

## Veterinary Surgery and Radiology

### 1. General Requirements

Level of programme	Nomenclature of qualification	Duration of the Course	Learning objectives	Eligibility	Components of the programme
Post Graduate	Master of Veterinary Science	2 years	To gain in-depth knowledge on various aspects of Surgery, Anesthesia and Radiology	Bachelor of Veterinary Science and Animal Husbandry	Course work Research work
PhD	Doctor of Philosophy	3 years	To gain in-depth knowledge on various aspects of Surgery, Anesthesia and Radiology	Master of Veterinary Science	Course work Research work
Diploma in Equine Clinical Practice	Diploma	1 year	To gain knowledge about all clinical aspects of equine	Bachelor of Veterinary Science and Animal Husbandry	Course work Clinical work
Other (specify)					

### 2. Infrastructure requirements:

Level of programme		For 03 seats in each department	For 05 seats in each department	Remarks
Post Graduate	1. Small animal operation theatre	1	1	For surgery of small animals
	2. Large animal operation theatre	1	1	For surgery of large animals
	3. Anesthesia lab	1	1	For demonstration, preparation of anesthesia
	4. Induction room for small animals	1	1	For induction of anesthesia in small animals
	5. Recovery room for small animals	1	1	For recovery of small animals
	6. Induction /recovery room for large	1	1	For induction of anesthesia and recovery of large animals

	animals			
	7. Sterilization unit	1	1	For sterilization of surgical instruments and equipment
	8. Ophthalmology unit	1	1	For performing surgery of eye
	9. Orthopedic unit	1	1	For performing surgery of bone and joints
	10. Dentistry unit	1	1	For dental surgery
	11. Minimally invasive surgery unit	1	1	For performing minimally invasive procedures
	12. Large Animal Radiology Unit	1	1	For obtaining diagnostic images(radiographs and ultrasonograms) in large animals
	13. Small Animal Radiology Unit	1	1	For obtaining diagnostic images(radiographs and ultrasonograms) in small animals
PhD	1. Small animal operation theatre	1	1	For surgery of small animals
	2. Large animal operation theatre	1	1	For surgery of large animals
	3. Anesthesia lab	1	1	For demonstration, preparation of anesthesia
	4. Induction room for small animals	1	1	For induction of anesthesia in small animals
	5. Recovery room for small animals	1	1	For recovery of small animals
	6. Induction /recovery room for large animals	1	1	For induction of anesthesia and recovery of large animals
	7. Sterilization unit	1	1	For sterilization of surgical instruments and equipment
	8. Ophthalmology unit	1	1	For performing surgery of eye
	9. Orthopedic unit	1	1	For performing surgery of bone and joints
	10. Dentistry unit	1	1	For dental surgery
	11. Minimally	1	1	For performing minimally invasive

	invasive surgery unit			procedures
	12. Large Animal Radiology Unit	1	1	For obtaining diagnostic images (radiographs and ultrasonograms) in large animals
	13. Small Animal Radiology Unit	1	1	For obtaining diagnostic images (radiographs and ultrasonograms) in small animals
	14. CT Scan	1 (optional)	1 (optional)	For obtaining diagnostic images in animals
Diploma in equine clinical practice	Same as in M.V.Sc			

3. Manpower Requirements: (To be submitted separately for each of the Departments)

Level of programme	For 03 seats in each department					For 05 seats in each department				
	Prof.	Assoc. Prof.	Asstt. Prof.	Others (Specify)	Non teaching or supporting staff	Prof.	Assoc. Prof.	Asstt. Prof.	Others (Specify)	Non teaching or supporting staff
Post Graduate	0	1	2		4	1	1	3		5
PhD	1	1	2		2	1	2	3		3
Diploma in equine clinical practice	0	0	2		2	-	-	-		-
Other (specify)										

4. **Equipments:** Though the list of equipments could not be listed and would depend upon the research projects and/or the area of study being conducted at the respective veterinary colleges. It is imperative that the Departments may suggest the list of basic equipments to be used for the Post Graduate, PhD or other programmes.

Level of programme		For 03 seats in each department	For 05 seats in each department	Remarks
Post Graduate	<b>Anesthetic Unit</b>			
	Anaesthesia machine for	3	4	For providing general

small animal ventilator, bair circuit			anesthesia using inhalant anesthetics in small animals
Anaesthesia machine for large animals, ventilator	1	1	For providing general anesthesia using inhalant anesthetics in large animals
Multi Para monitor for small animals	3	4	For monitoring of anesthesia in small animals
Multi Para monitor for large animals	1	1	For monitoring of anesthesia in large animals
ECG	2	2	For taking ECG
Doppler BP monitor	1	1	For taking Blood pressure
<b>Surgery Unit</b>			
General surgical instrument for small animals	5 packs	7 packs	For performing general surgery in small animals
General surgical instrument for large animals	3 packs	4 packs	For performing general surgery in large animals
All Orthopedic surgical sets for large animals	1	1	For performing orthopedic surgery in large animals
All Orthopedic surgical sets for small animals	1	1	For performing orthopedic surgery in small animals
Teat surgical set	3	4	For performing teat surgery in large animals
Weingarh set	2	2	For performing rumenotomy in bovines
Hoof instruments set	1	1	For hoof trimming and cleaning
Autoclaves	2	2	For sterilizing surgical instruments and equipment
Bovine OT Table	1	1	For performing surgery in bovine patients
Equine OT Table	1	1	For performing surgery in equine patients
Small animal OT Table	3	4	For performing surgery in small animals

Otoscope	1	1	For examination of ear
Arthroscopy set	1	1	For performing arthroscopy
Laser surgical set	1	1	For performing Laser surgery
Electrocautery set	1	1	For performing cauterization
OT light roof mounted	3	4	For visualization during surgery
OT lights floor mounted	3	3	
Suction Unit	3	4	For suctioning air/ fluid during surgery
Oxygen cylinder / centralized oxygen Unit	Min 10	Min 16	For artificial ventilation, anaesthesia
<b>Ophthalmic Unit</b>			
Ophthalmic surgical set	1	1	For performing ophthalmic surgery in small animals
Phacoemulsification machine	1	1	For performing cataract surgery
Operating microscope	1	1	For performing ophthalmic surgeries
Tonometer	1	1	For evaluation of intraocular pressure
Ophthalmoscope (direct and Indirect)	1	1	For examination of eye
Fundus camera	1	1	For examination of fundus
<b>Dentistry Unit</b>			
Dentistry unit (Dental surgical set for small animals, RVG, piezoelectric scalers etc)	1	1	For performing dental surgery in small animals
Dental instruments for large animals	1	1	For performing dental surgery in large animals
<b>Radiology Unit</b>			
CR and DR X ray machines for small animals	1	1	For obtaining radiographs in small animals
CR and DR X ray machines for large animals	1	1	For obtaining radiographs in large animals
Ultrasound machine for small animals	1	1	For obtaining ultrasound in small animals
Ultrasound machine for large animals	1	1	For obtaining ultrasound in large

				animals
	CT scan	1	1	For obtaining CT scan images
	Endoscopy set	1	1	For performing endoscopy
	Laparoscopy set	1	1	For performing laparoscopy
	Theloscopy set	1	1	For performing theloscopy
	C arm	1	1	For obtaining real time radiographic image during surgery
PhD	<b>Anesthetic Unit</b>			
	Anaesthesia machine for small animal ventilator, bair circuit	4	5	For providing general anesthesia using inhalant anesthetics in small animals
	Anaesthesia machine for large animals, ventilator	1	1	For providing general anesthesia using inhalant anesthetics in large animals
	Multi Para monitor for small animals	4	5	For monitoring of anesthesia in small animals
	Multi Para monitor for large animals	2	2	For monitoring of anesthesia in large animals
	ECG	2	2	For taking ECG
	Doppler BP monitor	2	2	For taking Blood pressure
	<b>Surgery Unit</b>			
	General surgical instrument for small animals	6 packs	8 packs	For performing general surgery in small animals
	General surgical instrument for large animals	4 packs	6 packs	For performing general surgery in large animals
	All Orthopedic surgical sets for large animals	1	1	For performing orthopedic surgery in large animals
	All Orthopedic surgical sets for small animals	1	1	For performing orthopedic surgery in small animals
	Teat surgical set	3	4	For performing teat surgery in large animals
	Weingarth set	2	2	For performing rumenotomy in bovines

Hoof instruments set	1	1	For hoof trimming and cleaning
Autoclaves	2	2	For sterilizing surgical instruments and equipment
Bovine OT Table	1	1	For performing surgery in bovine patients
Equine OT Table	1	1	For performing surgery in equine patients
Small animal OT Table	3	4	For performing surgery in small animals
Otoscope	1	1	For examination of ear
Arthroscopy set	1	1	For performing arthroscopy
Laser surgical set	1	1	For performing Laser surgery
Electrocautery set	1	1	For performing cauterization
OT light roof mounted	3	4	For visualization during surgery
OT lights floor mounted	3	3	
Suction Unit	3	4	For suctioning air/ fluid during surgery
Oxygen cylinder / centralized oxygen Unit	Min 10	Min 16	For artificial ventilation, anaesthesia
<b>Ophthalmic Unit</b>			
Ophthalmic surgical set	1	1	For performing ophthalmic surgery in small animals
Phacoemulsification machine	1	1	For performing cataract surgery
Operating microscope	1	1	For performing ophthalmic surgeries
Tonometer	1	1	For evaluation of intraocular pressure
Ophthalmoscope (direct and Indirect)	1	1	For examination of eye
Fundus camera	1	1	For examination of fundus
<b>Dentistry Unit</b>			
Dentistry unit (Dental surgical set for small animals, RVG, piezoelectric scalers etc)	1	1	For performing dental surgery in small animals
Dental instruments for large	1	1	For performing dental

	animals			surgery in large animals
	Endoscopy set	1	1	For performing endoscopy
	Laparoscopy set	1	1	For performing laparoscopy
	Theloscopy set	1	1	For performing theloscopy
	C arm	1	1	For obtaining real time radiographic image during surgery
	<b>Radiology Unit</b>			
	CR and DR X ray machines for small animals	1	1	For obtaining radiographs in small animals
	CR and DR X ray machines for large animals	1	1	For obtaining radiographs in large animals
	Ultrasound machine for small animals	1	1	For obtaining ultrasound in small animals
	Ultrasound machine for large animals	1	1	For obtaining ultrasound in large animals
	CT scan	1(Optional)	1(Optional)	For obtaining CT scan images
Diploma in equine clinical practice	Same as in M.V.Sc.			
Other (specify)				

5. **Veterinary Clinical Complex:** The additional facilities or the number of Outdoor and Indoor cases that may be required for Post Graduate, PhD or other programmes for the clinical and para-clinical departments may be provided.

Level of programme	For 03 seats in each department	For 05 seats in each department	Remarks	Additional Remarks
Post Graduate				
PhD				
Other (specify)				

6. **Livestock Farm complex:** The additional facilities or the number of various livestock animals that may be required for Post Graduate, Ph.D or other programmes for the animal sciences/husbandry departments may be provided.

Level of programme	For 03 seats in each department	For 05 seats in each department	Remarks	Additional Remarks
Post Graduate				



PhD				
Other ( specify)				

7. **Syllabus:** The syllabus for each of the programmes in each of the Departments may be suggested. Else it may also be informed whether the existing PG & PhD syllabus may be continued or amendments may be made to meet the learning objectives.

- Keeping in view the multiple specialties, it is proposed to create various units under the department with an associate or professor rank faculty as in charge of the unit and other faculty may be put on duty on the rotation basis
  - Diagnostic Imaging Unit
  - Ophthalmic Surgery Unit
  - Orthopedic Surgery Unit
  - Equine Surgery Unit
  - Bovine Surgery Unit
  - Small Animal Surgery Unit
  - Anesthesia Unit

**MVSc degree program**

- For clinical subjects, there should be only 0+1 credit hour supportive course on the Data analysis using computerized statistical methods such as SPSS. Biostatistics should be removed.
- Other supportive courses (6 credit hours) may be omitted for MVSC program. These credit hour may be added to the major courses.
- The course VSR 503 (Principles of surgery, 2+1) may be changed from core to elective.
- Essential course package (4-6 credit hours) should be provided for clinical discipline students as a single course.
- Comprehensive examination should be removed.
- A must know manual for all the clinical procedure to be taught in Post graduate studies should be developed.
- MVSc degree may be of two types
  1. With Thesis degree (2 years)
    - Exit program of 1 year may be allowed for Non thesis MVSc degree in which Diploma certificate may be provided.
- 4 years MVSc + PhD Integrated program can be started.
- Residency program with stipend should be started.
- Optional, Self-financed, Post Graduate students Externship (National/ International) program of 1 months may be allowed.
- Board certification in clinical subjects should be introduced

**Phd Degree program:** Appears Okay

**VETERINARY SURGERY AND RADIOLOGY**  
**Course Structure**

<b>COURSE NO.</b>	<b>COURSE TITLE</b>	<b>CREDITS</b>	<b>SEM</b>
VSR 601	PRINCIPLES OF SURGERY	2+0	I
VSR 602	CLINICAL PRACTICE - I	0+3	I
VSR 603	CLINICAL PRACTICE - II	0+3	II
VSR 604	SMALL ANIMAL ANAESTHESIA	2+1	I
VSR 605	LARGE ANIMAL ANAESTHESIA	2+1	II
VSR 606	DIAGNOSTIC IMAGING TECHNIQUES	2+1	I
VSR 607	VETERINARY OPHTHALMOLOGY AND DENTISTRY	1+1	II
VSR 608	SMALL ANIMAL SOFT TISSUE SURGERY	2+1	I
VSR 609	LARGE ANIMAL SOFT TISSUE SURGERY	2+1	II
VSR 610	ORTHOPAEDICS AND LIMB SURGERY	2+1	I
VSR 691	MASTER'S SEMINAR	1	I, II
VSR 699	MASTER'S RESEARCH	20	I, II
VSR 701	CLINICAL SURGICAL PRACTICE - I	0+2	I
VSR 702	CLINICAL SURGICAL PRACTICE - II	0+2	II
VSR 703	CLINICAL SURGICAL PRACTICE - III	0+2	I
VSR 704	ANAESTHESIA OF WILD AND LABORATORY ANIMALS	1+1	II
VSR 705	ADVANCES IN ANAESTHESIOLOGY	2+1	I
VSR 706	ADVANCES IN DIAGNOSTIC IMAGING TECHNIQUES	2+1	II
VSR 707	NEUROSURGERY	2+1	I
VSR 708	EXPERIMENTAL SURGICAL TECHNIQUES IN ANIMALS	1+1	II
VSR 789	SPECIAL PROBLEM IN ANAESTHESIA	0+2	I, II
VSR 790	SPECIAL PROBLEM IN SURGERY	0+2	I, II
VSR 791	DOCTORAL SEMINAR I	1	I, II
VSR 792	DOCTORAL SEMINAR II	1	I, II
VSR 799	DOCTORAL RESEARCH	45	I, II





anaesthesia of pediatric and geriatric patients, euthanasia.

**Practical**

Anaesthetic equipments and instrumentation, artificial ventilation, use of various preanaesthetic and anaesthetic agents in large animals, anaesthetic triad, balanced anaesthesia, total intravenous anaesthesia.

**Suggested Readings**

Hall LW & Clarke KW. (Eds.). 1991. *Veterinary Anaesthesia*. Bailliere Tindall. Muir WW & John AE. (Eds.). 1991. *Equine Anesthesia*. Mosby.  
Thurmon JC, Tranquilli WJ & Benson JG. (Eds.). 1996. *Lumb and Jone's Veterinary Anaesthesia*. Williams & Wilkins.

**Objective**

To impart the basic and practical knowledge of principles of diagnostic imaging techniques and interpretation of radiographs, ultrasonograph/CT/ MRI and other imaging techniques.

**Theory**

UNIT-I: Conventional and digital X-ray machine, quality of radiation, formation of radiograph technique chart, artifacts and their prevention, special diagnostic radiographic procedures, radiographic quality, radiographic accessories, differentiation of radiographic densities in relation to clinical diagnosis.

UNIT-II: Principles of radiographic interpretation, plain and contrast radiographic techniques of small and large animals, image intensification.

UNIT-III: Principles of radiation therapy, medical radioisotope curves, radiation laws and regulations.

UNIT-IV: Principles of ultrasound, basic physics, transducers, equipment controls, display models, terminology of echotexture and artifacts, application of ultrasound in small and large animals.

UNIT V: Sonography of abdominal and pelvic (liver, spleen, kidney, urinary bladder, stomach and intestines, prostate, ovary, uterus) organs.

UNIT-VI: Echocardiography (Doppler techniques), mammography, USG of muscle, tendons, bone, joints and ligaments.

UNIT VII: Introduction to MRI, CT scan, nuclear medicine, xeroradiography, positron emission tomography technique and other imaging techniques.

UNIT-VII: Hazards of electromagnetic radiations and protection and bio-safety.

**Practical**

Acquaintance with imaging equipments, dark room processing techniques and X-ray film handling, formulation of technique chart with fixed kVp and variable mAs, basics of radiographic interpretation of diseases, computer aided image acquisition and retrieval, radiographic positioning of different regions in domestic animals, angiography, cardiac catheterization and other contrast radiographic techniques of different types, interpretation of ultrasonographs, MRI, CT scans etc.

**Suggested Readings**

Bargai U, Bharr, JW & Morgan JP. (Eds.). 1989. *Bovine Radiology*. Iowa State University Press, Ames.

Bushong SC. (Ed.). 1975. *Radiologic Science for Technologists*. CV Mosby.

Gillette EL, Thrall DE & Lebel JL. (Eds.). 1977. *Carlson's Veterinary Radiology*. Lea & Febiger.

Goddard PJ. (Ed.). 1995. *Veterinary Ultrasonography*. CABI.

Kealy JK. (Ed.). 1987. *Diagnostic Radiology and Ultrasonography in Dogs and Cats*. 2<sup>nd</sup> Ed. Saunders, Philadelphia.

Morgan JP. (Ed.). 1972. *Radiology in Veterinary Orthopaedics*. Lea & Febiger. Singh AP & Singh J. (Eds.). 1994. *Veterinary Radiology*. CBS.

Thrall DE. (Ed.). 2007. *Textbook of Veterinary Diagnostic Radiology*. 5<sup>th</sup> Ed. Saunders, Philadelphia.

**VSR 607 VETERINARY OPHTHALMOLOGY AND DENTISTRY**

**1+1 SEM - II**

**Objective**

To impart the basic and practical knowledge of diagnosis and treatment of diseases of eye and teeth in domestic animals.

**Theory**

UNIT-I: General Anatomical and physiological and pharmacological considerations for ophthalmic surgery.

UNIT-II: Ophthalmic examination and diagnosis, local anaesthesia of eye, ocular therapeutics, diagnostic instruments.

UNIT-III: General consideration for eye surgery, diseases and surgery of eye lids, lacrimal apparatus, naso-lacrimal duct.

UNIT-IV: Diseases of conjunctiva, cornea, sclera, iris, Uvea, orbit, lens, aqueous and vitreous humor, retina and optic nerve and their management.

UNIT-V: Neuro-ophthalmology, Ocular manifestation of systemic diseases.

UNIT-VI: Anatomy of teeth, examination of teeth. Diseases of teeth- congenital anomalies (retained deciduous teeth, impacted teeth, abnormalities in the shape of teeth). Diseases of teeth- acquired diseases (irregular molar, dental caries, fracture of teeth, endodontic disease, dental materials and dental radiography). Restorative dentistry, periodontal disease, tooth extraction, gum diseases. Current techniques in dentistry.

**Practical**

Ophthalmic instrumentation, examination of the eye and its adnexa, preparation of patient for eye anaesthesia and surgery, canthotomy, tarsorrhaphy, transplantation of cornea, keratoplasty, anterior chamber paracentesis, flushing of naso-lacrimal duct, iridectomy, lens extraction/implantation. Dentistry instrumentation, dental radiography, teeth cleaning, tooth extraction.

**Suggested Readings**

Gelatt KN. (Ed.). 1981. *Veterinary Ophthalmology*. Lea & Febiger.

Gelatt KN. (Ed.). 2000. *Essentials of Veterinary Ophthalmology*. Blackwell.

Gelatt KN. (Ed.). 2007. *Atlas of Veterinary Ophthalmology*. 4<sup>th</sup> Ed. Blackwell Publ.

Lavach JD. (Ed.). 1990. *Large Animal Ophthalmology*. CV Mosby.

Oehme FW & Prier JE. (Eds.). 1974. *Textbook of Large Animal Surgery*. Williams & Wilkins.

Slatter DH. (Ed.). 1981. *Fundamentals of Veterinary Ophthalmology*. WB Saunders.

Tyagi RPS & Singh J. (Eds.). 1993. *Ruminant Surgery*. CBS.

**VSR 608 SMALL ANIMAL SOFT TISSUE SURGERY**

**2+1 SEM - I**

**Objective**

To familiarize with various surgical affections of different body systems and their treatment in small animals.

**Theory**

UNIT-I: Skin and adnexa- the integument, management of skin wounds, principles of

plastic and reconstructive surgery, pedicle grafts, skin grafts, burns, electrical chemical and cold injuries.

UNIT-II: Surgical approaches/ affections of ear, oral cavity and pharynx, abdomen, thorax, the salivary glands, oesophagus, stomach, intestines, rectum and anus, liver and biliary system, pancreas.

UNIT-III: Hernias- abdominal hernia, diaphragmatic hernia, perineal hernia, inguinal, scrotal, and umbilical hernia etc. Surgical approaches to thoracic wall, Pleura.

UNIT-IV: Respiratory system- functional anatomy, diseases of upper respiratory system and lower respiratory system.

UNIT-V: Surgical anatomy of the cardiovascular system, cardiovascular physiology, diagnostic methods, cardiac disorders, principles of vascular surgery, basic cardiac procedures, hypothermia, basic peripheral vascular procedures, peripheral vascular disorders, portacaval shunts and anomalies. Haemolymphatic system, bone marrow, spleen, tonsils, lymph nodes and lymphatics, thymus.

UNIT-VI: Male reproductive system- anatomy of the male genital organs, diagnostic and biopsy techniques, surgical affections of male genital organs; female reproductive system- anatomy, diagnostic techniques, surgical affections of female genital organs.

UNIT-VII: Urinary system- anatomy of the urinary tract, principles of urinary tract surgery, kidneys, ureters, surgery of the bladder, surgical diseases of the urethra, medical dissolution and prevention of canine uroliths, feline urologic syndrome.

UNIT-VIII: Endocrine system- pituitary, adrenals, thyroid, parathyroid, surgical affections of mammary glands and tail. Surgical affections of nervous system, special sense organs.

### **Practical**

Practice of various surgical techniques of skin and adnexa, alimentary system, hernias, respiratory system, cardiovascular system, male and female reproductive systems, urinary system, mammary glands and tail.

### **Suggested Readings**

Fossum TW. (Ed.). 2002. *Small Animal Surgery*. Mosby.

Slatter DH. (Ed.). 2002. *Textbook of Small Animal Surgery*. WB Saunders.

## **VSR 609      LARGE ANIMAL SOFT TISSUE SURGERY                      2+1      SEM - II**

### **Objective**

To familiarize with various surgical affections of different body systems and their treatment in large animals.

### **Theory**

UNIT-I: Abdominal wall, integumentary system - skin and appendages; mammary gland, tail, affections of oral cavity.

UNIT-II: Surgical affections of respiratory system, cardiovascular and lymphatic system. UNIT-III: Surgical affections of digestive system, urinary and genital system.

UNIT-IV: Surgical affections of nervous system, special sense organs.

### **Practical**

Practice of various surgical techniques of skin, alimentary system, hernias, respiratory system, cardiovascular system, male and female reproductive system, urinary system,



mammary glands and tail. Surgical affections of nervous system, special sense organs.

### **Suggested Readings**

Auer JA. (Ed.). 2006. *Equine Surgery*. WB Saunders.

Fubini SL & Ducharme NG. (Eds.). 2004. *Farm Animal Surgery*. WB Saunders.

Oehme FW & Prier JE. (Ed.). 1994. *Textbook of Large Animal Surgery*. Williams & Wilkins.

Tyagi RPS & Singh J. (Eds.). 1993. *Ruminant Surgery*. CBS.

## **VSR 610 ORTHOPAEDICS AND LIMB SURGERY 2+1 SEM - I**

### **Objective**

To familiarize with various affections of bones, joints, tendons, ligaments and foot as well as their treatment in animals.

### **Theory**

UNIT-I: Fractures and dislocations, fracture healing, ligaments and tendons - repair techniques.

UNIT-II: Treatment of fractures of different bones in domestic animals, bone diseases.

UNIT-III: Various affections of the joints, their diagnosis and treatment.

UNIT-IV: Conformation of the limb, anatomy of hoof.

UNIT-V Lameness and allied surgical conditions of fore limbs/hind limbs, rehabilitation of orthopaedic patient.

### **Practical**

Internal and external fixation of fractures and dislocation, arthrotomy, tenotomy, examination of limbs for lameness, nerve blocks, injections in joints, operations for arthritis, hoof surgery and corrective shoeing, physiotherapy. Instrumentation, neurological examination, imaging the spine; skull and brain, surgical approach to the cervical spine; thoracolumbar spine and brain.

### **Suggested Readings**

Auer JA. (Ed.). 2006. *Equine Surgery*. WB Saunders.

Fubini SL & Ducharme NG. (Eds.). 2004. *Farm Animal Surgery*. WB Saunders.

Newton CD & Nunamaber DM. (Eds.). 1985. *Textbook of Small Animal Orthopaedics*. JB Lippincott.

Oehme FW & Prier JE. (Eds.). 1974. *Textbook of Large Animal Surgery*. Williams & Wilkins.

Tyagi RPS & Singh J. (Eds.). 1993. *Ruminant Surgery*. CBS.

## **VSR 701 CLINICAL SURGICAL PRACTICE – I 0+2 SEM - I**

### **Objective**

To impart practical training in surgery, anaesthesia and diagnostic imaging techniques.

### **Practical**

Client management, public relations, code of conduct, management of surgical affections, designing of surgical hospital, hospital management, database management, attending surgical cases, surgical facilities, equipments and personnel.

## **VSR 702 CLINICAL SURGICAL PRACTICE – II 0+2 SEM - II**



anaesthetics; dissociative anaesthetics; inhalation anaesthetics; local anaesthetics; muscle relaxants and neuromuscular blocking agents.

UNIT-III: Anaesthetic machines and breathing system, airway management and ventilation, acid-base physiology and fluid therapy during anaesthesia, monitoring of anaesthetized patients, anaesthetic emergencies and accidents.

UNIT-IV: Anaesthesia for selected diseases (cardiovascular dysfunction, pulmonary dysfunction, neurologic diseases, renal diseases, hepatic diseases, gastrointestinal diseases, endocrine diseases, airway diseases).

UNIT-V: Anaesthesia for special patients (ocular patients, heart patients, caesarian section patients, trauma patients, neonatal and geriatric patients), euthanasia.

### **Practical**

Various procedures for catheterization of heart and great vessels, haemodynamic changes and pulmonary function tests during trials of anaesthetics, electrocardiographic, encephalographic evaluation of central nervous system activity, cybernetics, data acquisition and retrieval.

### **Suggested Readings**

Selected articles from journals.

## **VSR 706      ADVANCES IN DIAGNOSTIC IMAGING      2+1      SEM - II** **TECHNIQUES**

### **Objective**

To impart the advanced theoretical and practical knowledge of diagnostic imaging techniques and their interpretations.

### **Theory**

UNIT-I: Biological effects of radiations (alpha, beta, X-ray and gamma rays) *in vivo* and *in vitro* cellular response following radiation as an immunosuppressive agent.

UNIT-II: Isotopes (natural and man-made); cyclotron reactor, half-life, decay pattern, storage and handling of radioactive material, fluoroscopy, magnetic resonance imaging and computerised axial tomography, xeroradiography, doppler techniques, indications for ultrasound diagnosis.

UNIT-III: Methods in the detection of isotopes, Geiger-Muller tubes, photo-multiplier tube, medical use of isotope, dosimetry, nuclear medicine and its use in diagnosis of thyroid, kidney, bone and liver function studies.

UNIT-IV: Labelling of isotope and biological uses, detonation and fission products.

UNIT-V: Radiation therapy in cancer patients, biological effects of radiation physics, physics of radiation.

UNIT-VI: Doppler techniques echocardiography and its application, MRI, CT scan, nuclear medicine, xeroradiography, positron emission tomography technique etc.

UNIT-VII: Electromagnetic radiations, hazards of electromagnetic radiations and protection and bio-safety.

### **Practical**

Radiation safety measures, handling radioactive material, measurement of thyroid function and cardiac output, demonstration of advanced radiological techniques.

### **Suggested Readings**

Selected articles from journals.

**VSR 707 NEUROSURGERY****2+1 SEM - I****Objective**

To impart theoretical and practical knowledge of treatment of surgical affections of nervous system in animals.

**Theory**

UNIT-I: Nervous system- anatomy and physiology.

UNIT-II: Clinical neurology, pathogenesis of disease of the central nervous system.

UNIT-III: Diagnostic methods- neurological examinations, electrodiagnostic methods, neuroradiology.

UNIT-IV: Fundamentals of neurosurgery, surgical approaches to brain, surgical diseases of peripheral nerves, surgical approaches to the spine, diseases of the spinal column, intervertebral disc diseases.

UNIT-V: Intracranial surgery.

**Practical**

Instrumentation, neurological examination, imaging the spine; skull and brain, surgical approach to the cervical spine; thoracolumbar spine and brain.

**Suggested Readings**

Selected articles from journals.

**VSR 708 EXPERIMENTAL SURGICAL TECHNIQUES  
IN ANIMALS****1+1 SEM - II****Objective**

To familiarize with designing of experiments and various surgical models for research.

**Theory**

UNIT-I: General considerations and protocols for designing experiments.

UNIT-II: Surgical models of various systems. Care and feeding of genobiotic experimental animals.

UNIT-III: Rumen and intestinal fistulae, production of experimental peritonitis and ascitis, nephrectomy, adrenalectomy.

UNIT-IV: Cannulation of various blood vessels and lymphatics, portacaval shunt.

UNIT-V: Principles of transplantation of organs and use of prosthetic material.

UNIT-VI: Tissue engineering-*in vitro*, *in vivo*, *ex vivo* techniques, regenerative therapy.

**Practical**

Various experimental surgical techniques and special problems related to veterinary surgery, radiology and anaesthesiology, transplantation of skin, fascia, tendon and blood vessels.

**Suggested Readings**

Selected articles from journals.

**VSR 789 SPECIAL PROBLEMS IN ANAESTHESIA  
II****0+2 SEM - I,  
II****Objective**

To impart practical exposure to experimental models related to anaesthesia for research.

**Practical**

Investigative anaesthetic problems in clinical or experimental models. Didactic and interpersonal learning-teaching, problem solving self-learning strategies in problems related to anaesthesia.

**VSR 790 SPECIAL PROBLEMS IN SURGERY****0+2 SEM - I,****II****Objective**

To impart practical exposure to experimental models related to surgery for research.

**Practical**

Investigative surgical problems in clinical or experimental models. Didactic and interpersonal learning-teaching, problem solving self-learning strategies in problems related to surgery.

## **VETERINARY SURGERY AND RADIOLOGY**

### **List of Journals**

- American Journal of Veterinary Research
- Australian Veterinary Journal
- British Veterinary Journal
- Canadian Veterinary Journal
- Compendium of continuing Education for the practicing Veterinarian
- Cornell Veterinarian
- Equine Practice
- Equine Veterinary Journal
- Indian Journal of Veterinary Research
- Indian Journal of Veterinary Surgery
- Indian Veterinary Journal
- Journal of American Veterinary Medical Association
- Journal of American Animal Hospital Association
- Journal of Bone and Joint Surgery –A & B
- Modern Veterinary Practice
- Journal of Camel Practice and Research
- Journal of Veterinary Emergency and Critical Care
- Journal of Small Animal Practice
- Journal of Veterinary Dentistry
- Journal of Veterinary Medicine – Series A
- Veterinary Anaesthesia and Analgesia
- Veterinary clinics of North America – Small animal practice
- Veterinary clinics of North America – Equine practice
- Veterinary clinics of North America – Exotic animal practice
- Veterinary clinics of North America – Large animal practice
- Veterinary clinics of North America – Food animal practice
- Veterinary Ophthalmology
- Veterinary Radiology and Ultrasound
- Veterinary Record
- Veterinary Research Communication
- Veterinary Surgery

### **e-Resources**

- [www.blackwellpublishing.com/journal.asp](http://www.blackwellpublishing.com/journal.asp) (Veterinary Surgery)
- [www.blackwellpublishing.com/summit.asp](http://www.blackwellpublishing.com/summit.asp) (Veterinary anesthesia and Analgesia)
- [www.blackwellpublishing.com/journal.asp](http://www.blackwellpublishing.com/journal.asp) (Veterinary Radiology and Ultrasound)
- [www.blackwellpublishing.com/journal.asp](http://www.blackwellpublishing.com/journal.asp) (Veterinary Ophthalmology)
- [www.indianjournal.com/ijor.aspx](http://www.indianjournal.com/ijor.aspx) (Indian Journal of Veterinary Surgery)

### **Suggested Broad Topics for Master's and Doctoral Research**

- Evaluation of preanaesthetics and anaesthetics in domestic and laboratory animals
- Management of pain in animals
- Management of surgical disorders of different body systems in domestic animals
- Diagnostic imaging in animals

**Non-credit compulsory courses for M.V.Sc.**

<b>Course No.</b>	<b>Course title</b>	<b>Credit hours</b>	<b>Semester</b>
PGS 501	Library and information services	0+1	I and II
PGS 502	Technical writing and communication skills	0+1	I and II
PGS 503 (e-course)	Intellectual property and its management in Veterinary and animal husbandry	1+0	I and II
PGS 504	Basic concepts in laboratory techniques	0+1	I and II
PGS 505 (e-course)	Disaster management	1+0	I and II

**Syllabus of Common Courses for PG programmes**

**PGS 501 LIBRARY AND INFORMATION SERVICES (0+1)**

**Objective**

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines, etc.) of information search.

**Practical**

Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/ Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e- resources access methods.

**PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS (0+1)**

**Objective**

To equip the students/ scholars with skills to write dissertations, research papers, etc. To equip the students/ scholars with skills to communicate and articulate in English (verbal as well as writing).

**Practical (Technical Writing)**

- Various forms of scientific writings- theses, technical papers, reviews, manuals, etc.;
- Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature,



material and methods, experimental results and discussion);

- Writing of abstracts, summaries, précis, citations, etc.;
- Commonly used abbreviations in the theses and research communications;
- Illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations;
- Writing of numbers and dates in scientific write-ups;
- Editing and proof-reading;
- Writing of a review article;
- Communication Skills - Grammar (Tenses, parts of speech, clauses, punctuation marks);
- Error analysis (Common errors), Concord, Collocation, Phonetic symbols and transcription;
- Accentual pattern: Weak forms in connected speech;
- Participation in group discussion;
- Facing an interview;
- Presentation of scientific papers.

#### Suggested Readings

1. Barnes and Noble. Robert C. (Ed.). 2005. Spoken English: Flourish Your Language.
2. Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.
3. Collins' Cobuild English Dictionary. 1995.
4. Harper Collins. Gordon HM and Walter JA. 1970. Technical Writing. 3rd Ed.
5. Holt, Rinehart and Winston. Hornby AS. 2000. Comp. Oxford Advanced Learner's Dictionary of Current English. 6th Ed. Oxford University Press.
6. James HS. 1994. Handbook for Technical Writing. NTC Business Books.
7. Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed. Affiliated East-West Press.
8. Mohan K. 2005. Speaking English Effectively. MacMillan India.
9. Richard WS. 1969. Technical Writing.
10. Sethi J and Dhamija PV. 2004. Course in Phonetics and Spoken English. 2nd Ed. Prentice Hall of India.
11. Wren PC and Martin H. 2006. High School English Grammar and Composition.

S. Chand & Co.

**PGS 503 (e-course) INTELLECTUAL PROPERTY AND ITS**

## **MANAGEMENT IN VETERINARY AND ANIMAL HUSBANDRY (1+0)**

### **Objective**

The main objective of this course is to equip students and stakeholders with knowledge of Intellectual Property Rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge- animal health and production based economy.

### **Theory**

Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPs Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of animal breeds/strains and farmers' rights and biodiversity protection; Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.

### **Suggested Readings**

1. Erbisch FH and Maredia K.1998. Intellectual Property Rights in Agricultural Biotechnology. CABI.
2. Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw-Hill.
3. Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC and Aesthetic Technologies.
4. Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol. V. Technology Generation and IPR Issues. Academic Foundation.
5. Rothschild M and Scott N. (Ed.). 2003. Intellectual Property Rights in Animal Breeding and Genetics. CABI.
6. Saha R. (Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.

The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; The Biological Diversity Act, 2002.

## **PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES (0+1)**

### **Objective**

To acquaint the students about the basics of commonly used techniques in laboratory.

### **Practical**

- Safety measures while in Lab;

- Handling of chemical substances;
- Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vials;
- Washing, drying and sterilization of glassware;
- Drying of solvents/ chemicals;
- Weighing and preparation of solutions of different strengths and their dilution;
- Handling techniques of solutions;
- Neutralisation of acid and bases;
- Preparation of buffers of different strengths and pH values;
- Use and handling of microscope, laminar flow, vacuum pumps, viscometer, thermometer, magnetic stirrer, micro-ovens, incubators, sandbath, waterbath, oil-bath;
- Electric wiring and earthing;
- Preparation of media and methods of sterilization;
- Cell/Tissue cultures
- Description of animal species and breeds

#### Suggested Readings

1. Furr AK. 2000. CRC Hand Book of Laboratory Safety. CRC Press.
2. Gabb MH and Latchem WE. 1968. A Handbook of Laboratory Solutions. Chemical Publ. Co.

PGS-505 (e-course)      Disaster management 1+0

#### **Objectives:**

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

#### **Theory**

UNIT I: Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion.

UNIT II: Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT III: Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

#### **Suggested Readings**

Gupta HK. 2003. Disaster Management. Indian National Science Academy. Orient

Blackswan.

Hodgkinson PE & Stewart M. 1991. Coping with Catastrophe: A Handbook of Disaster Management. Routledge.

Sharma VK. 2001. Disaster Management. National Centre for Disaster Management, India.

### **Compulsory course for Ph.D. students from all disciplines**

#### **RPE 700 RESEARCH AND PUBLICATION ETHICS (1+1) Semester I and II**

##### **I. Theory**

###### **RPE 01: Philosophy and Ethics**

- Introduction to philosophy: definition, nature and scope, concept, branches
- Ethics: definition, moral philosophy, nature of moral judgements and reactions

###### **RPE 02: Scientific Conduct**

- Ethics with respect to science and research
- Intellectual honesty and research integrity
- Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
- Redundant publications: duplicate and overlapping publications, salami slicing
- Selective reporting and misrepresentation of data
- Publication ethics: definition, introduction and importance
- Best practices/ standards setting initiatives and guidelines: COPE, WAME, etc.
- Conflicts of interest
- Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
- Violation of publication ethics, authorship and contributorship
- Identification of publication misconduct, complaints and appeals
- Predatory publishers and journals

##### **II. Practical**

###### **RPE 4: Open Access Publishing**

- Open access publications and initiatives
- SHERPA/ RoMEO online resource to check publisher copyright and self-archiving policies

- Software tool to identify predatory publications developed by SPPU
- Journal finder/ journal suggestion tools, viz., JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

### **RPE 05: Publication Misconduct**

#### **A. Group Discussions**

- Subject specific ethical issues, FFP, authorship
- Conflicts of interest
- Complaints and appeals: examples and fraud from India and abroad

#### **B. Software tools**

- Use of plagiarism software like Turnitin, Urkund and other open source software tools

### **RPE 06: Databases and Research Metrics**

#### **A. Databases**

- Indexing databases
- Citation databases: Web of Science, Scopus, etc.

#### **B. Research Metrics**

- Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, CiteScore
- Metrics: h-index, g index, i10 index, altmetrics