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

Education Division
Indian Council of Agricultural Research
New Delhi

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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)

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Specialization</th>
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<tbody>
<tr>
<td>Dr. Simrat Sagar Singh</td>
<td>GADVASU, Ludhiana</td>
<td>Surgery</td>
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<tr>
<td>Convener</td>
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<tr>
<td>Dr. A.C. Varshney</td>
<td>COVS, CSK HPAU, Palampur</td>
<td>Surgery</td>
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<tr>
<td>Dean</td>
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</tr>
<tr>
<td>Dr. A.S. Nanda</td>
<td>GADVASU, Ludhaina</td>
<td>ARGO</td>
</tr>
<tr>
<td>Director of Research</td>
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<tr>
<td>Dr. A.K. Sinha</td>
<td>COVS, Ranchi Vety. College, Ranchi</td>
<td>ARGO</td>
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<tr>
<td>Dr. V. S. Rajora</td>
<td>Dept. of Vety. Clinical Medicine, COVS, GBPUAT, Pantnagar</td>
<td>Clinical Medicine</td>
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<tr>
<td>Professor</td>
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<td>Dr. A.K. Gehlot</td>
<td>COVS, RAU, Jobner Campus, Bikaner</td>
<td>Medicine</td>
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<tr>
<td>Dr. S.K. Kotwal</td>
<td>Bombay Vety. College, Mumbai</td>
<td>Public Health</td>
</tr>
<tr>
<td>Assoc. Prof. &amp; Head</td>
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<tr>
<td>Dr. N.K. Rakha</td>
<td>Dept of VEPM, COVS, CCS HAU, Hisar</td>
<td>VEPM</td>
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<tr>
<td>Prof. &amp; Head</td>
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<tr>
<td>Dr. A. M. Paturkar</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td><em>Member Secretary</em></td>
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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 widespread 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 ethno-pharmacology 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 stakeholders 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**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Master’s programme</th>
<th>Doctoral programme</th>
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<tbody>
<tr>
<td>Major</td>
<td>28</td>
<td>17</td>
</tr>
<tr>
<td>Minor + Supporting</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>(minimum 6 for minor &amp; 3 for supporting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>Research</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>60</strong></td>
<td><strong>75</strong></td>
</tr>
<tr>
<td>Compulsory Non Credit Courses</td>
<td>See relevant section</td>
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</tr>
</tbody>
</table>

**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)

<table>
<thead>
<tr>
<th>Major Subject</th>
<th>Minor Subjects*</th>
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<tbody>
<tr>
<td>Animal Reproduction Gynecology and Obstetrics</td>
<td>Veterinary Surgery &amp; Radiology, Veterinary Physiology, Veterinary Biochemistry, Veterinary Clinical Medicine, Ethics &amp; Jurisprudence, Animal Biotechnology, Veterinary Pharmacology &amp; Toxicology, Animal Nutrition</td>
</tr>
<tr>
<td>Veterinary Clinical Medicine, Ethics &amp; Jurisprudence</td>
<td>Veterinary Surgery and Radiology, Veterinary Epidemiology and Preventive Medicine, Veterinary Pharmacology &amp; Toxicology, Veterinary Physiology, Veterinary Biochemistry, Veterinary Clinical Medicine, Ethics &amp; Jurisprudence, Animal Reproduction Gynaecology and Obstetrics</td>
</tr>
<tr>
<td>Veterinary Epidemiology and Preventive Medicine</td>
<td>Veterinary Microbiology, Animal Biotechnology, Veterinary Clinical Medicine, Ethics &amp; Jurisprudence, Veterinary Public Health, Veterinary Pathology</td>
</tr>
<tr>
<td>Veterinary Public Health</td>
<td>Veterinary Epidemiology and Preventive Medicine, Veterinary Microbiology, Veterinary Pathology, Animal Biotechnology, Veterinary Pharmacology &amp; Toxicology, Veterinary Parasitology, Livestock Product Technology</td>
</tr>
<tr>
<td>Veterinary Surgery and Radiology</td>
<td>Veterinary Anatomy and Histology, Veterinary Clinical Medicine, Ethics &amp; Jurisprudence, Veterinary Pharmacology &amp; Toxicology, Veterinary Physiology, Veterinary Pathology, Animal Reproduction Gynaecology and Obstetrics</td>
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</table>

*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

<table>
<thead>
<tr>
<th>CODE</th>
<th>COURSE TITLE</th>
<th>CREDITS</th>
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<tbody>
<tr>
<td>VOG 601</td>
<td>GENERAL GYNAECOLOGY</td>
<td>3+1</td>
</tr>
<tr>
<td>VOG 602</td>
<td>FEMALE INFERTILITY</td>
<td>3+1</td>
</tr>
<tr>
<td>VOG 603</td>
<td>VETERINARY OBSTETRICS</td>
<td>2+2</td>
</tr>
<tr>
<td>VOG 604</td>
<td>ANDROLOGY &amp; MALE INFERTILITY</td>
<td>3+1</td>
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<tr>
<td>VOG 605</td>
<td>SEMEN PRESERVATION AND ARTIFICIAL INSEMINATION</td>
<td>2+1</td>
</tr>
<tr>
<td>VOG 606</td>
<td>REPRODUCTIVE BIOTECHNOLOGY</td>
<td>2+1</td>
</tr>
<tr>
<td>VOG 607</td>
<td>CLINICAL PRACTICE I</td>
<td>0+3</td>
</tr>
<tr>
<td>VOG 608</td>
<td>CLINICAL PRACTICE II</td>
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</tr>
<tr>
<td>VOG 691</td>
<td>MASTER’S SEMINAR</td>
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<tr>
<td>VOG 699</td>
<td>MASTER’S RESEARCH</td>
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<td>VOG 701</td>
<td>ADVANCES IN GYNAECOLOGY</td>
<td>2+1</td>
</tr>
<tr>
<td>VOG 702</td>
<td>ADVANCES IN OBSTETRICS</td>
<td>2+1</td>
</tr>
<tr>
<td>VOG 703</td>
<td>ADVANCES IN ANDROLOGY</td>
<td>2+1</td>
</tr>
<tr>
<td>VOG 704</td>
<td>ADVANCES IN REPRODUCTIVE BIOTECHNOLOGY</td>
<td>1+1</td>
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<td>VOG 705</td>
<td>ADVANCES IN SEMEN PRESERVATION</td>
<td>1+1</td>
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<tr>
<td>VOG 706</td>
<td>CLINICAL PRACTICE I</td>
<td>0+3</td>
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<tr>
<td>VOG 707</td>
<td>CLINICAL PRACTICE II</td>
<td>0+3</td>
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<tr>
<td>VOG 790</td>
<td>SPECIAL PROBLEM</td>
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<tr>
<td>VOG 791</td>
<td>DOCTORAL SEMINAR I</td>
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<tr>
<td>VOG 792</td>
<td>DOCTORAL SEMINAR II</td>
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<tr>
<td>VOG 799</td>
<td>DOCTORAL RESEARCH</td>
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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
UNIT VI
Factors affecting reproduction – seasonality, nutrition, stress, environment, management, suckling and diseases.
UNIT VII
Lactation and artificial induction of lactation.

Practical

Suggested Readings
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


Suggested Readings


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

Suggested Readings

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

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

Suggested Readings

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

Suggested Readings

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
Immunno-neutralization of hormones. Immunomodulation of fertility.

Practical

Suggested Readings
Gordon I. 2004. Reproductive Technologies in Farm Animals. CABI.

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**

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**

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

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
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.

Theory
UNIT 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, 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
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
Immunoneutralization of hormones. Immunomodulation of fertility.

**Practical**

**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**

**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-onlline.org (Journal of Andrology)
* www.reproduction-online.org (Reproduction)
* www.interscience.wiley.com (Reproduction in domestic animals)
* www.tieriojournal.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

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*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

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

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
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

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

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
Laboratory Animal Medicine. 2nd Ed.
Hafez ESE. (Ed.). Reproduction and Breeding Techniques for Laboratory
Animals. Lea & Fabiger.
Introduction. 3rd Ed. Blackwell Publ.
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,
allostriophagia, diseases of various body systems, nutritional deficiency
disorders).

UNIT II
Diagnostic tests related to various non-infectious diseases of camels.
Suggested Readings

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 toxaemia).

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

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

Suggested Readings

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
VCM 611  VETERINARY FORENSIC MEDICINE  1+1

Objective
To familiarize students with various aspects of veterinary forensic medicine.

Theory
UNIT I
Veterolegal aspects of ante mortem and post mortem examination.
UNIT II
Examination of wounds, blood, offenses, frauds in animals and their products, animal cruelty and welfare. DNA analysis of clinical samples
UNIT III
Study of common laws related to veterolegal aspects.

Practical
Ante mortem and post mortem examination, examination of wounds, blood, offenses, frauds in animals and their products, collection, dispatch and examination of veterolegal samples.

Suggested Readings

VCM 612  CLINICAL DIAGNOSTIC TECHNIQUES  0+2

Objective
Study the diagnostic protocols and procedures for various diseases of farm and companion animals.

Practical
UNIT I
Clinical tests and their interpretation related to diseases of alimentary tract, liver, cardiovascular system, blood and blood-forming organs of various species of animals.
UNIT II
Clinical tests and their interpretation related to respiratory, urinary, nervous, endocrine, musculoskeletal and integumentary systems of various species of animals.

Suggested Readings

VCM 613  VETERINARY EMERGENCY MEDICINE  0+2

Objective
Diagnosis and therapeutic management of various medical emergencies in farm and companion animals.

Practical
UNIT I
Diagnosis and therapeutic management of various emergencies of cardiovascular, respiratory, gastrointestinal, urinary and nervous systems,
UNIT II
Diagnosis and therapeutic management of various emergencies of toxicities, sting bites and burns of farm and companion animals.
UNIT III
Monitoring critical ill patient, application of emergency care procedures for resuscitation of critically ill patient

Suggested Reading

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 UROLOGICAL DISORDERS 2+0

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 DERMATOLOGICAL DISORDERS 2+0

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 profile, 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, thoracenetsis.

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)
* 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/ipsa (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
# Course Structure – at a Glance

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VETERINARY EPIDEMIOLOGY AND PREVENTIVE MEDICINE

Course Contents

VEP 601  PRINCIPLES OF EPIDEMIOLOGY  2+0

Objective
To familiarize students with epidemiological concepts.

Theory
UNIT I
Definitions, scope, concepts, types, application and common terms used in epidemiology.
UNIT II
Host-Agent-Environmental factors in causation of diseases and disease patterns.
UNIT III
Epidemiological data: its nature, sources, collection, storage, retrieval and presentation.
UNIT IV
Epidemiological studies: Experimental and observational, international organizations and laws regulating animal diseases.

Suggested Readings
Narayan KG. 2004. *Epidemiology, Diagnosis and Management of Zoonoses*. ICAR.

VEP 602  APPLIED EPIDEMIOLOGY  1+1

Objective
To acquaint students with the application of epidemiology in disease diagnosis, prevention and control.

Theory
UNIT I
Surveys, sampling and collection of information, design questionnaires, disease monitoring and surveillance.
UNIT II
Epidemiological investigations of disease outbreak, modeling, disease forecasting, serological and molecular epidemiology.
UNIT III
Economics of diseases and different strategies for prevention and control of diseases and syndromes. Disease free zones and zero disease concept.
UNIT IV
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

**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**

**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**
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

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, complyobacteriosis, tuberculosis, Johne’s disease, braxy, entero-toxaemia, brucellosis, salmonellosis, leptospirosis.

UNIT III
Actinomycosis, actinobacillosis, ringworm, cutaneous streptothricosis, sporotrichosis, aspergillosis, coccidiodomycosis, 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.
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 diarrhea, 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, trypanosomiosis, toxoplasmosis, coccidiosis.

UNIT IV
Sarcocystosis, fascioliosis, amphistomiosis, gastro-intestinal nematodiosis, schistosomiosis, 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

UNIT III
Trypanosomiasis/ dourine, babesiosis, parasitic pneumonia.

UNIT IV
Cutaneous eczema, cutaneous acne, cutaneous pustular dermatitis, candidiasis, histoplasmosis, coccidiomycosis, dermatophytosis.

Practical
Diagnostic tests and serological tests for study of epidemiology of infectious diseases of equines.

Suggested Readings

VEP 609 INFECTIONOUS DISEASES OF CANINES AND FELINES 2+1
Objective
Learning of etiology, epidemiology, pathogenesis, symptomatology, diagnosis and treatment of infectious diseases of dogs and cat.

Theory
UNIT I
Bacterial diseases: salmonellosis, campylobacteriosis, mycobacteriosis, actinomycosis, nocardiosis, streptococcosis, leptospirosis, borreliosis, tetanus, botulism. Viral diseases: canine-distemper, infectious canine hepatitis, parvovirus infection, rabies, infectious tracheo-bronchitis, corona virus infection.

UNIT II
Feline diseases: feline pan-leucopaenia, feline infectious peritonitis, feline herpesvirus, feline spongiform encephalopathy, feline calci virus, feline immuno-deficiency virus (FIV).

UNIT III
Toxoplasmosis, neosporosis, sarcoptic mange, demodectic mange, hookworm and toxocara canis infections, leishmaniasis, canine babesiosis, ehrlichiosis, hepatozoonosis.

Practical
Assignments, recent diagnostic/ serological tests for the diagnosis of important diseases of dogs and cats. Vaccination schedule for various diseases. Collection of material from clinical cases.

Suggested Readings

VEP 610 INFECTIONOUS DISEASES OF POULTRY 2+1
Objective
Learning of etio-pathology, diagnosis, prevention and control of important infectious diseases of poultry.
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

UNIT III
Fungal and parasitic diseases: aspergillosis, candidiosis, 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

VEP 611 INFECTIONOUS 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 septicemia, 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.
**Suggested Readings**


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**VEP 612**

**INFECTIOUS DISEASES OF LABORATORY AND ZOO ANIMALS**

**Objective**

Learning of specific diseases of laboratory and zoo animals which will help in understanding, and managing them in good health and employing good sanitation and bio-security measures.

**UNIT I**

Specific diseases of laboratory animals caused by bacteria, viruses, fungi and parasites.

**UNIT II**

Specific diseases of zoo (captive) animals caused by bacteria, viruses, fungi and parasites.

**Suggested Readings**


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**VEP 701**

**RECENT CONCEPTS IN EPIDEMIOLOGY AND DISEASE FORECASTING**

**Objective**

To learn about different epidemiological aspects of major diseases and to develop suitable disease forecasting system.

**Theory**

**UNIT I**

Review of epidemiological concepts and applications, recent concepts.
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**

**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**

**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

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 radioactively 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 708  ADVANCES IN PREVENTION AND CONTROL OF  2+1
INFECTIOUS DISEASES OF RUMINANTS

Objective
To understand advancements made in the field of etiology, pathogenesis, epidemiology, symptomatology, diagnosis, treatment and control of diseases of ruminants.

Theory
UNIT I
Bacterial diseases of economic importance in bovines, sheep and goats.
UNIT II
Viral diseases of economic importance in bovines, sheep and goats.
UNIT III
Fungal diseases of economic importance in bovines, sheep and goats.
UNIT IV
Blood protozoan and rickettsial diseases of economic importance in bovines, sheep and goats.
UNIT V
Parasitic diseases of economic importance in bovines, ovines and caprines.

Practical
Latest diagnostic and serological tests for establishing disease diagnosis, designing preventive and control measures for major diseases of veterinary importance caused by bacteria, viruses, fungi, rickettsiae, parasites and protozoa.

Suggested Readings

VEP 709  ADVANCES IN PREVENTION AND CONTROL OF  2+1
INFECTIOUS DISEASES OF EQUINES

Objective
To train students in learning and practicing advancements made in the field of prevention and control of important infectious diseases of equines.

Theory
UNIT I
Bacterial diseases of economic importance in equines.
UNIT II
Viral diseases of economic importance in equines.
UNIT III
Fungal diseases of economic importance in equines.
UNIT IV
Blood protozoan and rickettsial diseases of economic importance in equines.
UNIT V
Parasitic diseases of economic importance in equines.
Practical
Latest diagnostic and serological tests for establishing disease diagnosis, designing preventive and control measures against major diseases of veterinary importance caused by viruses, rickettsiae and protozoa.

Suggested Readings
Selected articles from journals.

VEP 710 ADVANCES IN PREVENTION AND CONTROL OF 2+1 DISEASE IN PET ANIMALS

Objective
To get students acquainted with advancements made in the field of prevention and control of important infectious diseases of pet animals.

Theory
UNIT I
Bacterial diseases of economic importance in pet animals.
UNIT II
Viral diseases of economic importance in pet animals.
UNIT III
Fungal diseases of economic importance in pet animals.
UNIT IV
Blood protozoan and rickettsial diseases of economic importance in pet animals.
UNIT V
Parasitic diseases of economic importance in pet animals.

Practical
Latest diagnostic and serological tests for establishing disease diagnosis, designing preventive and control measures against major diseases of pet animals caused by bacteria, viruses, fungi, rickettsiae, parasites and protozoa.

Suggested Readings
Selected articles from journals.

VEP 711 ADVANCES IN PREVENTION AND CONTROL OF 2+1 DISEASES IN POULTRY

Objective
To impart knowledge about latest advancements made in the field of prevention and control of important infectious diseases of poultry.

Theory
UNIT I
Bacterial diseases of economic importance in poultry.
UNIT II
Viral diseases of economic importance in poultry.
UNIT III
Fungal diseases of economic importance in poultry.
UNIT IV
Parasitic diseases of economic importance in poultry.

Practical
Latest diagnostic and serological tests for establishing disease diagnosis, designing preventive and control measures against major diseases of veterinary importance caused by bacteria, viruses, fungi and other parasites.
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
* 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://calvados.c3sl.ufpr.br/ojs2/index.php/veterinary/ (Archives of Veterinary Science)
* 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/ipestics (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)
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

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<td>NEUROSURGERY</td>
<td>2+1</td>
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VETERINARY SURGERY AND RADIOLOGY
Course Contents

VSR 601  PRINCIPLES OF SURGERY  2+0
Objective
To impart the basic knowledge of principles of surgery.
Theory
UNIT I
Wound healing, current concepts of inflammation and management, wound infections, antimicrobial therapy, principles of surgical asepsis, sterilization and disinfection.
UNIT II
UNIT III
UNIT IV
Operating room emergencies, cardio-pulmonary embarrassment and resuscitation, monitoring of surgical patient.
UNIT V
Principles of laser surgery, cryosurgery, electrosurgery, lithotripsy and endoscopy, physiotherapy, stem cell therapy etc.
Suggested Readings

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

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

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
Thurmon JC, Tranquilli WJ & Benson JG. (Eds.). 1996. Lumb and Jone’s Veterinary Anaesthesia. 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

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

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 conjuctiva, cornea, sclera, iris, orbit, lens, vitreous and aqueous humor, retina and optic nerve.
UNIT V
Ocular manifestation of systemic diseases.
UNIT VI

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, preparation of teeth extraction/implantation. Dentistry instrumentation, dental radiography, teeth cleaning, tooth extraction.

Suggested Readings

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

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

VSR 610    ORTHOPAEDICS AND LIMB SURGERY    2+1

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

Theory
UNIT I
Fractures and dislocations, fracture healing, ligaments and tendons - repair techniques.
UNIT II
Treatment of fractures of different bones in domestic animals, bone diseases.
UNIT III
Various affections of the joints, their diagnosis and treatment.
UNIT IV
Conformation of the limb, anatomy of hoof.
UNIT V
Lameness and allied surgical conditions of fore limbs/hind limbs, rehabilitation of orthopaedic patient.

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

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

VSR 701    CLINICAL SURGICAL PRACTICE - 1    0+3

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

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

**VSR 702  CLINICAL SURGICAL PRACTICE - II  0+3**

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

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

**VSR 703  CLINICAL SURGICAL PRACTICE - III  0+3**

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

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

**VSR 704  ANAESTHESIA OF WILD AND LABORATORY ANIMALS  1+1**

**Objective**
To impart the basic and practical knowledge of chemical immobilization, sedation and anaesthesia of laboratory animals, captive and free ranging wild animals.

**Theory**
- **UNIT I**
  General considerations in chemical restraint of captive and free ranging wild animals.
- **UNIT II**
  Methods of administration of anaesthesia in captive, free ranging animals and laboratory animals.
- **UNIT III**
  Local and general anaesthesia in exotic species, wild animals, zoo animals and laboratory animals.
- **UNIT IV**
  Anaesthetic emergencies and complications.

**Practical**
Familiarization with capture equipments, local anaesthetic techniques, use of various preanaesthetic and anaesthetic agents in laboratory animals, monitoring of patient during general anaesthesia.

**Suggested Readings**
Selected articles from journals.

**VSR 705  ADVANCES IN ANAESTHESIOLOGY  2+1**

**Objective**
To impart the advanced knowledge of animal anaesthesia.
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-Mullar tubes, photo-multiplier tube, medical use of isotope, dosimetry, nuclear medicine and its use in diagnosis of thyroid, kidney, bone and liver function studies.

UNIT IV
Labelling of isotope and biological uses, detonation and fission products.
UNIT V
Radiation therapy in cancer patients, biological effects of radiation physics, physics of radiation.

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

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

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

Suggested Readings
Selected articles from journals.

VSR 707 NEUROSURGERY 2+1
Objective
To impart theoretical and practical knowledge of treatment of surgical affections of nervous system in animals.

Theory
UNIT I
Nervous system- anatomy and physiology.
UNIT II
Clinical neurology, pathogenesis of disease of the central nervous system.
UNIT III
Diagnostic methods- electrodiagnostic methods, neuroradiology.
UNIT IV
Fundamentals of neurosurgery, surgical approaches to brain, surgical diseases of peripheral nerves, surgical approaches to the spine, diseases of the spinal column, intervertebral disc diseases.
UNIT V
Intracranial surgery.

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

Suggested Readings
Selected articles from journals.

VSR 708 EXPERIMENTAL SURGICAL TECHNIQUES IN ANIMALS 1+1
Objective
To familiarize with designing of experiments and various surgical models for research.

Theory
UNIT I
General considerations and protocols for designing experiments.
UNIT II
Surgical models of various systems. Care and feeding of genobiotic experimental animals.

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

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

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

UNIT VI
Tissue engineering-\textit{in vitro, in vivo, ex vivo} techniques, regenerative therapy.

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

Suggested Readings
Selected articles from journals.

VSR 789 \hfill SPECIAL PROBLEMS IN ANAESTHESIA \hfill 0+2
Objective
To impart practical exposure to experimental models related to anaesthesia for research.

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

VSR 790 \hfill SPECIAL PROBLEMS IN SURGERY \hfill 0+2
Objective
To impart practical exposure to experimental models related to surgery for research.

Practical
Investigative surgical problems in clinical or experimental models. Didactic and interpersonnel learning-teaching, problem solving self-learning strategies in problems related to surgery.
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/journalasp (Veterinary Surgery)
* www.blackwellpublishing.com/summit.asp (Veterinary anesthesia and Analgesia)
* www.blackwellpublishing.com/journalasp (Veterinary Radiology and Ultrasound)
* www.blackwellpublishing.com/journalasp (Veterinary Ophthalmology)

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)

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<td>LIBRARY AND INFORMATION SERVICES</td>
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<td>PGS 502</td>
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#### PGS 501 LIBRARY AND INFORMATION SERVICES 0+1

**Objective**

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

**Practical**

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

#### PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS 0+1

**Objective**

To equip the students/scholars with skills to write dissertations, research papers, etc.

To equip the students/scholars with skills to communicate and articulate in English (verbal as well as writing).

**Practical**

*Technical Writing* - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article.
**Communication Skills** - Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech; Participation in group discussion: Facing an interview; presentation of scientific papers.

**Suggested Readings**


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**PGS 503 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 biodiversity protection; Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.

**Suggested Readings**


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**


