609	Pathology of Zoonotic Diseases	3
VPATH-610	Wildlife Pathology	3
VPATH-611	Oncology	3
VPATH-612	Toxicologic Pathology	3
	Or related courses from other disciplines/department	

July – December Semester
(Elective courses may be changed in different semester)

Course Code	Course Title	Credit Hour
Compulsory Courses		
VPATH-604	Advanced Necropsy Techniques	3
VPATH-605	Avian Pathology	3
VPATH-606	Molecular Pathology and Biotechnology	3
Elective Courses (any two)		
VPATH-613	Aquatic Animal Pathology	3
VPATH-614	Pathology of Emerging and Transboundary Diseases	3
VPATH-615	Surgical Pathology	3
VPATH-616	Laboratory Animal Pathology	3
VPATH-617	Reproductive Pathology	3
VPATH-618	Systemic Pathology	3
	Or related courses from other disciplines/department	

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 601
Course Title: Advanced General Pathology

Introduction: Cell death, apoptosis, necrosis, gangrene, infarct; biochemical and ultra-structural changes of cell death; difference of necrosis from postmortem autolysis; characteristics and types of necrosis, apoptosis and its mechanism.

Intracellular and extracellular depositions; degeneration: Fatty changes, glycogen deposition, lysosomal storage diseases, glycogen storage disease, drug induced lysosomal storage diseases, amyloidosis, and fibrin deposition.

Mineral deposits and pigments: Pathologic calcification, diabetes, gout, pigments, photosensitization.

Disturbances of growth: Aplasia, atrophy, hypoplasia, hypertrophy, hyperplasia, metaplasia, dysplasia, and developmental anomalies. Definition, nomenclature and classification of neoplasms. In vitro and in vivo characteristics of neoplastic cells, causation and pathogenesis of neoplasia and its diagnosis.

Disturbances of circulation: Coagulation, thrombosis, failure to clot, disorders of thrombocytes, hemorrhages, hyperemia, congestion, shock.

Inflammation & repair: Inflammatory processes, cells of inflammation, vascular anatomy, fluid exchange and cellular events of inflammation, chemical mediators of inflammation, and functions of different types of cytokines. Types of inflammations, Cellular functions in the acute inflammatory reactions, mechanism of resolution, repair.

Genetic disorders: Definition, etiology, mechanisms, clinical signs and pathology of different genetic disorders of animals.

Books recommended:

1. Jones, T.C., Hunt, R.D. and King, N.W.1997. Veterinary Pathology. 6th Edition Williams and Wilkins, Philadelphia, USA.
2. Sastry, G.A. 1983. Veterinary Pathology. 6th Edition. CBS Publishers & Distributors, Delhi, India.
3. Hill, R.B. Jr. and Lavia M.F.1980. Principles of Pathology. 3rd Edition. Oxford University Press, U.K.
4. Majno, G. and Joris, I. 1996. Cells, Tissues and disease: principles of general pathology. Blackwell Scientific Publications, London.
5. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), *www.wiley.com*
6. Kahn, C.M. and Line, C. 2010. The Merck Veterinary Manual. 10th Edition. Merck & Co., Inc., NJ, USA.
7. Bancroft, J.D. and Gamble, M. 2007. Theory and practice of histological techniques, 6th edition. Churchill Livingstone, London, UK.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 602
Course Title: Clinical Pathology

Introduction: Setting up a clinical pathology laboratory. Cleaning and maintenance of glassware and instruments used in clinical Pathology. Preparation of various buffers, stains, and reagents.

Clinical hematology: Methods of collection of blood, serum and plasma. Routine hematological tests: total erythrocyte count (TEC), total leucocyte count (TLC), differential leucocyte count (DLC), hemoglobin estimation (Hb), erythrocyte sedimentation rate (ESR), packed cell volume (PCV), tests for coagulation disorder; Interpretation of hematological findings.

Clinical cytology: Examination of fine needle aspiration/smear for detection of cytologic alterations/proliferative changes.

Urinalysis: Microscopic and biochemical tests for urine and their interpretations.

Fecal examination: Quantitative and qualitative examination of fecal samples for detection of parasitic infections.

Clinical laboratory diagnosis of bacterial, viral and mycotic infection: Methods of collection of samples for isolation and identification of bacteria, virus and fungus. Antibiotic sensitivity assay. Examination of skin scraping for mycotic infection.

Serum chemistry: Profiling of serum (AST, ALT, ALP, bilirubin, insulin, etc.) for alteration of organ functions. Principle, procedure and interpretation of immunodiagnostic tests: hemagglutination test, hemagglutination inhibition test, complement fixation test, agar gel immunodiffusion tests, enzyme-linked immunosorbent assay (ELISA).

Tests for poisoning: Clinical laboratory diagnosis of common poisonings.

Tests for reproductive diseases/ conditions: Examination of PAP smear for reproductive diseases and vaginal discharge for detection of estrus phases (rodents).

Books recommended:

1. Benjamin, M.M. 1978. Outline of Veterinary Clinical Pathology. 3rd Edition. The Iowa State University Press, Iowa, USA.
2. Coles, E.H. 1986. Veterinary Clinical Pathology. 4th Edition. W.B. Saunders Company.
3. Coffin, D.L. 1953. Manual of Veterinary Clinical Pathology 3rd Edition. Comstock Publishing Association, A Division of Cornell University Press.
4. Schalm. O.W. 1965. Veterinary Hematology. 2nd Edition. Lea &Febiger, Philadelphia,
5. Kaneko, J.J. 1980. Clinical Biochemistry of Domestic Animals, 3rd edition. Academic Press, London.
6. Annon. 1984. Manual of Veterinary Investigation. Laboratory Techniques. Vol. 1 and 2. MAFF/ADAS Reference Book 389 and 390. HMSO, London.
7. Gray, C.H.,Howorth, P.J. N. and Rimsler, M. G. 1985.Clinical Chemical Pathology. 10th Edition. Hodder Arnold, London.
8. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), *www.wiley.com.*

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 603
Course Title: Immunopathology

1. Introduction, definition of immunology and immunopathology, classification of immunology.
2. Natural and acquired immunity, humoral and cell mediated immunity, immunoglobulin, and adhesion molecules, chemical substance of involved in natural immunity.
3. The immune system, development and differentiation of lymphocytes, cell surface markers and adhesion molecules involved in the immune system, antigen, antibody, antigen presenting cells.
4. Induction of immune response, TH1 and TH2 module and M1 and M2 paradigm.
5. The complement system and complement activation.
6. Immune effector mechanisms: neutralization, complement mediated cytolysis, antibody-dependent cellular cytotoxicity, T-cell cytotoxicity, T-cell mediated granuloma.
7. Major histocompatibility complex and immunogenetics.
8. Hypersensitivity,
9. Immunodeficiency.
10. Autoimmunity, types and differential diagnosis.
11. Immune tolerance and Immunotherapy.

Books recommended:

1. Tizard, I. 1996. Veterinary Immunology. 6th Edition. W.B. Saunders Co. Philadelphia.
2. Roitt, I.M. 1994. Essential Immunology. 8th Edition. Blackwell Scientific Publications, Oxford.
3. Taussig, M.J. 1984 Processes in Pathology and Microbiology. 2nd Edition. Blackwell Scientific Publications, Oxford.
4. Hudson, L. and Hay, F.C. 1989. Practical Immunology. 3rd Edition. Blackwell Scientific Publication, Oxford.
5. Weir, B.W. 1986. Handbook of Experimental Immunology, Vol. 1. 4th Edition. Blackwell Scientific Publications, Oxford.
6. Halliwell, R.E.W. and Gorman, T. 1989. Veterinary Clinical Immunology. W.B. Saunders Co. Philadelphia.
7. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), *www.wiley.com*

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code VPATH 604
Course Title: Advanced Necropsy Techniques

1. Purpose of necropsy. Differentiate postmortem changes from antemortem changes.
2. Basis and types of gross diagnoses.
3. Necropsy procedures and techniques for animals and poultry.
4. Recognition, interpretation and description of anatomic changes encountered at necropsy for specific diagnoses. Selection of tissues for histopathological diagnosis of specific diseases.
5. Collection of data at necropsy, preparation of necropsy report, management of necropsy data.
6. Collection, preservation and shipment of pathological specimens for diagnosis.

Books recommended:

1. Calnek, B.W. 1997. Diseases of Poultry. 10th edition. Iowa State University Press, Ames, Iowa.
2. Gordon, R.F. and Jordan, F.T.W. 1982. Poultry Diseases. 7th edition. The English Language Book Society and Bailliere Tindall, London.
3. Jones, T.C., Hunt, R.D. and King, N.W. 1997. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
4. Jensen, H.E. Necropsy: 2011. A Hand Book and Atlas. Samfundslitteratur, Denmark.
5. Severidt, J.A. 2002. Dairy Cattle Necropsy Manual. Colorado State University, Colorado, USA.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 605
Course Title: Avian Pathology

Introduction: Role of necropsy in the detection of poultry diseases. Overview on the diseases/ problems in poultry farms of Bangladesh. Defective biosecurity and hygienic management of poultry farms.

Pathogenesis and pathology of the following diseases of poultry:
Bacterial diseases: Salmonellosis, colibacillosis, pasteurellosis and Riemerella anatipestifer infection, infectious coryza, tuberculosis, staphylococcosis, streptococcosis, clostridial infections, avian spirochetosis, Erysipelas, listeriosis, Bordetellosis.

Viral diseases: Newcastle disease, infectious bursal disease, Marek's disease, infections laryngotracheitis, infectious bronchitis, chicken infectious anemia, avian influenza, fowl pox, avian encephalomyelitis, adenovirus infections, duck plague, duck virus hepatitis, duck viral enteritis, reovirus, rotavirus, hydropericardium hepatitis syndrome.

Mycoplasmal diseases: Chronic respiratory disease (CRD), mycoplasma-collibacillosis (MC) complex.

Chlamydial diseases: Psittacosis

Fungal diseases*:* Aspergillosis, thrush, cryptosporidiosis, aflatoxicosis.

Parasitic diseases: Helminthiasis (round worm, fluke, and tape worm) and coccidiosis, Plasmodium Infection in Poultry, Mites of Poultry, Lice in Poultry, Fleas of Poultry.

Nutritional deficiencies*:* Vitamins, minerals, proteins.

Diseases of unknown etiology*:* Hydropericardium and hepatitis syndrome, stunting growth syndrome, Fatty liver hemorrhagic syndrome in poultry, Ascites Syndrome in Poultry Malabsorption Syndrome in Poultry, Sudden Death Syndrome of Broiler Chickens.

Field trip: Field trips in different poultry operations and diagnostic centers/animal hospitals.

Books recommended:

1. Calnek, B.W. 1997. Diseases of Poultry. 10th edition. Iowa State University Press, Ames, Iowa
2. Saif, Y.M. 2012. Diseases of Poultry. 12th edition. Iowa State University Press, Ames, Iowa
3. Gordon, R.F. and Jordan, F.T.W. 1982. Poultry Diseases. 7th edition. The English Language Book Society and Bailliere Tindall: Lindon.
4. Whiteman, C. E. and Bickford, A. A. 1990. Avian Disease Manual. 3rd Edition. American Association of Avian Pathologists. Pennsylvania.
5. Chauhan HVS and Roy S (1996). Poultry Diseases, Diagnosis and Treatment. 2nd edn. New Age International (P) Limited Publishers. New Delhi, India.
6. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), *www.wiley.com*

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 606
Course Title: Molecular Pathology & Biotechnology

1. Molecular Pathology:

Molecular, ultra-structural and cellular alterations in proliferative lesions, intracellular and extracellular deposits, viral inclusions, poisoning and drug toxicities.

2. Diagnostic biotechnology

(a) Gene expression analyses: Isolation of mRNA and DNA, synthesis of cDNA, amplification of cDNA/DNA, polyacrylamide gel electrophoresis, restriction enzyme analysis.
(b) In-situ hybridization.
(c) Western blotting
(d) Immunohistochemistry/Immunofluorescence
(e) Enzyme-linked immunosorbent assay (ELISA)
(f) Preparation and use of primary cell culture
(g) Hybridoma technology

3. Recombinant DNA technology

a. Synthesis of cDNA
b. Cloning of cDNA in plasmid vector. Insert and vector preparation, ligation, transformation and analysis.
c. Expression of foreign protein in E. coli.

4. Gene defects and genetic diseases

Books recommended:

1. Brown, T.A. 1995. Gene Cloning: An introduction, 3rd Edition. Chapman & Hall, UK.
2. Ausubel, F.M. et al. 1999. Short Protocols in Molecular Biology, 4th Edition. John Wiley & Sons. Inc.
3. Hudson, L. and Hay, F.C. 1989. Practical Immunology, 3rd Edition. Blackwell Scientific Publication.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 607
Course Title: Pathology of Non infectious Diseases

Pathogenesis and pathology of nutritional deficiencies: Milk fever, ketosis, pregnancy toxemia, diabetes, grass tetany, equine rhabdomyolysis, white muscle disease, rickets and osteomalacia, fibrous osteodystrophy, osteoporosis, Osteopetrosis, Paget's disease of bone, Osteitis fibrosa cystica.

Pathogenesis and pathology of metabolic diseases: Due to deficiency or excess of Vitamin A, D, E, K, Vitamin B Complex, Vitamin C, protein, phosphorus, iron, zinc, selenium, magnesium, potassium, manganese iodine and copper.

Poisoning:

1. General consideration on the care and management of experimental animals in laboratory facility.
2. An overview on the maintenance of laboratory rodents in SPF condition.
3. General consideration on toxicologic experimentations on rodents and mammals: selection of species, age, sex, breed, drug, duration and protocol based on purpose and ethical guidelines.
4. Toxicologic experimentation of animals, studies of gross and microscopic tissue alterations of experimentally induced diseases/toxicities such as thioacetamide (TAA), α-naphthylisothiocyanate (ANIT), carbontetrachloride (CCl4), dibutyltintrichloride (DBTC) and their interpretations, differentiation to toxicologic pathology from background pathology.
5. Pathology of extraneous poisons: cyanide, arsenic, snake venom, organo-phosphates.
6. Effects of industrial, hospital and laboratory used chemicals and wastages.

Books recommended:

1. Jones, T.C., Hunt, R.D. and King, N.W. 1997. Veterinary Pathology, 6th Edition, Williams and Wilkins, Philadelphia, USA.
2. Runnels, R.A., Monlux, W.S. and Monlux, A.W. 1965.Principles of Veterinary Pathology, 7th Edition. The Iowa State University Press, Iowa.
3. Radostits, O.M., Blood, D.C. and Gay, C.C. 1994.Veterinary Medicine, 8th Edition. ELBS, Bailliere, Tindal, London.
4. Jubb, K.V.F., Kennedy, P.C. and Palmer, N. 1993.Pathology of Domestic Animas. 4th Edition. Vol. I,II& III. Academic Press, Inc. USA.
5. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), www.wiley.com
6. Haschek, W. M., Rousseaux, C. G., Wallig, M. A. 2013.Haschek and Rousseaux's Handbook of Toxicologic Pathology, 3rdedn. Academic Press, Inc. New York, USA.
7. Zachary, J. F. and McGavin, M. D. 2011. Pathologic Basis of Veterinary Disease, 5thedn. Mosby, New York, USA.
8. Loomis, T.A. and Hayes, A.W. 1996. Loomis's Essentials of Toxicology. 4th Edition. Academic Press, USA.
9. Lorgue, G., Lechenet J. and Rivere, A. 1996. Clinical Veterinary Toxicology. 1st English Edition. Blackwell Science Inc., Cambridge, USA.
10. Doull, J., Klaassen, C.C. and Amdur, O. 2001. Cassarett & Doull's Toxicology. 6th Edition. Macmillan Publishing Co. Inc. New York.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 608
Course Title: Pathology of Infectious Diseases

Bacterial Diseases:
General pathogenesis of bacterial diseases. Immune response and tissue reactions to bacterial diseases.
Pathogenesis and pathology of different bacterial diseases of animals with special emphasis to anthrax, clostridial infections, infection with streptococcus, staphylococcus,, camphylobacter, colibacillosis, brucellosis, tularemia, salmonellosis, actinobacillosis, pasteurellosis, yersiniosis, listeriosis, leptospirosis borreliosis, corynebacterium infections, tuberculosis, paratuberculosis, mycoplasmosis etc.

Viral Diseases:
Classification and nomenclature of viruses. Replication of viruses. Infection and spread of virus within the body. Immune responses to viruses. Mechanisms of virus induced tissue damage.
Pathogenesis and pathology of important viral diseases of animals with special emphasis to pox, infectious bovine rhinotracheitis, bovine malignant catarrh, infectious canine hepatitis, papillomatosis, canine parvovirus infection, foot and mouth disease, Goat pox, PPR, African horse sickness, rotavirus infections, bovine virus diarrhoea- mucosal disease, hog cholera, equine viral arteritis, canine distemper, Parvo virus infections, rabies, bovine ephemeral fever, equine infectious anemia, bovine spongiform encephalopathy.

Pathogenesis, pathology and diagnosis of diseases of different domestic and wild animals caused by fungi, rickettsiace and chlamydiaceae as follows:

Fungal diseases: Aspergillosis, Aflatoxicosis, Blastomycosis, Coccidioidomycosis, Cryptococcosis, Histoplasmosis, Candidiasis and Dermatomycoses.

Rickettsiel Diseases: Typhus fever, Rocky Mountain spotted fever, Scrub typhus, Q-fever, Salmon disease of dogs, “Heart water”, Tickborne fever and Bovine petechial fever, Bartenellosis, Anaplasmosis, Hemobartonellosis, Eperythrozoonosis.

Chlamydial Diseases: Psittacosis, Sporadic bovine encephalomyelitis, Polyarthritis, Enzootic bovine abortion, Enzootic ovine and caprine abortion and Pneumonia.

Effects of helminth parasites on to the host:
Pathogenesis and Pathology of the following diseases caused by helminthes, arthropods and protozoa:-

Helminthic Diseases:
Ascariasis, Ancylostomiasis, Trichostrongylosis, Hemonchosis, Ostertagiosis, Oesophagostimiasis, Dirofilariasis, Spirocercosis, Trichinosis, Pulmonary nematodiasis, Dioctophymosis, Strongyloidiasis, Habronemiasis, Trichuriasis, Onchocerciasis, Stephanofilariasis, Thelaziasis, Stephanuriasis, Cestodiasis, Cysticercosis, Echinococcosis, Trematodiasis, Schistosomiasis and Paragonimiasis,

Arthropod infestations:
Myiasis; Botflies, *O. Ovis* and *H. Bovis* infestations; Cutaneous and pulmonary acariasis.

Protozoal Diseases:
Coccidiosis, Toxoplasmosis, Sarcosporidiosis, Cryptosporidiosis, Amembiasis, Giardiasis, Trichomoniasis, Banlantidiasis, Trypanosomiasis, Leishmaniasis, Malaria, Babesiosis, and Theileriasis.

Books recommended:

1. Jones, T.C., Hunt, R.D. and King, N.W. 1997. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
2. Radostitis, O.M., Blood, D. C. and Gay, C.C.1994. Veterinary medicine, 8th Edition. Baillier Tindall, London.
3. Tausig, M.G. 1984. Processes I Pathology and Microbiology. 2nd Edition. Blackwell Scientific Publication, Oxford.
4. Mims, C.A. 1990. The Pathogenesis of Infectious Disease. 3rd Edition. Academic Press, London.
5. Mims, C.A. and White, D.O. 1994. Viral Pathogenesis and Immunology. Blackwell Scientific Publications, Oxford.
6. Jubb, K.V.F., Kennedy, P.C. & Palmer, N. 1993. Pathology of Domestic Animals. 4th Edition. Vol. I, II and III. Academic Press, Inc., USA.
7. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), www.wiley.com
8. Soulsby, E.J.L. 1982.Helminths, Arthropods and Protozoa of Domesticated Animals. 7th edition.Bailliere Tindall and Casssell Ltd., London.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 609
Course Title: Pathology of Zoonotic Diseases

Epidemiology, pathogenesis and pathology of the following zoonotic diseases:

a) Bacterial diseases: Bovine tuberculosis, Anthrax, Leptospirosis, Pasteurellosis, Listeriosis, Plague, Brucellosis, Colibacillosis, Salmonellosis, Shigellosis, Clostridial diseases, Streptococcosis, Chlamydiosis, Campylobacteriosis, Tularemia, Glanders, Streptobacillus infection, Cat scratch disease, Melioidosis etc.

b) Viral diseases: Cow pox, Monkey pox, Dengue, Tana pox, Rabies, Herpes virus simiae infection, Mad cow disease, Food and Mouth disease, Zika fiver, Wessels bron fever, Coloradotick fever, Influenza, swine flu, Newcastle disease etc.
c) Rickettsial diseases: Typhus fever, Scrub typhus, Rocky Mountain spotted fever, Q-fever, Rickettsia etc.

d) Fungal diseases: Aspergillosis, Blastomycosis, Coccididomycosis, Maduramycosis, Cryptococcosis, Histoplasmosis, Ringworm, etc.

e) Helminthes and arthropods: Ascariasis, Toxocariasis, Fascioliasis, Schistosomiasis, Lung. and intestinal flukes infestation, Acariasis, Visceral larva migrans, Filariasis, Cysticercosis, Echinococcosis etc.

f) Protozoal diseases: Babesiosis, Balantidiasis, Giardiasis, Toxoplasmosis, Crytosporidiosis, Trypanosomiasis, Leishmaniasis etc.

Books recommended:

1. Jones, T.C., Hunt, R.D. and King, N.W. 1997. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
2. Johne, B., Stephen R., Palmer S.R. and Payne, J.M. 1988. The Zoonoses. Infections Transmitted from Animals to Man. Edward Arnold-A Division of Hodder & Stoughten.
3. Schwabe, C.W. 1969. Veterinary Medicine and Human Health. 2nd Edition. Williams & Wilkins, Baltimore, USA.
4. Bell, D.R. 1995. Lecture Notes on Tropical Medicine. 4th Edition. Blackwell Scientific Publications, Oxford.
5. Kahn, C.M. and Line, C. 2010. The Merck Veterinary Manual. 10th Edition. Merck & Co., Inc., NJ, USA.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 610
Course Title: Wildlife Pathology

1. Introduction to wild lives: mammals, reptiles, birds, rodents and their habitats: forests, marine and fresh water, and captivity (zoo, aviary and aquarium).
2. Age-related pathology of wild lives in natural habitats and in captivity (Zoo, aviary and aquarium).
3. Introduction to bacterial, viral, mycoplasmal, chlamydial, rickettsial, fungal, parasitic and nutritional diseases of wildlife's.
4. Diseases of wild lives developed due to captivity, change of habitats, food etc.

Books recommended:

1. Jones, T.C., Hunt, R.D. and King N.W. 1997. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
2. Bell, D.R. 1995. Lecture Notes on Tropical Medicine, 4th Edition Blackwell Scientific Publications, Oxford.
3. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), www.wiley.com
4. Murray E. Fowler, R. Eric Miller 2008. Zoo and Wild Animal Medicine. Elsevier Health Sciences.
5. R. Eric Miller. 2011. Fowler's Zoo and Wild Animal Medicine Current Therapy, Volume 7. Saunders.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 611
Course Title: Oncology

1. Etiology of cancer and oncogenic virus
2. Clinical and histopathological presentations and nomenclature (according to FAO and INHAND guidelines) of common neoplasms of the followings:
    a. Skin and appendances
    b. Reproductive system and mammary glands
    c. Hemic and lymphatic system
    d. Digestive system
    e. Respiratory system
    f. Musculo-skeletal system
    g. Nervous system
    h. Organs of special senses
    i. Urinary system
    j. Endocrine system
3. Special and immunohistochemical stains for differential diagnosis of neoplastic diseases.
4. Special marker and antigen for the detection of neoplasm

Books recommended:

1. Jones, T.C., Hunt, R.D. and King, N.W. 1997. Veterinary Pathology, 6th Edition. Williams and Wilkins, Philadelphia, USA
2. Meuten, D. J. 2002. Tumors in Domestic Animals. 4thedn. Iowa State University Press, Ames, Iowa, USA.
3. Jubb, K.V.F., Kennedy, P.C & Palmer, N. 1993. Pathology of Domestic Animals. 4th Edition. Vol. I, II and III. Academic Press, Inc., USA.
4. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), *www.wiley.com*
5. Kahn, C.M. and Line, C. 2010. The Merck Veterinary Manual. 10th Edition. Merck & Co., Inc., NJ, USA.
6. Sastry, G.A. 2011. Veterinary Pathology. 7th edition. CBS Publisher & Distributors, New Delhi, India.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 612
Course Title: Toxicologic Pathology

1. General consideration on the care and management of experimental animals in laboratory facility.
2. An overview on the maintenance of laboratory rodents in SPF condition.
3. General consideration on toxicologic experimentations on rodents and mammals: selection of species, age, sex, breed, drug, duration and protocol based on purpose and ethical guidelines.
4. Toxicologic experimentation of animals, studies of gross and microscopic tissue alterations of experimentally induced diseases/toxicities such as thioacetamide (TAA), α-naphthylisothiocyanate (ANIT), carbontetrachloride (CCl4), dibutyltin trichloride (DBTC) and their interpretations, differentiation to toxicologic pathology from background pathology.
5. Pathology of extraneous poisons: cyanide, arsenic, snake venom, organo-phosphates.

Books recommended:

1. Haschek, W.M., Rousseaux, C.G., Wallig, M.A. 2013. Haschek and Rousseaux's Handbook of Toxicologic Pathology, 3rd edn. Academic Press, Inc. New York, USA.
2. Zachary, J.F. and McGavin, M.D. 2011. Pathologic Basis of Veterinary Disease, 5th edn. Mosby, New York, USA.
3. Jones, T.C., Hunt, R.D. and King, N.W. 1997. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
4. Loomis, T.A. and Hayes, A.W. 1996. Loomis's Essentials of Toxicology. 4th Edition. Academic Press, USA.
5. Lorgue, G., Lechenet J. and Rivere, A. 1996. Clinical Veterinary Toxicology. 1st English Edition. Blackwell Science Inc., Cambridge, USA.
6. Doull, J., Klaassen, C.C. and Amdur, O. 2001. Cassarett & Doull's Toxicology. 6th Edition. Macmillan Publishing Co., Inc. New York.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 613
Course Title: Aquatic Animal Pathology

Introductory chapters: Quality management in veterinary testing laboratories, Principles and methods of validation of diagnostic assays for infectious diseases, Methods for disinfection of aquaculture establishments.

Diseases of amphibians: General information, Infection with *Batrachochytrium dendrobatidis*, Infection with ranavirus.

Diseases of crustaceans: Crayfish plague (*Aphanomyces astaci*), Infectious hypodermal and haematopoietic necrosis, Infectious myonecrosis, Necrotising hepatopancreatitis, Taura syndrome, White spot disease, White tail disease, Yellowhead disease, Spherical baculovirus (*Penaeus monodon*-type baculovirus), Spherical baculovirus (*Penaeus monodon*-type baculovirus), Tetrahedral baculovirosis (*Baculovirus penaei*).

Diseases of fish: Epizootic haematopoietic necrosis, Infection with *Aphanomyces invadans*, Infection with *Gyrodactylus salaries*, Infectious haematopoietic necrosis, Infection with Infectious salmon anaemia virus, Infection with salmonid alphavirus, Koi herpesvirus disease, Red sea bream iridoviral disease, Spring viraemia of carp, Viral haemorrhagic septicaemia, *Oncorhynchus masou* virus disease, Viral encephalopathy and retinopathy.

Diseases of mollusks: Infection with abalone herpesvirus, *Bonamia exitiosa*, *Bonamia ostreae, Marteilia refringens, Perkinsus marinus, Perkinsus olseni, Xenohaliotis californiensis, Mikrocytos mackini,* ostreid herpesvirus 1 microvariant.

Diseases of crocodile: Crocodile and caiman pox, adenoviral hepatitis, mycoplasmosis, chlamydiosis, colibacillosis, salmonellosis, coccidiosis, trichinellosis, nonspecific septicemia, the nutritional diseases-osteomalacia, fat necrosis, gout, winter sores.

Diseases of otter: Leptospirosis, topxoplasmosis, canine distemper, parvovirus, rabies, heart diseases-heart worm, Dirofilaria luttae, renal failure- amyloidosis, pyelonephritis, hepatic lipodosis, adenocacinoma, transitional cellular carcinoma, peritonitis, diarrhea, gastric dilatation with volvulus, pneumonia, anesthetic death.

Diseases of Dolphin and whales: Papillovirus, Dolphin pox virus, Lobomycosis, Various neoplastic diseases (Malignant lymphoma), Algal bloom bio-intoxications, mantee cold stress syndrome, idiopathic cardiomyopathy of pygmy and dwarf sperm wheals.

Diseases of sea lions: Leptospirosis, Chlamydiosis, Psittacosis, Brucellosis, Morbilovirus infections, Canine parvovirus, Canine adenovirus 1 and 2, Vesicular Exanthema.

Diseases of sea horse: Exctoparasites, endoparasites, Flesh erosion disease, Internal gas bubble disease, pouch emphysema snout rot.

Books recommended:

1. Miller, R.E. and Fowler, M.E. 2011. Fowler's Zoo and Wild Animal Medicine Current Therapy, Volume 7. Saunders.
2. OIE Manual of diagnostic tests for aquatic animals 2014.
3. OIE Diagnostic Manual for Aquatic Animal Disease, 3rd edition. 2000.
4. Gondad, M.G. 2001. Asia Diagnostic Guide to Aquatic Animal Diseases. FAO.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 614
Course Title: Pathology of Emerging and Transboundary Diseases

1. Introduction to Emerging, Re-emerging and Transboundary diseases.
2. Factors affecting emergence and spread of emerging and transboundary diseases.
3. Pathogenesis and pathology of important emerging and transboundary diseases of animals and birds.
4. Constraints on the diagnosis of emerging and transboundary diseases.
5. Surveillance study of outbreaks of an Emerging, Re-emerging and Transboundary diseases.

Books recommended:

1. Jones, T.C., Hunt, R.D. and King N.W. 1997. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
2. Bell, D.R. 1995. Lecture Notes on Tropical Medicine, 4th Edition Blackwell Scientific Publications, Oxford.
3. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), *www.wiley.com*
4. Kahn, C.M. and Line, C. 2010. The Merck Veterinary Manual. 10th Edition. Merck & Co., Inc., NJ, USA.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 615
Course Title: Surgical Pathology

1. Basis of formulation of a good morphologic diagnosis of histopathologic preparations.
2. Procedures of collection, fixation, processing and sectioning of tissues for histopathological slide preparation. Decalcification of bone and special fixation and processing of tissues (Bouin's, Zamboni, methacarn, PLP-AMeX) for advanced diagnosis.
3. Techniques of routine and special staining.
4. Diagnosis of histopathological changes and commenting on the prognosis based on histopathological grade and margin clearance of systemic and specific diseases and disease conditions of surgical specimens.
5. Application of immunohistochemical/ immunofluorescence staining for the diagnosis of surgical specimens from neoplastic and viral diseases of animals and birds.

Books recommended:

1. Jones, T.C., Hunt, R.D. and King, N.W. 1977. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
2. Johnstone, A. and Thorpe, R. 1996. Immunochemistry in Practice. 3rd Edition. Blackwell Scientific Publication.
3. Bancroft, J. D. and Gamble, M. 2007. Theory and practice of histological techniques, 6th edition. Churchill Livingstone, London, UK.
4. Meuten, D. J. 2002. Tumors in Domestic Animals. 4thedn. Iowa State University Press, Ames, Iowa, USA.
5. Jubb, K.V.F. Kennedy, P.C. & Palmer, N. 1993. Pathology of Domestic Animals. 4th Edition. Vol. I, II and III. Academic Press, Inc. USA.
6. Luna LG. 1968. Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. 3rd edn. McGraw Hill Book Co., New York, USA.
7. Stubbs EL. 1954. Necropsy procedures for chickens and other birds. In: Veterinary Necropsy Procedures. Jones TC [Editors]. J. B. Lippincott Company, Philadelphia, USA.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 616
Course Title: Laboratory Animal Pathology

1. General consideration on to the care and management of experimental animals in laboratory facility.
2. An overview on the maintenance of laboratory rodents in SPF condition.
3. Pathogenesis and pathology of age-related changes of mice, rat, hamster, guineapig, rabbits and pig in different organs and systems.
4. Pathogenesis and pathology of infectious and non-infectious diseases of laboratory animals caused by microbial agents, nutritional deficiencies and extraneous poisonings.
5. An introduction and classification of animal models to human diseases. Pathogenesis and pathology of such diseases with special emphasis on rheumatoid arthritis, auto-immunehemolytic anemia, renal disease, Alzheimer's disease, reproductive and cardiac diseases.

Books recommended:

1. Fowler, M.E. 1986. Zoo and Wild Animal Medicine. 2nd Edition W.B. Saunders Company, Philadelphia.
2. Holmes, D.D. 1984. Clinical Laboratory Animal Medicine. The Iowa State University Press, Ames, Iowa, USA.
3. Fox, J.G., Anderson, L.C. and Loew, F.M. 2002. Laboratory Animal Medicine. Academic Press, Inc.
4. Benirschke, K. Garner, F.M. and Jones, T.C. 1978. Pathology of Laboratory Animal. Vol. I, II and III. Springer-Verlag Inc., New York.
5. Kahn, C.M. and Line, C. 2010. The Merck Veterinary Manual. 10th Edition. Merck & Co., Inc., NJ, USA.

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 617
Course Title: Reproductive Pathology

1. Hypothalamo-pituitary and gonadal axis and reproduction of farm animals
2. Congenital anomalies, cysts and pathology of different diseases and disease condition of reproductive system of male and female animals.
3. Pathogenesis and pathology of abortion in animals with special emphasis on Brucellosis, Camphylobacteriosis, Listeriosis, Leptospirosis, Chlamydiosis, IBR, BVD, Trichomoniasis, Toxoplasmosis, Neosporosis, Sarcocystosis, Aspergillosis etc.
4. Examination of Pap smear for reproductive diseases and vaginal discharge for detection of estrus phases (rodents).

Books recommended:

1. Kenneth McEntee. 1990. Reproductive Pathology of Domestic Mammals. Academic Press Inc.
2. Jubb, K.V.F. and Kennedy, P.C. 1993. Pathology of Domestic Animals. 4th Edition. Vol. I, II, and III. Academic Press, New York.
3. Jones, T.C., Hunt R.D. and King, N.W. 1997. Veterinary Pathology. 6th Edition. Williams and Wilkins, Philadelphia, USA.
4. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), *www.wiley.com*

Sher-e-Bangla Agricultural University
Department of Pathology
Syllabus for MS in Pathology
Course Code: VPATH 618
Course Title: Systemic Pathology

Definition, etiology, Pathogenesis, Pathology and Diagnosis of the disorders of the systems-

Skin and appendages: Epidermal and dermal response to various injurious agents

Skeletal muscle: Clinical pathologic alterations, developmental disorders, disturbances of growth, circulatory disorders, myositis

Skeletal system: Fracture of bones, reaction to injury, abnormalities of bone growth and development, metabolic bone diseases, infections of bone, joint diseases.

Respiratory system: Upper air passages- inflammation, parasites infestation, amyloidosis, nasal polyps, epistaxis, laryngeal hemoplegia, porcine atrophic rhinitis, bovine nasal granuloma. The trachea and bronchi- bronchiectasis, bronchitis, immotile cilia syndrome. Lung- pneumonia, pneumonitispleuritis, atelectasis, emphysema.

Cardiovascular system: Congenital anomalies, cardiac failure, Myocardium-hypertrophy, cardiomyopathy, degeneration, necrosis, inflammation. Pericardium-hydropericardium, hemopericardium, inflammation. Endocardium-inflammation, noninfectious endocarditis.

Blood vessels and lymphatic vessels- arteriosclerosis, atherosclerosis, hypertension, arteritis, aneurysm, mucoid medial degeneration, atrophy of arteries and hypertrophy, thrombosis, amyloidosis, phlebitis, varicose veins, telangiectasis.

Haemopoietic and Lymphatic systems: Bone marrow- hyperplasia, hypoplasia, agranulocytosis, osteomyelitis, fibrosis, non-neoplastic disorders of erythrocytes and leukocytes-anemia. Spleen- splenic enlargement, splenomegaly. Lymph nodes- inflammation and disorders. Thymus- hypoplasia, atrophy and hyperplasia.

Digestive system: Mouth and adnexa- developmental anomalies and inflammation. **Tonsil**-tonsilitis. **Pharynx**- pharyngitis. **Teeth**- caries, enamel hypoplasia, dental dysplasia. **Salivary gland**- sialoliths, sialoadenitis. **Esophagus**- inflammation, choke and achalasia. **Fore stomach of ruminants**- ruminal tympanitis, bloat, acidosis, rumenitis, ulcers. **Reticulum**- traumatic reticulitis. **Stomach**- pyloric stenosis and hypertrophy, gastric dilatation and torsion, displacement of abomasum, impaction, parasites, gastritis, hemorrhages, ulcers. **Small intestine**-inflammation, winter dysentery of cattle, malabsorption syndrome, obstruction, emphysema. **Cecum**- impaction, dilatation, intussusception. **Colon**- congenital and hereditary anomalies, inflammation. **Rectum and anus**- anomalies and inflammation. Peritonium- inflammation and ascites. **Liver**- congenital defects, necrosis, circulatory disorders, degeneration and deposition,

hepatitis, abscesses, cirrhosis. **Gall bladder**- cholecystitis and cholangitis, cystic hyperplasia, Cholelithiasis. **Pancreas**- hypoplasia, inflammation, calculi.

Urinary system: Kidneys- congenital and hereditary anomalies. Diseases of glomeruli, renal tubules, interstitium and renal vasculature, ureters, urechus, bladder and urethra. Urinary obstruction and hydonephrosis, urolithiasis.

Endocrine system: Diseases/ disorders affecting Pituitary, hypothalamus, thyroid, parathyroid, adrenal glands, pancreatic islets and pineal gland.

Nervous system: Reaction of cells and tissues to injury, trauma, equine incoordination, encephalopathy, encephalomalacia, disorders of myelin, congenital anomalies, epilepsy, spongy degeneration.

Organs of Special Senses: Eye- keratitis, keratoconjunctivitis, pannus, synechia, equine periodic ophthalmia, luxation, cataract, aphakia, retinal disorders, diseases of optic nerve, hereditary and congenital anomalies, glaucoma. **Ear**- inflammation of external, middle and inner ear

Books Recommended:

1. Jones, T. C. Hunt, R. D. and King, N. W. 1997. Veterinary Pathology. 6th edn. Williams and Wilkins. Philadelphia, USA.
2. Jubb, K. V. F., Kennedy, P. C. and Palmer, N. 1993. Pathology of Domestic ANimals. Vol. 1, 2 & 3. 4th edn. Academic Press Inc. New York, USA.
3. Luna, L.G. 1967. Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. McGraw-Hill Book Company, New York.
4. Donald J. Meuten. 2002. TUMORS in Domestic Animals. Fourth Edition. Iowa State Press 2121 State Avenue, Ames, Iowa 5001.
5. Sastry, G. A. and Rao, P. R. 2001. Veterinary Pathology. 7th edn. CBS Publishers & Distributors, New Delhi, India. PP. 612-613.
6. Cynthia M. Kahn. 2010-2015. The Merck Veterinary Manual, 10th Edition (Online), www.wiley.com