

**NEW AND RESTRUCTURED
POST-GRADUATE CURRICULA & SYLLABI**

Veterinary Clinical Subjects

Animal Reproduction, Gynecology & Obstetrics
Veterinary Clinical Medicine, Ethics & Jurisprudence
Veterinary Epidemiology & Preventive Medicine
Veterinary Surgery & Radiology



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EXECUTIVE SUMMARY

I. The New Approach

The proposed course curricula and syllabi in veterinary science disciplines have been prepared in the light of PG programs in vogue at different veterinary colleges in India and contemporary developments in veterinary sciences. The guiding principle of the proposed new approach is to impart comprehensive and practical knowledge by covering all important aspects of the subject area of study at Master's level. It is proposed that each MVSc student should register for all the courses offered by the major department, e.g. an MVSc student in microbiology should study all basic courses of bacteriology, virology and immunology instead of opting for courses of 1 or 2 sub-disciplines only. However, flexibility has been retained at Ph.D. level.

II. Credit Requirements

- Common academic regulations for post graduate education in SAUs, DUs and CAU as proposed in table 2 will be followed with slight adjustments to accommodate specific and special needs to build up and enhance the knowledge based competence of the veterinary students as given below.
- The total course work of 40 credit hours has been proposed at M.V.Sc. level instead of minimum requirement 35 credit hours (Table 2), keeping the research credit hours (20) unchanged. Break up of the course work: Major subject (including 1 credit seminar) - 29 credits, minor subject (specified in table 1) and supporting subjects (as per requirement) together -11 credits.
- At Ph.D. level, it is proposed to keep course credit hours (30) and research credit hours (45) unchanged. However, break up of the course work: Major subject (including 2 credit seminars) - 19 credits, minor subject (specified in table 1) and supporting subjects (as per requirement) together-11 credits.
- Out of 11 credit hours for minor and supporting subjects, courses with a minimum of 6 credits should be taken from minor subject and course (s) with a minimum of 3 credit hours from supporting subject (s) should be taken. Thus students will have the option to register courses of 6 to 8 credit hours in minor subject and of 3 to 5 credits in supporting subject.
- The credit hours for minor and supporting subjects both at Master's and Doctoral level have been reduced to compensate partially for the increased credit load of courses of major subject.
- It is proposed that clinical practice of 0+3 credit hours should be made compulsory in the two semesters for all MVSc students in departments of Clinical Medicine, Ethics & Jurisprudence, Surgery & Radiology, and Animal Reproduction, Gynaecology & Obstetrics.
- Besides, four general non-credit courses namely, Library and Information Services (0+1), Technical Writing and Communication Skills (0+1), Intellectual Property and its Management (1+0) and Disaster Management (1+0) are mandatory at Master's level, and at Doctoral level, if not studied already.
- The undergraduate courses for B.V.Sc. & A.H. students, formulated and implemented uniformly in all veterinary colleges of India under statutory provisions of Veterinary

Council of India, are up to 500 series. To avoid overlapping and confusion generated thereof, the numbering of courses is also revised i.e., 600 series for MVSc and 700 for Ph. D. programme.

III. Major additions and alterations in the existing PG courses

Animal Reproduction, Gynaecology and Obstetrics

- VOG 607 and VOG-608 [Clinical practice – I & II] courses made mandatory in all clinical subjects to encourage 'On site work based learning'.
- VOG 606 and VOG 704 [Reproductive biotechnology and Advances in reproductive biotechnology] contents of 'embryo biotechnology course' improved to include other aspects like stem cell biotechnology, immuno-modulation and immuno-neutralization

Veterinary Clinical Medicine, Ethics and Jurisprudence

- To facilitate comprehensive understanding and learning, all the courses of 600 series are designed so that diseases of group of animals (e.g. equines, canines etc.) are discussed together rather than the diseases of body systems.
- VCM 607 [Clinical diseases of animal species of regional importance e.g. Camel in Haryana, Yak in eastern & elephant in south India] has been introduced.
- VCM 610 [Veterinary forensic medicine]; VCM 611 [Clinical diagnostic techniques] and VCM 612 [Veterinary emergency medicine] are designed to meet current day demands.
- Newly framed courses (VCM 701 to 708) deal with advances in gastroenterology, cardiopulmonary medicine, neurological and urological disorders; endocrine and dermatological disorders; production diseases; pediatrics and geriatrics; veterinary diagnostics and veterinary therapeutics

Veterinary Epidemiology and Preventive Medicine

- To facilitate comprehensive understanding and learning the courses of preventive Medicine of 600 and 700 series are newly designed so that diseases of group of animals (e.g. ruminants, equines, canines etc.) are discussed together rather than the diseases of body systems.
- Two courses of epidemiology viz. VEP 604 [Veterinary clinical epidemiology] and VEP 605, [Bio-security practices in disease prevention] are new courses.
- Advanced courses (of 700 series) of preventive Medicine are new and courses enlist diseases of a group of animals.
- Advanced courses of epidemiology viz. VEP 701 [Recent concepts in epidemiology and disease forecasting]; VEP 702 [Herd health management]; VEP 703 [Data collection, management and presentation]; VEP 704 [Survey and surveillance]; VEP 705 [Emerging and re-emerging animal diseases] and VEP 706 [Ecology of diseases] are all newly designed courses keeping in mind the latest developments.

Veterinary Surgery and Radiology

- VSR 606 [Diagnostic imaging techniques] and VSR 707 [Advances in diagnostic imaging techniques] are redesigned courses from courses of radiology, ultrasound and alternate imaging. These also include latest techniques like MRI, CT Scan, nuclear medicine, positron emission tomography.
- VSR 701 [Veterinary dentistry]; VSR 705 [Anesthesia of wild and laboratory animals] and VSR 709 [Experimental surgical techniques in animals] are new courses.

BSMA Committee on Veterinary Clinical Subjects

(Vety. Epidemiology, Clinical Medicine, Obst. & Gynae, Surgery & Radiology)

(Constituted by ICAR vide Office order No. F. No. 13 (1)/2007- EQR
dated January 14, 2008)

Name	Address	Specialization
Dr. Simrat Sagar Singh Dean <i>Convener</i>	GADVASU, Ludhiana	Surgery
Dr. A.C. Varshney Dean	COVS, CSK HPAU, Palampur	Surgery
Dr. A.S. Nanda Director of Research	GADVASU, Ludhiana	ARGO
Dr. A.K. Sinha Dean	COVS, Ranchi Vety. College, Ranchi	ARGO
Dr. V. S. Rajora Professor	Dept. of Vety. Clinical Medicine, COVS, GBPUAT, Pantnagar	Clinical Medicine
Dr. A.K. Gehlot Dean	COVS, RAU, Jobner Campus, Bikaner	Medicine
Dr. S.K.Kotwal Assoc. Prof. & Head	Bombay Vety. College, Mumbai	Public Health
Dr. N.K. Rakha Prof. & Head	Dept of VEPM, COVS, CCS HAU, Hisar	VEPM
Dr A. M. Paturkar Professor	Bombay Vety. College, Parel, Bombay	Public Health
Dr. Jit Singh ADR <i>Member Secretary</i>	CCS HAU Hisar	Surgery

PREAMBLE

Veterinary sciences have helped in reducing animal sufferings, minimizing risk of zoonotic diseases threatening human health and ensuring food security. There have been unprecedented advancements in all the branches of veterinary sciences. The futuristic requirements of the society such as integrated casualty management, public health, food security and safety, healthy eco-system, containing bio-terrorism, productivity, profitability and stability of livestock farming systems etc., have posed greater challenges for veterinary academics and scientific community. Veterinarians with higher qualifications are increasingly being involved in devising means and methods of developing diagnostics against prevalent and emerging pathogens, prevention and control of animal diseases and zoonoses, eco-health stewardship, monitoring and surveillance of diseases of livestock and poultry, combating bio-terrorism, genetic engineering to optimize production and develop disease resistant breeds of animals. Bio-medical research, being heavily dependent upon animal experimentation, demands deeper scientific knowledge of veterinary sciences. Temporal aspirations of knowledge seekers ought to be addressed through building knowledge and skill portfolio suiting the job market and thus enhancing the marketability of the veterinary post graduates

In this perspective, it is important that the veterinary profession responds to the futuristic societal needs to remain relevant and purposeful. Recent advances in veterinary medical sciences have led to wide spread use of animal disease surveillance and prediction system, 3-D holographic animal models, robotic tele-surgery, globe-wide virtual class rooms and demonstration centers, sensor diagnostic facilities etc. The dominant forces shaping the Veterinary-Business and Veterinary-education are global and virtual with a large number of specialists offering tele-veterinary services from off-shore locations like India. The ever changing and demanding public service sector has necessitated re-look into the veterinary higher education.

At undergraduate level, veterinary students acquire comprehensive knowledge and skills in basic, para-clinical and clinical subjects required for performing multi-tasking role of a veterinarian. However, at post graduate level, in-depth knowledge of theory, practical aspects and research methodology in each subject is of paramount importance. Detailed study of the course curricula and syllabi, being implemented by veterinary colleges in India, revealed that there was enormous heterogeneity in the course structure, nomenclature and contents. Informal discussions amongst veterinary academicians, over

the years, referred to the need to train good teachers and researchers with comprehensive subject knowledge rather than narrow sub-specialization of a discipline at Master's level. In view of the above, the task of formulating need based contemporary post graduate courses and syllabi for implementation of post graduate education uniformly at national level was initiated.

Three BSMA committees, constituted by ICAR for restructuring of masters and doctorate course curricula and syllabi, worked in unison to formulate common basic format. The BSMA committees consisted of ¹Basic Veterinary Sciences (Anatomy and Histology; Veterinary & Animal Husbandry Extension; Biochemistry and Physiology); ²Veterinary Para-clinical Sciences (Microbiology, Parasitology, Pathology, Pharmacology & Toxicology, Public Health) and ³Veterinary Clinical Sciences (Animal Reproduction, Gynaecology & Obstetrics; Clinical Medicine, Ethics & Jurisprudence; Epidemiology & Preventive Medicine and Surgery & Radiology).

The Master's program in basic veterinary subjects aims at providing cutting edge concepts as well as practical applications of these exciting fields. The new and restructured Post-Graduate curricula and syllabi in respect of basic, paraclinical and clinical veterinary sciences documents contain several innovative and practically applicable courses and extensively revamped course contents viz. inclusion of imaging techniques, ultra-structural studies and clinical applications in the curricula of veterinary anatomy; emphasis on cell membrane dynamics, receptor biology and proteomics in relation to various animal diseases, in veterinary biochemistry; focus on rumen microbiology and metabolism, immuno-physiology and physiology of stress in veterinary physiology; framing of courses on social psychology, group dynamics, gender and livestock development, planning and monitoring, organizational management and information and communication technology in the veterinary and animal husbandry extension.

Para-clinical veterinary subjects, which provide essential support by employing disease diagnostics technologies for prevention and control of animal diseases, directing efforts for Green Earth, maintenance of biodiversity etc., have been redesigned in the light of general recommendations of the BSMA committees on veterinary sciences. Courses have been re-designed in such a manner that an MVSc student in Microbiology studies all aspects of bacteriology, virology, mycology and immunology. The contents of 17 courses of microbiology and 14 courses of immunology have been reshaped and encapsulated into 9 mandatory courses of 600 series and 18 optional courses of 700 series have been carved

in veterinary microbiology. In veterinary parasitology, new courses on malacology, remote sensing and GIS have been introduced. In veterinary pathology, courses on veterolegal pathology and toxico-pathology have been introduced. A new course on ethnopharmacology has been introduced in veterinary pharmacology while courses on fish, fish products and seafood hygiene; disaster management and bioterrorism; emerging and reemerging zoonoses; occupational health hazards; disposal and recycling of waste; biohazards and bio-security have been introduced in veterinary public health.

The new approach encompassed the latest knowledge for development of advanced diagnostics, clinical management, clinical epidemiology, bio-security, prevention and control of diseases of livestock and poultry including zoonoses like Bird Flu, Rabies, Tuberculosis, Brucellosis etc. New courses on 'Herd Health management', 'Ecology', 'Forensic Medicine', 'Emergency Medicine', 'Diagnostic Imaging Techniques,' 'Survey and Surveillance', 'Diseases of Zoo, Wild and Laboratory Animals' etc. have been framed and contents of other courses were heavily revised to include the latest developments. To encourage clinical practice in the veterinary clinics, courses of Clinical Practice each at MVSc and PhD level have been made mandatory. To focus on learning of research methodology, scientific thinking, planning and experimentation, a course for special problems has been introduced in all the subjects.

Teaching Veterinary Clinical Service Complex, along with clinical departments and diagnostic laboratories, provides yeoman's service to stake holders in the field of animal health. The up-gradation of the clinical services will go a long way in meeting the expectations and demands for advanced diagnosis, therapeutics and prophylaxis. The state of infra-structure, manpower (both technical and support staff) and contingencies attached to clinical service units in veterinary colleges in India, requires immediate attention of policy planners to support and supplement in terms of liberal financial grants.

The implementation of the new and restructured post graduate course curricula is expected to build knowledge and skill portfolio of the students so as to enhance their employability and marketability as multi-service providers with practical skills and comprehensive knowledge of the entire subject area after masters. The doctorates should, in turn, prove as specialists, in the field of their specialization. The valuable inputs received from the stakeholders viz. eminent academicians, scientists, extension workers, pharmaceutical/ dairy industry, leading veterinary practitioners, state animal husbandry department etc. have immensely helped in preparation of this document.

ORGANIZATION OF COURSE CONTENTS & CREDIT REQUIREMENTS

Code Numbers

- All courses are divided into two series: 600-series courses pertain to Master's level, and 700-series to Doctoral level. A Ph. D. student must take a minimum of two 700 series courses, but may also take 600-series courses if not studied during Master's programme.
- Credit seminar for Master's level is designated by code no. 691, and the two seminars for Doctoral level are coded as 791 and 792, respectively.
- Similarly, 699 and 799 codes have been given for Master's research and Doctoral research, respectively.

Course Contents

The contents of each course have been organized into:

- Objective – to elucidate the basic purpose.
- Theory units – to facilitate uniform coverage of syllabus for paper setting.
- Suggested Readings – to recommend some standard books as reference material. This does not unequivocally exclude other such reference material that may be recommended according to the advancements and local requirements.
- A list of journals pertaining to the discipline is provided at the end which may be useful as study material for 600-series courses as well as research topics.
- E-Resources - for quick update on specific topics/events pertaining to the subject.
- Broad research topics provided at the end would facilitate the advisors for appropriate research directions to the PG students.

Minimum Credit Requirements

Subject	Master's programme	Doctoral programme
Major	28	17
Minor + Supporting (minimum 6 for minor & 3 for supporting)	11	11
Seminar	01	02
Research	20	45
Total Credits	60	75
Compulsory Non Credit Courses	See relevant section	

Major subject: The subject (department) in which the students takes admission

Minor subject: The subject closely related to students major subject. A suggested list of specified minor subjects is given in Table 1.

Supporting subject: The subject not related to the major subject. It could be any subject considered relevant for student's research work.

Non-Credit Compulsory Courses: Please see the relevant section for details. Six courses (PGS 501-PGS 506) are of general nature and are compulsory for Master's programme. Ph. D. students may be exempted from these courses if already studied during Master's degree.

Table 1. Suggested list of specified minor subjects (departments)

Major Subject	Minor Subjects*
Animal Reproduction Gynecology and Obstetrics	Veterinary Surgery & Radiology, Veterinary Physiology, Veterinary Biochemistry, Veterinary Clinical Medicine, Ethics & Jurisprudence, Animal Biotechnology, Veterinary Pharmacology & Toxicology, Animal Nutrition
Veterinary Clinical Medicine, Ethics & Jurisprudence	Veterinary Surgery and Radiology, Veterinary Epidemiology and Preventive Medicine, Veterinary Pharmacology & Toxicology, Veterinary Physiology, Veterinary Biochemistry, Animal Reproduction Gynaecology and Obstetrics
Veterinary Epidemiology and Preventive Medicine	Veterinary Microbiology, Animal Biotechnology, Veterinary Clinical Medicine, Ethics & Jurisprudence, Veterinary Public Health, Veterinary Pathology
Veterinary Public Health	Veterinary Epidemiology and Preventive Medicine, Veterinary Microbiology, Veterinary Pathology, Animal Biotechnology, Veterinary Pharmacology & Toxicology, Veterinary Parasitology, Livestock Product Technology
Veterinary Surgery and Radiology	Veterinary Anatomy and Histology, Veterinary Clinical Medicine, Ethics & Jurisprudence, Veterinary Pharmacology & Toxicology, Veterinary Physiology, Veterinary Pathology, Animal Reproduction Gynaecology and Obstetrics

*The choice of minor courses other than those listed above, may be allowed on the recommendations of advisory committee, if essentially required as per the research problem, with the concurrence of Head of the department and Dean post graduate studies.

ANIMAL REPRODUCTION, GYNAECOLOGY & OBSTETRICS
Course Structure – at a Glance

CODE	COURSE TITLE	CREDITS
VOG 601	GENERAL GYNAECOLOGY	3+1
VOG 602	FEMALE INFERTILITY	3+1
VOG 603	VETERINARY OBSTETRICS	2+2
VOG 604	ANDROLOGY & MALE INFERTILITY	3+1
VOG 605	SEMEN PRESERVATION AND ARTIFICIAL INSEMINATION	2+1
VOG 606	REPRODUCTIVE BIOTECHNOLOGY	2+1
VOG 607	CLINICAL PRACTICE I	0+3
VOG 608	CLINICAL PRACTICE II	0+3
VOG 691	MASTER'S SEMINAR	1+0
VOG 699	MASTER'S RESEARCH	20
VOG 701	ADVANCES IN GYNAECOLOGY	2+1
VOG 702	ADVANCES IN OBSTETRICS	2+1
VOG 703	ADVANCES IN ANDROLOGY	2+1
VOG 704	ADVANCES IN REPRODUCTIVE BIOTECHNOLOGY	1+1
VOG 705	ADVANCES IN SEMEN PRESERVATION	1+1
VOG 706	CLINICAL PRACTICE I	0+3
VOG 707	CLINICAL PRACTICE II	0+3
VOG 790	SPECIAL PROBLEM	0+2
VOG 791	DOCTORAL SEMINAR I	1+0
VOG 792	DOCTORAL SEMINAR II	1+0
VOG 799	DOCTORAL RESEARCH	45

ANIMAL REPRODUCTION, GYNAECOLOGY & OBSTETRICS

Course Contents

VOG 601 GENERAL GYNAECOLOGY 3+1

Objective

To understand hormonal regulation of female reproduction and therapeutic management of infertility.

Theory

UNIT I

Puberty and sexual maturity, role of hypothalamic-pituitary-gonadal axis in attainment of puberty and sexual maturity, onset of postpartum ovarian activity, Endocrine regulation of estrous cycle.

UNIT II

Folliculogenesis, oogenesis and ovulation and associated endocrine pattern, manipulation of follicular waves, synchronization of estrus and ovulation and induction of ovarian activity.

UNIT III

Gamete transport, fertilization, implantation and maternal recognition of pregnancy.

UNIT IV

Embryonic and fetal development, placentation, fetal circulation and gestation, position of fetus in the uterus, age characteristics of fetus.

UNIT V

Pregnancy diagnosis: clinical, ultrasonographic, endocrinological and other diagnostic laboratory tests. Pseudo-pregnancy and its treatment.

UNIT VI

Factors affecting reproduction – seasonality, nutrition, stress, environment, management, suckling and diseases.

UNIT VII

Lactation and artificial induction of lactation.

Practical

Clinical examination of female genitalia. Biometry of female genital organs. Rectal and vaginal examination to diagnose cyclic phases of estrous cycle. Fern pattern of cervical mucus and exfoliated vaginal cytology. Pregnancy diagnosis in large and small animals by various methods. Estimation of age of the fetus. Use of ultrasound / RIA / ELISA in gynaecology. Synchronization of estrus and ovulation in farm animals.

Suggested Readings

- Cupps PT. 1991. *Reproduction in Domestic Animals*. Academic Press.
- Hafez ESE. 2000. *Reproduction in Farm Animals*. Lippincott, Williams & Wilkins.
- Pubedam MH & Pubedam MH. 2003. *McDonald's Veterinary Endocrinology and Reproduction*. Iowa State Press.
- Noakes DE, Parkinson DJ & England GCW. 2001. *Arthurs Veterinary Reproduction and Obstetrics*. Saunders Harcourt India.
- Roberts SJ. 1976. *Veterinary Obstetrics and Genital Diseases*. Scientific Book Agency.

VOG 602

FEMALE INFERTILITY

3+1

Objective

To impart knowledge and training in diagnosis and treatment of infertility in female domestic animals.

Theory

UNIT I

Introduction to infertility, classification, economic impact. Anatomical causes of infertility, congenital and hereditary causes and acquired defects.

UNIT II

Nutritional causes of infertility. Importance of body condition score.

UNIT III

Managemental and environmental causes of infertility. Out of season breeding.

UNIT IV

Infectious causes of female infertility, specific and non-specific infections.

UNIT V

Ovarian dysfunction: anoestrus, cystic ovarian degeneration, anovulation, delayed ovulation and luteal insufficiency.

UNIT VI

Repeat breeding: its causes, diagnosis and treatment.

UNIT VII

Early embryonic death (EED): causes, diagnosis and therapeutic management.

UNIT VIII

Abortion: infectious and non-infectious causes, diagnosis and prevention of abortion.

UNIT IX

Interactions in Immunological mechanisms and infertility.

Practical

Record keeping, herd fertility assessment and management, diagnosis and treatment of infertility in female animals, use of uterine swabs for bacterial and fungal culture, histo-pathological evaluation of uterine biopsy, exfoliated vaginal cytology and hormone assay. Use of ultrasonography in diagnosis of infertility. Immuno diagnostic techniques.

Suggested Readings

- Laing JA. 1979. *Fertility and Infertility in Domestic Animals*. English Language Book Soc. & Bailliere Tindall.
- Morrow DA. 1986. *Current Therapy in Theriogenology*. WB Saunders.
- Noakes DE, Parkinson DJ & England GCW. 2001. *Arthurs Veterinary Reproduction and Obstetrics*. Saunders Harcourt India.
- Roberts SJ. 1976. *Veterinary Obstetrics and Genital Diseases*. Scientific Book Agency.

VOG 603

VETERINARY OBSTETRICS

2+2

Objective

To impart knowledge and training on problems of pregnancy and parturition and their management in domestic animals.

Theory

UNIT I

Parturition: stages of parturition, mechanism of initiation of parturition, hormonal profiles associated with parturition.

UNIT II

Principles of handling of dystocia, obstetrical procedures: mutations, fetotomy, caesarean section. Obstetrical anesthesia and analgesia, epidural anesthesia.

UNIT III

Fetal and maternal dystocia: causes, diagnosis and management.

UNIT IV

Uterine torsion: causes, diagnosis and its correction.

UNIT V

Diseases and accidents during gestation and around parturition.

UNIT VI

Etiology, diagnosis and treatment of ante-partum and post-partum uterine and vaginal prolapse.

UNIT VII

Induction of parturition and elective termination of pregnancy.

UNIT VIII

Involution of uterus following normal and abnormal parturition.

UNIT IX

Care of dam and the newborn.

Practical

Pelvimetry of different species of farm animals. Diagnosis and correction of abnormal fetal presentation, position and posture in phantom box. Epidural anesthesia, ovariohysterectomy and caesarean operation. Fetotomy exercises. Detorsion of uterus. Management of prolapse. Handling of clinical cases of dystocia.

Suggested Readings

- Arthur GH, Pearson H & Noakes DE. 2000. *Veterinary Reproduction and Obstetrics*. English Language Book Society & Bailliere Tindall.
- Roberts SJ. 1976. *Veterinary Obstetrics and Genital Diseases*. Scientific Book Agency.
- Sloss V & Dufty JH. 1980. *Handbook of Bovine Obstetrics*. Williams & Wilkins.

VOG 604

ANDROLOGY AND MALE INFERTILITY

3+1

Objective

To impart knowledge and training about male reproduction and treatment of male infertility in domestic animals.

Theory

UNIT I

Structure and function of reproductive tract of male.

UNIT II

Sexual behavior and examination of bulls for breeding soundness.

UNIT III

Spermatogenesis, (formation, migration, maturation and ejaculation of semen), fine structure of spermatozoa, semen and its composition.

UNIT IV

Diseases transmitted through semen.

UNIT V

Factors affecting semen quality, semen culture, tests for assessment of sperm motility, sperm survival and fertilizing capacity of spermatozoa.

UNIT VI

Causes of infertility: hereditary, congenital, infectious, nutritional and hormonal. Pathological and functional disturbances of epididymis, vas deferens and accessory sex glands.

UNIT VII

Impotentia cocundi and impotentia generandi. Testicular hypoplasia and degeneration: causes and affect on semen and fertility.

UNIT VIII

Coital injuries and vices of male animals.

Practical

General and rectal examination for biometrics of male genitalia and accessory sex glands. Breeding soundness evaluation of male animals. Semen evaluation for sperm abnormalities, fertility and determination of other biochemical constituents of seminal plasma. Computer assisted semen analysis (CASA), Microbiological load of semen. Examination, diagnosis and treatment of infertile male animals.

Suggested Readings

Hafez ESE. 2000. *Reproduction in Farm Animals*. Lippincott, Williams & Wilkins.

Mann T & Lutwak-Mann C. 1981. *Male Reproductive Function and Semen*. Springer-Verlag.

Morrow DA. 1986. *Current Therapy in Theriogenology*. WB Saunders.

Roberts SJ. 1976. *Veterinary Obstetrics and Genital Diseases*. Scientific Book Agency

Salisbury GW, VanDemark NL & Lodge JR. 1978. *Physiology of Reproduction and Artificial Insemination of Cattle*. WH Freeman & Co.

VOG 605

SEMEN PRESERVATION AND ARTIFICIAL INSEMINATION

2+1

Objective

To impart knowledge and training about collection, evaluation and preservation of semen and artificial insemination (AI) in domestic animals.

Theory

UNIT I

History of artificial insemination.

UNIT II

Methods of semen collection.

UNIT III

Semen evaluation: macroscopic, microscopic, biochemical and microbiological tests, Computer assisted semen analysis (CASA).

UNIT IV

Semen preservation. Extenders for preservation of semen at different temperatures. Semen additives for enhancement of motility and fertilizing capacity of spermatozoa.

UNIT V

Cryopreservation of semen. Effects of cryopreservation on spermatozoa, semen quality and fertility.

UNIT VI

Thawing protocols of frozen semen. Factors affecting post-thaw semen quality.

UNIT VII

Ideal protocol for AI in different species of animals. Factors affecting success of AI.

Practical

Computer assisted semen analysis (CASA), Collection and evaluation of semen. Preparation of extenders. Preservation of semen: room temperature, refrigeration and cryopreservation. Handling and evaluation of processed semen. Practice of AI techniques.

Suggested Readings

Hafez ESE. 2000. *Reproduction in Farm Animals*. Lippincott, Williams & Wilkins.

Perry J. 1970. *Artificial Insemination of Farm Animals*. Oxford & IBH.

Salisbury GW, VanDemark NL & Lodge JR. 1978. *Physiology of Reproduction and Artificial Insemination of Cattle*. WH Freeman.

VOG 606

REPRODUCTIVE BIOTECHNOLOGY

2+1

Objective

To impart knowledge and training on biotechniques in animal reproduction.

Theory

UNIT I

Embryo transfer technology: selection of donors and recipients.

UNIT II

Synchronization, super-ovulation, surgical and non-surgical collection of embryos and evaluation of embryos.

UNIT III

Cryopreservation of embryos, transfer of embryos to donors.

UNIT IV

In vitro fertilization, *in vitro* maturation, micromanipulation of embryos.

UNIT V

Sexing of sperm and embryos.

UNIT VI

Transgenic animals. Chimeras.

UNIT VII

Stem cell biotechnology

UNIT VIII

Immuno-neutralization of hormones. Immunomodulation of fertility.

Practical

Synchronization of estrus in donors and recipients, superovulation, surgical and non-surgical collection and transfer of embryos. Collection of oocytes from slaughter house genitalia. *In vitro* fertilization, *in vitro* maturation and cryopreservation of embryos. Sexing of embryos.

Suggested Readings

Gordon I. 2004. *Reproductive Technologies in Farm Animals*. CABI.

Hafez ESE. 2000. *Reproduction in Farm Animals*. Lippincott, Williams & Wilkins.

VOG 607 CLINICAL PRACTICE - I 0+3

Objective

Hands-on training on diagnosis and treatment of reproductive disorders in animals in TVCSC.

Practical

Clinical examination of animals affected with reproductive disorders, use of diagnostic techniques for diagnosis and institution of required therapy. Maintenance of case records. Presentation on selected /assigned cases.

Suggested Readings

Morrow DA. 1986. *Current Therapy in Theriogenology*. WB Saunders.

VOG 608 CLINICAL PRACTICE – II 0+3

Objective

Hands-on training on diagnosis and treatment of reproductive disorders in animals in TVCSC.

Practical

Clinical examination of animals affected with reproductive disorders, use of diagnostic techniques for diagnosis and institution of required therapy. Maintenance of case records. Presentation on selected /assigned cases.

Suggested Readings

Morrow DA. 1986. *Current Therapy in Theriogenology*. WB Saunders.

VOG 701 ADVANCES IN GYNAECOLOGY 2+1

Objective

To learn about advances in endocrine, ovarian and uterine functions and effect of nutrition, season and immunological factors on female fertility.

Theory

UNIT I

Neuro-endocrine control of reproduction, follicular development, ovulation fertilization and implantation. Embryonic and fetal development.

UNIT II

Maternal recognition of pregnancy, Advances in early diagnosis of pregnancy.

UNIT III

Embryonic losses, abortion and their prevention.

UNIT IV

Seasonal breeders, synchronization and induction of estrus and ovulation in seasonal breeders, Assisted reproductive technology (ART) to increase reproductive efficiency in farm animals..

UNIT V

Effect of stress, nutrition and immunological factors on fertility.

UNIT VI

Onset of postpartum ovarian activity and factors affecting it.

UNIT VI

Diagnostic & therapeutic approaches in infertility: Principles of hormone therapy in reproductive disorders, Laparoscopy, ultrasonographic diagnosis of ovarian/uterine dysfunction, RIA/ELISA techniques for hormones assay in reproductive disorders, vaginal and uterine cytology

Practical

Clinical examination of female animals. Use of ultrasonography in ovarian function (follicular image pattern, follicular dynamics) and in early pregnancy diagnosis and infertility. Utility of uterine culture, uterine cytology and uterine biopsy (histopathological examination) in infertility investigation. Laparoscopy in diagnosis of ovarian and uterine dysfunction. ELISA/RIA of hormones and interpretation of results. Use of Assisted reproductive technology (ART) to enhance reproductive efficiency in farm animals.

Suggested Readings

Selected articles from journals.

VOG 702**ADVANCES IN OBSTETRICS****2+1****Objective**

To learn current developments in diagnosis and management of dystocia, accidents of gestation and peri-parturient disorders in domestic animals.

TheoryUNIT I

Conceptus and its development. Factors influencing gestation period and birth weight.

UNIT II

Anomalies of conceptus, teratogens and effect of stress on conceptus development.

UNIT III

Mechanism of initiation of parturition. Use of tocolytic drugs in management of uterine inertia.

UNIT IV

Induction of parturition and termination of abnormal pregnancies. Obstetrical analgesia and anaesthesia.

UNIT V

Pre-treatment evaluation of the dam suffering from dystocia. Management of maternal and fetal dystocia, hydrallantois, hydramnion, fetal mummification, fetal maceration, uterine inertia and uterine torsion.

UNIT VI

Fetotomy, caesarean section and ovario-hysterectomy.

UNIT VII

Neo-natal physiology and post-natal adaptations.

UNIT VIII

Involution of uterus, post-partum ovarian dysfunction and their manipulation.

Practical

Obstetrical operations in fetal dystocia: Mutations, fetotomy, caesarean section, ovario-hysterectomy; induction of parturition, use of tocolytic drugs in dystocia, obstetrical analgesia and anaesthesia.

Suggested Readings

Selected articles from journals.

VOG 703

ADVANCES IN ANDROLOGY

2+1

Objective

To learn advances in male reproduction and treatment of male infertility in domestic animals

Theory

UNIT I

Spermatogenesis, spermatogenic waves, sperm passage in male genitalia, biochemical milieu of male genitalia. Correlation between motility and fertilizing capacity of spermatozoa.

UNIT II

Separation of motile and immotile spermatozoa. Sexing and separation of male and female determining spermatozoa.

UNIT III

Sperm plasma membrane and its permeability and binding properties: acrosome and lysosomal enzymes, sperm nucleus and nuclear proteins. Mitochondria and their role in sperm metabolism. Flagellum and the mechanochemical basis of motility and cyclic nucleotides.

UNIT IV

Biochemistry of seminal plasma and accessory sex gland secretions. Electrolytes, proteins, enzymes and amino acids in seminal plasma. Fructose and other sugars, lipids, cholesterol, steroid hormones and prostaglandins in seminal plasma.

UNIT V

Fructolysis index. Aerobic and anaerobic metabolism of spermatozoa.

UNIT VI

Biochemical markers of fertility in males, sperm chromatin structure assay, Anti-sperm antibodies.

Practical

Breeding soundness evaluation of bulls, biochemical tests of semen for evaluation of fertility, semen culture for diagnosis of venereal diseases, diagnosis and treatment of genital pathological condition. Computer assisted semen analysis (CASA), Semen evaluation for assessment of fertilizing capacity of spermatozoa: cervical mucus penetration test, sperm capacitation test, hypo osmotic swelling test and zona free hamster egg penetration test. Anti-sperm antibody assay.

Suggested Readings

Selected articles from journals.

VOG 704

ADVANCES IN REPRODUCTIVE BIOTECHNOLOGY 1+1

Objective

To learn advances in recent developments in biotechnology in reproduction for the production of desired elite animals.

Theory

UNIT I

Embryo transfer technology and its application in farm animals.

UNIT II

Selection and management of donor and recipient animals. Superovulation, surgical and non-surgical collection, evaluation of embryos and transfer of embryos.

UNIT III

In vitro fertilization and maturation of oocytes.

UNIT IV

Micromanipulation, sexing and cryopreservation of embryos.

UNIT V

Sexing of sperm and embryos.

UNIT VI

Transgenic animals. Chimeras.

UNIT VII

Stem cell biotechnology

UNIT VIII

Immuno-neutralization of hormones. Immunomodulation of fertility.

Practical

Evaluation of superovulatory hormonal regimens in donors and synchronization of estrus in recipients. Surgical and non-surgical collection and transfer of embryos. Collection of oocytes from slaughter house genitalia. *In vitro* fertilization, *in vitro* maturation and cryopreservation of embryos. Sexing of embryos.

Suggested Readings

Selected articles from journals.

VOG 705

ADVANCES IN SEMEN PRESERVATION

1+1

Objective

To learn advances in processing and cryopreservation of semen and insemination techniques to obtain high fertility.

Theory

UNIT I

Transmission of venereal diseases through semen and their prevention.

UNIT II

Factors affecting motility and fertilizing capacity of spermatozoa. Semen collection, extension and cryopreservation of semen, damages to spermatozoa caused by cryopreservation.

UNIT III

Use of semen additives for promotion of sperm motility and fertilizing capacity.

UNIT IV

Thawing protocols for frozen semen. Post-thaw evaluation of motility and fertilizing capacity of spermatozoa.

Practical

Collection of preputial washings and semen for bacterial load and venereal pathogens. Preparation of semen extenders with different additives. Use of different freezing protocols for preservation of semen. Evaluation of fertility with frozen semen. Enzymatic changes in semen following cryopreservation.

Suggested Readings

Selected articles from journals.

- VOG 706** **CLINICAL PRACTICE - I** **0+3**
- Objective**
Hands-on training on diagnosis and treatment of reproductive disorders in animals.
- Practical**
Clinical examination of animals affected with reproductive disorders, use of diagnostic techniques for diagnosis and institution of required therapy, maintenance of case records, presentation on selected/ assigned cases
- Suggested Readings**
Selected articles from journals.
- VOG 707** **CLINICAL PRACTICE - II** **0+3**
- Objective**
Hands-on training on diagnosis and treatment of reproductive disorders in animals
- Practical**
Clinical examination of animals affected with reproductive disorders, use of diagnostic techniques for diagnosis and institution of required therapy.
- Suggested Readings**
Selected articles from journals.
- VOG 790** **SPECIAL PROBLEM** **0+2**
- Objective**
To expose students to research techniques related to sub discipline of the subject and submission of written project with references.
- Practical**
Student will carry out research on allotted project and submit the project along with research papers for publication in scientific journals.

ANIMAL REPRODUCTION, GYNAECOLOGY & OBSTETRICS

List of Journals

- * American Journal of Obstetrics and Gynaecology
- * Animal Reproduction
- * Animal Reproduction Science
- * Animal Science Journal
- * Bibliography of Reproduction
- * Biology of Reproduction
- * Equine practice
- * Equine Veterinary Journal
- * Fertility and Sterility
- * Indian Journal of Animal Reproduction
- * Indian Journal of Animal Sciences
- * Indian Journal of Experimental Biology
- * Indian Veterinary Journal
- * Journal of American Veterinary Medical Association
- * Journal of Animal Science
- * Journal of Dairy Science
- * Journal of Endocrinology
- * Journal of Reproduction and Development
- * Journal of Reproduction and fertility
- * Reproduction in Domestic Animals
- * Research in Veterinary Science
- * Theriogenology
- * Veterinary Record

e-Resources

- * www.anirgyep.elsevier.com (Animal Reproduction Science)
- * www.blackwellpublishing.com (International Journal of Andrology)
- * www.bioreprod.org (Biology of reproduction)
- * www.domesticanimalendo.com (Domestic Animal Andocrinology)
- * www.reproduction-online.org (Journal of Andrology)
- * www.reproduction-online.org (Reproduction)
- * www.interscience.wiley.com (Reproduction in domestic animals)
- * www.theriojournal.com (Theriogenology)
- * www.buffaloresearch.com (Buffalo Journal)
- * www.eje-online.org (European journal of Endocrinology)
- * www.sciencedirect.com (The Veterinary Journal)
- * www.blackwellpublishing.com (Asian journal of Andrology)
- * editorijar@yahoo.co.in (Indian Journal of Animal Reproduction)

Suggested Broad Topics for Master's and Doctoral Research

- * Anoestrus: Endocrinological investigations
- * Reproductive biotechnology
- * Investigations into andrological problems
- * Management of obstetrical problems

VETERINARY CLINICAL MEDICINE, ETHICS AND JURISPRUDENCE

Course Structure – at a Glance

CODE	COURSE TITLE	CREDITS
VCM 601	RUMINANT CLINICAL MEDICINE -I	2+0
VCM 602	RUMINANT CLINICAL MEDICINE -II	2+0
VCM 603	EQUINE CLINICAL MEDICINE	2+0
VCM 604	CANINE AND FELINE CLINICAL MEDICINE	2+0
VCM 605	SWINE CLINICAL MEDICINE	1+0
VCM 606	AVIAN MEDICINE	1+0
VCM 607	ZOO, WILD & LABORATORY ANIMAL MEDICINE	2+0
VCM 608	CLINICAL DISEASES OF ANIMAL SPECIES*OF REGIONAL IMPORTANCE	1+0
VCM 609	PRODUCTION DISEASES	2+0
VCM 610	DISEASES OF ANIMALS CAUSED BY TOXICANTS	1+0
VCM 611	VETERINARY FORENSIC MEDICINE	1+1
VCM 612	CLINICAL DIAGNOSTIC TECHNIQUES	0+2
VCM 613	VETERINARY EMERGENCY MEDICINE	0+2
VCM 614	CLINICAL PRACTICE I	0+3
VCM 615	CLINICAL PRACTICE II	0+3
VCM 691	MASTER'S SEMINAR	1+0
VCM 699	MASTER'S RESEARCH	20
VCM 701	ADVANCES IN GASTROENTROLOGY	2+0
VCM 702	ADVANCES IN CARDIOPULMONARY MEDICINE	2+0
VCM 703	ADVANCES IN NEUROLOGICAL AND UROLOGICAL DISORDERS	2+0
VCM 704	ADVANCES IN ENDOCRINE AND DERMATOLOGICAL DISORDERS	2+0
VCM 705	ADVANCES IN PRODUCTION DISEASES	2+0
VCM 706	ADVANCES IN PAEDIATRICS AND GERIATRICS	1+0
VCM 707	ADVANCES IN VETERINARY DIAGNOSTICS	1+2
VCM 708	ADVANCES IN VETERINARY THERAPEUTICS	1+2
VCM 709	ADVANCED CLINICAL PRACTICE I	0+2
VCM 710	ADVANCED CLINICAL PRACTICE II	0+2
VCM 711	ADVANCED CLINICAL PRACTICE III	0+2
VCM 790	SPECIAL PROBLEM	0+2
VCM 791	DOCTORAL SEMINAR I	1+0
VCM 792	DOCTORAL SEMINAR II	1+0
VCM 799	DOCTORAL RESEARCH	45

*Domestic animals of regional importance e.g. Camel in Haryana, Yak in Eastern India, Elephant in South India

VETERINARY CLINICAL MEDICINE, ETHICS AND JURISPRUDENCE

Course Contents

- VCM 601 RUMINANT CLINICAL MEDICINE - I 2+0**
- Objective**
Study of diseases of various body systems of bovine, sheep and goats.
- Theory**
- UNIT I
General systemic states.
- UNIT II
Diseases of alimentary system, liver and urinary system.
- UNIT III
Diseases of respiratory and nervous system.
- Suggested Readings**
Chakrabarti A. 1998. *Text Book of Clinical Veterinary Medicine*. Kalyani.
Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2000. *Veterinary Medicine*. WB Saunders.
- VCM 602 RUMINANT CLINICAL MEDICINE - II 2+0**
- Objective**
Study of diseases of various body systems of bovine, sheep and goats.
- Theory**
- UNIT I
Diseases of cardiovascular system, blood and blood forming organs.
- UNIT II
Diseases of musculoskeletal system and skin
- UNIT III
Diseases of eyes, ears, nose
- Suggested Readings**
Chakrabarti A. 1998. *Text Book of Clinical Veterinary Medicine*. Kalyani.
Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2000. *Veterinary Medicine*. WB Saunders.
- VCM 603 EQUINE CLINICAL MEDICINE 2+0**
- Objective**
Study of diseases of various body systems of horses, donkeys and mules.
- Theory**
- UNIT I
General systemic states and diseases of alimentary system and liver.
- UNIT II
Diseases of respiratory, cardiovascular system, blood and blood forming organs
- UNIT III
Diseases of urinary and nervous systems
- UNIT IV
Diseases of musculoskeletal system and skin.
- Suggested Books**
Wintzer H. 1986. *Equine diseases*. Verlaug Paul Parey.

Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2000. *Veterinary Medicine*. WB Saunders.

VCM 604 **CANINE AND FELINE CLINICAL MEDICINE** **2+0**

Objective

Study of diseases of various body systems of dogs and cats.

Theory

UNIT I

Specific needs of canine and felines, Pet psychology; pet behavior and adaptation needs; General systemic states. and

UNIT II

Diseases of digestive system, liver and pancreas, cardiovascular system, blood and blood-forming organs,.

UNIT III

Diseases of respiratory system, urogenital and nervous systems.

UNIT IV

Diseases of musculoskeletal system and skin.

UNIT V

Diseases of endocrine system, diseases of new borne animals.

Suggested Books

Dunn JK. 1999. *Text Book of Small Animal Medicine*. WB Saunders.

Ettinger SJ & Feldman EC. 2000. *Text Book of Veterinary Internal Medicine*. Vols. I, II. Saunders.

Gorman NT. 1998. *Canine Medicine and Therapeutics*. Blackwell.

VCM 605 **SWINE CLINICAL MEDICINE** **1+0**

Objective

Study of diseases of various body systems in swine.

Theory

UNIT I

General systemic states and diseases of digestive system

UNIT II

Diseases of cardiovascular and respiratory system.

UNIT III

Diseases of urogenital and nervous system and skin.

UNIT IV

Diseases of endocrine system and of newborn animals.

Suggested Readings

Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2000. *Veterinary Medicine*. WB Saunders.

Straw BF. (Eds.). 1999. *Diseases of Swine*. 8th Ed. Iowa State Univ. Press.

VCM 606 **AVIAN MEDICINE** **1+0**

Objective

Study of non-infectious diseases of avian species.

Theory

UNIT I

Diseases due to deficiency of vitamins (vitamins A, B complex, C, D, K); minerals (calcium, phosphorus, manganese, zinc) and sodium chloride.

UNIT II

Miscellaneous diseases/conditions/ vices (cage layer fatigue, blue comb disease, beak necrosis, round heart disease, kerato- conjunctivitis, ascites, urolithiasis, fatty liver, kidney hemorrhagic syndrome, heat stroke, cannibalism, vent picking).

Suggested Readings

Gordon RF & Jordan ETW. 1982. *Poultry Diseases*. ELBS.

Leeson S, Diaz G & Summers JD. 2001. *Poultry Metabolic Disorders and Mycotoxins*. IBDC Publ.

VCM 607 ZOO, WILD AND LABORATORY ANIMAL MEDICINE 2+0

Objective

Study of diseases and health management of zoo, wild and laboratory animals

Theory

UNIT I

Etiology, symptoms, diagnosis and management of various diseases of zoo, wild and laboratory animals.

Diseases of urinary system.

UNIT II

Diseases, restraint, feeding and health management of exotic animals kept as pets

Suggested Readings

Baker HJ. 1978. *Pathology of Laboratory Animals*. Springer, New York.

Fowler ME. 1986. *Zoo and Wild Animal Medicine*. 2nd Ed. W. B. Saunders.

Fox JG, Anderson LC, Loew FM & Quimby FW. (Eds.). 2004. *Laboratory Animal Medicine*. 2nd Ed.

Hafez ESE. (Ed.). *Reproduction and Breeding Techniques for Laboratory Animals*. Lea & Fabiger.

Hrapkiewicz K. 2007. *Clinical Laboratory Animal Medicine- An Introduction*. 3rd Ed. Blackwell Publ.

Joshi BP. 1991. *Wild Animal Medicine*. Kalyani.

Sirois M. 2005. *Laboratory Animal Medicine: Principles and Procedures*. 2nd Ed. Elsevier.

VCM 608 CLINICAL DISEASES OF ANIMAL SPECIES 1+0 OF REGIONAL IMPORTANCE

Objective

Study of non-infectious diseases of important regional animal species.

Theory

The animal species, to be studied/ taught is to be decided by the individual institution. For Veterinary College at CCS HAU Hisar, camel diseases will be covered.

UNIT I

Non-infectious/miscellaneous diseases of camels (satyriasis, kumri, allotriophagia, diseases of various body systems, nutritional deficiency disorders).

UNIT II

Diagnostic tests related to various non-infectious diseases of camels.

Suggested Readings

Gahlot TK. 2000. *Selected Topics on Camelids*. The Camelid Publishing House, Bikaner.

Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2000. *Veterinary Medicine*. WB Saunders.

VCM 609 PRODUCTION DISEASES 2+0

Objective

Study of metabolic, production and deficiency diseases of domestic animals.

Theory

UNIT I

General aspects, production diseases (parturient paresis, downer cow syndrome, ketosis, post-parturient haemoglobinuria, hypomagnesemic tetany, pregnancy toxemia).

UNIT II

Lactation tetany of mares, eclampsia of bitches, osteodystrophia fibrosa, azoturia of equines, rheumatism-like syndrome in buffaloes, hypothyroidism, diabetes mellitus and diabetes insipidus in dogs.

UNIT III

Deficiency diseases (calcium, phosphorus, vitamin-D₃, vit-A, vit B-complex, vit-C and vit-K).

UNIT IV

Deficiency diseases (iron, copper, cobalt, zinc, manganese, iodine, vitamin E and selenium).

Suggested Readings

Dunn JK. 1999. *Text Book of Small Animal Medicine*. WB Saunders.

Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2000. *Veterinary Medicine*. WB Saunders

VCM 610 DISEASES OF ANIMALS CAUSED BY TOXICANTS 1+0

Objective

Study of diseases caused by various toxicants in domestic animals.

Theory

UNIT I

Diseases caused by physical agents and poisoning of organic and inorganic compounds.

UNIT II

Diseases caused by farm chemicals and phytotoxins

UNIT III

Diseases caused by mycotoxins and zootoxins

UNIT IV

Diseases caused by poisonous plants, snake and insect bites.

Suggested Readings

Kahn CM. (Ed.). 2005. *The Merck Veterinary Manual*. Merck & Co.

Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2000. *Veterinary Medicine*. WB Saunders.

UNIT III

Monitoring critical ill patient, application of emergency care procedures for resuscitation of critically ill patient

Suggested Reading

Kirk RW.1995. *Handbook of Veterinary Procedures and Emergency Treatment*. 6th Ed. WB Saunders.

Sattler FP & Knowles W. 2001. *Veterinary Critical Care*. Lea & Febiger.

VCM 614 CLINICAL PRACTICE - I 0+3

Objective

Application of the theoretical concepts in practice

Practical

Diagnostic and therapeutic protocol application, specimen collection, examination and management of sick farm and companion animals.

Note: This course shall be conducted in TVCSC (College Clinics), where students shall participate in diagnosis and treatment of diseased animals).

VCM 615 CLINICAL PRACTICE - II 0+3

Objective

Application of the theoretical concepts in practice

Practical

Diagnostic and therapeutic protocol application, specimen collection, examination and management of sick farm and companion animals.

Note: This course shall be conducted in TVCSC (College Clinics), where students shall participate in diagnosis and treatment of diseased animals).

VCM 701 ADVANCES IN GASTROENTEROLOGY 2+1

Objective

Study of contemporary advancements in gastro-enterology

Theory

UNIT I

Advances in diagnosis, therapy and control of diseases of gastrointestinal system and associated organs of farm animals.

UNIT II

Advances in diagnosis, therapy and control of diseases of gastrointestinal system and associated organs of companion animals.

Practical

Advanced clinical procedures for the diagnosis of diseases of gastrointestinal system and associated organs of farm and companion animals

Suggested Readings

Selected articles from journals.

VCM 702 ADVANCES IN CARDIOPULMONARY MEDICINE 2+0

Objective

Study of recent advances in the field of cardiopulmonary medicine

Theory

UNIT I

Advances in diagnosis and therapeutic management of diseases of circulatory system

UNIT II

Advances in diagnosis and therapeutic management of diseases of respiratory system

UNIT III

Advances in diagnosis and therapeutic management of diseases of blood and blood forming organs in animals

Suggested Readings

Selected articles from journals.

VCM 703 ADVANCES IN NEUROLOGICAL AND 2+0
UROLOGICAL DISORDERS

Objective

Study of recent advances in the field of neurological and urological disorders.

Theory

UNIT I

Advances in diagnosis, therapy and control of diseases of nervous system

UNIT II

Advances in diagnosis, therapy and control of diseases of urogenital system

UNIT III

Advances in diagnosis, therapy and control of diseases of locomotor system

Suggested Readings

Selected articles from journals.

VCM 704 ADVANCES IN ENDOCRINE AND 2+0
DERMATOLOGICAL DISORDERS

Objective

Study of recent advances in endocrine and dermatological disorders.

Theory

UNIT I

Advances in diagnosis, therapy and control of diseases of skin and integumentary system

UNIT II

Advances in diagnosis, therapy and control of diseases of endocrine system.

Suggested Readings

Selected articles from journals.

VCM 705 ADVANCES IN PRODUCTION DISEASES 2+0

Objective

Study of recent advances in production diseases.

Theory

UNIT I

Latest advances in diagnosis, therapy and prophylaxis of metabolic diseases of farm and companion animals.

UNIT II

Latest advances in diagnosis, therapy and prophylaxis of nutritional diseases of farm and companion animals.

UNIT III

Latest advances in diagnosis and treatment of various poisonings and toxicities

Suggested Readings

Selected articles from journals.

VCM 706 ADVANCES IN PAEDIATRICS AND GERIATRICS 1+0

Objective

Study of recent advances in paediatrics and geriatrics

Theory

UNIT I

Recent advances in diagnosis, therapy and control of diseases and management of emergencies of neonates

UNIT II

Recent advances in diagnosis, therapy and control of diseases and management of emergencies of geriatric animals

Suggested Readings

Selected articles from journals.

VCM 707 ADVANCES IN VETERINARY DIAGNOSTICS 1+2

Objective

Study of recent advances in diagnostics

Theory

UNIT I

Blood and serum biochemical and hematological analyses.

UNIT II

Imaging techniques for the diagnosis of animal diseases (x-ray, contrast radiography, CT, MRI, Scintigraphy, Echocardiogram etc).

UNIT III

Electrocardiography, ophthalmoscopy, ultrasonography, EEG, CVP, GFR assessment, pulse-oxymetry etc.

Practical

Assignments on advanced diagnostic techniques for various diseases of domestic animals. Use of above mentioned advanced diagnostic techniques where ever possible. Collection of CSF, Gastric / rumen /intestinal fluid, absorption and digestion tests, water withheld, low and high dose dexamithasone test, ACTH stimulation, Hormone prolile, enzyme profile.

Suggested Readings

Selected articles from journals.

VCM 708 ADVANCES IN VETERINARY THERAPEUTICS 1+2

Objective

Study of recent advances in Veterinary Therapeutics.

Theory

UNIT I

Fluid and electrolyte imbalance and therapy.

UNIT II

Antimicrobial, antineoplastic and hormonal therapy.

UNIT III

Blood transfusion and Emergency critical care, Peritoneal dialysis / hemodialysis, Gastric lavage, fluid therapy, parenteral total nutrition, nebulization, oxygen therapy, paracentesis, thoracentesis.

Practical

Assignments on advanced therapeutic approaches in various diseases of domestic animals.

Suggested Readings

Selected articles from journals.

VCM 709 ADVANCED CLINICAL PRACTICE - I 0+2

Objective

Application of the theoretical concepts in practice

Practical

Diagnostic and therapeutic protocol application, specimen collection, examination and management of sick farm and companion animals.

Note: This course shall be conducted in TVCSC where students shall participate in diagnosis and treatment of diseased animals).

VCM 710 ADVANCED CLINICAL PRACTICE - II 0+2

Objective

Application of the theoretical concepts in practice

Practical

Diagnostic and therapeutic protocol application, specimen collection, examination and management of sick farm and companion animals.

Note: This course shall be conducted in TVCSC (College Clinics), where students shall participate in diagnosis and treatment of diseased animals).

VCM 711 ADVANCED CLINICAL PRACTICE - III 0+2

Objective

Application of the theoretical concepts in practice.

Practical

Diagnostic and therapeutic protocol application, specimen collection, examination and management of sick farm and companion animals.

Note: This course shall be conducted in TVCSC (College Clinics), where students shall participate in diagnosis and treatment of diseased animals).

VCM 790 SPECIAL PROBLEM 0+2

Objective

A short-term project work on some aspect of etio-pathogenesis, diagnosis and therapy of diseases of domestic animals.

VETERINARY CLINICAL MEDICINE, ETHICS AND JURISPRUDENCE

List of Journals

- * Indian Journal of Poultry Science
- * Indian Journal of Veterinary Medicine
- * Indian Journal of Veterinary Research
- * Indian Veterinary Journal
- * Journal of American Veterinary Medical Association
- * Research in Veterinary Science
- * Veterinary Medicine
- * Veterinary Medicine and Small Animal Clinician
- * Veterinary Record
- * Veterinary Research Communications

e-Resources

- * www.uni-sz.bg/bjvm/bjvm.htm (Bulgarian Journal of Veterinary Medicine)
- * www.jarm.com (International Journal of Applied Research in Vety. Medicine)
- * www.ispub.com/ostia/index..php?xmlFilePath=journals/ijvm/front.xml (Internet Journal of Veterinary Medicine)
- * Isrvma.org/journal.htm. (Israel Journal of Veterinary Medicine)
- * www.medwellonline.net/java/fp.html (Journal of Animal & Veterinary Advances)
- * www.jstage.jst.go.jp/browse/jes/-char/en (Journal of Equine Science)
- * www.stage.jst.go.jp/browse/jpsa (Journal of Poultry science)
- * www.vesci.org (Journal of Veterinary Science)
- * www.sasas.co.za (South African Journal of Animal Science)
- * journals.tubitak.gov.tr/veterinary/index.php (Turkish Journal of Veterinary and Animal Sciences)
- * vetmed.vri.cz (Veterinary Medicine)

Suggested Broad Topics for Master's and Doctoral Research

- * Clinico-therapeutic aspects of bovine mastitis
- * Hepatic, respiratory and skin disorders in animals
- * Metabolic/nutritional deficiency disorders in animals with emphasis on hypophosphatemia, hypocupremia and hypomagnesemia

VETERINARY EPIDEMIOLOGY AND PREVENTIVE MEDICINE

Course Structure – at a Glance

CODE	COURSE TITLE	CREDITS
VEP 601	PRINCIPLES OF EPIDEMIOLOGY	2+0
VEP 602	APPLIED EPIDEMIOLOGY	1+1
VEP 603	LIVESTOCK AND POULTRY DISEASE INVESTIGATION	0+2
VEP 604	VETERINARY CLINICAL EPIDEMIOLOGY	1+1
VEP 605	BIOSECURITY PRACTICES IN DISEASE PREVENTION	1+1
VEP 606	INFECTIOUS DISEASES OF RUMINANTS -I	2+1
VEP 607	INFECTIOUS DISEASES OF RUMINANTS -II	2+1
VEP 608	INFECTIOUS DISEASES OF EQUINES	1+1
VEP 609	INFECTIOUS DISEASES OF CANINES AND FELINES	2+1
VEP 610	INFECTIOUS DISEASES OF POULTRY	2+1
VEP 611	INFECTIOUS DISEASES OF ANIMAL SPECIES OF REGIONAL IMPORTANCE	2+1
VEP 612	INFECTIOUS DISEASES OF LABORATORY AND ZOO ANIMALS	1+0
VEP 691	MASTER'S SEMINAR	1+0
VEP 699	MASTER'S RESEARCH	20
VEP 701	RECENT CONCEPTS IN EPIDEMIOLOGY AND DISEASE FORECASTING	2+1
VEP 702	HERD HEALTH MANAGEMENT	2+1
VEP 703	DATA COLLECTION , MANAGEMENT AND PRESENTATION	2+1
VEP 704	SURVEY AND SURVEILLANCE	2+1
VEP 705	EMERGING AND RE-EMERGING ANIMAL DISEASES	2+0
VEP 706	ECOLOGY OF DISEASES	2+0
VEP 707	MOLECULAR APPROACHES IN EPIDEMIOLOGY	2+1
VEP 708	ADVANCES IN PREVENTION & CONTROL OF INFECTIOUS DISEASES OF RUMINANTS	2+1
VEP 709	ADVANCES IN PREVENTION AND CONTROL OF INFECTIOUS DISEASES OF EQUINES	2+1
VEP 710	ADVANCES IN PREVENTION AND CONTROL OF DISEASES IN PET ANIMALS	2+1
VEP 711	ADVANCES IN PREVENTION AND CONTROL OF DISEASES IN POULTRY	2+1
VEP 712	ADVANCES IN INFECTIOUS DISEASES OF LABORATORY AND ZOO ANIMALS	1+0
VEP 713	ADVANCES IN DIAGNOSIS AND MANAGEMENT OF TOXICOLOGICAL CONDITIONS	1+1
VEP 790	SPECIAL PROBLEM	0+2
VEP 791	DOCTORAL SEMINAR I	1+0
VEP 792	DOCTORAL SEMINAR II	1+0
VEP 799	DOCTORAL RESEARCH	45

VETERINARY EPIDEMIOLOGY AND PREVENTIVE MEDICINE

Course Contents

VEP 601	PRINCIPLES OF EPIDEMIOLOGY	2+0
Objective	To familiarize students with epidemiological concepts.	
Theory	<u>UNIT I</u> Definitions, scope, concepts, types, application and common terms used in epidemiology. <u>UNIT II</u> Host-Agent-Environmental factors in causation of diseases and disease patterns. <u>UNIT III</u> Epidemiological data: its nature, sources, collection, storage, retrieval and presentation. <u>UNIT IV</u> Epidemiological studies: Experimental and observational, international organizations and laws regulating animal diseases.	
Suggested Readings	Martin SW, Meek AH & Willeberg P. 1993. <i>Veterinary Epidemiology: Principles and Methods</i> . IBH. Narayan KG. 2004. <i>Epidemiology, Diagnosis and Management of Zoonoses</i> . ICAR. Schwabe CW, Riemann HP & Franti CE. 1984. <i>Epidemiology in Veterinary Practice</i> . 3 rd Ed. Lea & Fabiger. Thrusfield M. 2004. <i>Veterinary Epidemiology</i> . 8 th Ed. Blackwell.	
VEP 602	APPLIED EPIDEMIOLOGY	1+1
Objective	To acquaint students with the application of epidemiology in disease diagnosis, prevention and control.	
Theory	<u>UNIT I</u> Surveys, sampling and collection of information, design questionnaires, disease monitoring and surveillance. <u>UNIT II</u> Epidemiological investigations of disease outbreak, modeling, disease forecasting, serological and molecular epidemiology. <u>UNIT III</u> Economics of diseases and different strategies for prevention and control of diseases and syndromes. Disease free zones and zero disease concept. <u>UNIT IV</u> Molecular basis of a disease, application of nucleic acid based assays for genomic characterization of field isolates vis-à-vis vaccine strains.	
Practical	Design proforma questionnaires for collection of information on health and diseases in populations, sero-surveys for important diseases of livestock and poultry, investigation of outbreaks, use of computer software in epidemiology.	

Suggested Readings

- Martin SW, Meek AH & Willeberg P. 1993. *Veterinary Epidemiology: Principles and Methods*. IBH.
- Thrusfield M. 2004. *Veterinary Epidemiology*. 8th Ed. Blackwell.
- Thomas B. (Ed.). *Applied Veterinary Epidemiology*. Elsevier.

VEP 603 LIVESTOCK AND POULTRY DISEASE INVESTIGATION 0+2

Objective

To expose students to actual field based investigations of diseases in livestock and poultry.

Practical

To attend outbreaks of infectious diseases and toxicological conditions in livestock and poultry in the field and at farms. Recording and analysis of data. Investigation and diagnosis on dead and live diseased animal(s) and poultry. Collection, preservation and transport of material in the face of disease outbreak, and processing of material in the laboratory for diagnosis; screening of animal herds and poultry flocks for certain important diseases. Formulating and advising treatment and control measures. Extraction and isolation of nucleic acid of field isolates and vaccine strains, and their characterization by PCR and other techniques.

Suggested Readings

- Vihan VS. 2002. *Modern Veterinary Laboratory Techniques in Clinical Diagnosis*. CBS.

VEP 604 VETERINARY CLINICAL EPIDEMIOLOGY 1+1

Objective

To familiarize students with various epidemiological approaches for solving field problems.

Theory

UNIT I

Definitions and epidemiological approaches, measuring frequency of clinical events, incidence, prevalence, occurrence etc., principles of accuracy, precision, linearity, diagnostic sensitivity and specificity.

UNIT II

Uses of diagnostic tests, evaluation of diagnostic tests, cohort and case control studies.

UNIT III

Design and evaluation of clinical trials, cost of disease, cost benefit analysis.

Practical

Diseases of multiple etiology: mastitis, diarrhea, abortions and their diagnosis and prevention. Sampling, isolations and antibiotic/ culture sensitivity etc. statistical evaluation of diagnostic assays.

Suggested Readings

- Smith RD. 2005. *Veterinary Clinical Epidemiology - a Problem Oriented Approach*. 3rd Ed. Taylor & Francis, CRC.

VEP 605

**BIOSECURITY PRACTICES IN DISEASE
PREVENTION**

1+1

Objective

To facilitate learning concepts of disinfection, sterilization and vaccination for disease prevention.

Theory

UNIT I

Definition and principles of biosecurity, shedding of pathogens by infected animals, their survival in the environment, routes of entry and transmission of pathogens.

UNIT II

Protection of susceptible animals, interruption of pathways of transmission, role of disinfection to break cycle of infection.

UNIT III

Chemical disinfectants, microbial resistance to disinfectants, physical methods of disinfection and sterilization.

UNIT IV

Biosecurity measures for collection of specimen from wild animals. Vaccines- success stories of disease eradication through vaccination.

Practical

Practical use of disinfectants in destruction of microbes in laboratory and under field conditions. Determination of efficacy/phenol coefficient of commonly used disinfectants. Measurement of vaccine titres.

Suggested Readings

Linton AH, Hugo WB & Russell AD. 1987. *Disinfection in Veterinary and Farm Animals Practice*. Blackwell.

VEP 606

INFECTIOUS DISEASES OF RUMINANTS - I

2+1

Objective

To supplement cognitive learning with regard to recent progress made in the areas of etiology, pathogenesis, epidemiology, symptomatology, diagnosis, treatment and control of bacterial and fungal diseases of bovine, sheep and goats.

Theory

UNIT I

Mastitis, joint ill, ulcerative lymphangitis, anthrax, clostridial infections, black quarter, tetanus, bacillary haemoglobinuria, botulism, colibacillosis.

UNIT II

Pasteurellosis, listeriosis, campylobacteriosis, tuberculosis, Johne's disease, braxy, entero-toxaemia, brucellosis, salmonellosis, leptospirosis.

UNIT III

Actinomycosis, actinobacillosis, ringworm, cutaneous streptothricosis, sporotrichosis, aspergillosis, coccidioidomycosis, rhinosporidiosis, mucormycosis, histoplasmosis, candidiasis, blastomycosis etc.

Practical

Application of latest diagnostic/serological tests and adoption of preventive measures for the control of various bacterial and fungal diseases of bovine, sheep and goats.

Suggested Readings

Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2006. *Veterinary Medicine, a Text Book of Diseases of Cattle, Sheep, Pigs, Goats and Horses*. Book Power.

VEP 607 INFECTIOUS DISEASES OF RUMINANTS - II 2+1

Objective

To supplement cognitive learning with regard to recent progress made in the areas of etiology, pathogenesis, epidemiology, symptomatology, diagnosis, treatment and control of viral, rickettsial and parasitic diseases of bovine, sheep and goats.

Theory

UNIT I

Foot and mouth disease, vesicular stomatitis, vesicular exanthema, rinderpest, PPR, bovine viral diarrhoea, mucosal disease, ephemeral fever, bovine herpes virus-1 induced syndromes, leucosis, viral pneumonia, pox diseases, infectious gastro-enteritis of viral etiology.

UNIT II

Bovine malignant head catarrh, rabies, scrapie, blue tongue, louping ill, papillomatosis.

UNIT III

Bovine tropical theileriosis, babesiosis, anaplasmosis, trypanosomiasis, toxoplasmosis, coccidiosis.

UNIT IV

Sarcocystosis, fascioliasis, amphistomiasis, gastro-intestinal nematodiasis, schistosomiasis, verminous bronchitis, echino-coccosis, coenurosis, tape worm infestations.

Practical

Application of latest diagnostic and serological tests for establishing disease diagnosis, designing preventive and control measures against major diseases of veterinary importance caused by viruses, rickettsiae, helminth parasites and blood protozoa.

Suggested Readings

Radostits OM, Gay CC, Blood DC & Hinchcliff KW. 2006. *Veterinary Medicine, a Text Book of Diseases of Cattle, Sheep, Pigs, Goats and Horses*. Book Power.

VEP 608 INFECTIOUS DISEASES OF EQUINES 1+1

Objective

Learning of important infectious diseases of equines; their diagnosis, prevention and control.

Theory

UNIT I

Anthrax, tetanus, botulism, strangles, glanders, malignant edema, actinomycosis, clostridial infections, *Rhodococcus equi* pneumonia (Zoonotic), tuberculosis.

UNIT II

African horse sickness, infectious equine anaemia, equine influenza, equine encephalomyelitis, rabies, equine viral rhinopneumonitis, equine viral arteritis vesicular stomatitis, ulcerative lymphangitis.

Theory

UNIT I

Impact of diseases on poultry industry, mechanism of disease transmission. Bacterial diseases: *Escherichia coli* and Salmonella infections, coryza, fowl cholera, gangrenous dermatitis, mycoplasmosis, CRD.

UNIT II

Viral diseases: Newcastle disease, infectious bursal disease, Marek's disease, infectious bronchitis, inclusion body hepatitis, hydro-pericardium syndrome, avian pox, infectious laryngo-tracheitis, avian influenza, lymphoid leucosis, avian encephalomyelitis, infectious bronchitis.

UNIT III

Fungal and parasitic diseases: aspergillosis, candidosis, favus, mycotoxicosis, coccidiosis, roundworm and tape worm infestations, vaccination schedule etc.

Practical

Postmortem examination of poultry birds, collection of material for isolation, antibiotic sensitivity assay, histopathology and demonstration of other routine diagnostic tests. Seromonitoring for important diseases and pullorum testing.

Suggested Readings

Calnek BW, Barnes HA, Beard CW, Reid WM & Yoder HW Jr. 1994. *Diseases of Poultry*. 10th Ed. Iowa State Univ. Press.
Jordan FTW & Pattison M. 1996. *Poultry Diseases*. WB Saunders.

VEP 611

INFECTIOUS DISEASES OF ANIMAL SPECIES OF 2+1 REGIONAL IMPORTANCE (CAMEL AND SWINE)

Objective

Learning of diseases of animals which are important to the particular region i.e. swine, camel, yak, mithun, elephant etc. e.g., in Haryana, swine and camel diseases will be taught to the students.

Theory

UNIT I

Specific diseases of camel e.g. kapali, malli, jhooling, pica, satyriasis, specific peritonitis, kumree, chronic peritonitis.

UNIT II

General infectious diseases: anthrax, actinomycosis, black quarter, bronchitis, coccidiosis, contagious echthyma, haemorrhagic septicaemia, hydatidosis, mange, mastitis, camel pox, rabies, surra, tuberculosis etc.

UNIT III

Swine diseases: Swine influenza, hog cholera, African swine fever, swine pox, vesicular exanthema, vesicular stomatitis, rabies.

UNIT IV

Porcine enteroviruses, pseudorabies, listeriosis, leptospirosis, brucellosis, anthrax, salmonellosis, swine erysipelas, pasteurellosis, tuberculosis mange etc.

Practical

Recent diagnostic tests and preventive measures for the control of infectious diseases of swine and camel. Investigations of outbreaks. Visits to organized farms.

UNIT II

Epidemiology of economically important diseases in the region (haemorrhagic septicemia, foot and mouth disease, surra, brucellosis, PPR, swine fever, IBD and fowl typhoid).

UNIT III

Geographical Information System and its applications in epidemiology, various expert systems and their role in epidemiology.

UNIT IV

Modeling and application of various models in disease forecasting. Epidemiological software.

Practical

Epidemiology exercises of economically important diseases in the region, use of Geographical Information System in epidemiology, various expert systems, modeling and various models used in disease forecasting, use of various epidemiological softwares.

Suggested Readings

Noordhuizen JPTM, Franklin K, Thrusfield MV & Graat EAM. 2003. *Application of Quantitative Methods in Veterinary Epidemiology*. IBD.

VEP 702

HERD HEALTH MANAGEMENT

2+1

Objective

Adoption of holistic approach to address issues of herd health without affecting production.

Theory

UNIT I

General principles, interactions between health and production.

UNIT II

Dairy cattle: mastitis control and health management of dairy cows and calves.

UNIT III

Health and production in swine, sheep, goats and poultry.

Practical

Visit to farms, assessment of their problems, systematic programme or control of a specific disease and its impact.

Suggested Readings

Radostits & Blood DC. 1996. *Herd Health*. Book Power.

VEP 703

DATA COLLECTION, MANAGEMENT AND PRESENTATION

2+1

Objective

To apprise the students of importance of data collection, analysis and interpretation for effective disease control.

Theory

UNIT I

Classification of data, sources of data, data collection, questionnaires.

UNIT II

Data storage, computerized and non-computerized recording techniques.

UNIT III

Application of computing and internet based records. Veterinary recording schemes, veterinary information systems and databases.

UNIT IV

Presenting numerical data: some basic definitions. Displaying numerical data.

Practical

Collection, storage and analysis of data of Disease Investigation Laboratories of department, Veterinary hospitals, livestock and poultry farms etc. Development of suitable software for the same. Pie charts, graphs and maps for presentation of data.

Suggested Readings

Noordhuizen JPTM, Frankena K, Thrusfield MV & Gruat EAM. 2003. *Application of Quantitative Methods in Veterinary Epidemiology*. International Book Distr. Co.

VEP 704 SURVEY AND SURVEILLANCE 2+1

Objective

To demonstrate different methodologies and procedures involved in conducting survey and surveillance.

Theory

UNIT I

Over-view of concepts of survey and surveillance, purpose and method of sampling, size of sample, questionnaires.

UNIT II

Goals and types of surveillance, difference from monitoring, mechanism of surveillance and surveillance network.

UNIT III

Disease/data recording and reporting.

Practical

Develop questionnaires on selective topics, Survey among livestock and poultry farmers to find out usefulness/effectiveness of vaccination/ artificial insemination/ other practices, surveillance of important diseases in different parts of state.

Suggested Readings

Selected articles from journals.

VEP 705 EMERGING AND RE-EMERGING ANIMAL DISEASES 2+0

Objective

To create awareness about emerging and reemerging diseases and surveillance methods.

Theory

UNIT I

General concepts for emergence of new diseases and re-emergence of old diseases.

UNIT II

Epidemiology of globally and nationally important emerging/re-emerging diseases and designing of strategies for their prevention and control.

Suggested Readings

Selected articles from journals.

VEP 706

ECOLOGY OF DISEASES

2+0

Objective

To make the students aware about ecology, ecological systems and impact of global warming.

Theory

UNIT I

Basic ecological concepts, distribution and regulation of population size, the niche with examples.

UNIT II

Ecosystems, biotope, landscape epidemiology, nidality.

UNIT III

Patterns of disease, epidemic curves (Reed-Frost-model, Kendall's waves), trends in temporal and spatial distribution of disease.

UNIT IV

Global warming, its impact on animal health, pathogens/vectors and changing disease patterns.

Suggested Readings

Selected articles from journals.

VEP 707

MOLECULAR APPROACHES IN EPIDEMIOLOGY 2+1

Objective

Learning of recent advanced molecular techniques for establishing disease diagnosis.

Theory

UNIT I

The concept of molecular basis of a disease, molecular determinants of pathogenicity of infectious agents and their transmissibility to susceptible populations of livestock and poultry.

UNIT II

Laboratory biosafety, antigenic, genetic and biological characterization of field isolates of pathogens incriminated in field outbreaks, differentiation of field and vaccine strains, the concept of marker vaccines, and correlation of pathotypes and genotypes of a pathogen.

UNIT III

Immunological tests, immunoblotting techniques and use of monoclonal antibodies in different ELISAs for antigenic analysis. Application of nucleic acid based assays viz. polymerase chain reaction (PCR) assays, nucleotide sequencing, restriction endonuclease analysis and RFLP analysis for genomic characterization using the field material directly or after extraction of nucleic acid from small scale cultures, use of radio-actively labeled or non radioactive oligo-nucleotide probes in dot-blot and Southern hybridizations.

Practical

Extraction and isolation of nucleic acid from field isolates of the causative pathogens, digestion with restriction endonucleases and electrophoresis in agarose gel in order to obtain fingerprints and their comparative analysis. SDS-PAGE for protein profiling. Western blotting, ELISA for screening of field samples.

Suggested Readings

Selected articles from journals.

VEP 790

SPECIAL PROBLEM

0+2

Objective

To provide expertise in handling practical research problems.

Practical

Short research problems involving contemporary issues and research techniques.

VETERINARY EPIDEMIOLOGY AND PREVENTIVE MEDICINE

List of Journals

- * Avian Diseases
- * Avian pathology
- * British Poultry Science
- * British Veterinary Journal
- * Epidemiology and Infection
- * Indian Journal of comparative Microbiology, Immunology and Infectious diseases
- * Infection and Immunity
- * Infection and Immunity
- * Journal of General Virology
- * Journal of Poultry Science
- * Quarterly Bulletin of O.I.E.
- * Tropical Animal Health and Production
- * Veterinary Medicine
- * Veterinary Microbiology
- * Veterinary Record
- * World Animal Health
- * World Poultry Science Journal

e-Resources

- * <http://www.jarvm.com/> (International Journal of Applied Research in Veterinary Medicine)
- * <http://calvados.c3sl.ufpr.br/ojs2/index.php/veterinary/> (Archives of Veterinary Science)
- * <http://www.pjbs.org/ijps/ijps.htm> (International Journal of Poultry Science)
- * <http://www.ispub.com/ostia/index.php?xmlFilePath=journals/ijvm/front.xml> (Internet Journal of Veterinary Medicine)
- * <http://www.medwellonline.net/java/fp.html> (Journal of Animal and Veterinary Advances)
- * <http://www.jstage.jst.go.jp/browse/jpsa> (Journal of Poultry Science)
- * <http://www.jstage.jst.go.jp/browse/jvms/-char/en> (Journal of Veterinary Medical Science)
- * <http://www.cipav.org.co/lrrd/> (Livestock Research for Rural Development)
- * <http://vetmed.vri.cz/> (Veterinarni Medicina)
- * <http://isrvma.org/journal.htm> (Israel Journal of Veterinary Medicine)
- * <http://www.jstage.jst.go.jp/browse/jpestics> (Journal of Pesticide Science)
- * <http://www.vetsci.org> (Journal of Veterinary Science)
- * <http://journals.tubitak.gov.tr/veterinary/index.php> (Turkish Journal of Veterinary and Animal Sciences)
- * <http://www.uni-sz.bg/bjvm/bjvm.htm> (Bulgarian Journal of Veterinary Medicine)
- * <http://www.ecology.kee.hu/> (Applied Ecology and Environmental Research)

Suggested Broad Topics for Master's and Doctoral Research

- * Molecular epidemiological studies on infectious diseases of livestock
- * Molecular epidemiological studies on infectious diseases of poultry
- * Surveillance of economically important diseases of farm animals
- * Surveillance of economically important diseases of poultry
- * Development of immunodiagnostic/ sero-diagnostic tests for field application
- * Monitoring of protective immunity induced by vaccines under different schedules
- * Diagnostic assay for milk adulterants
- * Diagnostic assays and epidemiological studies in respect of toxicants in livestock and poultry feeds.

VETERINARY SURGERY AND RADIOLOGY
Course Structure – at a Glance

CODE	COURSE TITLE	CREDITS
VSR 601	PRINCIPLES OF SURGERY	2+0
VSR 602	CLINICAL PRACTICE – I	0+3
VSR 603	CLINICAL PRACTICE – II	0+3
VSR 604	SMALL ANIMAL ANAESTHESIA	2+1
VSR 605	LARGE ANIMAL ANAESTHESIA	2+1
VSR 606	DIAGNOSTIC IMAGING TECHNIQUES	2+1
VSR 607	VETERINARY OPHTHALMOLOGY AND DENTISTRY	1+1
VSR 608	SMALL ANIMAL SOFT TISSUE SURGERY	2+1
VSR 609	LARGE ANIMAL SOFT TISSUE SURGERY	2+1
VSR 610	ORTHOPAEDIC AND LIMB SURGERY	2+1
VSR 691	MASTER’S SEMINAR	1+0
VSR 699	MASTER’S RESEARCH	20
VSR 701	CLINICAL SURGICAL PRACTICE – I	0+2
VSR 702	CLINICAL SURGICAL PRACTICE – II	0+2
VSR 703	CLINICAL SURGICAL PRACTICE – III	0+2
VSR 704	ANAESTHESIA OF WILD AND LABORATORY ANIMALS	1+1
VSR 705	ADVANCES IN ANAESTHESIOLOGY	2+1
VSR 706	ADVANCES IN DIAGNOSTIC IMAGING TECHNIQUES	2+1
VSR 707	NEUROSURGERY	2+1
VSR 708	EXPERIMENTAL SURGICAL TECHNIQUES IN ANIMALS	1+1
VSR 789	SPECIAL PROBLEMS IN ANAESTHESIA	0+2
VSR 790	SPECIAL PROBLEMS IN SURGERY	0+2
VSR 791	DOCTORAL SEMINAR I	1+0
VSR 792	DOCTORAL SEMINAR II	1+0
VSR 799	DOCTORAL RESEARCH	45

VETERINARY SURGERY AND RADIOLOGY

Course Contents

VSR 601	PRINCIPLES OF SURGERY	2+0
Objective		
To impart the basic knowledge of principles of surgery.		
Theory		
<u>UNIT I</u>		
Wound healing, current concepts of inflammation and management, wound infections, antimicrobial therapy, principles of surgical asepsis, sterilization and disinfection.		
<u>UNIT II</u>		
Systemic effects of surgical stress, haemorrhage and haemostasis, metabolism of the surgical patient, fluid therapy in surgical patients, acid-base balance, shock. Hyperalimentation. Blood transfusion. Host defense mechanism.		
<u>UNIT III</u>		
Biomaterials, surgical immunity, pre-operative assessment of the surgical patient, post-operative care of the surgical patient. Chemotherapy of tumors.		
<u>UNIT IV</u>		
Operating room emergencies, cardio-pulmonary embarrassment and resuscitation, monitoring of surgical patient.		
<u>UNIT V</u>		
Principles of laser surgery, cryosurgery, electrosurgery, lithotripsy and endoscopy, physiotherapy, stem cell therapy etc.		
Suggested Readings		
Fossum TW. (Ed.). 2002. <i>Small Animal Surgery</i> . Mosby.		
Slatter DH. (Ed.). 2002. <i>Textbook of Small Animal Surgery</i> . WB Saunders.		
VSR 602	CLINICAL PRACTICE - I	0+3
Objective		
To impart practical training in anaesthesia, diagnostic imaging techniques and surgery.		
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, disaster management.		
Suggested Readings		
Auer JA. (Ed.). 2006. <i>Equine Surgery</i> . WB Saunders.		
Fossum TW. (Ed.). 2002. <i>Small Animal Surgery</i> . Mosby.		
Fubini SL & Ducharme NG. (Ed.). 2004. <i>Farm Animal Surgery</i> . WB Saunders.		
Slatter DH. (Ed.). 2002. <i>Textbook of Small Animal Surgery</i> . WB Saunders.		
VSR 603	CLINICAL PRACTICE - II	0+3
Objective		
To impart practical training in surgery, anaesthesia and diagnostic imaging techniques.		

Practical

Client management, animal welfare and rehabilitation, 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, disaster management.

Suggested Readings

- Auer JA. (Ed.). 2006. *Equine Surgery*. WB Saunders.
Fossum TW. (Ed.). 2002. *Small Animal Surgery*. Mosby.
Fubini SL & Ducharme NG. (Ed.). 2004. *Farm Animal Surgery*. WB Saunders.
Slatter DH. (Ed.). 2002. *Textbook of Small Animal Surgery*. WB Saunders.

VSR 604

SMALL ANIMAL ANAESTHESIA

2+1

Objective

To impart the basic and practical knowledge of principles of companion animal anaesthesia.

Theory

UNIT I

General considerations for anaesthesia, peri-operative and post-operative pain and its management.

UNIT II

Sedation: analgesia and pre-medication, anaesthetic agents (injectable anaesthetics, dissociative anaesthetics, inhalation anaesthetics), muscle relaxants, neuromuscular blocking agents and local analgesia.

UNIT III

Anaesthetic techniques, anaesthetic equipments, artificial ventilation.

UNIT IV

Anaesthesia of small animals, pediatric and geriatric patients, birds.

UNIT V

Monitoring of anaesthesia, anaesthetic emergencies, complications and their management, euthanasia.

Practical

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

Suggested Readings

- Hall LW & Clarke KW. (Eds.). 1991. *Veterinary Anaesthesia*. Bailliere Tindall.
Paddleford RR. (Ed.). 1999. *Manual of Small Animal Anesthesia*. 2nd Ed. WB Saunders.
Thurmon JC, Tranquilli WJ & Benson JG. (Eds.). 1996. *Lumb and Jone's Veterinary Anaesthesia*. Williams & Wilkins.
Thurmon JC, Tranquilli WJ & Benson JG. (Eds.). 1999. *Essentials of Small Animal Anesthesia and Analgesia*. Lippincott Williams & Wilkins.

VSR 605

LARGE ANIMAL ANAESTHESIA

2+1

Objective

To impart the basic and practical knowledge of principles of farm animal anaesthesia and mechanism of pain.

Theory

UNIT I

General considerations for anaesthesia, peri-operative pain, and post-operative pain and its management.

UNIT II

Pre-anaesthetic and anaesthetic adjuncts, injectable anaesthetics, dissociative anaesthetics, inhalation anaesthetics.

UNIT III

Local anaesthetics, neuromuscular blocking agents.

UNIT IV

Anaesthetic techniques, anaesthetic machines, breathing systems, artificial ventilation.

UNIT V

Monitoring of anaesthesia, anaesthetic emergencies and complications, 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.

VSR 606

DIAGNOSTIC IMAGING TECHNIQUES

2+1

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

Doppler techniques echocardiography and its application, introduction to MRI, CT scan, nuclear medicine, xeroradiography, positron emission tomography technique and other imaging techniques.

UNIT VI

Electromagnetic radiations, 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*. 2nd 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*. 5th Ed. Saunders, Philadelphia.

VSR 607

VETERINARY OPHTHALMOLOGY AND DENTISTRY

1+1

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 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, orbit, lens, vitreous and aqueous humor, retina and optic nerve.

UNIT V

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 (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.). 2007. *Atlas of Veterinary Ophthalmology*. 4th Ed. Blackwell Publ.
Gelatt KN. (Ed.). 2000. *Essentials of Veterinary Ophthalmology*. Blackwell.
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

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

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.

Theory

UNIT I

Considerations for general anaesthesia, drug interactions in anaesthesia, perioperative pain and distress, effects of anaesthetics on CNS function.

UNIT II

Pharmacology of preanaesthetics and anaesthetic adjuncts; injectable 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 TECHNIQUES 2+1

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.

VETERINARY SURGERY AND RADIOLOGY

List of Journals

- * American Journal of Veterinary Research
- * Canadian Veterinary Journal
- * Compendium of continuing Education for the practicing Veterinarian
- * Cornell Veterinarian
- * Equine Practice
- * Indian Journal of Veterinary Surgery
- * Journal of American Veterinary Medical Association
- * Journal of American Animal Hospital Association
- * Journal of Bone and Joint Surgery –A & B
- * 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 (Veterinary Surgery)
- * www.blackwellpublishing.com/summit.asp (Veterinary anesthesia and Analgesia)
- * www.blackwellpublishing.com/journal.asp (Veterinary Radiology and Ultrasound)
- * www.blackwellpublishing.com/journal.asp (Veterinary Ophthalmology)
- * 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 animals
- * Management of pain in animals
- * Surgical Management of gastrointestinal tract disorders in bovines
- * Management of fractures in animals
- * Ultrasonography of soft organs of large and small animals

COMPULSORY NON-CREDIT COURSES

(Compulsory for Master's programme in all disciplines; Optional for Ph.D. scholars)

CODE	COURSE TITLE	CREDITS
PGS 501	LIBRARY AND INFORMATION SERVICES	0+1
PGS 502	TECHNICAL WRITING AND COMMUNICATIONS SKILLS	0+1
PGS 503 (e-Course)	INTELLECTUAL PROPERTY AND ITS MANAGEMENT	1+0
PGS 506 (e-Course)	DISASTER MANAGEMENT	1+0

Course Contents

PGS 501	LIBRARY AND INFORMATION SERVICES	0+1
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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
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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

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

PGS 503
(e-Course)

**INTELLECTUAL PROPERTY AND ITS
MANAGEMENT**

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-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 varieties and farmers' rights and bio-diversity 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

- Erbisch FH & Maredia K. 1998. *Intellectual Property Rights in Agricultural Biotechnology*. CABI.

- Ganguli P. 2001. *Intellectual Property Rights: Unleashing Knowledge Economy*. McGraw-Hill.
- Intellectual Property Rights: Key to New Wealth Generation*. 2001. NRDC & Aesthetic Technologies.
- Ministry of Agriculture, Government of India. 2004. *State of Indian Farmer*. Vol. V. *Technology Generation and IPR Issues*. Academic Foundation.
- Rothschild M & Scott N. (Ed.). 2003. *Intellectual Property Rights in Animal Breeding and Genetics*. CABI.
- 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; National Biological Diversity Act, 2003.*

PGS 506
(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.

