Academic:

1. Degree Offered –UG, PG, PhD
   Title of degree: M.V. Sc. & PhD
   Duration: 2 years for MVSc and 3 years for PhD
   Eligibility Criteria: BVSc & AH for MVSc and MVSc for PhD
   Intake Capacity: MVSc-02 and PhD-02
   Opportunities: Government and private sector

2. Academic Regulations:
   UG , PG, PhD (VCI, ICAR, IV, V Dean's and Corrigendum) – PDF Copies

3. Course offered :: UG, PG , PhD - Semester / Year wise

List of UG Courses (B.V.Sc & AH) As per latest MSVE Guidelines) ,

Sr No	Course No.	Title	Credit	Course offered in the Year
1	Veterinary Pathology	Veterinary Pathology	4+2=6	II year

List of PG Courses (**MVSc:** Veterinary Pathology

Sr. No.	Course No.	Title	Credits	Semester
1	VPL 501	General Pathology	2+1=3	I
2	VPL 502	Techniques in Pathology	0+2=2	I
3	VPL 503	Animal Oncology	1+1=2	II
4	VPL 504	Clinical Pathology	1+1=2	I
5	VPL 505	Necropsy Procedures and Interpretations	0+1=1	II
6	VPL 506	Necropsy Conference	0+1=1	II
7	VPL 507	Systemic Pathology	2+1=3	II
8	VPL 508	Pathology of Infectious Diseases of Domestic Animals	2+1=3	II
9	VPL 509	Toxicopathology*	2+1=3	III
10	VPL 510	Avian Pathology	2+1=3	III
11	VPL 511	Pathology of Wild/ Zoo and Aquatic Animal Diseases*	2+1=3	III
12	VPL 512	Pathology of Laboratory Animal Diseases*	2+1=3	III
13	VPL 591	Master's Seminar	1+ 0=1	III
14	VPL 599	Masters Research	0+10=10	III
15	PGS 601	Technical Writing and Communications Skills	1+0=1	III
16	PGS 602	Agricultural Research, Research Ethics and Rural Development Programmes	1+0=1	III
17	PGS-603	Basic concepts in laboratory techniques	0+1=1	III
18	PGS 604	Intellectual Property and its management in Agriculture	1+0=1	III
19	PGS 605	Library and Information Services	0+1=1	III
20	VPL 599	Masters Research	0+20=20	IV

*indicates optional

PhD: Veterinary Pathology (**Regular**)

Sr. No	Course No.	Title of the course	Credits	Semester
1	VPL 601	Molecular and Ultrastructural Basis of Cell injury	2+1=3	I
2	VPL 602	Molecular Basis of Inflammation	1+1=2	I
3	RPE 700	Research & Publication Ethics	1+1= 2	I
4	VPL 603	Molecular Basis of Neoplasia*	1+1 =2	I
5	VPL 604	Immunopathology	2+1=3	II
6	VPL 607	Pathology of Important Emerging and Re-Emerging Diseases of Pets and Livestock*	2+1=3	II
7	VPL 608	Research Methodology in Pathology	1+0=1	II
8	VPL 609	Necropsy Conference I	0+1=1	II

9	VPL 691	Doctoral Seminar-I	1 + 0=1	II
10	VPL 605	Advances in Diagnostic Pathology*	1+2=3	II
11	VPL 606	Pathology of Nutritional and Metabolic Disturbances*	2 +1=3	II
12	VPL 699	Doctorate Research	0 +5=5	II
13	VPL 690	Special Problem*	0 +1=1	III
14	VPL 692	Doctoral Seminar-II	1 + 0=1	III
15	VPL 699	Doctorate Research	0 +10=10	III
16	VPL 699	Doctorate Research	0 +20=20	IV
17	VPL 699	Doctorate Research	0 +20=20	V
18	VPL 699	Doctorate Research	0 +20=20	VI

*Indicates optional

PhD: Veterinary Pathology (**In-service**)

Sr. No	**Course No.**	**Title of the course**	**Credits**	**Semester**
1	VPL 601	Molecular and Ultrastructural Basis of Cell injury	2 +1=3	I
2	VPL 602	Molecular Basis of Inflammation	1 +1=2	I
3	RPE 700	Research & Publication Ethics	1 +1= 2	I
4	VPL 603	Molecular Basis of Neoplasia*	1+1 =2	I
5	VPL 604	Immunopathology	2 + 1=3	II
6	VPL 605	Advances in Diagnostic Pathology*	1 + 2=3	II
7	VPL 606	Pathology of Nutritional and Metabolic Disturbances*	2 +1=3	II
8	VPL 607	Pathology of Important Emerging and Re-Emerging Diseases of Pets and Livestock*	2 +1=3	II
9	VPL 608	Research Methodology in Pathology	1 +0=1	II
10	VPL 609	Necropsy Conference I	0 +1=1	II
11	VPL 691	Doctoral Seminar-I	1 +0=1	III
12	VPL 692	Doctoral Seminar-II	1 +0=1	III
13	VPL 690	Special Problem*	0 + 1=1	III
14	VPL 699	Doctorate Research	0 +15=15	IV
15	VPL 699	Doctorate Research	0 +15=15	V
16	VPL 699	Doctorate Research	0 +15=15	VI
17	VPL 699	Doctorate Research	0 +15=15	VII
18	VPL 699	Doctorate Research	0 +15=15	VIII

*Indicates optional

4. Lecture Schedule – UG, PG , PhD - Theory / Practical Schedule – Approved by BoS – Subject wise

BVSc & AH (MSVE-2016)

Subject : Veterinary Pathology

Theory schedule

Lect. No	Sr. No.	Topics to be covered
UNIT –I General Veterinary Pathology		
1	1	Introduction and scope of Veterinary Pathology - Pathology and its relations with other disciplines, common terminologies used in the subject of pathology, health and diseases.
2, 3	2, 3	Brief outline of major intrinsic (including anomalies) and extrinsic causes of diseases.
4,5, 6	4, 5,6	Hemodynamic disorders (derangements) – Hyperemia, congestion and hemorrhage
7, 8	7, 8	Hemodynamic disorders (derangements) - Thrombosis, embolism, infarction
9	9	Edema
10	10	Shock
11	11	Cell Injury- Reversible and irreversible cell injury
12	12	Degenerations, glycogen overload, amyloidosis and fatty changes
13	13	Necrosis and its types
14	14	Gangrene and its types
15	15	Apoptosis, difference between PM autolysis and necrosis
16, 17	16, 17	Major exogenous and endogenous pigments, calcification, (Metastatic and Dystrophic). Jaundice in animals, photosensitizational dermatitis.
18, 19	18, 19	Disturbances in growth - Aplasia, hypoplasia, hyperplasia, metaplasia, dysplasia, atrophy and hypertrophy.
20, 21	20, 21	Inflammation: Definition, classification, various cell types and their functions, mediators, cardinal signs of inflammation and systemic effects.
22	22	Wound healing by primary and secondary intention including growth factors
23	23	Immunopathology in brief – Immunodeficiency, hypersensitivity and autoimmunity
UNIT-II Systemic Veterinary Pathology		
1	24	**Introduction to digestive system.** Pathological changes including neoplasms and affections of digestive system - its functional disturbances and anomalies. Affection of mouth (Dental caries, sialedenitis, sialolith, stomatitis, glossitis and ranula).
2	25	Affections of pharynx , esophagus and stomach (impaction, tympany, traumatic reticulitis)
3, 4	26, 27	Affections of intestine (mechanical obstruction, torsion, volvulus, intussusception and incarceration). Detailed study of enteritis and its varieties.
5, 6	28, 29	Study of hepatitis, cirrhosis, its varieties and effects
7	30	Study of affections of gall bladder, cholecystitis, cholangitis and pancreas (diabetes mellitus and diabetes insipidus)
8	31	**Introduction to Respiratory system.** Pathological changes including neoplasms & affections of respiratory system – its functional disturbances, anomalies and diseases of nasal cavity (epistaxis, bull nose, rhinitis, nasal schistosomiasis)

9, 10	32, 33	Affections of larynx and trachea. Non-inflammatory conditions of lung atelectasis, emphysema, oedema, hemoptysis, pleurirtis
11	34	Hydrothorax, Pneumothorax, Pyothorax, Hemothorax in brief.
12	35	Detail study of Pneumonia and its types.
13	36	Pathology of pulmonary adenomatosis (Jaagsiekte) and Maedi
14, 15	37, 38	**Introduction to musculoskeletal system.** Pathological changes including neoplasms & affections of muscles. Equine rhabdomyolysis (Azoturia / Monday morning sickness), White muscle disease, myositis (Acute, chronic and hemorrhagic)
16, 17	39, 40	Pathology of bone (osteodytrophic diseases, fracture), joints, ligaments and tendons
18	41	**Introduction to cardiovascular system including blood circulation.** Pathological changes including neoplasm and affections of cardiovascular system - its functional disturbances and anomalies.
19	42	Study of pathology of epicardium and pericardium. Detail study of pericardium-hydropericardium, pyopericardium, peumopericardium, hemopericardium and pericarditis
First internal assessment / examination		
20, 21	43, 44	Study of pathology of myocardium and endocardium – Myocarditis, right and left side heart failure, changes in the size of heart (hypertrophy, dilatation and atrophy), endocarditis and its types.
22	45	Detail study of pathology of artery (arteritis, arteriosclerosis and atherosclerosis), vein (phlebitis, varicose veins, phleboliths) and aneurysm.
23	46	**Introduction to haemopoietic system.** Pathological changes including neoplasm and affections of haemopoietic system (oligocythemia, polycythemia, pathology of anemia)
24	47	Study of anemia continued, affections of W.B.C.s (leucocytosis, leucopenia, leukemia)
25	48	**Introduction to lymphoid system**. Pathological changes including neoplasm and affections of lymphoid system.
26	49	**Introduction to urinary system.** Pathological changes including neoplasm and affections of urinary system- anomalies and its functional disturbances (proteinuria, glycosuria, ketonuria, hematuria, hemoglobinuria etc.,)
27, 28	50, 51	Study of hydronephrosis, cystitis, urolithiasis and uremia
29	52	Study of pathology of nephritis
30	53	**Introduction to male reproductive system**. Pathological changes including neoplasm and non-infectious conditions affecting male reproductive system
31, 32	54, 55	**Introduction to female reproductive system.** Pathological changes including neoplasm and affections of female reproductive system.
33, 34	56, 57	**Introduction to Nervous system**. Pathological changes including neoplasm and affections of brain and meninges. Reaction of nervous tissue to injury.
35, 36	58, 59	**Introduction to endocrine system.** Study of affections of adrenal, thyroid, thymus, pituitary, parathyroid and pancreas
37	60	Study of affections of skin and appendages (horn, hoof), eye and ear
UNIT –III Animal oncology, Veterinary clinical pathology and necropsy		
1,2	61, 62	**Animal oncology -** Definitions, general characteristics, classification and etiology of neoplasms. Differences between benign and malignant tumours.
3	63	Carcinogenesis and spread of neoplasms, tumour immunity
4	64	Effects and diagnosis of tumours, staging and grading of neoplasms

5,6	65, 66	Pathology of various types of tumours in domestic animals (epithelial, connective tissue, hematopoietic tissue etc.)
7	67	**Veterinary clinical pathology** - Introduction and importance of clinical pathology. Different anticoagulant used in haematology.
8	68	Interpretation of blood tests - haemoglobin, packed cell volume, total erythrocyte count, erythrocytic indices, erythrocytic sedimentation rate
9	69	Interpretation of blood tests - total leukocyte count, absolute count of different leucocytes), blood smear examination and its interpretation
10,11	70, 71	**Urinalysis**- Interpretation of physical, chemical and microscopic examination of urine
12	72	Study of biopsy and cytology including exfoliative cytology as rapid diagnostic techniques.
13	73	**Necropsy**- Introduction, objectives, pre-necropsy guidelines, procedure for post mortem examination of various species of animals including wild animals
14	74	Details study of post mortem changes in carcass
15	75	Collection, preservation and dispatch of specimens (morbid materials) for laboratory examination
16	76	Writing of post mortem report
17	77	Veterolegal necropsy, veterolegal wounds
UNIT IV-Pathology of infectious and non-infectious disease of domestic animals		
1	78	General introduction to pathology of bacterial diseases. Study of pathogenesis, gross and microscopic pathology of tuberculosis and Johne's disease
2,3	79, 80	Study of pathogenesis, gross and microscopic pathology of actinomycosis, actinobacillosis and anthrax.
4, 5	81, 82	Study of pathogenesis, gross and microscopic pathology of clostridial group of diseases (black quarter, black disease, enterotoxaemia, braxy, botulism, tetanus),
6	83	Study of pathogenesis, gross and microscopic pathology of streptococosis including strangles in horses, staphylococosis, glanders
7,8	84, 85	Study of pathogenesis, gross and microscopic pathology of pasteurellosis, leptospirosis and listeriosis,
Second internal assessment / examination		
9	86	Study of pathogenesis, gross and microscopic pathology of swine erysipelas and corynebacterium infections (caseous lymphadenitis, pseudotuberculosis)
10	87	Study of pathogenesis, gross and microscopic pathology of brucellosis and campylobacteriosis
11	88	Study of pathogenesis, gross and microscopic pathology of salmonellosis and colibacillosis including oedema disease in pigs and necrobacillosis
12,13	89, 90	Study of pathogenesis, gross and microscopic pathology of mycoplasma infection (contagious bovine pleuropneumonia, contagious caprine pleuropneumonia, porcine enzootic pneumonia), diseases of chlamydial group, Q-fever, anaplasmosis and ehrlichiosis
14, 15	91, 92	Study of pathogenesis, gross and microscopic pathology of superficial and deep mycoses - ringworm (dermatophytosis), aspergillosis, zygomycosis, histoplasmosis, cryptococosis, rhinosporidiosis and candidiasis
16	93	Study of pathogenesis, gross and microscopic pathology of aflatoxicosis, ochratoxicosis, trichothecosis, degnala disease and ergotoxicosis
17	94	General introduction to pathology of viral diseases. Study of pathogenesis, gross and microscopic pathology of FMD, vesicular exanthema, vesicular stomatitis

18	95	Study of pathogenesis, gross and microscopic pathology of rinderpest, pestes des petits ruminants
19	96	Study of pathogenesis, gross and microscopic pathology of blue tongue and pox
20	97	Study of pathogenesis, gross and microscopic pathology of Infectious bovine rhinotracheitis, Bovine viral diarrhea and malignant catarrhal fever.
21, 22	98, 99	Study of pathogenesis, gross and microscopic pathology of Equine infectious anemia, Equine influenza, Equine viral arteritis, Equine rhino-pneumonitis and equine encephalomyelitis
23	100	Study of pathogenesis, gross and microscopic pathology of classical swine fever and swine influenza
24, 25 26	101,102, 103	Study of pathogenesis, gross and microscopic pathology of Rabies , Canine distemper, Infectious canine hepatitis, canine parvovirus infection and feline panleukopenia
27	104	Study of pathogenesis, gross and microscopic pathology of maedi, Jaagziekte, rota and corona viruses.
28	105	Study of pathogenesis, gross and microscopic pathology of prion diseases (scrapie, bovine and feline spongiform encephalopathies).
29, 30	106, 107	Study of pathogenesis, gross and microscopic pathology of fasciolosis, amphistomiasis, ascariasis, strongylosis, haemonchosis, spirocercosis, filariasis, hookworm and tapeworm infections
31, 32	108, 109	Study of pathogenesis, gross and microscopic pathology of haemorpotozoal diseases - babesiosis, theileriosis and trypanosomosis
33	110	Study of pathogenesis, gross and microscopic pathology of coccidiosis, toxoplasmosis, cryptosporidiosis,
34	111	Pathological changes of nutritional imbalances (in brief) due to carbohydrates, proteins and fats
35, 36	112, 113	Pathological changes of nutritional imbalances (in brief) due to minerals and vitamins and metabolic diseases (pregnancy toxaemia, post-parturient haemoglobinuria, hypomagnesemic tetany, azoturia, and sway back or enzootic ataxia, pica and rheumatism like syndrome).
37	114	Gross and microscopic pathology (in brief) of toxicities like arsenic, copper, lead, mercury and cadmium
38	115	Gross and microscopic pathology (in brief) of strychnine, nitrate, nitrite, hydrocyanic acid, fluoride, selenium and oxalates
39	116	Gross and microscopic pathology (in brief) of insecticide, pesticide poisoning, plant poisoning (braken fern, gossypol, ratti and lantana)
UNIT-V Avian Pathology		
1	117	Study of avian inflammation in comparison to mammalian inflammation
2	118	Pathogenesis, gross & microscopic pathology of Ranikhet Disease (RD) and Avian Influenza.
3	119	Pathogenesis, gross & microscopic pathology of Infectious Bronchitis (IB) & Infectious Laryngo-tracheitis (ILT).
4	120	Pathogenesis, gross & microscopic pathology of Infectious Bursal disease (IBD), Inclusion body hepatitis (IBH) & hydropericardium syndrome
5	121	Pathogenesis, gross & microscopic pathology of Marek's Diseases (MD), Avian Leucosis or sarcoma group of diseases & reticuloendotheliosis
6	122	Pathogenesis, gross & microscopic pathology Fowl pox, Chicken infectious anaemia, Avian Nephritis & Avian encephalomyelitis

7	123	Pathogenesis, gross & microscopic pathology of Eggs drop syndrome, (EDS) & Reovirus infection
8	124	Pathogenesis, gross & microscopic pathology of Collibacillosis (yolk sac disease, peritonitis, Coligranuloma) and Infectious coryza.
9	125	Pathogenesis, gross & microscopic pathology of Fowl cholera & tuberculosis
10	126	Pathogenesis, gross & microscopic pathology of Clostridial diseases- botulism, necrotic & ulcerative enteritis and gangrenous dermatitis.
11	127	Pathogenesis, gross & microscopic pathology of Salmonellosis, Fowl typhoid & Spirochaetosis
12	128	Pathogenesis, gross & microscopic pathology of *Mycoplsama gallisepticum* (CRD) & *M. synovae* infection , Chlamydosis
Third internal assessment / examination		
13	129	Pathogenesis, gross & microscopic pathology of aspergillosis, thrush, favus, aflatoxicosis, ochratoxicosis & trichothecenes
14	130	Gross & microscopic pathology of parasitic disease. Helminthic diseases of poultry in brief (flukes, cestodes, nematodes), ectoparasites. Common vices of poultry
15	131	Pathogenesis, gross & microscopic pathology of coccidiosis & histomoniasis
16	132	Gross and microscopic pathology Nutritional and metabolic disease- deficiency / excess of carbohydrate, proteins, minerals and vitamins in poultry.
17,18	133, 134	Miscellaneous diseases (Heat stroke, vent gleet, internal layer, false layer, pendulous crop, breast blister, ascites syndrome, fatty liver and kidney syndrome, fatty liver syndrome, cage layer fatigue, gout, hemorrhagic syndrome, round heart disease, impaction of oviduct, egg bound condition, bumble foot).
UNIT-VI Pathology of diseases of laboratory and wild animals		
1,2,3	135, 136 137	Pathology of important diseases of rats, mice, and guinea pigs (Tyzzer's disease, Pseudotuberculosis, Salmonellosis, Infectious ectromelia, Infantile diarrhea, Murine hepatitis virus, Lymphocytic choriomeningitis);
4,5	138, 139	Pathology of important diseases of rabbits (Pasteurellosis, Blue breasts, Treponematosis, Enterotoxaemia, Rabbit pox, Infectious myxomatosis, Papillomatosis , Coccidiosis, Mite infestation).
6,7, 8	140, 141 142	Gross and microscopic pathology of important diseases of wild animals (West Nile Fever, Rabies, FMD, Pox, Kyasanaur forest disease, Infectious hepatitis virus, Anthrax, Tuberculosis, Colibacillosis, Clostridial infections Trypanosomosis, Babesiosis, Theileriosis, Nutritional deficiency diseases)

Practical Schedule

Pract. No.	Sr. No.	Topics to be covered
UNIT –I General Veterinary Pathology		
1, 2	1, 2	Study of gross pathological specimens and recognition of pathological lesions
3,4,5	3,4,5	Histopathological techniques– Processing of tissue for paraffin embedding technique, section cutting, staining and identification of microscopic lesions
6, 7, 8, 9, 10	6,7,8 9, 10	Examination of histopathological slides showing general pathological alterations.
UNIT –II Systemic Veterinary Pathology		
1, 2	11, 12	Study of gross specimens and histopathological slide- Digestive system
3,4	13, 14	Study of gross specimens and histopathological slide - Respiratory system

5,6	15, 16	Study of gross specimens and histopathological slide - Musculoskeletal system
7,8	17, 18	Study of gross specimens and histopathological slide - Cardivascular system
9,10	19, 20	Study of gross specimens and histopathological slide - Haemopoietic & lymphoid system
11,12	21, 22	Study of gross specimens and histopathological slide - Urinary system
13,14	23, 24	Study of gross specimens and histopathological slide - Reproductive system (Male & Female)
15,16	25, 26	Study of gross specimens and histopathological slide - Nervous system
17,18	27, 28	Study of gross specimens and histopathological slide - Endocrine, skin and appendages
UNIT –III Animal oncology, veterinary clinical pathology and necropsy		
1,2	29, 20	Macroscopic and microscopic examinations of various types of benign tumors
3,4	31, 32	Macroscopic and microscopic examinations of various types of malignant tumors
5	33	Examination of blood for routine haematological tests (Hb, PCV, ESR, Erythrocytic Indices) in domestic animals
6	34	Total Erythrocyte Count, Total Leucocytes Count
7	35	Differential Leukocyte Count
8	36	Haematology in Poultry
9	37	Physical, chemical and microscopic examination of urine
10,11	38, 39	Post mortem examination of different species of animals
12	40	Post mortem examination of wild animals
13	41	Post mortem examination of laboratory animals
UNIT IV -Pathology of infectious and non-infectious disease of domestic animals		
1,2	42, 43	Post mortem examination and its interpretations in infectious and non-infectious disease of domestic animals
3, 4,5 6	44, 45, 46, 47	Study of gross specimens and histopathological slides of various organs pertaining to infectious and non- infectious diseases of domestic animals
7,8,9 10	48, 49, 50, 51	Demonstration of causative agents in tissue section by special staining methods and use of rapid diagnostic tests.
UNIT- V Avian Pathology		
1	52	Post-Mortem examination in poultry and diagnosis of poultry diseases.
2	53	Writing of post mortem examination reports of important diseases
3	54	Collection, preservation & dispatch of morbid material in poultry diseases.
4	55	Study of gross specimens & microscopic lesions of viral diseases of poultry.
5	56	----------do----------
6	57	Study of gross specimens & microscopic lesions of bacterial diseases
7	58	----------do----------
8	59	Study of gross specimens & microscopic lesions of parasitic and fungal diseases of poultry.
9	60	Study of gross specimens & microscopic lesions of nutritional (deficiency /excess) and miscellaneous diseases of poultry.
UNIT-VI Pathology of diseases of laboratory and wild animals		
1,2	61, 62	Post mortem examination of laboratory and wild animals
3,4	63, 64	Post mortem examination of laboratory and wild animals
5,6	65, 66	Study of gross specimen and histopathological slides of diseases affecting laboratory animals.
7,8	67, 68	Study of gross specimen and histopathological slides of diseases affecting wild animals.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 501 **Credits: 2+1= 3**

Course Title: General Pathology

Aim of the course: To acquaint the students with different types of degenerations, cell injuries caused by different types of irritants and inflammation

Lecture Schedule (Theory)

Lecture numbers	Name of Topic
	UNIT I
1	Introduction and principles of pathology: aim, objective, branches etc.
2	Etiology : intrinsic and extrinsic causes of diseases
3	Genetic basis of diseases in animals
4	Causes and morphological alterations in cell injury
5	Mechanisms of reversible and irreversible cell injury
6-7	Morphologic characteristics, significance and fate of various intracellular (lipids, glycogen, proteins) accumulations/ degenerations
8	Morphologic characteristics, significance and fate of various extracellular (hyaline material and amyloid) accumulations/ degenerations
9	Morphologic characteristics, significance and fate of various extracellular (fibrinoid change and gout) accumulations/ degenerations
10	Morphologic characteristics, significance and fate of various endogenous and exogenous pigmentations
11	Detailed study of necrosis
12	Detailed study of apoptosis
13	Pathologic calcifications
14	Cellular adaptive changes
	UNIT II
15	Causes, mechanisms, morphologic features, significance and fate of hyperemia and congestion
16	Causes, mechanisms, morphologic features, significance and fate of edema
17	Causes, mechanisms, morphologic features, significance and fate of hemorrhages and thrombosis
18	Causes, mechanisms, morphologic features, significance and fate of embolism
19	Causes, mechanisms, morphologic features, significance and fate of ischemia and infarction
20	Causes, mechanisms, morphologic features, significance and fate of shock
	UNIT III
21	Introduction to inflammation

22-23	Vascular, cellular and molecular events in acute inflammation

24	Mediators of inflammation and heat shock proteins of acute inflammation
25	Cellular components (details of cells of acute inflammation) and morphologic classification of acute inflammation
4.	Outcomes of acute inflammation
5.	Causes of chronic inflammation
6.	Morphologic features of chronic inflammation
7.	Cellular components (details of cells of chronic inflammation) of chronic inflammation
30-31	Healing and repair
32	Systemic effects of inflammation

UNIT IV

- Immune mediated diseases and immune deficiency diseases
- Introduction to autoimmunity
- Mechanisms of hypersensitivity reactions
- Mechanisms of hypersensitivity reactions- continued

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 501 **Credits**: **2+1= 3**

Course Title: General Pathology

Aim of the course: To acquaint the students with different types of degenerations, cell injuries caused by different types of irritants and inflammation

---

Lecture Schedule (Practical)

Practical numbers	Title of Practical
1	Study of gross (specimens) and/ or microscopic lesions of degenerations and infiltrations.
2	Study of gross (specimens) and/ or microscopic lesions of pigmentations
3	Study of gross (specimens) and/ or microscopic lesions of necrosis
4	Study of gross (specimens) and/ or microscopic lesions of circulatory disturbances
5	Study of gross (specimens) and/ or microscopic lesions of growth disturbances
6	Study of gross (specimens) and/ or microscopic lesions of different types of inflammation
7	Study of gross (specimens) and/ or microscopic lesions of different types of inflammation
8	Demonstration of post mortem changes
9	Demonstration of post mortem changes
10	Assessment of students for their skills in the diagnosis of gross lesions during post-mortem examination of different tissues of domestic animals.
11	Assessment of students for their skills in the diagnosis of gross lesions during post-mortem examination of different tissues of domestic animals
12	Assessment of students for their skills in the diagnosis of gross lesions during post-mortem examination of different tissues of domestic animals
13	Assessment of students for their skills in the diagnosis of gross lesions during post-mortem examination of different tissues of domestic animals
14	Preparation of histopathology slides on the selected cases followed by interaction in the student seminars/ group discussions.
15	Preparation of histopathology slides on the selected cases followed by interaction in the student seminars/ group discussions.
16	Preparation of histopathology slides on the selected cases followed by interaction in the student seminars/ group discussions.
17	Preparation of histopathology slides on the selected cases followed by interaction in the student seminars/ group discussions.
18	Preparation of histopathology slides on the selected cases followed by interaction in the student seminars/ group discussions.

Suggested Reading

5. McGavin MD and Zachary JF. 2017. Pathologic Basis of Veterinary Diseases. 6th Ed. Elsevier.

6. Vegad JL. 2007. Text Book of Veterinary General Pathology. 2nd Ed. International Book Distr.

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 502 **Credits: 0+2= 2**

Course Title: Techniques in Pathology

Aim: To acquaint the students with different techniques used frequently in Veterinary Pathology.

Lecture Schedule (Practical)

Practical Numbers	Title of Practical
1	Introduction to basic histological/histopathological techniques.
2	Collection, fixation and processing of tissues for histopathological studies
3	Hematoxylin and eosin staining of tissue sections
4	Collection, fixation and processing of tissues for scanning electron microscopy
5	Principle and applications of scanning electron microscopy
6	Collection, fixation and processing of tissues for transmission electron microscopy
7	Principle and application of transmission electron microscopy
8	Collection and processing of tissues for histochemical examinations
9	Collection and processing of tissues for toxicological examinations
10	Collection and processing of tissues for bacteriological examinations
11	Collection and processing of tissues for virological examinations
12	Demonstration of different inclusions in tissues
13	Demonstration of different bacteria and fungi in tissues
14	Principle and applications of dark field microscopy
15	Principle and applications of phase contrast microscopy
16	Principle and applications of fluorescent microscopy
17	Histochemical techniques for demonstration of fat
18	Histochemical techniques for demonstration of glycogen
19	Histochemical techniques for demonstration of connective tissue
20	Histochemical techniques for demonstration of mucopolysaccharides
21	Histochemical techniques for demonstration of common enzymes

22-23	Histochemical techniques for demonstration of pigments
24	Histochemical techniques for demonstration of minerals
25	Collection and processing of tissue for cryo-sectioning
26	Application and processing tissue for immunoperoxidase
27	Application and processing tissue for immunofluorescence
28-29	Principles and applications of PCR. Different variants of PCR
30-31	Demonstration of PCR for disease diagnosis
32-36	Collection, preparation, fixation and maintenance of museum specimen of different pathological conditions

Suggested Reading

• Culling CFA. 1969. Handbook of Histological Techniques. Butterworths.

•Lillie RD. 1965. Histopathologic Techniques and Practical Histo-chemistry. 3rd Ed. McGrawHill.

16 Culling CFA. 2013. Handbook of Histopathological and Histochemical Techniques: Including Museum Techniques PDF, eBook (http://mbooknom.men/go/best.php?id=B01DRY52U8)

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 503 **Credits:** 1+1=2

Course Title: Animal Oncology

Aim: To acquaint the students with different types of neoplasms of domestic animals, their nature, cause, pathology and diagnosis.

Lecture schedule (Theory)

Lectures numbers	Name of Topic
	UNIT I
1-2	Tumor-etiology, carcinogens and oncogenesis
3	Nomenclature, classification and characterisation of benign and malignant tumors
4-5	Molecular mechanisms of carcinogenesis and spread of tumors
6	Tumor immunology
	UNIT II
7	Effects of tumours
8-9	Laboratory diagnosis of tumours. Staging and grading of tumors
18	Animal models of neoplasms- Experimental induction
	UNIT III
11	Pathology of epithelial tissue tumours with their characteristic identification features and epidemiology
12	Pathology of connective tissue tumours with their characteristic identification features and epidemiology
13	Study of tumors of respiratory and haemopoietic system
14	Study of tumors of integumentary and musculoskeletal system
15	Study of tumors of gastrointestinal and hepatobiliary system
16	Study of tumors of uro-genital system
17	Study of tumors of nervous system and other sense organs (eye and ear)
18	Study of tumors of endocrine system

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 503 **Credits:** 1+1=2

Course Title: Animal Oncology

Aim: To acquaint the students with different types of neoplasms of domestic animals, their nature, cause, pathology and diagnosis.

Lecture schedule (Practical)

Practical numbers	Title of Practical
1-4	Cytological diagnosis of tumours via impression smears and Fine Needle Aspiration cytology of respiratory, haemopoietic, integumentary, musculoskeletal, gastrointestinal system
5-9	Cytological diagnosis of tumours via impression smears and Fine Needle Aspiration cytology of hepatobiliary, uro-genital, nervous, ocular, ear and endocrine system
10-13	To study the gross and microscopic changes in different types of neoplasms ofrespiratory, haemopoietic, integumentary, musculoskeletal, gastro-intestinalsystem
14-18	To study the gross and microscopic changes in different types of neoplasms ofhepatobiliary, uro-genital, nervous, ocular, ear and endocrine system

Suggested Reading

• Meuten DJ. 2016. Tumors in Domestic Animals. 5th Ed. Wiley-Blackwell

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 504 **Credits**: 1+1=2

Course Title: Clinical Pathology

Aim: To acquaint the students with clinical alterations in blood, urine, CSF and other body fluids due to different diseases.

Lecture Schedule (Theory)

Lecture Numbers	Name of the topic
	UNIT –I
1	Introduction and scope of clinical pathology in disease diagnosis. Important terminologies used in clinical pathology.
2-3	Erythrocyte disorders
4	Leukocyte disorders and platelet /thrombocyte disorders
5	Disorders of Calcium, Phosphorus and Magnesium metabolism in different species
6	Disorders of Sodium and Potassium metabolism in different species
7	Liver function tests and their diagnostic significance
8	Kidney function tests and their diagnostic significance
9	Thyroid and pancreatic function tests and their diagnostic significance
10-11	Common cytologies in veterinary practice and interpretation of results. Applications of exfoliative cytology
12-13	Urinalysis and its diagnostic significance
14	Faecal sample examination, skin Scrapings examination and their diagnostic significance
15-16	Biopsy: definition, types and their applications. Common biopsies in veterinary practice
17-18	Diagnostic significance of CSF, milk and other body fluid examinations

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 504 **Credits**: 1+1=2

Course Title: Clinical Pathology

Aim: To acquaint the students with clinical alterations in blood, urine, CSF and other body fluids due to different diseases.

Lecture Schedule (Practical)

Practical numbers	Title of Practical
1	Collection of blood sample for hematological examination and Estimation of various parameters in erythrogram (Hb, PCV, TEC, ESR, MCV, MCHC, etc)and interpretation of results
2	Estimation of various parameters in leukogram and thrombogram(TLC, DLC, Platelet count etc) and interpretation of results
3-4	Blood smear examination for diagnosis of various morphological abnormalities, inclusions and parasites in RBCs, WBCs and platelets
5	Photometric techniques (Colorimetry / Spectrophotometry /Flame Emission Photometer) and Serum auto-biochemistry analyzer in clinical biochemistry.
6	Estimation of various serum/plasma biochemical parameters (Ca, P, K, Na,Cletc) and interpretation of results
7-8	Urinalysis (Physical, chemical and microscopic examination)and interpretation of results
9	Faecal sample examination for diagnosis of gastrointestinal parasitic diseases (trematodes and nematodes)
10	Faecal sample examination for diagnosis of gastrointestinal parasitic diseases (cestodes and protozoa). Skin Scraping examination.
11-12	Common biopsy techniques in veterinary practice and interpretation of results.
13-14	Common cytologies, staining of cytological preparations and interpretation of results
15	CSF and other body fluid examinations and their interpretation
16	Liver function tests in different species and their interpretations
17	Kidney function tests in different species and their interpretations
18	Thyroid function test and their interpretations. Pancreatic Function Tests and their interpretations

Suggested Reading

• Amy C. Valenciano, Rick L. Cowell. 2013. Cowell and Tyler's Diagnostic Cytology and Hematology of the Dog and Cat, 4th Ed, Elsevier

• Benzamin MM. 1985. Outline of Veterinary Clinical Pathology. 3rd Ed. Ludhiana, Kalyani Publishers.

• Coles EH. 1986. Veterinary Clinical Pathology. 4th Ed, WB Saunders.

• Douglas J., Weiss, K and Jane Wardrop. 2010. Schalm's Veterinary Haematology, Wiley.

• Stevan Stockham and Michael Scott Fundamentals Of Veterinary Clinical Pathology 2Nd Edition

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 505 **Credit: 0+1=1**

Course Title: Necropsy Procedures and Interpretations

Aim: To acquaint the students with necropsy procedures in large and small animals and study of PM lesions in different diseases and to educate the students about common veterolegal problems and technically simple and legal writing of PM reports.

Lecture schedule (Practical)

Practical numbers	Title of Practical
1	Detailed necropsy examination of various species of large animals
2	Detailed necropsy examination of various species of small animals
3	Detailed necropsy examination of poultry
4	Detailed necropsy examination of laboratory animals and wildlife
5	Systematic examination of cardiovascular system for gross pathological and histopathological studies and correlation of the observations to diagnose the disease conditions
6	Systematic examination of respiratory system for gross pathological and histopathological studies and correlation of the observations to diagnose the disease conditions
7-8	Systematic examination of digestive system for gross pathological and histopathological studies and correlation of the observations to diagnose the disease conditions
9	Systematic examination of musculoskeletal system for gross pathological and histopathological studies and correlation of the observations to diagnose the disease conditions
10	Systematic examination of urinary and nervous system for gross and histopathological studies and correlation of the observations to diagnose the disease conditions
11	Systematic examination of haemopoietic and lymphoid system for gross and histopathological studies and correlation of the observations to diagnose the disease conditions
12	Systematic examination of male and female genital system for gross and histopathological studies and correlation of the observations to diagnose the disease conditions
13	Systematic examination of endocrine system and affections of skin and appendages (horn, hoof), eye and ear for gross pathological and histopathological studies and correlation of the observations to diagnose the disease conditions
14-15	Necropsy case presentation and report writing
16-18	Collection, preservation and dispatch of morbid materials for

	diagnosis of viral bacterial, protozoan, parasitic diseases, toxic/Poisoning, histochemistry/ histopathology

Suggested Reading

- Albert C Strafuss.1988. Necropsy: Procedures and Basic Diagnostic Methods for Practicing Veterinarians, Charles C. Thomas Publisher Springfield
- Benjamin Lucio-Martinez and Jodi A Korich. 2010. Illustrated guide to Poultry Necropsy and diagnosis, Cornell University (https://www.slideshare.net /heshamkotb/illustrated-guideto-poultry-necropsy-and-diagnosis)
- D Gopala Krishna Rao. 2005. Textbook on necropsy and histopathological techniques, 1st Ed.Academa
- Donald B Feldman and John Curtis Seely. 1988. Necropsy Guide: Rodents and the Rabbit,1st Ed. CRC Press
- Gahlot AK, Sharma SN and Tanwar RA. 2003. Veterinary Jurisprudence. 5th Ed. NBS Publishers, Bikaner.
- John M King, David C Dodd and Lois Roth. 2006. The Necropsy Book, Fifth Edition, C L Davis Foundation
- Jones TC and Gleiser CA. 1954. Veterinary Necropsy Procedures. JB Lippincott
- Lincoln PJ and Thomson J. 1998. Forensic DNA Profiling Protocols. Humana Press.
- Majó Masferrer, Natàlia, Dolz Pascual, Roser and Shivaprasad HL. 2011. Atlas of Avian Necropsy: Macroscopic Diagnosis Sampling, SERVET Publishers
- Rudin N and Inman K. 2002. An Introduction to Forensic DNA Analysis. CRC Press

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 506 **Credit: 0 + 1=1**

Course Title: Necropsy Conference

Aim: To promote self-learning of the students in different necropsy procedures of animals including poultry and description of post-mortem lesions in different diseases/disease conditions.

Lecture schedule (Practical)

Practical Numbers	Title of Practical
1-3	Continuous assessment of students on detailed necropsy examination of various species of large animals, small animals including poultry necropsy associated cytological examinations; systematic examination of different organs for **morphologic description of gross lesions**; gross photography; collection of tissues for histopathology and based on nature of gross lesions, if possible further collection for investigation of viral/ bacterial/protozoan/ fungal/ parasitic diseases/ toxic or poisoning, etc
4-5	Presentation of selected case (s) in monthly seminars followed by report writing and final morphologic/etiologic diagnosis
6-8	Continuous assessment of students on detailed necropsy examination of various species of large animals, small animals including poultry necropsy associated cytological examinations; systematic examination of different organs for **morphologic description of gross lesions**; gross photography; collection of tissues for histopathology and based on nature of gross lesions, if possible further collection for investigation of viral/ bacterial/protozoan/ fungal/ parasitic diseases/ toxic or poisoning, etc
9	Presentation of selected case (s) in monthly seminars followed by report writing and final morphologic/etiologic diagnosis
10-12	**Morphologic description of microscopic lesions**; microscopic photography; correlation of gross and microscopic observations with the results of other parallel investigations to diagnose the disease conditions
13	Presentation of selected case (s) in monthly seminars followed by report writing and final morphologic/etiologic diagnosis
14-16	**Morphologic description of microscopic lesions**; microscopic photography; correlation of gross and microscopic observations with the results of other parallel investigations to diagnose the disease conditions
17-18	Presentation of selected case (s) in monthly seminars followed by report writing and final morphologic/etiologic diagnosis

Suggested reading

- Albert C Strafuss. 1988. Necropsy: Procedures and Basic Diagnostic Methods for Practicing Veterinarians, Charles C. Thomas Publisher Springfield.
- Benjamin Lucio-Martinez and Jodi A Korich. 2010. Illustrated guide to Poultry Necropsy
- and diagnosis, Cornell University (https://www.slideshare.net/heshamkotb/illustrated-guideto-poultry-necropsy-and-diagnosis)

- D Gopala Krishna Rao. 2005. Textbook on necropsy and histopathological techniques, 1st EdAcadema.
- Donald B Feldman, John Curtis Seely. 1988. Necropsy Guide: Rodents and the Rabbit, 1st Ed. CRC Press.
- Jones TC and Gleiser CA. 1954. Veterinary Necropsy Procedures. JB Lippincott.
- John M King, David C Dodd and Lois Roth. 2006. The Necropsy Book, Fifth Edition, C LDavis Foundation.
- Majó Masferrer, Natàlia, Dolz Pascual, Roser and Shivaprasad HL. 2011. Atlas of AvianNecropsy: Macroscopic Diagnosis Sampling, SERVET Publishers.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No.: VPL 507 **Credits:** 2+1= 3

Course Title:-Systemic Pathology

Aim: To teach the students about different disease conditions of haemopoietic, circulatory, respiratory, digestive, urinary and genital systems, nervous, musculoskeletal, endocrine glands and special senses.

Lecture Schedule (Theory)

Lecture numbers	Name of Topics
	UNIT I
1 – 4	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting cardiovascular system (heart, blood vessels and lymph vessels)
5 – 9	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting respiratory system (nasal cavity, larynx, trachea, bronchi, lungs and pleura)
10-14	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting digestive system (buccal cavity, pharynx, oesophagus, stomach and intestines)
15 -19	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting haemopoietic system (bone marrow, blood, spleen, lymph node)
	UNIT II
20-23	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting urinary system (kidneys, ureter, urinary bladder and urethra)
24-26	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting genital system (male and female genital organs including mammary gland)
	UNIT III
27-29	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting nervous system (brain and spinal cord)
30-31	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting endocrine system (pituitary, thyroid, parathyroid, pancreas)
32-33	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting musculo-skeletal system (muscles and bones)
34-36	Advanced study of pathological conditions in relation to their etiology, pathology and pathogenesis including examples of specific infectious or non-infectious diseases affecting organs of special senses (eye, ear), skin and its appendages (hoof, tail)

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No.: VPL 507 **Credits:** 2+1= 3

Course Title:-Systemic Pathology

Aim: To teach the students about different disease conditions of haemopoietic, circulatory, respiratory, digestive, urinary and genital systems, nervous, musculoskeletal, endocrine glands and special senses.

Lecture Schedule (Practical)

Practical numbers	Title of Practical
01	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides - Cardiovascular (heart, blood vessels and lymph vessels)
02	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides -Respiratory system (nasal cavity, larynx, trachea, bronchi, lungs and pleura)
03	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides - Digestive system (buccal cavity, pharynx, oesophagus, stomach and intestines)
04	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides - Haemopoietic system (bone marrow, blood, spleen, lymph node)
05	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides - Urinary system (kidneys, ureter, urinary bladder and urethra)
06	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides - Genital system (male and female organs including mammary gland)
07	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides - Nervous (brain and spinal cord) and endocrine (pituitary, thyroid, parathyroid, pancreas)
08-09	Study of the morphologic description of lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs in the preserved specimens/ slides - Musculo-skeletal system (muscles and bones) and organs of special senses (eye, ear), skin and its appendages (hoof, tail)
10-18	Continuous assessment of students for their skills in the morphologic description of

	lesions and nomenclature of a morphologic diagnosis based on gross and/ or microscopic lesions in variety of organs during post-mortem examination of domestic animals followed by interaction in the student seminars/ group discussions

Suggested Reading

• Grant Maxie. 2015. Jubb, Kennedy & Palmer's Pathology of Domestic Animals, 6th Ed. Saunders Ltd.

• Vegad JL and Madhu Swamy. 2010. A text book of Veterinary Systemic Pathology, 2nd Ed. Publisher IDBC, Lukhnow

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No.: VPL 508 **Credits: 2+1=3**
Course Title: Pathology of Infectious Diseases of Domestic Animals
Aim: To teach the students about important infectious disease conditions of domesticanimals.

Lecture Schedule (Theory)

Lecture numbers	Name of Topic
	UNIT I
1	Study of etiology, pathology and pathogenesis of viral diseases: Foot and mouth disease, vesicular stomatitis, vesicular exanthema and Swine vesicular disease
2	Study of etiology, pathology and pathogenesis of viral diseases :Rinderpest, Bovine viral diarrhoea and Mucosal disease
3	Study of etiology, pathology and pathogenesis of viral diseases: PPR, Contagious ecthyma and Blue tongue
4	Study of etiology, pathology & pathogenesis of viral diseases: Infectious bovine rhinotracheitis
5	Study of etiology, pathology and pathogenesis of viral diseases: Parainfluenza-3 and Bovine respiratory syncytial virus infection
6-7	Study of etiology, pathology and pathogenesis of viral diseases: Bovine malignant catarrhal fever and Pox diseases
8	Study of etiology, pathology & pathogenesis of viral diseases: Rabies & Pseudorabies
9-10	Study of etiology, pathology and pathogenesis of viral diseases: Canine distemper, Parvovirus infections and Infectious canine hepatitis,
11	Study of etiology, pathology and pathogenesis of viral diseases: Classical swine fever and Swine influenza
12-13	Study of etiology, pathology and pathogenesis of viral diseases: Equine influenza, Equine infectious anaemia, African horse sickness, Equine viral arteritis, Equine viral encephalomyelitis and Equine herpesvirus infections
14	Study of etiology, pathology and pathogenesis of viral diseases: Papillomatosis, Rift Valley fever, Japanese encephalitis and Ovine encephalomyelitis (Louping ill)
15	Study of etiology, pathology and pathogenesis of Prion diseases
	UNIT II
16	Study of etiology, pathology and pathogenesis of bacterial diseases: Tuberculosis and Johne's disease
17	Study of etiology, pathology and pathogenesis of bacterial diseases: Actinobacillosis and Actinomycosis
18	Study of etiology, pathology and pathogenesis of bacterial diseases: Brucellosis and Listeriosis

19	Study of etiology, pathology and pathogenesis of bacterial diseases:Pasteurellosis, Leptospirosis and Anthrax
20-21	Study of etiology, pathology and pathogenesis of bacterial diseases: Clostridial group of diseases, Streptococcal and Staphylococcal infections.
22	Study of etiology, pathology and pathogenesis of bacterial diseases: Campylobacter infections and Swine erysipelas
23	Study of etiology, pathology and pathogenesis of bacterial diseases: Glasser's disease and Foot rot
24	Study of etiology, pathology and pathogenesis of bacterial diseases: Colibacillosis and Salmonellosis
25	Study of etiology, pathology and pathogenesis of bacterial diseases: Glanders, Melioidosis and Nocardiosis,
26-27	Study of etiology, pathology and pathogenesis of bacterial diseases: Cutaneous strepthricosis, Corynebactrium infections. Chlamydial and Mycoplasma infections.
UNIT III	
28	Study of etiology, pathology and pathogenesis of fungal diseases: Aspergillosis and Blastomycosis
29	Study of etiology, pathology and pathogenesis of fungal diseases: Coccidioidomycosis, Histoplasmosis, Epizootic lymphangitis and Rhinosporidiosis
30	Study of etiology, pathology and pathogenesis of fungal diseases: Sporotrichosis, Candidiasis and Crytococcosis
31	Study of etiology, pathology and pathogenesis of fungal diseases: Dermatomycoses. Diseases due to commonly occurring Mycotoxins
32	Study of etiology, pathology and pathogenesis of rickettsial diseases: Q-fever and Heart water disease
33	Study of etiology, pathology and pathogenesis of rickettsial diseases: Ehrlichiosis, Anaplasmosis and Haemobartonellosis (Hemotropic mycoplasmosis)
34	Study of etiology, pathology and pathogenesis of protozoal diseases: Coccidiosis, Toxoplasmosis and Babesiosis
35	Study of etiology, pathology and pathogenesis of protozoal diseases:Theilariosis, Cryptosporidiosis and Trypanosomiasis
36	Study of etiology, pathology & pathogenesis of diseases caused by helminthes: Liver fluke, Amphistomiasis, Schistosomiasis, Ascariasis, Hemonchosis, Oesophagostmes, Trichinellosis, Spirocercosis, lung worm, Tape worm and Cysticercosis

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No.: VPL 508 **Credits: 2+1=3**

Course Title: Pathology of Infectious Diseases of Domestic Animals

Aim: To teach the students about important infectious disease conditions of domestic animals.

Lecture Schedule (Practical)

Practical numbers	Title of Practical
1-2	Demonstration of necropsy of different species of domestic animals (Large and small ruminants).
3	Demonstration of necropsy of different species of domestic animals (Equines, Canines, felines etc.)
4	Collection and preservation of specimens during necropsy examination.
5-7	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of bacterial diseases of domestic animals.
8-10	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of viral diseases of domestic animals.
11-12	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of fungal diseases of domestic animals.
13-14	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of Mycoplasmal, Ricketssial diseases of domestic animals.
15	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of protozoal diseases of domestic animals.
16-18	Preparation of histopathology slides on the selected cases followed by interaction in the student seminars/ group discussions

Suggested Reading

• Jones TC, Hunt RD & King NW. 1997. *Veterinary Pathology*. Blackwell Publishing.

• Grant Maxie. 2015. Jubb, Kennedy & Palmer's *Pathology of Domestic Animals*, 6th Ed. Saunders Ltd.

• Gary Procop and Bobbi Pritt. 2014. *Pathology of Infectious Diseases*, 1st Ed. Saunders

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No.: VPL 509 **Credits**: **2+1= 3**

Course Title: Toxicopathology

Aim: To teach student about toxicity in livestock due to plants and extraneous poisons**.**

Lecture Schedule (Theory)

Lecture numbers	Name of Topic
	UNIT I
1	Introduction to Toxicopathology
2	Classification of poisoning/toxicity
3-4	Mode of action of different poisons/toxins
	UNIT II
5 –7	Study of pathogenesis, symptoms, gross and microscopic pathology of diseases caused by **Toxic plants** (Cyanogenic Plants, Plants containing nitrates, oxalates, plants causing teratogenecity, plants causing delayed blood coagulation, photosensitization etc.) commonly taken or administered maliciously to different species of domestic animals
8-10	Study of pathogenesis, symptoms, gross and microscopic pathology of diseases caused by **Toxic plants**(*Datura, Lantana camara, Ipomoea, Nerium olander, Strychnosnuxvomica, Ricinus communis , Arbus, Bracken fern* etc.) commonly taken or administered maliciously to different species of domestic animals
11-17	Study of pathogenesis, symptoms, gross and microscopic pathology of diseases caused by Lead, arsenic, copper, molybdenum, mercury, cadmium, florine, selenium, phosphorus, common salt, nitrates, oxalates, organochlorines, organophosphates, rodenticides, herbicides and common drugs etc. commonly taken or administered maliciously to different species of domestic animals
18-19	Study of pathogenesis, symptoms, gross and microscopic pathology of diseases caused by Snake venoms, Scorpion venoms, Spider Venoms, Toad , Bees, Tick, Fish toxins, mycotoxins, Bacterial toxins etc.
	UNIT III
20-23	Various regulatory bodies and regulatory processes, protocols in conducting toxico-pathological trials.
24-25	Chronology for conducting preclinical toxicology.
26-28	OECD guidelines and Good Laboratory Practices,
29-30	Toxico-pathological profile including battery of tests for pharmaceutical / toxic agents
	UNIT IV
31-33	*In-vitro* models for toxicity studies and evaluation of parameters
34-36	*In-vivo* models for toxicity studies and evaluation of parameters

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No.: VPL 509 **Credits**: **2+1= 3**

Course Title: Toxicopathology

Aim: To teach student about toxicity in livestock due to plants and extraneous poisons**.**

Lecture Schedule (Practical)

Practical numbers	Title of Practical
01-03	Study of gross and histopathological alterations as a result of ingestion of toxic plants such as *Lantana camera* (Ghaneri), *Ipomea carnea* (Beshram), *Nerium olender*, *Ricinus communis*, *Arbus precatorius*, etc. (plants of regional importance) in domestic animals
04-06	Study of gross and histopathological alterations as a result of ingestion of toxic plants such as *Anagelis arvensis* (Niliphuli), *Sorghum vulgarae*, Sugar cane tops, Brakern fern, *Amaranthus retroflexus*, *Datura stramonium*etc (plants of regional importance). in domestic animals
07-08	Study of gross and histopathological alterations as a result of ingestion of Lead, arsenic, copper, molybdenum, mercury, cadmium, fluorine, selenium, phosphorus, common salt, nitrates, oxalates etc.
09-10	Study of gross and histopathological alterations as a result of ingestion of organochlorines, organophosphates, rodenticides, herbicides, etc.
11-12	Study of gross and histopathological alterations as a result of toxicity of common drugs etc.
13-14	Assignments on commonly occurring toxic plants of the region
15	Collection, preservation of morbid material for diagnosis of cases suspected for toxicity/ poisoning
16	Diagnosis of commonly taken or maliciously administered poisonous plants (qualitative/ quantitative toxicity tests) substances
17- 18	Diagnosis of commonly taken or maliciously administered poisonous extraneous poisonous substances (qualitative/ quantitative toxicity tests)

Suggested Reading

• Jones TC, Hunt RD and King NW. 1997. Veterinary Pathology. Blackwell Publishing.

Department of Veterinary Pathology
Maharashtra Animal& Fishery Sciences University, Nagpur

Course No. : VPL 510 **Credits**: **2+1= 3**

Course Title: Avian Pathology

Aim: To teach the students about the different disease conditions of poultry.

Lecture Schedule (Theory)

Lecture Numbers	Name of Topic
	UNIT I
1	Study of Avian inflammation and immunology
2	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Ranikhet Disease in chickens, turkeys, ducks and other birds
3	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Infectious bursal disease in chickens, turkeys, ducks and other birds
4	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Infectious bronchitis, Infectious laryngotracheitis chickens, turkeys, ducks and other birds
5	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Marek's disease, Leukorsarcoma group of diseases and Reticuloendotheliosis
6	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Avian influenza
7	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Fowl pox, Inclusion body hepatitis,
8	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Chicken infectious anaemia, Avian encephalomyelitis,
09	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Hydropericardium syndrome, Egg drop syndrome-76, Avian nephritis
10	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Reovirus infections- Viral arthritis and Infectious stunting syndrome
11	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Duck plague, Duck viral hepatitis, Coronaviral enteritis and Haemorrhagic enteritis of turkeys
12-13	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Salmonellosis, Pullorum disease and Fowl typhoid.
14	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Colibacillosis
15-16	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Clostridial diseases - Necrotic enteritis, gangrenous dermatitis and Botulism.
17	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Infectious coryza, Fowl cholera
18	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Tuberculosis, Streptococcosis, Staphylococcosis
19	Study of etio-pathology, symptoms/signs, transmission and diagnosis of Chlymadiosis and Spirochaetosis and mycoplasma

20	Study of etio-pathology, symptoms/signs, transmission and diagnosis of diseases of birds caused by ectoparasites
21-22	Study of etio-pathology, symptoms/signs, transmission and diagnosis of diseases of birds caused by endoparasites: Coccidiosis, Histomoniasis, Round worms and Tape worms
23	Study of etio-pathology, symptoms/signs, transmission and diagnosis of diseases of birds caused by fungi: Aspergillosis, Thrush, Miscellaneous fungal infections.
24-25	Study of etio-pathology, symptoms/signs, transmission and diagnosis of diseases of birds caused by mycotoxins: Aflatoxicosis, Ergotism, fusarium Mycotoxin, Trichothecene (T2 toxin), Deoxynivalinol (DON), Zerlenone, Ochratoxicosis, Citrinin
UNIT II	
26	Study of etio-pathology, symptoms/signs and diagnosis of diseases due to Proteins, Amino acid, Carbohydrate and fat imbalance.
27	Study of etio-pathology, symptoms/signs and diagnosis of diseases of nutritional deficiencies due to Vitamin and Mineral: Vit. A deficiency and Vit. D deficiency.
28	Study of etio-pathology, symptoms/signs and diagnosis of diseases of nutritional deficiencies: Vita. E, Vita. K, Thiamine (B1), Riboflavin (B2), Pantothenic acid, Niacin, Pyridoxin (B6) deficiency, B12 deficiency, Cynacobalamine and choline deficiencies
29	Study of etio-pathology, symptoms/signs and diagnosis of diseases of nutritional deficiencies: Calcium, Phosphorus, Manganese deficiency /excess, common salt deficiency and excess. Copper, Iron, Zinc and Selenium deficiencies.
30-31	Study of etio-pathology, symptoms/signs and diagnosis of Metabolic diseases: Ascites, Gout, Fatty liver and kidney syndrome, Fatty liver haemorrhagic syndrome, Cage layer fatigue, SDS
32	Study of pathology of miscellaneous conditions of poultry: Heat stress, Blue comb, Breast blister, Bumble foot, Cannibalism, False layer, Internal layer, Pendulous crop, Round heart disease, etc
UNIT III	
33	Introduction to an emerging and a re-emerging diseases of poultry
34-35	Emerging and a re-emerging pathogen, mechanisms of poultry pathogen's emergence, co-evolution of poultry pathogens with their vaccines and medications
36	Common pathogens of poultry susceptible to point mutations and their pathology

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 510 **Credits**: **2+1= 3**

Course Title: Avian Pathology

Aim: To teach the students about the different disease conditions of poultry.

Lecture Schedule (Practical)

Lecture Numbers	Title of Practical
1 - 2	Demonstration of necropsy examination of Avian species.
3	Collection and preservation of specimens/samples for diagnosis of diseases.
4 - 6	Morphologic description of gross and/ or microscopic lesions in the preserved Specimens / slides of bacterial diseases of birds.
7- 9	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of viral diseases of birds.
10	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of fungal diseases of birds
11	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of Mycoplasmal, Ricketssial diseases of birds.
12	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of protozoal diseases.
13-15	Morphologic description of gross and/ or microscopic lesions in the preserved specimens/ slides of other miscellaneous conditions (Mycotoxicosis, FLS, Ochratoxicosis and Vitamin and mineral deficiency diseases).
16-18	Preparation of histopathology slides on the selected cases followed by interaction in the student seminars/ group discussions

Suggested Reading

• Saif YM, Barnes FJ, Glisson JR, Fadly AM, Mc Dougald LR & Swayne D. 2008. *Diseases of Poultry*. 12th Ed. Blackwell Publishing.

• Randall CJ. 1984. *A Colour Atlas of Diseases of the Domestic Fowl and Turkey,* Mosby International.

• Majó Masferrer, Natàlia, Dolz Pascual, Roser and Shivaprasad HL. 2011. *Atlas of Avian Necropsy: Macroscopic Diagnosis Sampling*, SERVET Publishers.

• Benjamin Lucio-Martinez and Jodi A Korich. 2010. *Illustrated guide to Poultry Necropsy and diagnosis,* Cornell University (https://www.slideshare.net/heshamkotb/illustrated-guideto-poultry-necropsy-and-diagnosis)

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course Code: VPL 511 **Credits**: 2+1=3

Course Title: Pathology of Wild/Zoo and Aquatic Animal Diseases

Aims: To teach the pathology and diagnosis of different disease conditions of wild and aquatic animals particularly fish.

Lecture Schedule (Theory)

Lecture Numbers	Name of the Topic
	UNIT-I
1	Introduction to the course and its scope
2	Etiology, transmission& spread, pathogenesis, clinical signs, gross and microscopic lesions and diagnosis of **West Nile fever** and **Rabies** in different wild and zoo animals
3-4	Etiology, transmission & spread, pathogenesis, clinical signs, gross and microscopic lesions and diagnosis of **Foot and mouth disease** and **Pox** in different wild and zoo animals
5	Etiology, transmission & spread, pathogenesis, clinical signs, gross and microscopic lesions and diagnosis of **Kyasanaur forest disease** and **Infectious hepatitis virus** in different wild and zoo animals
6	Etiology, transmission & spread, pathogenesis, clinical signs, gross and microscopic lesions and diagnosis of **Infectious feline peritonitis** and **Anthrax** in different wild and zoo animals
7-8	Etiology, transmission & spread, pathogenesis, clinical signs, gross and microscopic lesions and diagnosis of **Tuberculosis**, **Colibacillosis** and **Clostridial infections**in different wild and zoo animals
9-10	Etiology, transmission & spread, pathogenesis, clinical signs, gross and microscopic lesions and diagnosis of **Trypanosomosis, Babesiosis** and **Theileriosis** in different wild and zoo animals
11	Etiology, gross and microscopic pathology of commonly occurring non-infectious diseases of Wild/ Zoo animals
	UNIT-II
12	Overview of diseases of aquatic animals with special reference to fish and discussion on ecology of diseases. Study of etiology, gross and microscopic pathology of Viral diseases of fish -Spring viremia of carp, Infectious pancreatic necrosis and Viral hemorrhagic septicaemia
13	Study of etio-pathology of viral diseases of fish: Infectious spleen and kidney necrosis, Carp pox, Virus nervous necrosis and Lymphocystis disease
14-15	Study of etio-pathology of viral diseases of fish: Infectious salmon anemia, Salmon alpha virus infections, Infectious hematopoietic necrosis and Herpes viral hematopoeitic necrosis,
16	Study of etio-pathology of viral diseases of fish: Koi herpes virus disease, Chinese

	grass carp reovirus disease, Viral hemorrhagic necrosis and Epizootic hemorrhagic necrosis
17	Study of etio-pathology of fungal diseases of fish - Saprolegniasis, Branchiomycosis (Gill rot) and Ichthyosporidiosis
18	Study of etio-pathology of fungal diseases of fish: Exophiala infection, Aphanomyces and Fusarium infection
19	Study of etio-pathology of bacterial diseases of fish - Bacterial cold water disease, Bacterial fin disease, Fin rot and Furunculosis
20	Study of etio-pathology of bacterial diseases of fish - Epizootic ulcerative syndrome, Yersiniosis, Pseudomoniasis and Alteromoniasis
21	Study of etio-pathology of bacterial diseases of fish –Pasteurellosis, Aeromonas septicemia, Enteric septicemia of catfish and Edwardsiellosis
22	Study of etio-pathology of bacterial diseases of fish - Vibriosis, Streptococcosis, Bacterial kidney disease and Mycobacteriosis
23	Study of etio-pathology of bacterial diseases of fish -Nocardiosis, Epitheliocystis: Salmonid Rickettsial septicaemia and Columnaris disease
24	Study of etio-pathology of protozoal diseases of fish –Ich or White spot disease, Costiasis, Trichodiniasis, Velvet disease and Coral fish disease
25	Study of etio-pathology of protozoal diseases of fish - Red sore disease and Glossatella and Myxosporidiosis
26	Study of etio-pathology of protozoal diseases of fish: Whirling disease, Microsporidiosis (Glugea, Pleistophora, Loma), Coccidiosis, Proliferative kidney disease and Cryptosporidiosis
UNIT-III	
27	Neoplastic conditions in fish- Melanoma in Platyfish/ Swordtail hybrids, Hepatoma and hepatocellular carcinoma in rainbow trout.
28	Neoplastic conditions in fish- Stomatopapilloma of eels (Cauliflower disease), Papilloma of the brown bullhead and Lip Fibroma (Fibropapilloma) of Angel fish
29	Neoplastic conditions in fish- Dermal fibrosarcomas of walleye pike, Lymphosarcoma of pike and Schwannoma/ Neurofibromas of the bicoloured damselfish
30	Pathology of Protein, Lipid and Carbohydrate deficiency disorders in fish
31-32	Pathology of vitamins and mineral deficiency disorders in fish
33	Important metabolic diseases of fish
34	Study of diseases due to environmental stress: Gas bubble disease, Acidosis/ Alkalosis
35	Study of diseases due to environmental stress: Thermal shock, Sun burn disease, Anoxia, Increased in dissolved CO2 or H2S or Ammonia concentration in water
36	Study of diseases due to environmental stress: Increase in turbidity of pond water, Algal toxicosis

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course Code: VPL 511 **Credits**: 2+1=3

Course Title: Pathology of Wild/Zoo and Aquatic Animal Diseases

Aims: To teach the pathology and diagnosis of different disease conditions of wild and aquatic animals particularly fish.

Lecture Schedule (Practical)

Sr. No	Title of Practical
1-2	Post-mortem examination of wild animals
3	Post-mortem examination of wild birds
4-5	Study of gross and microscopic lesions of important viral diseases of wild/zoo animals.
6-7	Study of gross and microscopic lesions of important bacterial diseases of wild/zoo animals.
8	Study of gross and microscopic lesions of important parasitic and fungal of wild/zoo animals.
9-10	Study of gross and microscopic lesions of important viral, bacterial, parasitic and fungal diseases of wild birds.
11-12	Post-mortem examination of fish
13	Study of gross and microscopic lesions/specimens of important Viral diseases of fish
14	Study of gross and microscopic lesions/specimens of important bacterial diseases of fish
15	Study of gross and microscopic lesions/specimens of important fungal diseases of fish
16	Study of gross and microscopic lesions/specimens of important parasitic diseases of fish
17	Study of gross and microscopic lesions/specimens of important neoplastic conditions of fish
18	Study of gross and microscopic lesions/specimens of important nutritional disorders of fish

Suggested Reading

• Arora BM. 1984. Wildlife Diseases in India.Periodical Expert Book Agency.

• Fowler ME. 1978. Zoo and Wild Animal Medicine. WB Saunders. Roberts RJ. 1979. Fish Pathology.BailliereTindall, London

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course Code: VPL512 **Credits:** 2+1=3

Course Title: Pathology of Laboratory Animal Diseases

Aim: To teach the students about pathology and diagnosis of different disease conditions of laboratory animals.

Lecture Schedule (Theory)

Lecture No.	Name of Topic
UNIT-I	
1-2	Etiology, transmission, gross and microscopic pathology of some commonly occurring Bacterial Diseases of Rabbits: Pasteurellosis, Bordetellosis, Colibacillosis, Tyzzer's disease and Staphyloccal infections.
3-4	Etiology, transmission, gross and microscopic pathology of some commonly occurring Bacterial Diseases of Rabbits: Venereal spirochetosis, (rabbit syphilis, cuniculosis), Proliferative ileotyphilitis, Salmonellosis, Tularemia and Clostridium infections.
5-6	Etiology, transmission, gross and microscopic pathology of somecommonly occurring Viral Diseases of Rabbits: Myxomatosis, Rabbit fibroma/ shope fibroma, Rabbit papillomatosis and Viral hemorrhagic disease.
7-8	Etiology, transmission, gross and microscopic pathology of some commonly occurring Parasitic/Miscellaneous/Neoplastic Diseases of Rabbits: Coccidiosis, Enephalotozoonoses, Baylisascarisprocyonis, Cestode, Mites, Fleas and lice, miscellaneous and neoplastic diseases of rabbits.
UNIT-II	
9-11	Etiology, transmission, gross and microscopic pathology ofcommonly occurring Bacterial Diseases of Rats: Staphylococcal dermatitis, Pasteurellosis, Streptococcal diseases, Helicobacter infection, CAR bacillus, *Mycoplasma pulmonis*, Pseudotuberculosis (corynobacteriosis), Tyzzers disease, Salmonellosis and Rat bite fever.
12-15	Etiology, transmission, gross and microscopic pathology of commonlyoccurring Viral/Fungal/Other Miscellaneous/Neoplastic Diseases of Rats:Rattheilo virus (RTV-1),Parvovirus, coronavirus, pneumonia virus of mice, Hantaan virus,Sendai virus, Reovirus-3, fungal disease (*Pneumocystis carinii*), othermiscellaneous and neoplastic diseases.
16-18	Etiology, transmission, gross and microscopic pathology ofcommonly occurring Parasitic Diseases of Rats: Protozoan diseases (*Trichomonads, Chilomastix bettencorti, Spironucleus muris, Giardia muris*, Rat sarcodines, Rat enteric coccidian), Ectoparasitic diseases (Mesostigmated mites, lice of rats) and helminthic diseases (rat pinworms, Hymenolepid tapeworm, Cestodes with a rat intermediate host, rat thread worms).

UNIT-III	
19-21	Etiology, transmission, gross and microscopic pathology of commonlyoccurring Bacterial Diseases of Mice: Helicobacter infection,Pasteurellosis, Staphylococcal furunculosis, *Mycoplasma pulmonis*, Cilia associated respiratory bacillus, *Corynebacterium bovis*,*Pseudomonas aeruginosa*, *Citrobacter rodentium*, Tyzzer's disease and Salmonellosis.
22-26	Etiology, transmission, gross and microscopic pathology of commonlyoccurring Viral/Fungal/Other Miscellaneous/Neoplastic Diseases of Mice:Mouse norovirus, Mousehepatitis virus, Mouse encephalomyelitis virus, Epizooticdiarrhoea of infant mice, Parvovirus, Murine cytomegalovirus, Mouse adenovirus, Ectromelia virus, Lymphocytic choriomengitis virus, Pneumonia virus of mice, Lactate dehydrogenase elevating virus,Sendai virus, Mouse thymic virus, Mouse polyoma viruses, Reo-3 virus; Fungal disease (*Pneumocystis* pneumonia) and other miscellaneous and neoplastic diseases.
27-28	Etiology, transmission, gross and microscopic pathology of commonlyoccurring Parasitic Diseases of Mice: Pin worms, Fur mites of mice, Mange mites, Mesostigmatid mites, Lice of mice, Trichomonads, *Chilomastix bettencorti*, *Spironucleu smuris*, *Giardia muris*, Mouse sarcodines, Mouse enteric coccidian, Mouse parentral coccidian,Mouse sporozoans, Hymenolepid tapeworms and Encysted tape worm.
UNIT-IV	
29-30	Etiology, transmission, gross and microscopic pathology of commonlyoccurring Bacterial Diseases of Guinea Pigs: Antibiotic induced enterotoxemia/ haemorrhagic typhlitis, *Bordetella* pneumonia, Streptococcal pneumonia, Cervical lymphadenitis, Pododermatitis, Mastitis, Tyzzer's disease and Salmonellosis.
31-32	Etiology, transmission, gross and microscopic pathology of commonlyoccurring Viral Diseasesof Guinea Pigs: Guinea pig cytomegalovirus, Adenovirus, Parainfluenza virus, Corona-like virus and Lymphocytic choriomeningitis virus.
33-34	Etiology, transmission, gross and microscopic pathology of commonly occurring Parasitic Diseases of Guinea Pigs: Coccidia, Fur mites, Helminthes,Lice of guinea pigs, Mange mites, Cryptosporidiosis, Microsporidium parasites and other miscellaneous conditions.
UNIT-V	
35-36	Etiology, transmission, gross and microscopic pathology of commonly occurring diseases of Hamsters, Gerbils and Primates.

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course Code: VPL-512 **Credits:** 2+1=3

Course Title: Pathology of Laboratory Animal Diseases

Aim: To teach the students about pathology and diagnosis of different disease conditions of laboratory animals.

Lecture Schedule (Practical)

Practical number	Title of Practical
1	Post-mortem examination of Rabbits.
2-3	Post-mortem examination of Rats and Mice
4-5	Post-mortem examination of Guinea Pigs, Hamsters, Gerbils and Primates.
6-7	Study of gross and microscopic lesions of important Bacterial and Viral diseases of Rabbits.
8-9	Study of gross and microscopic lesions of important Parasitic, Neoplastic and other Miscellaneous Diseases of Rabbits.
10-11	Study of gross andmicroscopic lesions of important Bacterial and Viral diseases of Rats and Mice.
12-13	Study of gross and microscopic lesions of important Parasitic, Fungal, Neoplastic and other Miscellaneous diseases of Rats and Mice.
14-15	Study of gross and microscopic lesions of important Bacterial and Viral diseases of Guinea Pigs.
16	Study of gross and microscopic lesions of important Parasitic and other Miscellaneous diseases of Guinea Pigs.
17-18	Study of gross and microscopic lesions of commonly occurring diseases of Hamsters, Gerbils and Primates.

Suggested Reading:

1. Beninchka K, Garner FM and Jones TC. 1978. *Pathology of Laboratory Animals.* Vols. I, II. Springer Verlag.

2. Stephen W. Barthold, Stephen M. Griffey and Dean H. Percy. 2016. Pathology of Laboratory Rodents and Rabbits. 4thEdn. Wiley-Blackwell Publishers, USA.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 601 **Credits:** 2+1= 3
Course Title: Molecular and Ultra structural Basis of Cell injury
Aim: To teach the students about different molecular mechanisms including ultra structural changes in diseases conditions.

Lecture Schedule (Theory)

Lecture numbers	Name of Topic
	UNIT I
1	Introduction to molecular and ultra structural pathology and its importance in disease diagnosis and research
2	Detailed ultra-structural study of cell (Normal / Abnormal) and its organelles (Mitochondria, Endoplasmic reticulum, Ribosomes, Cisternae).
3	Detailed ultra-structural study of cell (Normal / Abnormal) and its organelles (Cell membrane, Golgi apparatus, Lysosomes,)
4	Detailed ultra structural study of cell (Normal / Abnormal) and its organelles (Centrioles, Nuclear membrane, Chromosomes, Nucleolus).
5	Interpretation of abnormal cells with molecular perspectives in various types of inflammation and degeneration etc.
6	Interpretation of abnormal cells in various types of infections
	UNIT II
7	Overview of cell injury
8-9	Targets of cell injury (cell membrane, aerobic respiration, structural proteins, enzymes and genetic apparatus of cell)
10	Molecular mechanisms of hypoxic cell injury
11	Molecular mechanisms of cell injury by free radicals and chemicals
12-13	Molecular mechanisms of cell injury by infectious agents and other forms of cell injury (due to immune mediated reactions).
14-15	Molecular mechanisms of genetic derangements in cells
16	Molecular mechanisms of cell membrane damage
17	Mechanisms of DNA damage (Base loss, base modification, chemical modification, replication errors)
18	Mechanisms of DNA damage (Inter-strand cross-links, DNA-protein cross-links and strand breaks)
19	Molecular and immunopathological changes associated with different types of cell

	injuries
UNIT III	
8.	Morphology of reversible cell injury with particular emphasis on ultra structural changes in the cells and organelles
9.	Morphology of irreversible cell injury with particular emphasis on ultra structural changes in the cells and organelles.
22-23	Molecular mechanisms and ultra-structural changes in morphology of cell death and necrosis
□	Molecular mechanisms of apoptosis and autolysis
□	Ultra structural changes in apoptosis
□	Molecular mechanisms and ultra-structural changes in intracellular accumulations
□	Molecular mechanisms and ultra-structural changes in extracellular accumulations
28-29	Molecular mechanisms and ultra-structural changes in pigments deposits and tissue deposits
30	Consequences of cell injury
31-34	Molecular mechanisms and ultra-structural changes in cellular adaptations (hyperplasia, hypertrophy, atrophy, metaplasia, dysplasia etc)
UNIT IV	
35	Mechanism and ultra structural changes in pyroptosis and ferroptosis
36	Molecular mechanism and ultra structural changes in autophagy and ETOSIS etc.

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 601 **Credits:** 2+1= 3

Course Title: Molecular and Ultra structural Basis of Cell injury

Aim: To teach the students about different molecular including ultra structural changes in diseases conditions.

Lecture Schedule (Practical)

Practical Numbers	Title of Practical
1	Collection and preparation of specimens for scanning electron microscopy studies.
2	Collection and preparation of specimens for transmission electron microscopy studies.
3-4	Interpretation of ultra-structural changes in mitochondria and their correlation with gross and histopathological findings
5	Interpretation of ultra-structural changes in endoplasmic reticulum and their correlation with gross and histopathological findings
6	Interpretation of ultra-structural changes in ribosomes and their correlation with gross and histopathological findings
7	Interpretation of ultra-structural changes in golgi apparatus and their correlation with gross and histopathological findings
8 – 9	Interpretation of ultra-structural changes in cell membrane and their correlation with gross and histopathological findings
10-12	Interpretation of ultra-structural changes in lysosomes and their correlation with gross and histopathological findings
13-14	Interpretation of ultra-structural changes in nucleus and their correlation with gross and histopathological findings
15-16	Interpretation of ultra-structural changes in chromosomes and their correlation with gross and histopathological findings
17-18	Case presentations

Suggested readings

• Selected articles from journals.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 602 **Credits:** 1+1= 2
Course Title: Molecular basis of inflammation
Aim: To teach the students about molecular mechanisms of inflammations

Lecture Schedule (Theory)

Lecture numbers	Name of Topic
	UNIT I
7.	Overview of cellular, molecular and immunopathological changes associated with inflammation.
8.	Molecular basis of acute inflammation and vascular events of acute inflammations
9.	Molecular mechanisms of cellular events in acute inflammation
4-5	Molecular mechanisms of leucocyte-endothelial interactions and leucocyte adhesion molecules; endothelial adhesion molecule receptors
6-7	Molecular mechanism of leucocyte chemotactic factors, microbicidal activity of leucocytes, leucocyte activation.
	UNIT II
8-9	Plasma derived mediators of inflammation (Complement system, Kinin system, Coagulation system and fibrinolytic system)
10 -12	Cell derived mediators of inflammation-vasoactive amines and lipid Mediators, cytokines, chemokines, oxygen radicals and nitric oxide
13	Cellular components of inflammation and types of exudative inflammation
	UNIT III
14-15	Molecular mechanisms of chronic inflammation and its types
17	Elements of chronic inflammation
18	Molecular mechanisms of healing and repair; wound healing mediators and their functions
19	Molecular mechanisms of repair of bone, nervous tissue and myocardium.

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 602 **Credits:** 1+1= 2

Course Title: Molecular basis of inflammation

Aim: To teach the students about molecular mechanisms of inflammations

Lecture Schedule (Practical)

Practical lectures	Title of Practical
1-4	Molecular alterations and their correlation with gross and microscopic inflammatory changes in acute inflammation
5-8	Various techniques for the estimation of mediators of inflammations
9-10	Molecular alterations and their correlation with gross and microscopic inflammatory changes in chronic inflammation
11-13	Molecular alterations and their correlation with gross and microscopic inflammatory changes in avian inflammation
14-16	Molecular alterations and their correlation with gross and microscopic changes in repair
17-18	Molecular alterations and their correlation with gross and microscopic changes in repair of bone, nervous tissue and myocardium.

Suggested readings

Selected articles from journals.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 603 **Credits:** 1+1=2
Course Title: Molecular Basis of Neoplasia
Aim:To teach the students about molecular mechanisms of neoplasia and diagnostic techniques.

Lecture schedule (Theory)

Lecture numbers	Name of Topic
	UNIT I
1-2	Molecular characteristics of neoplasia/tumors
3	Tumor differentiation and proliferation
4-5	Molecular basis of cancer
6	Tumour stromal interactions
7-8	Molecular mechanisms of angiogenesis, invasion and metastasis of tumours
9-10	Molecular changes underlying tumour progression and heterogeneity
11-12	Tumour biology and growth
	UNIT II
13-15	Tumour genetics
16- 18	Immunohistochemical/ including markers associated tumour diagnosis

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 603 **Credits:** 1+1=2

Course Title: Molecular Basis of Neoplasia

Aim: To teach the students about molecular mechanisms of neoplasia and diagnostic techniques.

Lecture schedule (Practical)

Practical numbers	Title of Practical
1-5	Cytological techniques in diagnosis and prognosis of various tumour conditions
6-10	Histopathological techniques in diagnosis and prognosis of various tumour conditions
11-14	Immunohistochemical techniques in diagnosis and prognosis of various tumour conditions
15-18	Molecular techniques in diagnosis and prognosis of various tumour conditions

Suggested reading:

Related National/ International Journals

Department of Veterinary Pathology
Maharashtra Animal& Fishery Sciences University, Nagpur

Course No: VPL 604 **Credits:** 2+1=3
Course Title: Immunopathology

Aim: To teach the students about immune mediated and autoimmune diseases of animals.

Lecture schedule (Theory)

Lecture numbers	Name of Topic
UNIT I	
1-3	Principles of immunopathology
4-7	Etio-pathology of hypersensitivity reactions and immune complex diseases
8-10	Mechanisms of autoimmunity
11-13	Genetic factors of autoimmunity
14 -17	Microbial and environmental factors in autoimmunity
UNIT II	
18- 20	Study of etiology, pathology and pathogenesis of commonly encountered Immunoproliferative disorders (Multiple myeloma)
21-22	Study of etiology, pathology and pathogenesis of commonly encountered Immunoproliferative disorders (lymphoma)
23-25	Study of etiology, pathology and pathogenesis of commonly encountered Immunoproliferative disorders (leukemia etc.)
26-28	Study of etiology, pathology and pathogenesis of hypersensitivity diseases (Type I and II)
29-31	Study of etiology, pathology and pathogenesis of hypersensitivity diseases (Type III and IV)
32-34	Etio-pathological studies of autoimmune diseases.
35-36	Etio-pathological studies of immune deficiency diseases.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 604 **Credits:** 2+1=3

Course Title: Immunopathology

Aim:To teach the students about immune mediated and autoimmune diseases of animals.

Lecture schedule (Practical)

Practical numbers	Title of Practical
1	Separation of immunoglobin from serum
2-3	Separation and estimation of immune complex from serum
4-5	Principles, procedure and applications of electrophoresis (SDS PAGE)
6-7	Principles, procedure and applications of Immuno-electrophoresis, horizontal and vertical gel electrophoresis
8-9	Separation of antigens from tissue (tumour)
10-12	Principle and use of leucocyte migration Inhibition test (LMIT) to evaluate of cell mediated immune response
13-14	Principle and use of Alpha Naphthyl Acetate Esterase (ANAE) staining of Blood smears and tissue sections for demonstration of T cells
15-16	Study of gross and microscopic pathology of hypersensitivity reactions (type I and II)
17-18	Study of gross and microscopic pathology of hypersensitivity reactions (type III and IV)

Suggested reading:

Related National/ International Journals

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 605 **Credits:** 1+2=3
Course Title: Advances in Diagnostic Pathology

Aim: To teach the students about current diagnostic techniques for diagnosis of different diseases.

Lecture schedule (Theory)

Lecture numbers	Name of Topic
	UNIT I
1	Principles and applications of Scanning electron microscopy.
2	Principles and applications of Transmission electron microscopy,
3	Principles and applications of Laser scanning confocal microscopy
4 – 5	Principles and applications of Telemicroscopy-Virtual slide microscopy
	UNIT II
6	Principle and various types of ELISA with procedure and its application in animal disease diagnosis
7	Principle and various types of Polymerase Chain Reaction (PCR) with their procedures. Application of PCR in diagnosis of animal diseases.
8	Principle and various types of Flow cytometry (FCM) and its application in diagnosis of animal diseases.
9	Principle and application of In-situ hybridization techniques in diagnosis of animal diseases.
10-11	Principle and various types of Bio chip techniques (DNA chip, Protein microarray, Tissue microarray) and its application in diagnosis of animal diseases.
12-13	Principle and application of Chromatography, Spectrophotometry and Immuno-diffusion technique in diagnosis of animal diseases.
19	Applications of different biopsy techniques, procedures and its significance in diagnosis of animal diseases.
20 -16	Importance and application of various laboratory animal models in disease diagnosis
	UNIT III
17 -18	Principle and applications of *In-vitro* cell culture techniques (commonly used cell lines, chicken embryo etc.), cytopathic effect of different viruses and their interpretations in various diseases of livestock.

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No : VPL 605 **Credits:** 1+2=3

Course Title: Advances in Diagnostic Pathology

Aim: To teach the students about current diagnostic techniques for diagnosis of different diseases.

Lecture schedule (Practical)

Practical No.	Title of Practical
1-2	Principles, procedures and applications of Scanning Electron Microscopy
3 -4	Principles, procedures and applications of Transmission Electron Microscopy
5-6	Principles, procedures and applications of Laser scanning confocal microscopy
7-8	Principles, procedures and applications of Telemicroscopy-Virtual slide microscopy
9-11	Principle and various types of ELISA with procedure and its application in animal disease diagnosis
12-14	Different type of Polymerase Chain Reactions (PCR) in animal disease diagnosis
15-16	Principle and various types of Flow cytometry (FCM) and its application in animal disease diagnosis
17	Principle and application of In-situ hybridization techniques in animal disease diagnosis
18-20	Principle and various types of Bio chip techniques (DNA chip, Protein microarray,) and its application in animal disease diagnosis
21-22	Tissue microarray in animal disease diagnosis
23-24	Principle and application of Chromatography, Spectrophotometry and Immuno-diffusion technique in animal disease diagnosis
25-27	Different biopsy techniques, procedures and its significance in animal disease diagnosis
28-29	Biological testing in laboratory animals for diagnosis of common bacterial diseases
30-31	Biological testing in laboratory animals for diagnosis of common viral diseases
32	*In-vitro* cell culture technique (on commonly used cell lines); cytopathic effect of different viruses and their interpretations in various diseases of livestock
33	Chicken embryo inoculation for diagnosis of various viral diseases
34- 36	Case presentations based on various techniques as above.

Suggested reading:

- Selected articles from journals.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 606 **Credits:** 2+1=3

Course Title: Pathology of Nutritional and Metabolic Disorders

Aim:To teach the students about nutritional and metabolic disorder of animals.

Lecture Schedule (Theory)

Lecture No.	Name of Topic
	UNIT-I
1-6	Pathogenesis, gross and microscopic pathology of nutritional imbalances of Vitamins.
7-12	Pathogenesis, gross and microscopic pathology of nutritional imbalances of macro and microelements.
13-16	Pathogenesis, gross and microscopic pathology of nutritional imbalances of carbohydrate, protein and fats.
	UNIT-II
17-23	Pathogenesis, gross and microscopic pathology of different metabolic diseases namely milk fever, downer's cow and rheumatism likesyndrome and post parturient hemoglobinuria in domestic animals.
24-28	Pathogenesis, gross and microscopic pathology of different metabolic diseases namely ketosis, pregnancy toxaemia and tetany.
29-33	Pathogenesis, gross and microscopic pathology of different metabolic diseases namely azoturia and equine hyperlipidemia.
34-36	Pathogenesis, gross and microscopic pathology of different metabolic diseases namely diabetes mellitus in dogs.

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL-606 **Credits:** 2+1=3

Course Title: Pathology of Nutritional and Metabolic Disorders

Aim:To teach the students about nutritional and metabolic disorder of animals.

Lecture Schedule (Practical)

Practical No.	Title of Practical
1-9	Estimation of certain minerals in sera of natural and experimentally induced deficiencies in domestic animals.
10-18	To study the haematological, gross and microscopic pathological alterations caused by nutritional and metabolic disorders.

Suggested Reading: Selected articles from journals.

Department of Veterinary Pathology
Maharashtra Animal and Fishery Sciences University, Nagpur

Course No: VPL 607 **Credits:** 2 + 1=3

Course Title: Pathology of Important Emerging and Re-Emerging diseases of Pets and Livestock

Aim: To teach the students about important emerging, re-emerging, exotic and transboundary diseases of pets and livestock.

Lecture Schedule (Theory)

Lecture No.	Name of topic
	UNIT I
1	Advances in pathogenesis and pathology including molecular basis of important viral infections: Foot and mouth disease,Vesicular stomatitis and Vesicular exanthema
2	Advances in pathogenesis and pathology including molecular basis of important viral infections: Rinderpest and Bovine malignant catarrhal fever
3-4	Advances in pathogenesis and pathology including molecular basis of important viral infections: Infectious bovine rhinotracheitis, Parainfluenza-3, and Bovine respiratory syncytial virus infection
5	Advances in pathogenesis and pathology including molecular basis of important viral infections: Blue tongue and Contagious ecthyma
6	Advances in pathogenesis and pathology including molecular basis of important viral infections: Pox diseases
7	Advances in pathogenesis and pathology including molecular basis of important viral infections: Peste des petitsruminants and Pseudorabies
8-9	Advances in pathogenesis and pathology including molecular basis of important viral infections: Canine distemper and Rabies
10	Advances in pathogenesis and pathology including molecular basis of important viral infections: parvovirus infections and Infectious canine hepatitis
11	Advances in pathogenesis and pathology including molecular basis of important viral infections: Hog cholera/ swine fever and swine influenza
12	Advances in pathogenesis and pathology including molecular basis of important viral infections:Rift valley fever and Japanese encephalitis
13	Advances in pathogenesis and pathology including molecular basis of important viral infections: Diseases caused by Nipahvirus
14	Advances in pathogenesis and pathology including molecular basis of important viral infections:Kyasanaur forest disease and West nile fever

•	Advances in pathogenesis and pathology including molecular basis of important viral infections:Hendravirus and Ebolavirus
•	Advances in pathogenesis and pathology including molecularbasis of important viral infections: Crimean-Congo haemorrhagic fever and Chikungunya virus
•	Advances in pathogenesis and pathology including molecular basis of important viral infections: Ganjam virus and Marburg virus
•	Advances in pathogenesis and pathology including molecular basis of important prion infections: Scrapie and Bovine spongiform encephalopathy
UNIT II	
□	Advances in pathogenesis and pathology including molecular basis of important bacterial infections: Tuberculosis and Johne's disease
□	Advances in pathogenesis and pathology including molecular basis of important bacterial infections: Actinobacillosis and Actinomycosis
21-22	Advances in pathogenesis and pathology including molecular basis of important bacterial infections: Brucellosis and Listeriosis
□	Advances in pathogenesis and pathology including molecular basis of important bacterial infections: Pasteurellosis and Leptospirosis
24- 25	Advances in pathogenesis and pathology including molecular basisof important bacterial infections: Anthrax and Clostridial group of diseases
□	Advances in pathogenesis and pathology including molecular basis of important bacterial infections: Swine erysipelas, Glasser's disease and Corynebactrium infections
□	Advances in pathogenesis and pathology including molecular basis of important bacterial infections: Chlamydial infections
□	Advances in pathogenesis and pathology including molecular basis of important bacterial infections: Mycoplasma infections
UNIT III	
29-30	Advances in pathogenesis and pathology including molecularbasis of important fungal infections: Aspergillosis, Blastomycosis and Coccidioidomycosis
□	Advances in pathogenesis and pathology including molecularbasis of important fungal infections: Histoplasmosis and Rhinosporidiosis
□	Advances in pathogenesis and pathology including molecularbasis of important fungal infections: Sporotrichosis and Candidiasis
□	Advances in pathogenesis and pathology including molecularbasis of important fungal infections: Crytococcosis and Dermatomycoses
□	Diseasesdue to commonly occurring mycotoxins: Aflatoxins and Ochratoxin
□	Diseasesdue to commonly occurring mycotoxins: Zearalenone and T-2 toxins
□	Diseases due to commonly occurring mycotoxins: Rubratoxin, Fumonisin and Moniliformin

Department of Veterinary Pathology

Maharashtra Animal & Fishery Sciences University, Nagpur

Course No: VPL 607 **Credits:** 2 + 1=3

Course Title: Pathology of Important Emerging and Re-Emerging diseases of Pets and Livestock

Aim: To teach the students about important emerging, re-emerging, exotic and transboundary diseases of pets and livestock

---

Lecture Schedule (Practical)

Practical numbers	Title of Practical
1-2	Study of clinical and gross alterations and histopathology of Foot and mouth disease,Vesicular stomatitis, Vesicular exanthema, Rinderpest and Bovinemalignant catarrhal fever
3-4	Study of clinical and gross alterations and histopathology of Infectious bovine rhinotracheitis,Parainfluenza-3, Bovine respiratory syncytial virus infection, Blue tongue and Contagious ecthyma
5	Study of clinical and gross alterations and histopathology of Pox diseases, Peste des petitsruminants and Pseudorabies
6	Study of clinical and gross alterations and histopathology of Canine distemper, Rabies, parvovirus infections,Infectious canine hepatitis
7	Study of clinical and gross alterations and histopathology of Rift valley fever, Japanese encephalitis and diseases caused by Nipahvirus
8	Study of clinical and gross alterations and histopathology of Kyasanaur forest disease, West Nile fever and Hendravirus, Ebolavirus
9	Study of clinical and gross alterations and histopathology of Crimean-Congo haemorrhagic fever, Chikungunya virus, Ganjam virus, Marburg virus
10	Study of clinical and gross alterations and histopathology of Hog cholera/ swine fever, swine influenza, Scrapie and Bovine spongiform encephalopathy
11	Study of clinical and gross alterations and histopathology of Tuberculosis, Johne's disease, Actinobacillosis and Actinomycosis
12	Study of clinical and gross alterations and histopathology of Brucellosis, Listeriosis, Pasteurellosis and Leptospirosis
13	Study of clinical and gross alterations and histopathology ofAnthrax and Clostridial group of diseases
14	Study of clinical and gross alterations and histopathology of Swine erysipelas, Glasser's disease and Corynebactrium infections
15	Study of clinical and gross alterations and histopathology of Chlamydial and

	mycoplasma infections
16	Study of clinical and gross alterations and histopathology of Aspergillosis, Blastomycosis, Coccidioidomycosis and Histoplasmosis
17	Study of clinical and gross alterations and histopathology of Rhinosporidiosis, Sporotrichosis, Candidiasis, Crytococcosis and Dermatomycoses
18	Study of clinical and gross alterations and histopathology of Aflatoxins, Ochratoxin, Zearalenone, T-2 toxins, Rubratoxin, Fumonisin and Moniliformin

Suggested Reading: Selected articles from journals.

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No.: VPL 608 **Credits:** 1+0= 1

Course Title: Research Methodology in Pathology

Aim: To provide exposure to the students on different methodologies indispensable in Pathology research through available scientific literature in world class journals.

Lecture Schedule (Theory)

Lecture No.	Name of Topic
	UNIT I
01 – 04	Literature based study: Use of various experimentation techniques in pathology research and animal experimentation techniques
05 – 09	Planning and design of various types of experiments through study of literature for selection of appropriate methodology and evaluation parameters including scoring system, data evaluation methods etc.
	UNIT II
10 – 13	Introduction to OECD-GLP guidelines, Reference studies through literature for safety evaluation of drug/ plant/ plant molecules using *In-vitro* and *In vivo* techniques
14 – 18	Determination and calculation of LC50, LD50, ID50, MIC, MTD, etc., use of modern molecular techniques in experimental pathology research

Suggested materials/readings

- Mendelys desktop

Department of Veterinary Pathology
Maharashtra Animal & Fishery Sciences University, Nagpur

Course No. : VPL 609 **Credits:** 0+1= 1

Course Title: Necropsy Conference I

Aim: To promote self learning of the students in different necropsy procedures of animals including poultry and description of post-mortem lesions in different diseases/ disease conditions.

Lecture Schedule (Practical)

Practical numbers	Name of Practical
01–09	Continuous assessment of students on detailed necropsy examination of various species of large and small animals including poultry; necropsy associated cytological examinations; systematic examination of different organs for morphologic description of gross lesions; gross photography; collection of tissues for histopathology and based on nature of gross lesions, if possible further collection for investigation of viral/ bacterial/ protozoan/ fungal/ parasitic diseases/ toxic or poisoning, etc.
10– 13	Morphologic description of microscopic lesions; microscopic photography; correlation of gross and microscopic observations with the results of other parallel investigations to diagnose the disease conditions
14– 18	Presentation of select case(s) in the monthly seminars followed by report writing and final morphologic/ etiologic diagnosis, classification and preservation of microscopic slides

Suggested readings

- https://secure.vet.cornell.edu/nst/nst.asp (Dr. John M. King's Necropsy Show & Tell is a comprehensive image catalogue of several thousand pathological images).
- D Gopala Krishna Rao. 2005. *Textbook on necropsy and histopathological techniques*, 1st Ed.Academa.
- Donald B Feldman, John Curtis Seely. 1988. *Necropsy Guide: Rodents and the Rabbit*, 1st Ed. CRC Press.
- Albert C Strafuss. 1988. *Necropsy: Procedures and Basic Diagnostic Methods for PracticingVeterinarians*, Charles C. Thomas Publisher Springfield.
- Jones TC and Gleiser CA. 1954. *Veterinary Necropsy Procedures*. JB Lippincott.
- John M King, David C Dodd and Lois Roth. 2006. *The Necropsy Book*, Fifth Edition, C LDavis Foundation.
- Majó Masferrer, Natàlia, Dolz Pascual, Roser and Shivaprasad HL. 2011. *Atlas of AvianNecropsy: Macroscopic Diagnosis Sampling*, SERVET Publishers.

19 Benjamin Lucio-Martinez and Jodi A Korich. 2010. *Illustrated guide to Poultry Necropsyand diagnosis*, Cornell https://www.slideshare.net/heshamkotb/illustrated-guide to-poultry-necropsy-and-diagnosis).

20 https://secure.vet.cornell.edu/nst/nst.asp (Dr. John M. King's Necropsy Show & Tell is a comprehensive image catalogue of several thousand pathological images).