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FACULTY OF ANIMAL SCIENCE, VETERINARY SCIENCE AND FISHERIES

Course Bulletin of B.V. Sc. & A.H.

AGRICULTURE AND FORESTRY UNIVERSITY (AFU)
Rampur, Chitwan, Nepal
2072

AFU BULLETIN

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Foreword

It gives me a great pleasure to write this foreword for this course bulletin of B.V.Sc. & A.H. Program. This bulletin was long due and yet timely. The Agriculture and Forestry University (AFU) is the first State-owned and technical University of Nepal established in accordance with the Agriculture and Forestry University Bill enacted by the Parliament in 2010. The constituent campuses of Tribhuvan University, the Agriculture Campus in Rampur, the Dean office, Institute of Agriculture and Animal Science, Chitwan (IAAS) and the Institute of forestry, Hetauda Campus were merged, and Agriculture and Forestry University was created in Rampur, Chitwan. The university aims at producing needed human resources to promote education, research and development in agriculture, livestock, veterinary science, fisheries, forestry and allied disciplines.

This bulletin includes all the information on the academic requirements needed by the University to complete the program and is so important to the students, faculty members & also to all those who intend to get admission in this program in the University. During the beginning phase, AFU had no faculty members of its own and upon the university administration's request, faculties of Tribhuvan University and experts from other institutions worked days and nights to complete the details of course requirements. Course coordinators were assigned to review categories of courses for further refinements. These courses were then widely reviewed, and modified by Subject Committees and forwarded to the related Faculty Board. The courses were then finally approved by the Academic Council.

I would like to acknowledge the efforts of Professor Shrawan Kumar Sah the Director of Curriculum Development Center for the painstaking job of bringing this bulletin to the present shape.
Last but not the least, the guidance of Dr. Surya Kant Ghimire, Registrar was crucial and his liberal attitude in helping this bulletin get published with all logistics and administrative support was helpful and encouraging.
I am sure this bulletin will help all those who are interested in pursuing higher studies in this University. I am confident that any errors identified and suggestions received during the course of its use will be duly considered by the Curriculum Development Center in its second edition.

Professor Kailash N. Pyakuryal, Ph.D.
Vice-Chancellor

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Message From Registrar

April, 29, 2015

Agriculture and Forestry University (AFU) is a state owned premier University for higher education, research and extension in the field of agriculture, veterinary, animal science, fisheries and forestry. Since its inception in 2010, AFU has been making continuous and strenuous efforts to design and implement educational programs for the established and emerging needs of the agriculture and forestry sector in the country. This bulletin is the outcome of such efforts for last five years.

This bulletin contains the academic information, rules and regulations, admission requirements and course description of B.V. Sc. & A.H. The various aspects of curriculum and course contents have been thoroughly discussed among the faculty members, consumer agencies and various stakeholders. The curriculum development is a dynamic process and it demands periodic review and update. Therefore, I appreciate receiving suggestions, comments or criticism from faculty members, students, consumer agencies and various stakeholders involved in agriculture and forestry.

I would like to thanks all the participants involved in the preparation of this bulletin. The chairpersons and the members of the subject committees and the faculty members of AFU deserve thanks and appreciations. Finally, I appreciate and congratulate Prof. Dr. Shrawan Kumar Sah, Director, curriculum development Center for his efforts in bringing out this bulletin in the present shape.

I hope, this bulletin will be useful and serve as guideline for the faculty members, students and all other concerned personnel and institution involved in the agriculture and forestry sector development in Nepal.

Thanks

Surya Kant Ghimire, PhD.
Registrar
&
Chairman of CDC

CONTENT

1. INTRODUCTION

1.1 Agriculture and Forestry University

Agriculture and Forestry University (AFU) is Nepal's premier University for higher education, research and extension in the field of agriculture, veterinary, animal science, fisheries and forestry. The University was established with the enactment of Agriculture and Forestry University Act- 2010 by the parliament in a land-grant government university model. This is the first and specialized technical university of the country. The purpose of the university is to conduct academic programs integrating teaching, research and extension to produce academic and skilled professionals in the allied agricultural and forestry fields so as to improve the socio-economic status of the rural people by modernization of agriculture. The University was constituted by upgrading the Institute of Agriculture and Animal Science (IAAS) at Rampur, Chitwan and Institute of Forestry at Hetauda, Makwanpur, which were previously under the Tribhuvan University (TU).

Objectives of the AFU

1. To design and implement educational programs in agriculture, veterinary, animal science, fisheries and forestry for the established and emerging needs of the agriculture and forestry sectors in the country;
2. To produce technically competent man power in the field of agriculture, veterinary, animal science, fisheries and forestry for the application of knowledge and skills for the development of the Nation;
3. To promote excellence in teaching, research and extension in agriculture and forestry;
4. To encourage and support faculty members and students for research and scholarly activities relevant to the needs of agriculture and forestry; and
5. To foster students self development, commitment and responsibility for the welfare of Nepalese society.

1.2 Faculty of Animal Science, Veterinary Science and Fisheries

Faculty of Animal Science, Veterinary Science and Fisheries (FOAVF) is located at Rampur in Chitwan district. It was previously the IAAS veterinary and animal science school under the TU. The IAAS itself was established in 1974 in Rampur, Chitwan. The location of the FOAVF, Rampur, is 9 Km West of the town of Bharatpur; headquarter of Chitwan district, and 157 Km south-west from Kathmandu. It is situated at an altitude of 228 meters above the sea level. It has a subtropical humid climate with three distinct seasons; rainy season (June-October), winter season (November – February) and summer season (March- May). The hottest month is May and the coolest month is January. The average annual rainfall in Rampur is about 2000 mm. The FOAVF is expanded in 125 ha of land that harbors the academic buildings, veterinary teaching hospital, livestock and aquaculture farms and staff residences.

2. PHYSICAL FACILITIES AT THE FOAVF.

2.1 Instructional Livestock Farm Complex (ILFC)

The Instructional Livestock Farm Complex is a separate unit under the independent incharge of a Faculty Member with specialization in the Animal science and Veterinary science. The farm complex is used for teaching in rearing of livestock species including poultry with the following facilities:

i) Housing, feeding, breeding and management of large and small ruminant units, piggery, poultry and equine
ii) Record keeping
iii) Storage facilities for feed and fodder
iv) Production facilities for fodder crops
v) Suitable- housing for managerial and technical staffs.

All the concerned staff on duty in the Instructional Livestock Farm Complex are responsible for management including emergencies of the animals in the Livestock Farm. They arrange and supervise the routine management practices from time to time and maintain record for the same. They are also responsible for production activity in each of the units.

2.2 Veterinary Teaching Hospital (VTH)

Veterinary teaching hospital is a separate unit under the independent incharge of a Faculty member of the rank of a Professor with specialization in any of the clinical subjects. It has client accommodation, emergency service and the necessary facilities to conduct and demonstrate/ train all medical, surgical and gynecological cases and separate "in Health" care facilities like artificial insemination, pregnancy diagnosis, health verification tests, prophylaxis etc.
VTH also have residential accommodation for clinical and hospital staff and students for emergency/night duties and cafeteria/canteen for staff, students and clients. All the concerned staff on duty in the teaching veterinary hospital are responsible for the treatments and allied public services and invariably attend the clinics including emergencies/ night duties and on Sundays/ holidays. The staff as well as students should be properly attired and equipped for the performance of clinical duties.

The hospital maximally utilizes the animal/patient information observing all the time the principles of animal welfare and ethics, and arranges the teaching material in the form of clinical cases in sufficient number, variety and species. It also Subsidize treatment to encourage larger attendance in teaching veterinary, hospitals and procure or provide free maintenance to, cases of academic interest or typical' cases of teaching value so that students can benefit from them. In the case of death/ euthanasia detailed necropsy be demonstrated and specimens preserved.

2. 3 Fish pond and Fish breeding Complex:

The Aquaculture Department has all basic facilities needed to fulfill requirements of the higher levels of education. The Department has a farm, a hatchery complex and a lab. The farm is extended to 4.8 ha and includes 36 earthen ponds. The farm is used for production, teaching and research. The hatchery includes five breeding tanks, eighteen nursing tanks, two earthen fingerling ponds, an overwintering tank and five holding tanks. The hatchery is accommodated for carp and tilapia breeding. In addition, the Department also has a rice-fish demonstration plot near the hatchery. The lab contains all equipments essential for water quality analysis and also some for feed analysis. The Department lacks a building at the moment but a new building will be built very soon to accommodate lab, classroom and office.

3. ACADEMIC PROGRAMS OF THE FOAVF

The FOAVF offers following degree from different faculties and campuses:

3.1 Bachelor of Veterinary Science and Animal Husbandry (B.V. Sc. & A.H.)

The aim of this program is to produce academically competent and practical oriented professional veterinarians and animal scientists. The B. V. Sc. & A. H. Program is a ten - semester (five years) program after 12 years of schooling with majoring in science in the high school. Besides the regular B.V.Sc. and A. H. courses, students will have following requirement to successfully complete the degree. These will be non-credit activities but shall be mentioned in the degree transcript along with the grades obtained.

3.1.1 Tracking Programs

The tracking programs have been developed to allow students to exercise more control over the specific direction of their profession and motivate them for self-teaming through virtual classroom, distant learning, internet etc. A student has to compulsorily take any two programs of two credits each (2x2=4 credits) any time (one semester duration each) during second year to fifth year of B.V.Sc. & A.H. Degree Course under the supervision of one faculty member as designated by the Dean of the Faculty for that program. Evaluation of the students for this program shall be done internally on Satisfactory/ Unsatisfactory basis. In case of unsuccessful candidates, the program can be carried over to the next semester/year. List of the Tracking Programs are given below:

i) Feline Medicine
ii) Cryobiology of Gametes
iii) Neurosciences
iv) Clinical/ Interventional Nutrition
v) Dermatology/integument Science
vi) Alternate Veterinary Medicine
vii) Ophthalmology
viii) Anesthesiology
ix) Small Animal Critical Care
x) Non-Mammalian Medicine

xi) Sports Animal Medicine
xii) Drug designing

3.1.2. Study Circles

Each student of B.V.Sc. & A.H. degree course shall have to enroll himself/herself for at least two Study Circle activities daring the B.V.Sc. & A.H. degree course out of the proposed Study Circles-as listed below:

i) Livestock and Livelihood Study Circle
ii) Production Systems Study Circle
iii) Ecosystems and Livestock Study Circle
iv) Equine Study Circle
v) Canine Study Circle
vi) Diagnostic Study Circle
vii) Alternate Animal Use Study Circle
viii) Fun/Sport Animal Study Circle
ix) Law and Veterinary Science Study Circle
x) Livestock products study circle

The Faculty Dean shall designate an advisor for each of the above Study Circle activities who shall supervise, guide, monitor and evaluate the activities of the Study Circles. Each enrolled student shall have to present a Seminar on the topics of his/her Study Circle any time during the Semester. The date and time of the Seminar shall be notified inviting participation of all students. The Study Circle shall also put up news, wall papers, drawings, exhibits of their subject in the Faculty buildings. The Dean of the Faculty shall coordinate the activities with the Advisors for each of the above Study Circles. The evaluation of the student for each of the registered Study Circles shall be done internally on Satisfactory/ Unsatisfactory basis. The same shall be recorded in the Degree Transcript along with the grades obtained. No student shall be allowed to change the Circles during the professional year.

3.1.3 Entrepreneurial Training

Each student of B.V.Sc. & A.H. degree course shall be required to compulsorily undertake one of the activities of Entrepreneurial Training as listed below. This training is aimed at developing entrepreneurial skill for self employment. The university shall provide interest free loans out of a revolving fund (Rs.2 lakhs) to student groups (team of up to five students), technical support and infrastructure for these activities. Inputs, day-to-day work and financial accounting shall be undertaken by the students. The profits/loss, if any, shall be kept/borne by the students. However, in case of loss, the Dean of the Faculty through the Entrepreneurship Committee consisting of four faculty members (at least one subject matter specialist) may evaluate the reasons of such loss and provide compensation in case it is found that the loss has been inadvertent .Proposed list of 17 Entrepreneurial activities is as follows:

1. Goat Production
2. Sheep Production

3. Pig Production
4. Broiler and Egg Production
5. Pet Production
6. Dairy Production
7. Meat Production and Processing
8. Feed Production-Mineral Mixture
9. Milk Products
10. Food safety-residue Analysis
11. Clinical Investigatory laboratory
12. Quality Control-Evaluation (Microbial)
13. Shoeing and Shoe Manufacture
14. Production of Diagnostic
15. Pharmaceutical Formulations,
16. Fish Production
17. Existing economics of livetock enterprizes

Besides, the Faculty may also offer the facilities for Entrepreneurial Training involving the activities of regional interest

3.1.4. Internship

(a) After passing the nine semester examinations, every student of B.V.Sc. & A.H. degree course shall be required to undergo a compulsory rotating internship for a minimum of six months so as to be eligible for the B.V.Sc & A. H. degree and fulfill the Nepal Veterinary Council registration criteria.

(b) Compulsory rotating internship shall include a full time training in veterinary and animal husbandry services including emergencies and night duties, Sundays and holidays). The intern will devote whole time to the training and will not be allowed to accept a whole time or part time appointment paid or otherwise,

(c) Internship shall be undertaken only after completion of all credit requirements of veterinary curriculum including Tracking Programs, Study Circles, Entrepreneurial Training as prescribed under these regulations.

(d) The university shall issue a provisional course completion certificate of having passed all the professional examinations up to 4th year and having successfully completed course work.

(e) The Veterinary Council of Nepal will grant provisional registration to the candidate on production of provisional B.V.Sc. & A.H. course completion certificate. The provisional registration will be for a minimum period of six months.

(f) After provisional registration with the Veterinary Council or Veterinary Council of Nepal, the candidate shall register for internship of six calendar months.

(g) Interns will be actively involved in rendering veterinary service under the supervision of an experienced teacher.

(h) They shall assist the teacher in all activities of the units they are posted in.

(i) During the period of internship they shall be" provided remuneration in the form of internship allowance as may be decided by the Faculty of Animal Science, Veterinary Science and Fisheries from time to time.

(j) Attendance will be compulsory. The candidate will be entitled for 10 days casual leave. The leave cannot be claimed as a matter of right until and unless the sanctioning authority sanctions it. If an intern will fully absents from the training program even if for part of a day or during off hours duty (including Sundays/holidays) he/ she may be treated absent for that day. The candidate will be required to undergo training for the additional days in lieu of the absence period and internship allowance will not be paid for these additional days.

(k) The internship program shall be monitored by a Committee constituted by the Dean under his/her chairmanship including among others the Director of VTH, Departmental Heads and Director of ILFC as members. This Committee shall monitor effective implementation of the internship training program from time to time. The member secretary would be the Director of VTH or the Departmental Heads.

(l) In case of unsatisfactory work/ performance and/or shortage of attendance, the period of compulsory rotating internship shall be extended by not more than two months by the appropriate authority If this period is more than two months, the intern has to re-register afresh for internship program for entire six calendar months including registration with the Nepal Veterinary Council.

(m) Internship allowance will be paid only for six calendar months. No internship allowance will be paid for the period of absence/unsatisfactory performance/extended period.

(n) The compulsory rotating internship for six calendar months shall be done in teaching and approved Veterinary Polyclinics/Veterinary Hospitals, Veterinary Biological Centers, Farms, National Parks and wildlife conservation and Veterinary Disease Investigation Centers. The internship program can be undertaken at approved veterinary institutions in Nepal.

(o) The compulsory rotating internship shall be in the following areas:

(i) Clinical training covering veterinary medicine, surgery and radiology, animal reproduction, gynecology and obstetrics, clinical emergencies, indoor ward care, hospital management record keeping etc. for three months.

(ii) Livestock production and management training, covering farm routines of cattle and buffalo farms, piggery/rabbitary, sheep and goat farms, and equine/ camel unit etc. for one month.

(iii) Poultry production and management covering layer and broiler Production, hatchery and chick management quail, turkey, duck units etc. as well as fishery or any other recycling unit where feasible, for one month.

(iv) Livestock technology and service' covering familiarization in biological product units, disease control campaigns (disease investigation and sample collection and dispatch, vaccination, mass testing etc.) in plant training in meat plants, milk plants, etc. training in zoo/ wild life center/ national parks, for one month.

(p) Details of day to day work, posting and duration needs to be worked out by the Veterinary Institution as per its needs and infrastructure facilities,

(q) Where an Intern is posted to a recognized Veterinary hospital for training, a Representative of the Faculty and the Director of the Veterinary Teaching Hospital shall regulate the training of such interns,

(r) Every Intern shall render professional veterinary service, skill and knowledge under supervision and guidance of a registered veterinary practitioner working in the approved Veterinary Institution.

(s) Function, responsibilities and duties of Interns:

(i) Participation with clinical faculty in the hospital practice.

(ii) Shares the emergency and night duties on rotation in the larger and small animal hospitals including Sundays & holidays.

(iii) Participation with staff of the place of posting in Veterinary Practice (production or technology).

(iv) The intern responsibilities include hands-on diagnostic and treatment procedures for hospitalized cases under the supervision of the attending veterinarian.

(v) Participation in the tutorial instructional program of the Veterinary Faculty.

(vi) The intern will administer primary care to emergency cases and participate in service such as anaesthesia, radiology, ultrasonography, endoscopy, laboratory and diagnostic procedures. Medicine and Surgery rounds are held periodically allowing the interns to present cases and participate in topic discussion.

(t) The training shall be supplemented by weekly sessions of clinical conference, farm operation and data analysis, preparation of feasibility reports, project report, campaigns/ discussions in, clinical training, farm training and technology and services respectively.

(u) For the purpose of internship all necessary inputs like accommodation, transport, adequate clinical facilities etc. shall be provided through internship allowance.

(v) The intern shall maintain a log book of day to day work which may be verified & certified by the supervisor under whom he/she works. In addition, the interns will prepare a brief project report on the basis of his/ her case study/ case analysis, survey reports etc. This shall be based on his/ her own study during the internship. Such reports can be supervised by more than one teacher, if required. The interns shall present such report in seminar organized for the purpose.

(w) The grading shall be based upon the evaluation of log book, their performance reports from the site advisors, project report and Internship report presentations at the end of the program by an Evaluation Committee conducted at the end of the program comprising of the faculty representing the concerned departments appointed by the Dean for this purpose.

(x) Every Intern shall have to submit an Entrepreneurial Project during the Internship Program.

3.1.5. Comprehensive Examination on Core Competence in Veterinary skills:

The competence in veterinary skills examination shall be based on an evaluation of core competence in professional skills as detailed below;

1. Restraint of cow, sheep, horse, dog and pig. Haltering, snaring, muzzling, tad switch, bandaging of horse for exercise and stable bandaging
2. Animal identification, Dentition and ageing of animals
3. Housing layout/requirements of livestock and poultry
4. Computation of ration of livestock of different breeds and age groups in health and disease
5. Fodder management and interpretation of feed quality evaluation
6. Physical evaluation of livestock health parameters (auscultation, percussion, recording of temperature, pulse, heart rate, respiration rate etc.)
7. Recording and interpretation of cardiovascular response
8. Testing of milk and milk products for quality, clean milk production
9. Carcass quality evaluation (ante-mortem & post-mortem examination)
10. Specific diagnostic tests for zoonotic diseases
11. Sample collection, handling-and dispatch of biological materials for laboratory examination
12. Staining techniques for routine clinico- pathological examinations
13. Relating post-mortem lesions to major livestock diseases
14. Hematological evaluation (total leukocyte count, differential leukocyte count, hemoglobin, packed cell volume, erythrocyte sedimentation rate etc.) and interpretation
15. Tests and their interpretation for haemoprotozoan diseases
16. Body fluids collection, examination and interpretation as an aid to diagnosis
17. Urine evaluation procedures and interpretation as indicators for diagnosis of diseases
18. Fecal examination- procedures and interpretation
19. Examination of skin scrapings and interpretation
20. Interpretation of blood chemistry profile in diseases
21. Deworming procedures and doses for different species of animals/birds
22. Managing an outbreak of infectious/contagious disease
23. Approach to diagnosis of a given disease condition
24. Pre-anesthetic administration and induction, maintenance of general anesthesia and dealing with anesthetic emergencies
25. Local anesthetic administration
26. Nerve blocks-sites, functional application
27. Suture material, suture pattern and tying knots
28. Common surgical procedures including dehorning, docking, caesarian section, ovariohysterectomy, castration, rumenotomy
29. Application of plaster cast/splint for fracture immobilization and other bandaging procedure in large and small animals.
30. Soundness in horses
31. Rectal examination - palpation of pelvic/abdominal organs in cattle/ horses/ buffaloes,
32. Detection of oestrus, artificial insemination, pregnancy diagnosis,
33. Management of vaginal/uterine prolapse and dystocia

34. Andrological examination of bull, handing, preservation and evaluation of semen
35. Vaccination procedures, vaccination schedules and vaccine types for different diseases
36. Handling of radiograph, interpretation of a given radiograph of large and small animals
37. Client management
38. Managing a clinical practice, ambulatory van, transporting a sick animal requirements, etc.
39. Dosage regimens of important drugs
40. Drug administration techniques in different species of animals-oral, parenteral, rectal, intra-peritoneal and intra-uterine
41. Identification of major livestock/poultry breeds
43. Measuring climatic parameters and their interpretation
44. Communication technology tools

3.2 Bachelor of Science in Fisheries (B. Sc. Fisheries.)

The aim of the program is to train highly competent and professional man power in fisheries. This is a four-year (eight semesters) program after 12 years of schooling with majoring in science in the high school.

3.3 Doctor of Philosophy (Ph. D.)

Doctor of Philosophy (Ph.D.) program is conducted in various Departments of FOAVF in Rampur, Chitwan. Ph. D. is a three years program after Master degree in the relevant field and maximum allowable duration is seven years. The Ph. D. program is conducted either by course and research or by research only.

4. STUDENT ADMISSION

4.1. Admission committee

The Faculty Dean forms an admission committee within the framework of the Agriculture and Forestry University's rules and regulations to formulate the policies concerning student intake and entrance examination.

4.2. Advertisement for Admission

An advertisement regarding student admission is done in national newspaper and on the website of Agriculture and Forestry University (http:// www. afu.edu.np). The exact date of admission process may vary from year to year but it generally starts in August- September and classes starts from mid of November.

4.3. Admission requirements for Bachelor degree

Students with I. Sc. (Basic Science) or 10+2 (Science) with compulsory English, Physics, Mathematics, Chemistry and Biology securing a minimum of 50% marks in aggregate from any recognized Universities or Boards are eligible to apply for B.Sc. Ag, B. V. Sc. & A.

H., B. Sc. Fisheries, B. Sc. Forestry program. The selection for admission is on merit basis through an entrance examination. Girls' students and students from disadvantage group are provided some preferences in terms of reserved quota and leverages in admission requirements.

5. EDUCATION SYSTEM

5.1 Semester system

The Agriculture and Forestry University follows a semester system of education for all academic programs. There are two semesters in each academic year. One semester covers a period of ninety effective working days of teaching and two weeks for final examination. The academic calendar is prepared in the beginning of academic session by the faculty dean and circulated to all departments for effective functioning of academic program.

5.2 Vacations and holidays

There will be one month vacation at the start of Dashain festival and one month vacation during summer generally after the middle of Jestha. The other vacations depend upon the calendar of the Agriculture and Forestry University. The class work generally remains closed during vacation.

6. EXAMINATION SYSTEM

6.1 Internal assessment

The Agriculture and Forestry University follows semester system of examination for evaluation. A total of 20% of full marks in theory in each subject is evaluated internally by the subject teacher through an internal assessment. The student must secure 40% marks in the internal assessment to qualify for final examination. The course teacher gives one chance for makeup test to those who fail in the first internal assessment or missed for valid reasons.

6.2 Final theory and practical examination

The Examination Controller Office, AFU conducts a separate final theory examination of 80% of total marks, and 100% of practical for each level externally through an external system of examination. A students must secure at least 40% marks in theory and practical separately to pass the final theory and practical examination in each subject. The students who fail in the final theory or practical examination are allowed to take a back-paper examination conducted by the Examination Controller Office, AFU in each semester after about a month of announcement of final examination result of previous semester. Those who fail in the back paper examination must register the course again and take the regular class along with regular students of the particular semester.

6.3 Attendance Requirement

A student must attend at least 70% of classes in theory and practical in each subject to be eligible for final examination. All teachers will submit their attendance register to the Faculty Dean after the end of classes of each subject.

6.4 Grading System

A student will be graded at 1- 4 scale; 1 being the lowest and 4 being the highest grade. A, B, C and D grade will be awarded according to marks obtained in the courses.

Grade	Marks obtained
A	80 % and above
B	65 % and less than 80 %
C	50 % and less than 65 %
D	40 % and less than 50 %

The students must secure grade point 2 to pass the undergraduate courses.

7 CURRICULUM DESIGN AND DELIVERY

The curriculum is designed to provide learning opportunities to meet the requirements for the degree. The curriculum includes the basic and core courses and practical required for each disciplines. The content of courses has been discussed critically among the experts and faculty of related disciplines. The course codes listed have short text of the subject matter with numbers. The first digit of the number indicates the year in which a course is offered and other digit indicates the serial number of course. Each theory or practical credit hours is equivalent to 25 marks in theory or practical. For example, a course with credit hours of 2+1 has full marks of 75 (Theory 50 and practical 25). One credit for theory means one- hour of theory per week, and for practical means two to three hours of practical per week.

8 STUDENTS' WELFARE

The facilities for student' welfare at Faculty of Animal Science, Veterinary Science and Fisheries (FOAVF) includes students' hostels, health care and medical facilities and facilities for sports, extracurricular activities and recreation. There is Directorate of Student Welfare (DSW) for organizing sports and other cultural programs. In addition students clubs and cultural groups also organize extracurricular activities from time to time.

8.1 Scholarship

The AFU provides scholarship to meritorious students. At present 25 percent of the students receive a scholarship of Rs. 600 per month up to maximum of 5 months in each semester. The scholarship of first semester is given on the merit basis on the marks obtained in the internal assessment whereas; in the second semester and onwards scholarship is given on the basis of marks obtained in previous semester. In addition 25 percent of students are provided with free ship that waives payment of the tuition fees.

9 OTHER REQUIREMENTS AND RULES

The aspects of instruction, evaluation and other areas of academics not mentioned here are as per rules and regulations of the AFU. The university may change any rules and regulations any times as required for its effective functioning.

Semesterwise Distribution of Courses
For B.V.Sc. and A.H.

1st Semester

Course	Code	Name of the subject	Credit Hours
VAN	101	Gross Anatomy I (Osteology, Arthrology and Biomechanics)	1+2
VAN	102	Gross Anatomy II (Myology, Neurology, Angiology and Aesthesiology)	2+2
VBC	101	General Biochemistry	2+1
LPM	101	Ruminant Production and Management	2+1
ANU	101	Principles and Practices of Fodder Production and Pasture Management	2+1
EXT	101	Sociology and Principles of Vet. and A. H. Extension	1+1
Total			**10+8**

2nd Semester

Course	Code	Name of the subject	Credit Hours
VAN	103	Veterinary Histology and Embryology	2+2
VPY	101	Physiology I (Locomotor, Cardiovascular, Blood and Respiratory System)	2+1
LPM102		Non ruminant Production (Pig and Poultry)	2+1
VBC 102		Physiological Biochemistry	2+1
ANU 102		Principles of Animal Nutrition	1+1
LPM 103		Animal Housing and Sanitation	1+1
AST 302		Biostatistics and Computer Application	2+1
Total			**12+8**

3rd Semester

Course	Code	Name of the subject	Credit Hours
VAN	204	Splanchnology and Applied Anatomy	2+2
VPA	201	Parasitology I (General Veterinary Parasitology and Cestode Parasites)	2+1
VPY	202	Physiology II (Digestive Excretory and Nervous System)	2+1
VPP	201	General Pathology	2+1
ANU	203	Applied Animals Nutrition I (Ruminant)	1+1
VMI	201	Microbiology I (General Veterinary Microbiology)	2+1
LPM	204	Bee, Pet and Lab Animal Management	1+1
ANB	201	Principles of Genetics and Animal Breeding	2+1
VPT	201	General and Systemic Pharmacology	2+1
Total			**16 +10**

4th Semester

Course	Code	Name of the subject	Credit Hours
VPY	203	Physiology III(Reproduction, Lactation and Endocrinology)	2+1
VPA	202	Parasitlogy II (Helminthology and Leeches)	2+1
VPT	202	Veterinary Neuropharmacology	2+1
VMI	202	Microbiology II (Veterinary Immunology and Serology)	2+1
VPP	202	Systemic Pathology	2+1
ANU	204	Evaluation of Feed Stuff	1+1
ANU	205	Applied Animals Nutrition II (Non- ruminant)	1+1
ANB	202	Animal Breeding and Biotechnology	2+0
AQU	201	Principles of Aquaculture	1+1
Total			**15+8**

5th Semester

Course	Code	Name of the subject	Credit Hours
VPT	303	Veterinary Chemotherapy	2+1
VPY	304	Physiology IV (Growth Environment and Climatology)	1+1
VPH	301	Environmental Hygiene	1+1
ANU	306	Applied Human Nutrition	2+0
VMI	303	Microbiology III (Systematic Veterinary Bacteriology and Mycology)	2+1
VPA	303	Parasitology III (Veterinary Entomology and Acarology)	1+1
EXT	302	Extension Techniques in Veterinary Practices and Livestock Production	1+1
VPP	303	Special Pathology I	2+1
LPT	301	Abattoir Practices and APT	1+1
Total			**13+8**

6th Semester

Course	Code	Name of the subject	Credit Hours
VBC	303	Clinical Biochemistry	1+1
VPH	302	Veterinary Epidemiology	2+1
VPA	304	Veterinary Protozoology	2+1
VMI	304	Microbiology IV (Systematic Veterinary Virology)	2+1
VPP	304	Special Pathology II (Poultry, Fish and Diagnostic Pathology)	2+1
VOG	301	Theriogenology I (Animal Reproduction and Endocrinology)	2+1
VMC	301	Internal Medicine I (Systemic)	2+1
VCS	301	Veterinary Clinical Service I	0+1
VPT	304	Veterinary Toxicology	2+1
Total			**15+9**

7th Semester

Course	Code	Name of the subject	Credit Hours
AEC	402	Farm Management and Production Economics	2+1
VOG	402	Theriogenology II (Gynaecolgy and Obstetric)	2+1
VSR	401	Anaesthesiology	1+1
VSR	402	General Surgery	2+1
VMC	402	Internal Medicine II (Metabolic and Deficiency)	2+1
VMC	403	Preventive Medicine I (Bacterial, Fungal and Rickettsial)	2+1
VCS	402	Veterinary Clinical Service II	0+2
AQU	402	Fish Diseases	2+1
LPT	402	Milk and Milk Product Technology	1+1
VPH	403	Milk and meat Hygiene, food safety and Public Health	2+1
Total			**16+11**

8th Semester

Course	Code	Name of the subject	Credit Hours
LPT	403	Meat, Meat Products Technology	1+1
VOG	403	Theriogenology III (Animal Infertility)	2+1
VSR	403	Radiology and Diagnostic Imaging	1+1
VSR	404	Regional and Clinical Surgery I	2+1
VMC	404	Preventive Medicine II (Viral, Protozoal and Parasitic Diseases)	2+1
VMC	405	Ethics and Jurisprudence	1+0
VCS	403	Veterinary Clinical Service III	0+2
VBC	404	Molecular Biology and Biotechnology	2+1
AEC	401	Agriculture Marketing and Cooperatives	2+0
Total			**13+8**

9th Semester

Course	Code	Name of the subject	Credit Hours
VPH	504	Zoonosis and Public Health	1+1
ANB	503	Livestock and Poultry Breeding	2+1
VOG	504	Theriogenology IV **(**Veterinary Andrology and Reproductive Techniques)	1+1
VSR	505	Regional and Clinical Surgery II	2+1
VMC	506	Animal Welfare	1+0
VCS	504	Veterinary Clinical Service IV	0+2
VMC	507	Wildlife, Pet and Lab Animal Medicine	1+1
EXT	503	Social Mobilization and Community Development	2+1
LPM	505	Wildlife Production and Management	1+1
VCS	505	Veterinarian in Society	1+0
Total			**12+9= 21**

Total Credit Hours: 122+79=201

Veterinary Anatomy, Physiology and Biochemistry

Course Code : VAN 101
Course Title : Gross Anatomy I (Osteology, Arthrology and Biomechanics)
Credit Hours : 3 (1+2) Full Marks: 75 Theory: 25 Practical: 50

Objectives:

Upon the completion of the course, students will be able to apply their knowledge in the field of veterinary osteology, arthrology and biomechanics and will be able to identifty different bones, joints with their kinetics of locomotion.

Syllabus:

Osteology: Definition of the terms used in Veterinary Anatomy in general and osteology in particular. Classification, physical properties, chemical composition and structure of bones. Gross study of bones of appendicular and axial skeleton of Ox / Buffalo as type species and comparison with Sheep / Goat, Pig, Horse, Dog and Fowl with particular emphasis on their topography, contour, landmarks and functional anatomy from clinical and production point of view. Detail study of bones of head, neck, thorax, abdomen, pelvis, tail, fore limb and hind limb.

Arthrology: Classification and structure of joints. Articulation and ligaments of head, neck, thorax abdomen, pelvis, tail, fore limb and hind limb of Ox / Buffalo as type species, their structure, functional anatomy and comparison with other domestic animals from clinical and production point of view. Dissection and desription of different types of joints of Ox/ Buffalo and their comparison with other species.

Biomechanics: Biomechanics and its application with reference to quadruped locomotion, kinetics of locomotion, stress and strains falling on locomotor apparatus, landmarks, angulation and weight bearing bones of ox, buffalo and comparison with other animals particularly horse and dog. Biomechanics and kinetics of locomotion.

Course Breakdown

Theory

S.No.	Topic	No. of Lectures
1.	Definition of the terms used in Veterinary Anatomy in general and osteology in particular	1
2.	Classification, physical properties, chemical composition and structure of bones of domestic animals and birds.	1
3.	Gross study of bones of appendicular and axial skeleton of Ox / Buffalo and comparison with Horse, Sheep / Goat, Dog, Pig and Fowl.	
	(A) Appendicular Skeleton	
	(a) Bones of the thoracic limb of fore limb:	1
	Thoracic Girdle (Shoulder)/Pectoral Girdle,	
	Humerus, Radius/ulna, Carpus,	1
	Metacarpus, and Digits	1
	(b) Bones of the pelvic limb or hind limb:	
	Pelvic Girdle / Hip bone	1
	Femur, Tibia / Fibula, Patella,	1
	Tarsus, Metatarsus, and Digits	1
	(B) Axial Skeleton Skull,	1
	Vertebral column,	1
	Ribs, and sternum	1
4.	Introduction and classification of joints	1
5.	Different terms used in Arthrology	1
6.	Study of joints of head, neck, trunk, tail, thorax, forelimb, hindlimb and vertebral column	1
7.	Biomechanics and its application	1
Total		**15**

Practical

S.No.	Topic	No. of Practicals
1.	Gross study of individual bones of appendicular and axial skeleton of bovine and their comparison with other species	
	(A) Appendicular Skeleton	
	(a) Bones of the thoracic limb of fore limb:	
	Thoracic Girdle (Shoulder)/Pectoral Girdle,	1
	Arm/Humerus,	1
	Forearm/Radius/ulna,	1
	Manus;	
	Carpus,	1
	Metacarpus	1
	Digits.	1

	(b)	Bones of the pelvic limb or hind limb:	
		Pelvic Girdle/Hip bone	1
		Thigh/Femur,	1
		Leg/Tibia / Fibula, Patella,	1
		Pes;	
		Tarsus,	1
		Metatarsus,	1
		Digits	1
	(B)	Axial Skeleton	
		Skull,	2
		Cervical Vertebra,	1
	(C)	Thoraaic Vertebra,	1
		Lumbar Vertebra,	1
		Sacral Vertebra,	1
		Coccygeal Vertebra,	1
		Ribs,	1
		Sternum	1
2.		Gross study and description of different types of joints of	
		bovine and their comparison with other species Head	1
		Vertebral column	1
		Thorax	1
		Fore limb	2
		Hind limb	2
3.		Biomechanics and kinetics of locomotion.	2
Total			**30**

REFERENCE:

Dyce, K.M., W.O. Sack and C.J.G Wensing. 1996. Text Book of Veterinary Anatomy (Second Edition). W.B. Saunders Company.

McLeod, W.M. 1964. Bovine Anatomy (Second Edition). Burger Publishing Company.

Neil, D.S. 1977. The Anatomy of Sheep, University of Queensland Press, Sydney.

Sisson, S. and J.D. Grossman. 1977. The Anatomy of the Domestic Animals, Vol. 1 & 2 (Fifth Edition). MacMillan, India .

Course Code : VAN 102
Course Title : Gross Anatomy II (Myology, Neurology, Angiology and Aesthesiology)
Credit Hours : 4 (2+2) Full Marks: 100 Theory: 50 Practical: 50

Objectives:

The course will enable the students to apply their knowledge in the field of mycology, neurology, angiology and anesthesiology with particular emphasis on dissection and identification of different muscles, network of blood and nerve supply to the different parts of aninmal body and to observe the gross structures of sense organs and common integuments to know the mechanism of sense.

Syllabus:

Myology: Structural and functional classification of muscles. Gross study of skeletal muscles of head, neck, thorax, abdomen, pelvis, tail, fore limb and hind limb with their origin, insertion and action and their structural and functional importance from clinical and production point of view in Ox / Buffalo as a type species. Dissection of muscles of all body regions of Ox/Buffalo, their location, functional role in the body and comparison with other species.

Neurology: Study of central, peripheral and autonomic nervous system. Gross study of meninges, brain, spinal cord, cranial and spiral nerves and their functional importance from clinical and production point of view. Study of brain and spinal cord in different domestic animals.

Angiology: Gross morphology of heart and disposition of arteries, veins and lymphatic of head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo as type and comparison with that of Sheep / Goat, Pig, Horse, Dog and Fowl. Their importance from clinical and production point of view. Study of heart and major blood vessels in different species of animals. Demonstration of palpable Lymph nodes of the body.

Anesthesiology: Gross morphological study of the eye, ear, nose, hoof, horn and skin in Ox / Buffalo. Their functional importance and comparative study in other domestic animals. Dissection for study of eye, ear, nose, hoof and horn.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1.	Introduction and classification of muscle	1
2.	Gross study of different muscles of Head,	2
	Neck,	1
	Trunk	1
	Tail	1
	Thorax,	1
	Abdomen,	1
	Pelvis,	1
	Thoracic/ fore limb, and	2
	Pelvic /Hind limb	1
3.	Introduction and classification of nervous system	1
4.	Gross study of Brain,	1
	Spinal cord,	1
	Cranial nerves,	1
	Spinal nerves, autonomic nervous system,	1
	Brachial plexus,	1
	Lumbo-sacral plexus	1
5.	Gross study of heart, blood vessels and lymphatics of	
	Heart,	1
	Head, Neck,	1
	Thorax, Abdomen,	1
	Pelvis, Tail,	1
	Thoracic/Forelimb,	1
	Pelvic /Hind limb,	1
	Systemic, pulmonary and foetal circulation, &	1
	Hepato portal and Lymph circulation.	1
6.	Gross study of sense organs and common integuments	
	Eye, Ear	1
	Nose, Tongue	1
	Skin, Horn and Hoof	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Dissection of muscles of all body regions of bovine, their location, and comparison with other species.	
	Muscles of head,	2
	Neck,	2
	Trunk,	1
	Tail,	1
	Thorax,	1
	Abdomen,	1
	Pelvis,	1
	Thoracic/Fore limb, &	2
	Pelvic/Hind limb,	2
2.	Dissection and study of brain, spinal cord, spinal nerve and major nerve trunk in different domestic animals.	
	Gross study of Brain,	2
	Spinal cord,	2
	Spinal nerves,	1
	Brachial plexus,	1
	Lumbo-sacral plexus	1
3.	Dissection and study of heart and major blood vessels in different species of animals	
	Gross study and major blood vessels of Heart,	1
	Head,	1
	Neck, Thorax,	1
	Abdomen,	1
	Pelvis, Tail,	1
	Thoracic/Fore limb,	1
	Pelvic/Hind limb.	1
4.	Dissection and study of sense organs and common integuments of	
	Eye, Ear,	1
	Nose, Tongue,	1
	Skin, Horn and Hoof.	1
Total		**30**

REFERENCES:

Dyce, K.M., W.O. Sack and C.J.G Wensing. 1996. Text Book of Veterinary Anatomy (Second Edition). W.B. Saunders Company.

McLeod, W.M. 1964. Bovine Anatomy (Second Edition). Burger Publishing Company.

Neil, D.S. 1977. The Anatomy of Sheep, University of Queensland Press, Sydney.

Sisson, S. and J.D. Grossman. 1977. The Anatomy of the Domestic Animals, Vol. 1 & 2 (Fifth Edition). MacMillan, India .

Course Code : VAN 103
Course Title : Veterinary Histology and Embryology
Credit Hours : 4 (2+2) Full Marks: 100 Theory: 50 Practical: 50

Objectives:

This course will enable the students to learn about normal cell, basic tissue, embryogenesis, microscopic structure and development of organs of different systems of animal body.

Syllabus:

General Histology: Structure of animal cell and basic tissues and their functional activity.Epithelia and their modifications. Connective tissue and its components including blood and bone. Muscular tissue types and their functional peculiarities. Neuron, nerve fibre and ganglion. Comparison of light and electron microscopy. Histological techniques, Processing of tissues for paraffin sectioning and Haematoxylin and Eosin staining. Microscopic examination and identification of basic tissue and their components. Systemic Histology: Study of microscopic structure of the organs of digestive, respiratory, urinary, reproductive, nervous, cardiovascular, endocrine and lymphoid systems, sense organs of domestic animals and birds. Examination of histological sections of various organs/systems of domestic animals and birds. Embryology: Gametogenesis, fertilization, cleavage, gastrulation, and the development of foetal membranes in birds and mammals. Structure and types of mammalian placenta. Development of the organs of digestive, respiratory, urogenital,cardiovascular,nervous and locomotor system and organs of special sense and endocrine glands. Fetal circulation. Study of structure of mammalian ova, spermatozoa and egg of fowl. Study of serial sections of avian and mammalian embryo / foetus at different stages of development.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1.	Animal cell, cell structure	1
2.	Basic tissues	
	Epithelial tissue	1
	Connective tissue	1
	Muscular tissue	1
	Nervous tissue	1
3.	Definition, embryology, Gametogenesis, ovulation	1
4.	Fertilization, cleavage, gastrulation,	1
5.	Formation of germ layers	1
6.	Foetal membranes and placenta	1
7.	Development of digestive and respiratory system	1
8.	Development of cardiovascular system	1
9.	Development of uro-genital system	1
10.	Development of nervous system	1
11.	Development of muscular and locomotory system	1
12.	Development of special sense organs and endocrine system	1
13.	Histology of digestive system	
	Oesophagus, stomach, intestine	1
	Liver, pancreas,salivary gland	1
14.	Histology of respiratory system	
	Pharynx,larynx, trachea	1
	Bronchi, bronchiole, lungs	1
15.	Histology of cardiovascular system	
	Heart	1
	Artery, vein, capillary	1
16.	Histology of urinary system	1
17.	Histology of reproductive system	
	Male reproductive system	1
	Female reproductive system	1
18.	Histology of nervous system	
	Brain	1
	Spinal cord	1
19.	Histology of endocrine system	
	Pituitary, adrenal	1
	Thyroid, parathyroid, pineal	1
20.	Histology of lymphoid system	1
21.	Histology of sense organs	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Study of compound microscope and its parts	1
2.	Histological techniques	2
3.	Study of blood cells	1
4.	Microscopic study of basic tissues	4
5.	Microscopic study of sperm and ovum of mammals	1
6.	Study of fertilized and unfertilized eggs of fowl	1
7.	Study of serial sections of chicks at different stages of development	5
8.	Microscopic study of digestive system	2
9.	Microscopic study of respiratory system	2
10.	Microscopic study of cardiovascular system	1
11.	Microscopic study of urinary system	2
12.	Microscopic study of reproductive system	3
13.	Microscopic study of nervous system	1
14.	Microscopic study of endocrine system	1
15.	Microscopic study of lymphoid system	2
16.	Microscopic study of sense organs	1
Total		**30**

REFERENCES:

Dellmann, H.D. and E.M. Brown. 1976. Text Book of Veterinary Histology (Latest Edition). Lea and Fiebiger, Philadelphia.

Noden, D. M. and A.D. Lahunta. 1985. The Embryology of Domestic Animals. Developmental Mechanisms and Malformations.

Trautmann, A. and J. Fiebiger. 1952. The Histology of Domestic Animals (Latest Edition).

William, J. B., L.M. Jr. Wood. Colour Atlas of Veterinary Histology (Latest Edition).

Course Code : VAN 204
Course Title : Splanchnology and Applied Anatomy
Credit Hours : 4 (2+2) Full Marks: 100 Theory: 50 Practical: 50

Objectives:

Upon the completion of the course, students will be able to understand the visceralorgans, their location and relation with other structures. It also enable the students todissect specimens, identify the sites for surgical operations and conduct post-mortem.

Syllabus:

Splanchnology: Gross morphological and topographical study of various organs of digestive, respiratory, urinary, reproductive, lymphatic and endocrine systems, Pleura and Peritoneum in Ox, Buffalo as a type species and their comparison with that of Sheep/Goat, Pig, Horse, Dog and Fowl. Dissection and study of organs of digestive, respiratory, urinary, reproductive, lymphatic and endocrine systems of Ox /Buffalo and their comparative anatomy in other species.

Applied Anatomy: Different Terminology used in applied Anatomy. Palpable Anatomical body structures, peripheral lymphnodes and their use in health and disease. Learning different anatomical methods of approaching different sinuses in life. Applied anatomy of sites for laparotomy, oesophagotomy, rumenotomy, gastrotomy, tracheotomy, cystotomy, urethrotomy, palpation of anatomical structures in the abdominal and perineal regions. Radiographic visualisation of gross anatomical features of various regions of the body.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Introduction, body cavity, peritoneum	1
2.	Gross study of digestive system and their comparison with other species	
	Mouth cavity and associated organs	1
	Pharynx, oesophagus	1
	Stomach (rumen, reticulum, omasum, abomasum)	1
	Small intestine (duodenum, jejunum, ileum)	1
	Large intestine (ceacum, colon, rectum)	1
	Liver	1
	Pancreas	1
	Spleen	1
	Salivary gland	1
3.	Gross study of respiratory system and their comparison with others specie	
	Nasal cavity / mouth cavity and pharynx	1
	Larynx	1
	Trachea	1
	Bronchi and lungs	1
4.	Gross study of urinary system and their comparison with other species	
	Kidney	1
	Ureter	1
	Urinary bladder	1
	Urethra	1
5.	Gross study of male genital system and their comparison with other species	
	Testicle	1
	Epididymis	1
	Ductus deferens	1
	Urethra, Penis	1
	Seminal vesicle, prostate gland, bulbo-urethral gland	1
6.	Gross study of female genital system and their comparison with other species	
	Ovary	1
	Uterine tube / fallopian tube	1
	Uterus	1
	Vagina, Vulva	1
	Mammary gland	1
7.	Gross study of endocrine system	
	Pituitary, adrenal	1
	Thyroid, parathyroid, pineal	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Dissection and study of entire visceral organs	
	Study of organs of digestive system	3
	Study of organs of respiratory system	2
	Study of organs of urinary system	2
	Study of organs of male genital system	3
	Study of organs of female genital system	3
	Study of endocrine system	2
2.	Introduction and importance of applied anatomy	1
3.	Post mortem technique	1
4.	Learning different anatomical methods of approaching different sinuses in life	1
5.	Salivary glands and their ducts specially the parotid or stenson duct	1
6.	Study of male and female genitalia of farm animals	2
7.	Study of location of visceral organs, peripheral lymphnodes, surface veins and palpatable arteries	1
8.	Study of sites and tissues encountered during amputation of horn and tail	1
9.	Laprotomy, oesophagotomy, rumenotomy, gastrotomy, tracheotomy, cystotomy, urethrotomy,	3
10.	Caesarian section, vasectomy and castration in cattle and other species	1
11.	Nerve block, extirpation of eyeball, medial patellar desmotomy	1
12.	Study of organs of various regions of body through radiography	1
13.	Study of developing organs of foetus of cow and other species	1
Total		**30**

REFERENCES:

Dyce, K.M., W.O. Sack and C.J.G. Wensing. 1996. Text Book of Veterinary Anatomy (Second Edition). W.B. Saunders Company.

Sisson, S. and J.D. Grossman. 1977. The Anatomy of the Domestic Animals, Vol. 1 & 2 (Fifth Edition). MacMillan, India.

Bhardwaj, R.L., R. Rajput and K.S. Roy. Applied Anatomy of Domestic Animals (Latest Edition).

Tyagi, R.P.S. and J. Singh. 1995. Ruminant Surgery. A text Book of surgical diseases of cattle, buffaloes, camels, sheep, and goats (First Edition), CBS Publishers and distributors, New Delhi.

Ommer, P.A. and , K.R Harshan. Applied Anatomy of the Domestic Animals (Latest Edition).

Course Code : VBC 101
Course Title : General Biochemistry
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand the biochemical composition of prokaryotic and eukaryotic cells, biomolecules and their functions with respect to animal and veterinary sciences.

Syllabus:

Scope and importance of biochemistry, structures and functions of cell organelles and biological membranes and transport across membranes. Aqueous system and buffer system, functions of Donnan membrane equilibrium. Dissociation of acids, pH, buffer systems, Henderson-Hasselbalch equation and thermodynamic concept of biological reactions. Biological significance of important monosaccharides (ribose, glucose, fructose, galactose, mannose and amino sugars), disaccharides (maltose, isomaltose, lactose, sucrose & cellobiose), polysaccharides, (starch, dextrins, dextrans, glycogen, cellulose, inulin, chitin), and mucopolysaccharides including bacterial cell wall polysaccharides. Structures and functions of fatty acids, properties and biological significance of simple, compound and derived lipids and lipoproteins. Structure and functions of prostaglandins and bile acids. Classification, structures, properties and biological significance of proteins and amino acids. Chemical reactions and buffering actions of amino acids. Chemistry of purines, pyrimidines, nucleosides and nucleotides. Biological significance of nucleosides & nucleotides. Structures and functions of deoxyribonucleic acid (DNA) and a typical ribonucleic acid (RNA). Structures and biological functions of water soluble and insoluble vitamins. Classification, kinetics, and inhibition of enzymes. Classification, structure, and functions of animal hormones. Biochemistry of poisoning of snakes and insects. Biochemical techniques (principle and instrumentation of centrifuge, spectrophotometry, chromatography and electrophoresis).

Course Breakdown

Theory

S.No.	Topic	No. of Lectures
1.	Introduction of biochemistry and its scope with respect to veterinary sciences.	1
2.	Structures and functions, composition of bacterial cell wall and related enzymes of cell organelles and of biological membranes and transport across membranes.	3
3.	Aqueous system, Donnan membrane equilibrium. Ionization of water, dissociation of acids, pH, buffer systems, Henderson-Hasselbalch equation and thermodynamics concept of biological reactions.	3
4.	Biochemistry of carbohydrates: Biological significance of monosaccharides (ribose, glucose, fructose, galactose, mannose and amino sugars), disaccharides (maltose, isomaltose, lactose, sucrose & cellobiose), polysaccharides, (starch, dextrins, dextrans, glycogen, cellulose, inulin, chitin), and mucopolysaccharides including bacterial cell wall polysaccharides.	3
5.	Biochemistry of lipids: Structures and functions of fatty acids, properties and biological significance of simple, compound and derived lipids and lipoproteins. Structure and functions of prostaglandins and bile acids.	3
6.	Biochemistry of proteins: Classification, structures, properties and biological significance of proteins. Amino acids: classification and structure of neutral, basic and acidic amino acids. Properties of amino acids: amphoteric nature, optical activity, and peptide bond formation. Chemical reactions and buffering actions of amino acids.	3
7.	Biochemistry of nucleic acids: Chemistry and biological significance of purines, pyrimidines, nucleosides and nucleotides. Structures and functions of deoxyribonucleic acid (DNA) and a typical ribonucleic acid (RNA).	3
8.	Structures and biological functions of water soluble and insoluble vitamins.	2
9.	Classification, kinetics, and inhibition of enzymes.	3
10.	Classification, structure, and functions of animal hormones. Biochemistry of poisoning of snakes and insects.	3
11.	Biochemical techniques (principle and instrumentation of centrifuge, spectrophotometry, chromatography and electrophoresis).	3
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Introduction and uses of laboratory equipments and glass wares.	1
2.	Preparation of normal and molar solutions of acids and alkali solution and standardization by titrimetric method.	1
3.	Preparation of buffer solutions and determination of pH.	1
4.	Preparation of colloidal solutions.	1
5.	Titration curve of amino acids versus acids and bases.	2
6	.Tests of mono-, di-, and polysaccharides and their identification.	1
7.	Estimation of lactose in milk.	1
8.	Determination of acid number of oil.	1
9.	Colour reactions of proteins.	1
10.	Precipitation reactions of proteins.	1
11.	Estimation of amino acids (Sorensen's method.	1
12.	Biochemical techniques spectrophotometry, chromatography, (centrifugation, electrophoresis).	3
Total		**15**

REFERENCES:

Lehninger, D.L.N, and M.C. Michael. Lehninger Principle of Biochemistry (Latest Edition). Macmillan Worth Publisher.

Voet Donald and G. Voet Judith. Fundamentals of Biochemistry. Life at the Molecular level (Latest Edition). John Wiley & Sons, Inc.

Course Code : VBC 102
Course Title : Physiological Biochemistry
Credit Hours : 3 (2+1) Full Marks 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand the metabolism systems related to animal physiology.

Syllabus:

Enzymes: Definition and classification, EC numbering of enzymes. Coenzymes, cofactors and iso-enzymes. Properties: Protein nature, enzyme-substrate complex formation, modem concept of the active center of enzyme. Specificity of enzyme action: Substrate specificity, group specificity, stereo or optical specificity. Factors influencing enzyme action: Effects of temperature, pH, concentration of substrate and enzyme. Enzyme units: International Units, katal, turnover number & specific activity. Enzyme inhibition: Competitive, non-competitive, uncompetitive inhibition & suicidal inhibition. Allosteric enzymes. Biological oxidation: Enzymes and coenzymes involved in oxidation and reduction viz. Oxidoreductases, oxidases, oxygenases, dehydrogenases, hydroperoxidases & cytochromes. Respiratory chain/ electron transport chain, oxidative phosphorylation, inhibitors, uncouplers and other factors influencing electron transport chain. Carbohydrate metabolism: Glycolysis, Kreb's cycle, glyoxylate cycle, HMP shunt, gluconeogenesis, Cori cycle, glycogenesis, glycogenosis, hormonal control of carbohydrate metabolism & regulation of blood sugar Bioenergetics of carbohydrate metabolism. Lipid metabolism: Beta oxidation of fatty acids, ketone body formation, biosyntheses of fatty acids, triacylglycerol, phospholipids & apoprotein metabolism. Bioenergetics of lipid metabolism. Protein metabolism: Biosynthesis and degradation of proteins. Deamination, transamination and decarboxylation of amino acids. Ammonia transport and urea cycle. Nucleic acids: Metabolism of purines and pyrimidines. Biosynthesis of DNA & RNA. Integration of metabolism. Metabolic functions of macro and micro nutrients, Metabolic functions of lipid and water soluble vitamins. Uses of isotopes in metabolic studies.

Course Breakdown

Theory

S.No	Topic	No.of Lectures
1.	Definition and classification, EC numbering of enzymes.	1
2.	Coenzymes, cofactors & iso-enzymes	1
3.	Protein nature, enzyme-substrate complex formation, modern concept of the active center of enzyme.	1
4.	Specificity of enzyme action: Substrate specificity, group specificity, stereo or optical specificity.	1
5.	Effects of temperature, pH, concentration of substrate and enzyme.	1
6.	International units, katal, turnover number & specific activity of enzyme.	1
7.	Allosteric enzymes, Biological oxidation and enzymes and coenzymes involved in oxidation and reduction reactios.	2
8.	Oxidoreductases, oxidases, oxygenases, dehydrogenases, hydroperoxidases & cytochromes.	2
9.	Respiratory chain/ electron transport chain, oxidative phosphorylation, inhibitors, uncouplers and other factors influencing electron transport chain.	1
10.	Glycolysis, Kreb's cycle, glyoxylate cycle, HMP shunt, gluconeogenesis, Cori cycle, glycogenesis, hormonal control of carbohydrate metabolism & regulation of blood sugar, bioenergetics of carbohydrate metabolism.	3
11.	Beta oxidation of fatty acids, ketone body formation, biosyntheses of fatty acids, triacylglycerol, phospholipids & Apoprotein metabolism. Bioenergetics of lipid metabolism.	3
12.	Biosynthesis and degradation of proteins. Deamination, transamination and decarboxylation of amino acids. Ammonia transport and urea cycle.	3
13.	Metabolism of purines and pyrimidines	2
14.	DNA & RNA biosynthesis	2
15.	Integration of metabolism	3
16.	Metabolic functions of macro and micro nutrients	1
17.	Metabolic functions of lipid and water soluble vitamins	1
18.	Uses of isotopes in metabolic studies.	1
Total		**30**

Practicals

S.No.	Topic	No.of Practicals
1.	Introduction and uses of homogenizer, centrifugation, pH meter, rotary evaporator, spectrophotometer, micropipette, microfilter, lyophilizer etc.	1
2.	Determination pH of biological fluids.	1
3.	Determination effect of pH, temperature and concentration on enzyme activity.	1
4.	Qualitative estimation of urine constituents.	1
5.	Qualitative estimation of serum proteins.	2
6.	Qualitative estimation of blood glucose.	1
7.	Qualitative estimation of cholesterol.	1
8.	Qualitative estimation of bilirubin.	1
9.	Qualitative estimation of enzymes in serum.	1
10.	Separation of amino acids, proteins by paper chromatography.	2
11.	Qualitative estimation of blood urea	1
12.	Extraction and separation of DNA	2
Total		**15**

REFERENCES:

Bernard, L. Oser. 1979. Hawk's Physiological Chemistry (Fourth Edition), Tata Mc-Graw Hill Publishing Company Ltd., New Delhi.

Robert K. M, D. K. Granner, P.A. Mayes and V. W. Rodwell. 2003. Harper's Illustrated Biochemistry (Twenty-sixth edition). Lange Medical Books/McGraw-Hill.

Course Code : VBC 303
Course Title : Clinical Biochemistry
Credit Hours : 2 (1+1) Full Marks 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of the course, students will able to determine the health and disease condition of animal.

Syllabus:

Biochemical conditions of health and disease acid-base balance and interpretation. Biochemistry of renal function and acid base balance, digestive disorders, endocrine functions. Liver, kidney and pancreatic function tests. Role of enzymes for detection of tissue /organ affections. Clinical application of enzymes, identification and the basis of treatment of enzyme deficiency, disorders of metabolism with detailed emphasis on diabetes, obesity, atheroschlerosis, jaundice, diseases related to hormones. Recent laboratory techniques to assay chemical/ biochemicals/ immunochemicals and their clinical correlations and interpretation of laboratory results. Enzyme linked immunosorbent assay, agglutination, etc. Toxic metals such as arsenic, lead, antimony, mercury, copper, zinc, fluorides. Nitrates/nitrites, cyanides and tannins in body fluids/tissues of animals and evaluation of toxic residues. Appreciation and differentiation of symptoms caused by various types of toxic materials including agrochemicals plants and drugs. Principle and applications of flame photometer.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Biochemical conditions of health and disease- acid-base balance and interpretation.	2
2	Biochemistry of renal function and acid base balance, digestive disorders, endocrine functions.	2
3	Liver, kidney and pancreatic function tests.	1
4	Role of enzymes for detection of tissue and organ affections.	1
5	Clinical application of enzymes, identification and the basis of treatment of enzyme deficiency, disorders of metabolism with detailed emphasis on diabetes, obesity, atheroschlerosis, jaundice, disease related to hormones.	3
6	Recent laboratory techniques to assay chemical, biochemicals, immunochemicals and their clinical correlations and interpretation of laboratory results.	2
7	Enzyme linked immunosorbent assay. Dot immunoassay, agglutination test etc.	2

8	Toxic materials such as arsenic, lead, antimony, mercury, copper, zinc, fluorides. Nitrates and nitrites, cyanides and tannins in body fluids and tissues of animals.	1
9	Appreciation and differentiation of symptoms caused by various types of toxic materials including agrochemicals, plants and drugs.	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1	Quantitative estimation of plasma protein.	1
2	Quantitative estimation of cholesterol in serum.	1
3	Quantitative estimation of bilirubin in serum.	1
4	Quantitative estimation of urea in serum.	1
5	Quantitative estimation of glucose in serum.	1
6	Estimation of Li, Na and fluoride in extra cellular fluids	1
7	Enzyme linked immunosorbent assay test 1	
8	Dot immunoassay	1
9	Tube agglutination test, slide agglutination tests etc	1
10	Extraction and estimation of toxic materials such as arsenic, lead, antimony, mercury, copper, zinc from samples.	2
11	Detection of Nitrates, nitrites, cyanides and tannins in body fluids and tissues of animals.	2
12	Separation of proteins by electrophoresis.	2
Total		**15**

REFERENCES:

Devlin, T.M. 1997. TextBook of biochemistry with clinical correlation. Wiley liss, publication.

Kaneko, J. Jerry, J.W. Harvey and M.L. Bruss. 1997. Clinical biochemistry of domestic animals (Fifth Edition). Academic Press.

Course Code : VBC 404
Course Title : Molecular Biology and Biotechnology
Credit Hours : 3(2+1) Full marks 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of the course, students will be able to understand the fundamentals of molecular biology and DNA technology, and its use in animal biotechnology and disease diagnosis. Nutritional and fermentation biotechnology and bioinformatics will also be introduced to apply molecular biology to veterinary and agricultural problems, biotechnology and biomanufacturing.

Syllabus:

Structure and properties of nucleic acids, Recombinant DNA technology, Biotechnological application in animal improvements, Nutritional biotechnology, Animal tissue culture, Molecular diagnosis, Fermentation process, regulatory issues in biotechnology and Bioinfomnatics and modern vaccine. Genetic diseases & Gene therapy.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Overview of DNA and RNA structure and DNA Replicationn and Transcription, RNA processing,Translation and genetic code DNA Damage and Repair	1
2	Regulation and expression of gene	1
3	Chromosomal aberrations and gene mutation	1
4	Gene cloning, vectors and expression vectors.	1
5	Transformation and transfection	1
6	Real time Polymerised chain reaction (PCR),	1
7	Construction of genomic library and cDNA library..	1
8	DNA sequencing.	1
9	Principles of transfer of nucleic acids and proteins (Southern, Northern and Western blotting),	1
10	Nucleic acid hybridization	1
11	DNA probes and DNA fingerprinting	1
12	Restriction fragment length polymorphisms and related DNA-based approaches	1
13	DNA microarray technology	1
14	Proteomics	1
15	Embryo biotechniques, in-vivo and in- vitro embryo production and preservation	1
16	Sexing, micromanipulation and cloning,	1
17	transgenic animal and biopharming	1
18	Mapping of genome and genome sequencing.	1

19	Marker assisted selection..	1
20	Gene banking	1
21	Bioconversion of lignocellulose,	1
22	Genetic manipulation of microbes for improved feed utilization and health	1
23	Animal tissue culture, transformation and cell lines,	1
24	Tumor markers and acute phase proteins and DNA probes.	1
25	Hybridoma and monoclonal antibodies.	1
26	Gene deletion vaccines – bacteria and Subunit recombinant	1
27	Marker vaccines and companion diagnostic tests and recombinant vectored vaccines	1
28	Fermentation process and technologies for milk, meat and leather	1
29	Ethics and regulatory issues in Biotechnology. IPR. and Bioinfomatics	1
30	Genetic diseases & Gene therapy	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Tumor markers and its detection in tissue affected by tumors	1
2	Antibody detection by Competitive ELISA (C-ELISA)	1
3	RNA isolation.	1
4	Demonstration of real time PCR-techniques for disease diagnosis	3
5	Expression analysis of gene by Northern and Western analysis.	1
6	Detection of protein by Immunohistochemistry and Immunoblotting	2
7	Embryo transfer technique	2
8	Use of Multimedia and audio-visual aids for molecular biology aspects.	2
9	Tissue culture technique	2
Total		**15**

REFERENCES:

Karp, G. Cell and Molecular Biology, Concepts and Experiments (Latest Edition). John Wiley and Sons.

Jenkins, N. 1999. Methods in Biotechnology. Animal Cell Biotechnology – Methods & Protocols. Human Press Inc., New Jersey.

Malacinski and J. Freifelder. Essentials of molecular Biology (Latest Edition). Bartlelt Publishers.

Srivastava S., P. S. Srivastava & B. N. Tiwary. 1996. Trends in Molecular biology and Biotechnology. CBS Publications & Distributors, New Delhi.

William, H. E. & D.C. Elliott. 1997. Biochemistry and Molecular Biology. Oxford University Press, Oxford.

Course Code : VPY 101
Course Title : Physiology I (Locomotor, Cardiovascular, Blood & Respiratory System)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand physiology of locomotor system and muscle contraction as well as cardiovascular and respiratory system.

Syllabus:

Introduction and vocabulary related to physiology. Types of muscle and its contraction. Rigormortis and fatigue. Composition of muscle, physiological properties of muscle. Blood, blood volume, homograph, erythrocyte, origin, maturation, fate, hemoglobin and its metabolism, anaemia, leucocytes classification, formation of thrombocytes, blood plasma, composition of plasma protein, coagulation of blood, lymph composition formation and flow, cerebrospinal fluid and synovial fluid. Heart and conduction system, electrocardiogram, cardiac cycle,Heart beat and sound, cardiac output, coronary circulation. Nervous and chemical regulation of heart, cardiac arrhythmias vascular system, blood flow, blood pressure, pulse, vasomotor control, pulmonary circulation, shock. Adaptation during exercise, fluid and electrolyte balance. Respiratory apparatus, mechanism of respiration, types of breathing, volume of air respired, intrapulmonic and intrathoracic pressure, composition of inspired and expired air, gas laws, transport of blood gases, exchange of gases in lungs and tissues, anoxia, regulation of respiration, respiratory reflexes, adaptation of respiration during muscle exercise, role of respiration in acid base mechanism and respiration in birds.

Course Breakdown
Theory

S. No.	Topic	No.of Lectures
1.	Introduction and vocabulary related to veterinary physiology.	1
2.	Structure of different types of muscles, mechanism of contraction. Muscle excitation and electrical stimulation. All or non law, Isotonic and isometric contraction. Rigormortis and fatigue of muscle.	2
3.	Composition and physiological properties of muscle	1
4.	General function of blood, blood cell plasma and serum, anticoagulant, blood volume estimation,	2
5.	Erythrocytes formation, maturation and fate. Life span of RBC and its fragibility	1
6.	Chemical structure of hemoglobin, its synthesis, catabolism and absorption and anaemia	1
7.	Formation of leucocytes and their classification and role or leucocytes in immunity	1
8.	Formation of leucocytes and their classification and role or leucocytes in immunity	1
9.	Thrombocytes formation, maturation and fate and its role in blood coagulation. Blood coagulation	1
10.	Chemical composition of blood plasma and its protein.	1
11.	Composition of lymph and its flow. Cerebrospinal fluid and synovial fluid.	1
12.	Heart structure, phenomenon of conduction, and cardiac cycle. Electrocardiogram	1
13.	Neuro chemical regulation of heart and arrhythmias	1
14	Vascular system and blood circulation, veinous and arterial pressure	2
16	System of pulmonary circulation 1	
17	Adaptation of blood flow, pressure during muscle exercise. Mechanism of fluid and electrolyte balance	2
18	Respiratory apparatus, mechanism of respiration and type of breathing	1
19	Respired air volume, composition of inspired and expired air	1
20	Intrapulmonary and intrathoracic pressure and their role in respiration	1
21	Gas law, mechanism of gases transported	1
22	Regulation of respiration, respiration centre and anoxia	1
23	Physiology of respiratory reflexes, adaptation during muscle exercise	1
24	Role of respiration in the balance of acid-base	1
25	Respiration in birds	1
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Collection of blood samples from various animals and birds, Separation of serum and plasma	2
2.	Enumeration of erythrocytes, leucocytes, differential leucocyte count, platelet count	2
3.	Erythrocyte sedimentation rate, hematocrit, packed cell volume, Estimation of haemoglobin	2
4	Blood coagulation time and bleeding time	1
5	Blood grouping	1
6	Recording of normal heart beat of frog	2
7	Demonstration of effect of temperature(heat and cold) and drugs on heart	2
8	Demonstration of ECG in various farm animals	2
9	Recording of respiratory movement and estimation of lung volume	1
Total		**15**

REFERENCES:

Cunningham, J. G. 1997. Text Book of Veterinary Physiology (Second Edition). W. B. Saunders Company Ltd.

Swenson, M.J. Dukes Physiology of Domestic Animals (Latest Edition).

Guyton, A.C.Text Book of Medical Physiology (Latest Edition).

Ganong, W.F. 1991. Review of Medical Physiology (Fifteenth Edition). Prentice- Hall International Inc.

Course Code : VPY 202
Course Title : Physiology II (Digestive, Excretory and Nervous System)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand physiology of digestion and absorption in monogastric, ruminants as well as chickens including excretory system and excretion in birds.

Syllabus:
Prehension of food, mastication, salivation, deglutition and digestion in simple stomach, stomach movement, hunger, digestion in rumen, digestion and absorption in small and large intestine, pancreatic and intestinal secretion. Liver bile and detoxification. Intestinal movement, defecation, nervous control of digestive processes, digestion in poultry. Kidney, urine formation and composition, renal secretion. Skin- Sebaceous gland and their secretion, water loss through sweat and insensible perspiration, regulation of body temperature. Nervous system, neurons, synapses, receptors, all or none character of nerve impulses. Cutaneous receptor organs, peripheral nerves, spinal cord and reflex action, cerebellum, thalamus, hypothalamus, pons, medulla and spinal cord, cranial and spinal nerve reflexes. Autonomic nervous system. Vision, hearing, taste and smell.

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	Functional anatomy of digestive tract: monogastric and ruminant animals.	1
2.	Prehension, mastication, deglutition, movement of stomach, small intestine and large intestine- rumination, defecation, hunger contraction thirst and vomition	2
3.	Saliva and its composition, secretion and function, pancreatic juice, bile, intestinal juices- their regulation, composition and function	2
4.	Digestion in ruminant stomach, microbial activities in the stomach and intestine	2
5.	Absorption of food stuffs, places of absorption, mechanism of absorption, absorption of carbohydrate, protein, fats and water	2
6.	Digestion in poultry	1
7.	Kidney structure of nephron, histological peculiarities blood supply of kidneys, determination of glomerular filtration rate (GFR)	2
8.	Physical characteristics and composition of urine in health and disease	1
9.	Role of kidney in acid base and electrolyte balance	1
10.	Excretion of urine in birds	1

11.	Skin function sebaceous and sweat gland and their function, thermoregulation, maintenance of body temperature regulation against heat and cooling	2
12.	Nervous system: neurons, structure of nerve fibres, degeneration and regeneration of nerve fibres	2
13.	Synapse and transmission of nerve impulses, all or non character of nerve impulse, transmission of excitatory state from nerve to effector tissues	2
14	Cutaneous receptor organs, peripheral nerves, spinal cord and reflex action	2
15	Brain stem and cerebellum, cerebral hemisphere condition reflex, wakefulness and sleep	2
16	Autonomic nervous system, general arrangement and chemical transmission	2
17	Eye: structure of eyes, nourishment and protection mechanism of vision, visual accommodation and defective vision, retina and its structure, physiological and structural changes in retina on exposure to light	2
18	Ear: Structure of ear and mechanism of hearing physiology of olfaction and taste	1
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Counting of rumen motility, estimation of volatile fatty acids and ammonia in rumen, bacterial count, protozoal count	3
2.	In vitro action of proteolytic enzymes- pepsin and trypsin, recording of rumen movements- reticular sound	3
3.	Physiological constituent of urine- estimation of titrable acidity in urine	3
4	Nerve muscle preparation- simple muscle curve- in vivo muscle stimulation- effect of heat cold and load- effect of fatigue	3
5	Demonstration of kidney function tests, intestinal motility- urine secretion-excretory system of bird	3
Total		**15**

REFERENCES:

Cunningham, J. G. 1997. Text Book of Veterinary Physiology (Second Edition). W. B. Saunders Company Ltd.

Swenson, M.J. Dukes Physiology of Domestic Animals (Latest Edition).

Guyton, A.C.Text Book of Medical Physiology (Latest Edition).

Ganong, W.F. 1991. Review of Medical Physiology (Fifteenth Edition). Prentice- Hall International Inc.

Course Code : VPY 203
Course Title : Physiology III (Reproduction, Lactation and Endocrinology)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand physiology of the endocrine system, reproductive system and function of mammary gland.

Syllabus:

Endocrine system: general organization and methods of study; Hormones: definition, classification, general mode of action and regulation; Endocrine physiology of hypothalamus, hypophysis, thyroid, parathyroid, adrenal, pancreas, pineal body and thymus glands, local hormones, Interrelation of endocrine and nervous system, interrelation of genetics and endocrinology. Male and female reproductive organs: puberty sexual maturity, role of hormones on sexual development, oestrus, patterns of oestrus cycle in different animals and birds. Oogenesis, follicular development, ovulation, fertilization, pregnancy and physiology of parturition, Functional anatomy of male reproductive organs; Spermatogenesis, Endocrine physiology of testes; thermoregulation of testes, sexual behavior, avian reproduction. Mammary gland: functional organization, structure and development; endocrine control of initiation and maintenance of lactation; colostrum; composition of milk.

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	Endocrine system: general organization and method of study	1
2.	Hormones: definition, classification, general mode of action and regulation	2
3.	Endocrine physiology of hypothalamus, Hypophysis Thyroid, Parathtroid, Adrenal, Pancreas, Pineal body, Thymus glands	2
4.	Local hormones: prostaglandins, hormones of gastrointestinal tract	1
5.	Interrelation of endocrine and nervous system	2
6.	Interrelation of genetics and endocrinology	2
7.	Puberty and sexual maturity	1
8.	Role of hormones on sexual development	2
9.	Oestrus, patterns of oestrus cycle in different animals and birds	2
10.	Oogenesis, follicular development, ovulation, fertilization	2
11.	Pregnancy and physiology of parturition	2
12.	Endocrine physiology of ovary, Hormones present in biological fluids during pregnancy and their use for the diagnosis of pregnancy	2

13.	Functional anatomy of male reproductive organs	1
14	Spermatogenesis	1
16	Endocrine physiology of testes	1
17	Thermoregulation of testes, sexual behavior	1
19	Avian reproduction	1
20	Mammary gland: Functional organization, structure and development.	2
21	Endocrine control of initiation and maintenance of lactation	1
22	Colostrum, composition of milk	1
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Study of endocrine organs and reproductive organs of mammals and birds	1
2.	Rectal palpation of reproductive organs,Determination of oestrus	2
3.	Demonstration of let down of milk	1
4	Parturition stages, Demonstration of parturition in various animals (live or video film)	2
5	Effect of heat and cold on scrotum	1
6	Observation of sperm motility	1
7	Sperm count, live and dead sperm count	2
8	Pregnancy diagnosis test	1
9	Determination of lactose in milk	2
10	Estimation of progesterone and oestrogen by RIA and ELISA techniques	2
Total		**15**

REFERENCES:

Cunningham, J. G. 1997. Text Book of Veterinary Physiology (Second Edition). W. B. Saunders Company Ltd.

Swenson, M.J. Dukes Physiology of Domestic Animals (Latest Edition).

Guyton, A.C.Text Book of Medical Physiology (Latest Edition).

Ganong, W.F. 1991. Review of Medical Physiology (Fifteenth Edition). Prentice- Hall International Inc.

Course Code : VPY 304
Course Title : Physiology IV (Growth, Environment and Climatology)
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand physiology of growth and physical relation to environment and climatology.

Syllabus:

Animal ecology, physiology of growth, regulation of growth, factors affecting efficiency of growth. Clinical effects on growth and production. Physical reaction to environmental changes, physiology of behavior. Climatology- various parameters and their importance;reaction of animal to different environmental variation, viz. temperature and fever; central control of heat regulation. Temperature regulation in birds.

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	Animal ecology	2
2.	Physiology, regulation of growth, factors affecting efficiency of growth	3
3.	Clinical effects on growth and production	2
4	Physical reaction to environmental changes, physiology of behavior	2
5	Climatology- various parameters and their importance	2
6	Reaction of animal to different environmental variation, viz. temperature and fever; central control of heat regulation	2
7	Temperature regulation in birds	2
Total		**15**

Practical

S. No.	Topic	No.of Practicals
1.	Measures and measurements of growth in various species	5
2.	Climatic changes related to environmental physiology	5
3.	Climatology- instruments and equipments used in climatology, meteriological assessments	5
Total		**15**

REFERENCES:

Cunningham, J. G. 1997. Text Book of Veterinary Physiology (Second Edition). W. B. Saunders Company Ltd.

Ganong, W.F. 1991. Review of Medical Physiology (Fifteenth Edition). Prentice- Hall International Inc.

Veterinary Medicine and Public Health

Course Code : VPH 301
Course Title : Environmental Hygiene
Credit Hours : 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of the course, students will be able to explain the sources of contamination of water, air pollution, sanitation and prevention of air and water borne diseases in animals and man.

Syllabus:

Sources of water supply and their qualities, Physical, chemical, microbiological and biological evaluation of water, Sources of contamination of water and their prevention, Purification and sanitization of water, Sources of air pollution within animal houses and its effect on animal health and production Ventilation and ventilation systems within animal houses and specialized laboratories, Bacteriology of water and air, Disposal of sewage and farm refuses, Health implications of farm wastes, Sanitation and disinfection of animal houses, Methods of prevention and control of air and water borne diseases of man and animals, Atmospheric pollution and methods of control, Farm waste recycling.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Sources of water supply and their qualities,	1
2	Physical, chemical, microbiological and biological evaluation of water,	1
3	Sources of contamination of water and their prevention,	1
4	Purification and sanitization of water,	1
5	Sources of air pollution within animal houses and its effect on animal health and production	1
6	Sources of air pollution within animal houses and its effect on animal health and production	1
7	Bacteriology of water and air,	2
8	Disposal of sewage and farm refuses, Health implications of farm wastes,	2
9	Health implications of farm wastes,	1
10	Methods of prevention and control of air and water borne diseasesof man and animals,	2
11	Atmospheric pollution and methods of control	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Sampling of water for sanitary examination,	1
2	Physical examination of water, estimation of colour, turbidity, total hardness, solids, alkalinity and acidity of water	3
3	Chemical and Microbiological evaluation of water quality,	3
4	Disinfection of animal houses	1
5	Determination of the efficacy of disinfectants,	2
6	Demonstration of water purification system	1
7	Carcasses disposal methods	1
8	Demonstration of various ventiliation systems in animal houses.	1
9	Visit to local polluted sites and documentation of local environmental problems.	1
10	Visit of nearest waste disposal and purification plant.	1
Total		**15**

REFERENCES:

Park K. Text Book of Preventive and Social Medicine (Latest Edition).

Ray, M. Environmental Pollution: Impact of Technology on Quality of Life (Latest Edition).
Philp R.B. Environmental Hazards and Human Health.

Sherikar, A.T., V.N. Bachhil and D.C. Thapliyal (Ed.). 2004. TextBook of Elements of Veterinary Public Health. ICAR, New Delhi. [ISBN : 81-7164-024-9].

Course Code : VPH 302
Course Title : Veterinary Epidemiology
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to describe the pattern and spread of a disease in a community, and explain different methods of prevention, control and eradication of diseases.

Syllabus

Definitions and application of epidemiology, ecological concepts of epidemiology, disease spread, patterns of disease distribution, multifactorial causation of disease, strategies of epidemiology, types of epidemiological studies, prevention, eradication and control of diseases, laws regulating animal diseases, international organizations regulating emerging diseases, OIE and its functions, regulations handling, import and export of biomaterials.

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	Definitions, objectives and applications of epidemiology.	2
2.	Ecological concepts of epidemiology	3
3.	Disease process and its spread	2
4.	Pattern of disease distribution in the community; epidemic, endemic, sporadic and pandemic	2
5.	Multifactorial causation of disease: agent, host and envirionment	2
6.	Strategies of Epidemiology	2
7.	Types of epidemiological studies: case control, cohort etc.	2
8.	Investigation of an epidemic	2
9.	Prevention, control and eradication of diseases.	3
10.	Laws regulating animal diseases	2
11.	International organizations regulating emerging and spreading diseasesof animals and birds; Office Internationale Des epizootic (OIE), its functions , its categorization of diseases that are transmissible	3
12.	Regulations regulating handling, import, export of biomaterials.	2
13.	Veterinary Economics and risk-assessment.	3
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Visit to the veterinary hospitals/organized farms etc. for the collection of data for epidemiological investigation	1
2.	Collection of epidemiological samples. Measurement of disease: determination of morbidity and mortality rates/ratios	1
3.	The laboratories investigations and data collection related to epidemiological studies and its correlation.	2
4	Determination of Associations and risks: relative risk, Odd's ratio, Kappa ratio, attributable risk, SPSS, logistic regression, factor analysis	5
5	Evaluation of diagnostic tests	2
6	Survey of an animal disease on a farm	1
7.	GIS (Geographical information system)	3
Total		**15**

REFERENCES:

Martin, S.W., A. H. Meek, and P. Willeberg.1987. Veterinary Epidemiology; Principles and Methods (First Edition). Iowa State Press/Ames.

Thapliyal. 1996. Fundamental Animal Hygiene and Epidemiology. International Book Distributing Company.

Thrushfield. M. Veterinary Epidemiology (Latest Edition). Blackwell publishing.

Course Code : VPH 403
Course Title : Milk and Meat Hygiene, Food Safety and Public Health
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives

Upon the completion of course, students will be able to increase milk and meat product quality, risk analysis, sanitary and phytosanitary measures in relation to food of animal and aquatic origin.

Syllabus

Milk hygiene in relation to public health. Microbial flora of milk and milk products. Sources of milk contamination during collection and transport of milk and processing of dairy products. Control of milk and milk product contamination. Hygienic handling/ management of dairy equipment. Quality control of milk and milk products. Legislation and standards for milk and milk products. Milk as a source of disease transmission. Pathological conditions associated with the transport of food animals. Elements of meat inspection. Hygiene in abattoirs. Ante-mortem inspection of meat animals. Humane slaughter of animals. Postmortem inspection of meat animals. Methods of inspection of meat. Rigor mortis and examination of lymph nodes. Speciation of meat. Health implications of emergency and causality slaughter. Hygienic disposal of unsound meat. Inspection of poultry and aquatic foods (fish) for human consumption. Occupational health hazards in meat processing plants. Meat as a source of disease transmission. Food safety, definition, hazard analysis and critical control point (HACCP) system and chemical and microbial toxicities associated with milk, meat and aquatic foods. Risk analysis: assessment and management and food safety measures. Toxic residues (pesticides, antibiotics, metals and hormones) and microbial toxins in food and their health hazards. Types of bio-hazards. Sanitary and phytosanitary measures in relation to foods of animal origin and aquatic foods. International and national food safety standards, Office International des Epizootics (OIE), World Trade Organisation (WTO), Sanitary and Phytosanitary (SPS) and Codex Alimentarius.

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	Milk hygiene in relation to public health.	1
2.	Microbial flora of milk and milk products. Sources of milk contamination during collection and transport of milk and processing of dairy products.	2
3.	Control of milk and milk product contamination. Hygienic handling/ management of dairy equipment.	2
4.	Quality control of milk and milk products;Legislation and standards for milk and milk products.	2
5.	Milk as a source of disease transmission.	1
6.	Elements of meat inspection.	1
7.	Pathological conditions associated with the transport of food animals.	1
8.	Hygiene in abattoirs; Ante-mortem inspection of meat animals.	2
9.	Humane slaughter of animals. Postmortem inspection of meat animals.	2
10.	Methods of inspection of meat. Rigor mortis and examination of lymph nodes.	2
11.	Speciation of meat.	1
12.	Health implications of emergency and causality slaughter; Hygienic disposal of unsound meat.	1
13.	Inspection of poultry and aquatic foods (fish) for human consumption.	2
14	Occupational health hazards in meat processing plants. Meat as a source of disease transmission.	2
15	Food safety, definition, hazard analysis and critical control point (HACCP) system and chemical and microbial toxicities associated with milk, meat and aquatic foods.	2
16	Risk analysis: assessment and management and food safety measures.	2
17	Toxic residues (pesticides, antibiotics, metals and hormones) and microbial toxins in food and their health hazards.	2
18	Types of bio-hazards. Sanitary and phytosanitary measures in relation to foods of animal origin and aquatic foods.	1
19	International and national food safety standards {Office International des Epizootics (OIE), World Trade Organisation (WTO), Sanitary and Phytosanitary (SPS) and Codex Alimentarius}.	1
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Sanitary collection of samples for chemical and bacteriological examination.	1
2.	Grading of milk by MBR test	1
3.	Test for pasteurization and plant sanitation.	1
4	Microbiological examination of raw and pasteurized milk, milk products and water. Standard plate, coliform, faecal streptococcal, psychrophillc, mesophilic and thermophilic counts.	3
5	Detection of adulterants and preservatives in milk and milk products.	1
6	Isolation and identification of organisms of public hearth significance from milk.	2
7	Visit to abattoirs, meat processing plants, marketing centers and food service establishments.	1
8	Ante-mortem and post mortem inspection of food animals.	1
9	Methods of slaughter (demonstration at the slaughter houses).	1
10	Demonstration of speciation of meat.	1
11	Physical and bacteriological quality of meat and aquatic foods (fish).	1
12	Demonstration of toxic chemical and microbiological residues in milk and meat	1
Total		**15**

REFERENCES:

Forsythe, S.J. and P.R. Hayes. 1998. Food Hygiene, Microbiology and HACCP (Third Edition). An Aspen Publishers, Gaithersberg, Maryland.

John de Vries (Ed.). 1997. Food Safety and Toxicity, 1997, CRC press, New York

Leo M.L., Nollet & Fidel Toldra (Eds.). 2011. Safety Analysis of Foods of Animal Origin. CRC Press.

Gracey, J., S.C. David and R. Huey. 1999. Meat Hygiene (Tenth Edition). WB Saunders Company Ltd., London, UK.

James M.J. 2000. Modern Food Microbiology (Sixth Edition). An Aspen Publishers, Gaithersberg, Maryland.

Course Code : VPH 504
Course Title : Zoonosis and Public Health
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to assess the role of different animals in the transmission of zoonotic diseases and describe the methods of prevention, eradication, and control of zoonotic diseases.

Syllabus:

Definiton of zoonoses, classification of zoonoses, role of domesticated pets and wild animals, transmission of zoonotic disease, study of important zoonotic disease of the region, method of prevention, control and eradication of zoonotic disease, socio-economic condition and human health

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	Definitions and objectives of zoonoses	1
2.	Classification of Zoonoses: Direct, Cyclo, Meta, Saprozoonoses	2
3.	Role of domesticated pets, various wild & cold blooded animals in transmission of zoonotic diseases.	1
4.	Mode of transmission of zoonotic diseases	1
5.	Study of the important zoonotic diseases of the region, eg., Rabies, Brucellosis, Japanese encephalitis, influenza, anthrax, , tuberculosis, leptospirosis, listeriosis, plague, rickettsiosis, chlamydiosis and dermatophytosis. Food borne zoonoses: salmonellosis, staphylococcosis, clostridial food poisoning, campylobacteriosis, toxoplasmosis and sarcocystosis.etc.	5
6.	Methods of prevention, control and eradication of zoonotic diseases.	2
7.	Socio-economic conditions and Human health	2
8.	Zoonotic pathogens as agents of bio-terrorism	1
Total		**15**

Practical

S. No.	Topic	No.of Practicals
1	Field survey of zoonotic diseases.	4
2	Isolation and Identification of important pathogens of zoonotic importance from animal and human sources including foods of animal origin and their interpretation.	4
3	Study of the Rural Environment and health status of the rural community.	3
4	Visit to primary health centre/human hospital and study of the common diseases affecting rural/urban population, and probable relationships of these human disease conditions with animal diseases present in the area.	4
Total		**15**

REFERENCES:

Acha, P.N. and B. Szyfres. 1989. Zoonoses and Communicable diseases common to man and animals (Second Edition). Pan American Health Organization, USA.

Krauss, H. Zoonoses: Infectious diseases Transmitted from Animals to Human Being (Latest Edition).

Martin, E., E.H. Jones, W.T. Hubbart and H.V. Hagstard. Zoonoses: Recognition Control and Prevention (Latest Edition).

Pathak, K.M.L. Fundamentals of Parasitic Zoonoses (Latest Edition).

Thapliyal. 1996. Fundamental Animal Hygiene and Epidemiology. Internation Book Distributing Company.

Course Code : VMC 301
Course Title : Internal Medicine I (Systemic)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will able be to perform a complete and accurate physical examination, including ophthalmologic, otoscopic, dental and rectal examinations, interpret the result, diagnose and treat the diseases of digestive, respiratory, cardiovascular and urogenital system.

Syllabus:

History and importance of veterinary medicine, Concept of health and disease in relation to general medicine, Definition, classification, etiology, pathogenesis, clinical sign diagnosis, differential diagnosis and treatments of diseases of alimentary tract, respiratory system, cardiovascular system and urogenital system. Diseases of digestive system with special reference to rumen dysfunction and diseases of stomach in non-ruminants. Affections of peritoneum, liver and pancreas. Diseases of respiratory and cardiovascular systems including blood and blood forming organs. Diseases of uro-genital system & lymphatic system.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	History and importance of veterinary medicine, Concept of health and disease in relation to general medicine.	1
2	Definition , classification, etiology, pathogenesis, clinical sign Diagnosis, differential diagnosis and treatments of alimentary diseases of teeth, stomatitis, glositis	1
3	Parotitis, pharyngitis, oesophagitis, choke,	1
4	Indigestion in animals ,tympany	1
5	Traumatic reticulitis ,diaphragmatic hernia	1
6	Vagus indigestion,abomasal displacement	2
7	Gastritis in small animals,vomition in swine	1
8	Colic in horses, enteritis	2
9	Cecal obstruction, volvulus	1
10	Intussusceptions and proctitis	1
11	Definition , classification, etiology, pathogenesis, clinical sign diagnosis, differential diagnosis and treatments of hepatitis and cirrhosis	1
12	Jaundice, pancreatitis, peritonitis, ascites	2
13	Definition, classification, etiology, pathogenesis, clinical sign diagnosis, differential diagnosis and treatments of rhinitis, epistaxix	1
14	Laryngitis,bronchitis	1

15	Pneumonia,pulmonary emphysema, pleurisy broken wind in horses and repiratory failure.	2
16	Pneumothorax, hydrothorax,lungs abscess, asthma	1
17	Definition , classification, etiology, pathogenesis, clinical sign diagnosis, differential diagnosis and treatments of ,Pericarditis, myocarditis, endocarditis	2
18	Hypertrophy and dilatation of heart congestive heart failure, Haemorrhage, toxaemia,	2
19	Anaemia, Leukaemia, Leukopenia	1
20	Lyphangitis, Lymphadenitis and diseases of lymphatic system	1
21	Nephritis, Nephrosis, renal colic, Albuminurea, haemoglobinurea	2
22	Urinary incontinence, uremia, urethritis, Urolithiosis, cystitis pyelonephritis, and orchitis	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	History taking of animals	1
2	Morbidity and mortality rate determination	1
3	Identification of equipments and utensils used in medicine laboratory.	1
4	Identification of different chemicals reagents used in Veterinary medicine laboratory	1
5	Physical and clinical examination of animals	2
6	Collectation ,preservation and storage of faecal samples	1
7	Collection and examination of blood samples	1
8	Collection and examination of urine samples	1
9	Collection and examination of feaces for lab test	1
10	Prescription writing techniques	1
11	Method of administration of drugs by intra uterine route	1
12	Method of administration of drugs by injections	1
13	Method of administration of drugs drenching	1
14	Case record of at least 10 cases	1
Total		**15**

REFERENCES:

Blood, D.C. and G.M. Radostitis.1989. Veterinary Medicine, A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (7th Edition). ELBS publication.

Chakrabarti, A. 1988. Text Book of Clinical Veterinary Medicine (Third revised Edition). Kalyani Publishers, India.

Aiello, S.E. (Ed.). 2010. Merck Veterinary Mannual (10th Edition). Merck and Co. Inc. White House Station, USA.

Smith, B.P. 1996. Largest Animal Internal Medicine (2nd Edition). Mosby Publication.

Code : VMC 402
Course Title : Internal Medicine II (Metabolic and Deficiency)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion this course, students will be able to learn the skills on interpretation of results of diagnostic tests, identifying new problems and subsequently diagnose the animals affected by metabolic disease, deficiency diseases and diseases of muscle, skin, eye and ears.

Syllabus:

Definition, classification, etiology, pathogenesis, clinical sign diagnosis, differential diagnosis and treatments of milk fever, downer's cow syndrome, hypomagnesaemia in cattle and buffalo, azoturia in equines, hypothyroidism and diabetes in dogs. Diagnosis and management of diseases caused by deficiency of iron, copper, cobalt zinc, manganese, selenium, calcium, phosphorus, magnesium, vitamin A, D, E, B. complex, K and C in domestic animals and poultry, Nutritional haemoglobinuria. Diseases of neonates. Diseases of skin and musculo-skeletal system, sense organs of domestic animals.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1	Definition , classification, etiology, pathogenesis, clinical sign diagnosis, differential diagnosis and treatments of milk fever, downer's cow syndrome	2
2	Hypomagnesemic tetany, Ketosis.	2
3	Diabetes mellitus and diabetes insipidus	1
4	Nutritional haemoglobinuria,goiter, rheumatism	1
5	Rickets, Osteomalacia, Hypothyroidism	2
6	Pregnanacy toxaemia in cows	1
7	Azoturia, Eclampsia, Obesity	2
8	Vitamin defeficiency- Vitamin A,D,E,K	3
9	Vitamin deficiency – Vitamin B and C	2
10	Mineral deficiency diseases	2
11	Myopathy,myositis, osteodystrophy,osteomyelitis, arthritis	3
12	Urticaria, alopecia, psoriasis, erythema, ,	2
13	Dermatomycoses, pododerm, photosensitization, parakeratosis, hyperkeratosis	2
14	Conjunctivitis, Keratitis, otitis	1
15	Common poisoning cases	2
16	Ethnoveterinary medicine	1
17	Diseases of new borne animals	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Clinical examination of sick animals suffering from metabolic diseases	2
2	Examination of urine and milk for ketone bodies	2
3	Skin scrapping for lab test	1
4	Examination of blood for lab test	3
5	Collection of body fluids for metabolic profile test	2
6	Case records	5
Total		**15**

REFERENCES:

Blood, D.C. and G.M. Radostitis.1989. Veterinary Medicine, A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (7th Edition). ELBS publication.

Chakrabarti, A. 1988. Text Book of Clinical Veterinary Medicine (Third revised Edition). Kalyani Publishers, India.

Aiello, S.E. (Ed.). 2010. Merck Veterinary Mannual (10th Edition). Merck and Co. Inc. White House Station, USA.

Smith, B.P. 1996. Largest Animal Internal Medicine (2nd Edition). Mosby Publication.

Robison, N.E. 1997. Current Therapy in Equine Medicine (Latest Edition). WB Saunders.

Course Code : VMC 403
Course Title : Preventive Medicine I (Bacterial, Fungal and Rickettsial Diseases)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to describe the status of bacterial, fungal and rickettsial diseases prevalent in livestock and poultry and able to diagnose and treat the common infectious diseases.

Syllabus:

Principles of epidemiology, general epidemiology of infectious diseases, Modes of disease transmission. Definition, incidence, etiology, epidemiology, pathogenesis, transmission, clinical signs, diagnosis, treatment, prevention and control of Pasteurellosis, Black quarter, Tetanus, Anthrax, Tuberculosis, Paratuberculosis, Actinomycosis, Actinobacillosis, Brucellosis, Listeriosis, Leptospirosis, Mastitis, Contagious bovine pleuropneumonia (CBPP), Campylobacteriasis (Vibriosis) Chlamydiosis, Botulism, Contagious Caprine Pleuropneumonia (CCPP),Foot rot, Strangles, Glanders, Swine Erysepalas, Salmonellosis, Mycoplasmosis, Fowl Typhoid, Fowl cholera, Colibacillosis, Aspergillosis, Mycotoxicosis, Sporotrichosis, Ringworm, Degnala disease, Q fever, Anaplsmosis.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1.	Introduction and principles of epidemiology	1
2	General epidemiology of infectious diseases and modes of disease transmission	1
3	Pasteurellosis and Black quarter	2
4	Tetanus	1
5	Anthrax and Tuberculosis	2
6	Paratuberculosis	1
7	Actinobacillosis and Actinomycosis	1
8	Brucellosis	1
9	Leptospirosis and Listeriosis	2
10	Mastitis	1
11	Contagious bovine pleuropneumonia (CBPP)	1
12	Campylobacteriosis and Chlamydiosis	1
13	Botulism	1
14	Foot rot and Enterotoxaemia	2
15	Contagious Caprine Pleuropneumonia (CCPP)	1
16	Strangles and Glanders	1

17	Swine erysepalas	1
18	Salmonellosis and Fowl typhoid	1
19	Mycoplasmosis and Colibacillosis	2
20	Fowl cholera and Aspergillosis	1
21	Mycotoxicosis and Sporotrichosis	2
22	Ringworm and Degnella disease	2
23	Q fever and Anaplasmosis	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Collection, preservation and dispatch of materials for bacteriology and mycology.	1
2	Preparations of glasswares and medias for bacteria and fungus.	1
3	Identification of bacteria by Gram's staining.	2
4	Drug sensitivity tests.	1
5	Common biochemical tests	2
6	Diagnosis of mastitis by cultural and indirect tests	2
7	Diagnosis of Tubercullosis and Johne's disease by allergic tests	1
8	Diagnosis of brucellosis by PAT and MRT	1
9	Diagnosis of Salmonellosis by whole blood agglutination tests	1
10	Examination of skin scrapings for fungus	1
11	Maintaining of case records of at least 10 cases	2
Total		**15**

REFERENCES:

Blood, D.C. and G.M. Radostitis.1989. Veterinary Medicine, A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (7th Edition). ELBS publication.

Aiello, S.E. (Ed.). 2010. Merck Veterinary Mannual (10th Edition). Merck and Co. Inc. White House Station, USA.

Chakravarti, A . 2011. TextBook of Preventive Veterinary Medicine. Kalyani Publishesrs , India.

Course Code : VMC 404
Course Title : Preventive Medicine II (Viral, Protozoal and Parasitic Diseases)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course student will be able to describe the status of viral, protozoal and parasitic diseases prevalent in livestock and poultry and able to diagnose and treat the common infectious diseases.

Syllabus:

Definition, incidence, etiology, transmission, pathogenesis, clinical signs, diagnosis, treatment, prevention and control of Rabies, Pseudorabies, FMD Infectious bovine Rinderpest rhinotracheitis, Bovine viral diarrhea, Bovine malignant catarrah, Ephemoral fever, Pox disease, Scrapie, Blue tongue, Contagious pustular dermatitis, PPR, African horse sickness, Infectious equine anaemia, Infectious equine rhinopneumonitis, Equine influenza, Virus encephalomyelitis of horse, Hog cholera, Swine influenza, Swine vesicular disease, Canine distemper, Infectious canine hepatitis, Canine Parvo virus infections, Avian influenza, Ranikhet disease, Infectious bursal disease, Infectious bronchitis, Marek's disease, Avian leucosis complex, Fowl pox, Litchi disease, EDS – 76, Avian encephalomyelitis, Trypanosomosis, Theileriosis, Babesiosis, Coccidiosis, Amphistomiosis, Fascioliosis, Schistosomosis, echinococcosis, cysticercosis, trichomonosis,

Course Breakdown
Theory

S.No.	Topic	No of.Lectures
1.	Rabies and Pseudorabies,FMD	2
2	Infectious bovine rhinotracheitis and Bovine viral diarrhea, Rinderpest	2
3	Bovine malignant catarrah and Ephemoral fever,	1
4	Pox disease, Scrapie and Blue tongue,	1
5	Contagious pustular dermatitis and PPR	1
6	African horse sickness and Infectious equine anaemia,	1
7	Infectious equine rhinopneumonitis, Equine influenza and Virus encephalomyelitis of horse,	2
8	Hog cholera,	1
9	Swine influenza and Swine vesicular disease,	1
10	Canine distemper,	1
11	Infectious canine hepatitis and Canine Parvo virus infections,	2
12	Avian influenza,	1
13	Ranikhet disease and Infectious bursal disease,	2
14	Infectious bronchitis and Marek's disease,	2
15	Avian leucosis complex and Fowl pox,	1
16	Litchi disease, EDS – 76 and Avian encephalomyelitis,	1
17	Trypanosomosis and Theileriosis,	2
18	Babesiosis and Coccidiosis,	2
19	Amphistomiosis and Fascioliosis,	1
20	Schistosomiosis and echinococcosis,	1
21	Cysticercosis and Trichomonosis,	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Collection, preservation and dispatch of materials for virology laboratory	2
2	Practice of vaccination in livestock	2
3	Practice of vaccination in poultry	2
4	Review of common viral diseases of livestock in Nepal	2
5	Review of common viral disease of poultry prevalent in Nepal	2
6	Case record of 10 viral diseases	5
Total		**15**

REFERENCES:

Blood, D.C. and G.M. Radostitis.1989. Veterinary Medicine, A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (7th Edition). ELBS publication.

Aiello, S.E. (Ed.). 2010. Merck Veterinary Mannual (10th Edition). Merck and Co. Inc. White House Station, USA.

Chakravarti, A . 2011. TextBook of Preventive Veterinary Medicine. Kalyani Publishesrs , India.

Course Code : VMC 405
Course Title : Ethics and Jurisprudence
Credit Hours : 1 (1+0) Full Marks: 25 Theory: 25 Practical: 0

Objectives:

Upon the completion of this course, students will be able to know about the ethics, duties and laws related to veterinary practices, and be able to practice different acts related to veterinary sciences/services.

Syllabus:

Legal duties of veterinarians, animal legislation, welfare and forensic laws. Examination of animals for soundness. Examination of injuries, causes of sudden animal death. Post- mortem examination. Detection of frauds, malicious poisoning, bestiality, mischief, cruelty, poisoning drugs. Animal quarantine and meat inspection act. Insurance. Ethics for veterinarian made under Nepal Veterinary Council Act. OIE codex.

Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Legal duties of veterinarian	1
2	Techniques of soundness examination for animals	1
3	Clinical examination of injuries.	1
4	Causes of sudden animal death and their detection.	1
5	Post-mortem examination for detection of death cause.	1
6	Frauds, malicious poisoning, bestiality	1
7	Examination Mischief and cruelty	1
8	Forensic laws, OIE codex and guidelines, poisoning drugs and their cautious use	2
9	Animal quarantine act and slaughter house and meat inspection Regulation, 2057 (2001)	1
10	Insurance of livestock.	1
11	Nepal veterinary council rules, 2057 (2000)	2
12	And Act Made to Provide Necessary Arrangement Relating to Animal Health and Livestock Services	1
13	Laws relating to Nepali Muluki Ain	1
Total		**15**

REFERENCES:

Blood, D.C. and G.M. Radostitis. 2007. A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (Tenth Edition). ELBS publication.

Dabas, S.P.S and O.P. Saxena. 2001. Veterinary Jurisprudence and Post mortem (Second Edition). International, Book Distributing Co..

Nepal Veterinary Council Rules, 2057 (2000).

Course Code : VMC 506
Course Title : Animal Welfare
Credit Hours : 1(1+0) Full Marks: 25 Theory: 25 Practical: 0

Objectives:

Upon the completion of this course, students will be able to define animal welfare within the context of the five freedoms, understand the various spectrum of animal welfare, manifest appreciation of the importance of the five freedoms to animals, explain or discuss and give examples of inputs in providing welfare needs to various animal species, express own practice of applying learned concepts in animal welfare.

Syllabus:

Discussion on concepts and importance of animal welfare, spectrum of animal welfare, five freedoms of animal welfare, ethical concerns of welfare, normal behaviors of animals, Identified behavioral indicators of welfare, interaction of humans with animals, animal-human abuse link, role of the veterinarian in animal welfare, responsible pet ownership, welfare issues in population control programmes, humane methods of euthanasia, cultural differences with respect to philosophy and practices on animal ownership and use, animal welfare for wildlife and animal under disasters management, discussion on concepts in animal welfare including practice governing animal control as well as protection and prevention of cruelty to domestic and wild animals.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Introduction to concepts of animal welfare and ethics	1
2	Welfare assessment methods and the five freedoms	1
3	Human-animal interactions	1
4	Physiological and behavioral indicators of animal welfare	1
5	Immune and production indicators of welfare	1
6	Welfare of animals used in research, testing and education	1
7	Farm animal welfare, animals during transportation and Issues	1
8	Animal welfare in commercial livestock farming practices	1
9	Pet and companion animal welfare	1
10	Companion animals – population control programmes	1
11	Wild animal welfare	1
12	Animal welfare during natural calamities and disaster management.	1
13	Euthanasia, cruelty to the animals and bestiality.	1
14	Animal welfare legislations and organizations	1
15	Devel opment of veterinary ethics and roles of veterinarian on animal welfare	1
Total		**15**

REFERENCES:

World Society for Animals 2007. Concepts in Animal Welfare: Animal Welfare Syllabus (CD ROM format). London: University of Bristol and WSPA.

Legood, G. (ed.) 2000. Veterinary Ethics: An Introduction. New York: Continuum.

Fraser, A.F. and D.M. Broom 1997. Farm Animal Behaviour and Welfare (Third Edition). Cambridge: CABI Publishing.

Gregory, G.G. 1998. Animal Welfare and Meat Science. Cambridge: CABI Publishing.

Stafford, K. 2006. The Welfare of Dogs – Animal Welfare Series Volume 4. Dordrecht: Springer.

Course Code : VMC 507
Course Title : Wildlife, Pet and Lab Animal Medicine
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to handle, restrain, diagnose and treat the common diseases of wild animals, zoo animals and lab animals.

Syllabus:

Basic principles of habitat and housing of various classes of wild and zoo animals. Population dynamics of wild animals, Nutrient requirements of wild animals, Restrain, capture, handling, physical examination and transport of wild and zoo animals. Principles of anaesthesia, anaesthetics, chemicals of restraining, Capture myopathy. Principles of zoo hygiene, public health problems arising from zoos. Prevention, control and treatment of infectious, parasitic, nutritional and metabolic diseases in zoo and wild animals.
National and international organisations and institutions interlinked to wild and zoo animals, Common diseases affecting dogs and cats (bacterial, viral, parasitic, fungal, nutritional etc.)- their clinical manifestations, diagnosis, treatment and control. Vaccination/ deworming schedules. Common diseases affecting pet birds their control and prevention. Common diseases affecting lab animals, their control and prevention.

Course Breakdown
Theory

S. No.	Topic	No of Lectures
1.	Basic principles of habitat and housing of various classes of wild and zoo animals.	1
2.	Population dynamics of wild animals	1
3.	Nutrient requirements of wild animals	1
4.	Restrain, capture, handling, physical examination and transport of wild and zoo animals.	1
5.	Principles of anaesthesia, anaesthetics, chemicals of restraining, Capture myopathy.	2
6.	Principles of zoo hygiene, public health problems arising from zoos.	1
7.	Prevention, control and treatment of infectious, parasitic, nutritional and metabolic diseases in zoo and wild animals.	2
8.	National and international organisations and institutions interlinked to wild and zoo animals	1
9	Common diseases affecting dogs and cats(bacterial, viral, parasitic, fungal, nutritional etc.) - their clinical manifestations, diagnosis, treatment and control. Vaccination/ deworming schedules.	3
10	Common diseases affecting pet birds ,their control and prevention.	1
11	Common diseases affecting lab animals, their control and prevention.	1
Total		**15**

Practical

S. No.	Topic	No.of Practicals
1	Visit of nearby wild life sanctuary/zoo/wild animal centres to study the care and management, restraint, examinations, administration of medicines etc. in zoo animals. To study the housing, feeds and feeding schedule of zoo animals.	1
2	Post mortem examination of wild and zoo animals.	1
3	Handling, processing and interpretation of pathological materials from zoo and wild animals.	1
4	Planning for balanced feeding. Diet charts, preparation of balanced diet for new borne, growing and sick animals as oral and intravenous feeds.	2
5	Care of pups, weaning, and administration of medicine. Nail and tooth care, clipping of hairs for show purposes.	2
6	Hygiene of kennel/pens, feeding utensils.	1
7	Restraining of dogs for examination and medicine administration.	1
8	Common breeds of cats, handling, restraint, examination, medication and surgical intervention in cats and kittens.	2
9	Identification of common pet birds. Handling of pet birds, their examination and administration of medicines.	2
10	Identification of common lab animals. Handling of lab animals, their examination and administration of medicines.	2
Total		**15**

REFERENCES:

Craig, E.G. 1998. Infectious Diseases of the Dog and Cat (2nd Edition). W.B. Saunders Company, London, U.K

Ettinger, S.J. and E.C. Feldman. 2000. Text Book of Veterinary Internal Medicine (5th Edition). W.B. Saunders, London,U.K

Fowler, M.E. and R.E. Miller. Zoo and Wild Animal Medicine (5th Edition). WB Saunders, London, U.K.

Joshi, B.P. Wild Animal Medicine, Oxford and IBH Publishing Company, New Delhi.

Course Code: VCS 505
Course Title: Veterinarian in Society
Credit hours: 1(1+0) Full Marks: 25 Theory: 25 Practical: 0

Objectives

Upon the completion of this course, students will be able to familiar with the different roles of veterinarians in society and the importance of veterinary profession in safeguarding animal and public health.

Syllabus

Man Animal and society: Social – ecological interactions in animal rearing. Client oriented approach to physical examination of animals. Concepts in interaction with animal owner/ clients. Bio-medical ethics and clinical evaluation. Communication skills. Animal/ owner information management. Human–animal bonds. Health maintenance in individual animal and population. Veterinary public health as component of society. Professional development. Societal responsibilities of veterinarians. Societal responsibilities with respect to private and public hospital and practice management. Social conduct and personality profiles in management of clinical practice. Veterinary professional interactions with Health authorities, drug and food regulatory authorities, zoo/animal welfare organizations and civil administration. Role of veterinarian in Natural calamities and disaster management.

Course Breakdown

Theory

S. No.	Topics	No. of Lectures
1.	Man Animal and society; Man animal interaction, Ethano-veterinary medicine; Social – ecological interactions in animal rearing.	1
2.	Client oriented approach to physical examination of animals; client service, client dealing, delivering bad news, Concepts in interaction with animal owner /clients.	1
3.	Bio-medical ethics and clinical evaluation; Ethical theories, bioethical principles, ethical oaths and codes	1
4.	Animal / owner information management.	1
5.	Human – animal bonds: Benefits of pets to people, responsibility of veterinarians to the society, factors influencing the formation of the human animal bond.	1
6.	Health maintenance in individual animal and population.	1
7.	Veterinary public health as component of society: Duties of veterinarians to the public, , role of veterinary services in food safety, approaches to food safety, at the farm level, meat inspection	2
8.	Professional development: Veterinarians oath, duties of veterinarians to the profession	1

9	Communication skills; functions of communications; communication styles, functions of interpersonal communications.	1
10	Societal responsibilities of veterinarians.	1
11	Societal responsibilities with respect to private and public hospital and practice management. Social conduct and personality profiles in management of clinical practice: Veterinary institutions, veterinary practice management.	2
12	Veterinary professional interactions with Health authorities, drug and food regulatory authorities, zoo / animal welfare organizations and civil administration.	1
13	Role of veterinarian in Natural calamities and disaster management: Preparedness activities before disaster seasons, response and recovery activities; problems for livestock during natural calamities	1
Total		**15**

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Veterinary Microbiology and Parasitology

Course Code : VPA 201
Course Title : Parasitology I (General Parasitology and Cestode Parasites)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to assess the knowledge about identification of eggs, adult cestode parasites, their pathogenesis and drugs used in their control.

Syllabus:

Introduction to parasitology- Parasites and parasitism, Animal association, Types of hosts, Types of parasitism, Host parasite relationship, Mode of transmission of parasites and methods of dissemination of the infective stages of the parasite, Parasite specificity in relation to species, breed, sex and location. Tissue reaction caused by parasite to the host. Resistance of hosts to parasitic infections/infestation. Immunity against parasitic infections. Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD). General description of helminth parasites affecting domestic animals and birds.

Classification of helminthes, characteristics of phylum (Platyhelminthes, Nemathelminthes and Acanthocephala). Salient morphological features of diagnostic importance. Lifecycle of the cestode parasite in relation to transmission, pathogenesis, epidemiology, diagnosis, general control measures of following cestode parasite of animals and birds.

Cestodes: Mesocestoides, Equine tape worms (Anoplocepahala, Paranocephala), Ruminant tapeworms (Moniezia, Avitelina, Stilesia), Dog tape worms (Dipylidium, Taenia, Multiceps and Echinococcus), Poultry tape worms (Davainea, Cotugnia, Raillietina, Amoebotaenia), Dwarf tape worm (Hymenolepis nana) and Fish tape worm (Diphyllobothrium).

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1	Introduction (definition of parasitology, terms use in parasitology, short history of parasitology)	2
2	Animal association (Phoresis, Mutualism, symbiosis, commensalism and parasitism, Types of host and parasites	1
3	Host parasite relationship, tissue reaction caused by parasites to their hosts, Mode of transmission of parasites	3

4	Resistance of host to parasitic infection/infestation Immunity gainst parasitic infections.	3
5	Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD)	2
6	Classification of helminths and characteristics of various phyla Protozoa, Platyhelminthes, Nemathelminthes, Acanthocephala, Annelida and Arthropoda.	3
7	Morphological features, mode of transmission, life cycle, pathogenesis, symptoms, diagnosis, treatment and control measures. Mesocestoides, equine tapeworm (Anoplocephala, Paranophlocephala)	3
8	Ruminant tapeworm (Avitellina, Stilesia, Moniezia)	2
9	Dog tapeworm (Dipylidium, Taenia hydatigena, Multiceps, Echinococcus)	3
10	Human tapeworm (Taenia spp., Hymenolepis sp.)	3
11	Poultry tapeworm (Davainea, Cotugnea, Railletina, Amoebotinia)	3
12	Fish tapeworm (Diphyllobothrium)	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Collection, fixation, and preservation of cestode parasites and their larval stages.	3
2	Demonstration of lesion of the cestode or their larval stages cause by adult parasite and their larval stages.	3
3	Visits laughter house to observe adult and larval stages of cestode parasites.	3
4	Demonstration of the types of final host and their intermediate hosts.	3
5	Faecal examination methods and identification of eggs of cestode parasites.	3
Total		**15**

REFERENCES:

Change, T.C. 1973. General Parasitology (1st Edition). Academic Press, Florida, USA.

Levine, N. D. 1983. Text Book of Veterinary Parasitology (1st Indian Edition). CBS Publishers and Distributers.

Soulsby, E. J. L. 1986. Helminths, Arthropods and Protozoa of Domesticated Animals (7th Edition). The English Language Book Society and Bailliere Tindall and Cassell Ltd.

Urguhart, G. M. 1996. Veterinary Parasitology (2nd Edition). Blackwell Science Ltd.

Course Code : VPA 202
Course Title : Parasitology II (Helminthology and Leeches)
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completionof this course, students will be able to identify the trematodes, nematodes, acanthocephalan and leeches parasites and their eggs their larval stages and their control measures.

Syllabus:

General description of trematodes, nematode, acanthocephala, leeches which affected animals and birds. Classification and characteristics of Platyhelminthes, Nemathelminthes, Acanthocephala and annelids. Salient morphological features of diagnostic importance, life cycle, mode of transmission, pathogenesis, epidemiology, diagnosis, treatment and control measures of following helminthes of animals and birds.

Trematodes: Liver flukes (Dicrocoelium, Fasciola and Opisthorchis), intestinal flukes (Fasciolopsis), blood flukes (Schistosoma i.e., S. nasalis and other schistosomiasis, and Ornithobilharzia), Amphistomes/immature amphistomiasis (Paramphistomum, Gigantocotyl, Gastrothylax, Cotylophoron, Gastrodiscus, Gastrodiscoides, Pseudodiscus), Lung flukes (Paragonimus) and Oviduct flukes (Prosthogonimus) their importance in the diagnosis.

Nematodes: Ascaris, Parascaris, Toxascaris, Ascaridia, Heterakis and Oxyuris, Bursate Worms (Strongyloides, Strongyles, Chabartia, Syngamus, Oesophagostomum), Kidney worms (Stephanurus, Dioctophyma), Hook worms (Ancylostoma, Agriostomum, Bunostomum, Trichostrongylus, Ostertagia, Cooperia, Nematodirus). Stomach worms (Haemonchus, Mecistocirus), Tissue roundworms (Habronema, Thelazia, Spirocerca, Gongylonema, Gnathostoma), Filarial worm (Dirofilaria, Parafilaria, Onchocerca, Setaria, Stephanofilaria), Lung worms (Dictyocaulus, Mullerius and Protostrongylus), guinea worms (Dracunculus). Spiny headed worms (Acanthocephala and Macracanthorhynchus), Annelids (Hirudinaria and Haemadipsa). International regulations for control of different helminthic diseases.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Important helminth parasites of domestic animals and birds General description	1
2	Classification and characteristics of helminth parasites a. Platyhelminthes, b. Nemathelminthes, c. Acanthocephala d. Annelida	1
3	Trematode parasites:	
	a. Liver flukes- Fasciola, Dicrocoelium and Opisthorchis	2
	b. Intestinal fluke- Fasciolopsis	1
4	Blood flukes (Schistosoma nasalis, S. bovis, S. spandale, S. indica, S. incognitum) and cercarial dermatitis due to schistosoma andOrnithobilharzia.	2
5	Amphistomes/immature amphistomiasis (Paramphistomum, Cotylophoron, Gigantocotyle, Gastrothylax, Gastrodiscus, Gastrodiscoides, Pseudodiscus).	2
6	Lung fluke- Paragonimus Oviduct fluke- Prothogonimus	1
7.	Nematode parasitesAscaris, Parascaris, Toxocara, Toxascaris, Ascaridia, Oxyuris and Heterakis	3
8	Bursate worms (Strongyloides, Strongyles, Chabartia, Syngamus, Oesophagostomum	3
9	Kidney worms- Stephanurus and Dioctophyma	1
10	Hook worms- Ancylostoma, Agriostomum, Bunostomum, Trichostrongylus, Ostertagia, Cooperia, Capillaria, and Nematodirus.	3
11	Stomach worms- Haemonchus, Ollulanus and Mecistocirus	3
12	Tissue round worms- Trichinella, Habronema, Thelazia, Spirocerca and Gongylonema	3
13	Filarial worms- Dirofilaria, Setaria, Onchocerca	2
14	Lung worms- Dictyocaulus, Protostrongylus	1
15	Guinea worm- Dracunculus	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Methods of collection, fixation, preservation, mounting of trematode, nematode, and acanthocephala parasites.	2
2	Identification of important trematodes, nematodes, acanthocephala and annelids parasites.	2
3	Study of morphological characters of adults and their larval stages and damages caused by them.	1
4	Examination of Faecal smples for eggs of cestode, trematode, nematodes and acanthocephalan.	2
5	Demonstration of parasitic culture, sporulation and detection of larvae of parasites with Bearmann's apparatus.	2
6	Demonstration of the lifecycle and development of the types, species of Trematode, Nematode, Acanthocephala and leeches parasites.	2
7	Visit the slaughter house or abattoir for collection of parasites.	1
8	Collection of important snail, their identification and preservation.	1
9	Measure the size of parasite and its organs and eggs with the help of micrometer	2
	Total **15**	

REFERENCES:

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Soulsby, E. J. L. 1986. Helminths, Arthropods and Protozoa of Domesticated Animals (7th Edition). The English Language Book Society and Bailliere Tindall and Cassell Ltd.

Urguhart, G. M. 1996. Veterinary Parasitology (2nd Edition). Blackwell Science Ltd.

Course Code : VPA 303
Course Title : Parasitology III (Veterinary Entomology and Acarology)
Credit Hours : 2(1+1) Full Marks: 50 Theory: 25 Practical:25

Objectives:

Upon the completion of this course, students will be able to recognize the important arthropods, ticks and diagnose the gross lesions caused by these parasites as well as their role in vector borne diseases.

Syllabus:

General description of insect and arachnida affecting domestic animals and birds. Arthropoda as direct/ indirect parasites. Broad classification, general morphological features, distinguishing characteristics, arthropods as disease transmitters on livestock and poultry. Life cycle and vector potentiality in relation to disease transmission, pathogenesis and control of following arthropods affecting animals, birds and man.
The biting midges (culicoides), buffalo/black fly, gnats (Simulium), sandflies (Phlebotamus). The mosquitoes (Cule, Anopheles and Aedes). Horse fly (Tabanus), Musca, Stomoxys, Sarcophaga, Warbles (Hypoderma) and bots (Gasterophilus), bugs, lice (Haematopinus, Linognathus, Trichodectus, Damalina, Menopon, Lipeuris, Menacanthus (Poultry lice). Fleas (Pulex, Ctenocephalides, Echidnophaga, Xenopsylla). Arachnids (Ticks and mites of veterinary importance, soft tick (Argasidae), Argus, Ornithodorus and Otobius.
Hard ticks (Boophilus, Hyalomma, Rhipicephalus, Haemophysalis, Ambyomma, Ixodes), mites (Sarcoptes, Psoroptes, Demodex, Chorioptes, Notoedrus). Anti-tick immunoprophylaxis. Damages to hide and skins due to ectoparasitic infestation.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Introduction of arthropods, general description of insects and arachnida affecting domesticated animals and birds.	1
2	Classification of arthropods, general morphology, mouth parts, wing venation their larval and pupal stage.	1
3	General morphology, bionomics, life cycle, vector potentiality, pathogenesis and control measures of following important arthopods affecting man, animals and birds.	1
4.	The biting midges-Culicoides Buffalo/Blalck fly or gnats-Simulium Sandflies-Phlebotomus, Lutzomyia, Mosquitoes- Anopheles, Culex and Aedes	2
5	Tabanidae – Tabanus (horse fly) Muscidae- Musca (houseflies), Stomoxys (stable/flies) Calliphoridae-Lucilia and Calliphora Sarcophagidae –Sarcophaga (blowflies) Hypodermatidae- Hypoderma (warble flies)	2
6	Oestridae- Oestrus (Nasal flies) Gasterophidae- Gasterophilus (bots) Hippoboscidae (wingless flies)- Hippobosca, Melophaga (the sheep ked)	2
7	Bugs- Cimex	1
8	Lice- Haematopinus (sucking lice of cattle), Linognathus, Damalina, Goniocotes, Goniodes, Menopon and Cuclotogaster.	2
9	Fleas- Pulex, Ctenocephalides, Xenopsylla, and Echidnophaga.	1
10	Archnida Soft ticks (Argasidae)- Argas, Otobius and Ornithodoros. Hard ticks (Ixodidae)- Boophilus, Hyaloma, Amblyomma, Rhipicephalus, Haemophysalis, Dermacenter and Ixodes.	2
11	Mites- Dermanyssus (red mite of poultry), Ornithonyssus (tropical mite of poultry), Nemidocopties (scaly leg mite of poultry), Psoroptes, Sarcopties and Demodex (parasitic mites of mammals).Damageto hide and skin due to ectoparasite infestation.	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1	Demostration of the type representatives of various groups of insects, ticks and mites through charts, specimen and mounted slides.	3
2	Demonstration of the types representatives of various groups of ticks and mites through charts, specimen and mounted slides.	3
3	Demonstration of different characters of Insecta and Arachnida (ticks and mites)	3
4	Methods of collection, fixation, preservation, mounting and identification of arthropod parasites.	3
5	Demonstration of enteric myiasis and their collection and preservation.	3
Total		**15**

REFERENCES

Change, T.C. 1973. General Parasitology (1st Edition). Academic Press, Florida, USA.

Soulsby, E. J. L. 1986. Helminths, Arthropods and Protozoa of Domesticated Animals (7th Edition). The English Language Book Society and Bailliere Tindall and Cassell Ltd.

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Course Code : VPA 304
Course Title : Parasitology IV (Veterinary Protozoology)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to evaluate the protozoan disease based on their pathogenesis and symptoms, they also know their mode of transmission and control measures.

Syllabus:

Introduction and general description to protozoa and their development. Differentiate from protophyta, bacteria and rickettsia. Classification of protozoan parasites. Life cycle in relation to mode of transmission, pathogenesis, diagnosis and control of protozoan parasite of veterinary importance.
Entamoeba, Leishmania, Trypanosoma (surra), Giardia, Hexamita, Histomonas, Trichomonas, Balantidium, Eimeria, Isospora, Plasmodium, Babesia(piroplama), Theileria (theilerosis), Hepatozoon, Toxoplasma, Sarcocystis, Haemoproteus, Leucocytozoon, Besnoitia, Neospora, Cryptosporidiosis and Anaplama. Recent developments in the preparation of protozoan vaccine for field use. International regulation for control of different protozoan diseases.

Course breakdown
Theory

S.N.	Topic	No.of Lectures
1	Introduction and general description to protozoa and their development.	2
2	Differentiate from protophyta, bacteria and rickettsia.	1
3	Classification, life cycle, mode of transmission, pathogenesis, symptoms diagnosis treatment and control measures of different parasites of animals, birds and man. These important parasites are-	
4.	Entamoeba, Typanosomes, Leishmania	3
5	Giardia, Hexamita, Histomonas,	2
6	Trichomonas, Balantidium, Plasmodium,	3
7	Eimeria, Isospora, Cryptosporium,	3
8	Babesia, Theileria, Hepatozoon,	3
9	Toxoplasm, Sarcocystis, Hemoproteus,	3
10.	Neospora, Leucocytozoon,	3
11.	Besnoitia and Anaplasma.	3
12.	Recent development in protozoan vaccine for field use.	2
13.	International regulation for control of different protozoan diseases.	2
Total		**30**

Practical

S.N.	Topic	No. of Practicals
1	Examination of faecal materials for identification of intestinal protozoa, coccidian and flagellates.	2
2	Demonstration different organs/tissue of hosts affected by protozoan parasite.	2
3	Preperation of thick and thin blood smear and their staining, examination of slides for haemoprotozoan parasites.	2
4	Methods of collection, fixation, preservation and mounting of protozo an parasites.	3
5	Identification of representative slides of protozoan parasites.	3
6	Identification of drugs against the protozoan diseases.	3
Total		**15**

REFERENCES:

Levine, N. D. 1983. Text Book of Veterinary Parasitology (1st Indian Edition). CBS Publishers and Distributers.

Soulsby, E. J. L. 1986. Helminths, Arthropods and Protozoa of Domesticated Animals (7th Edition). The English Language Book Society and Bailliere Tindall and Cassell Ltd.

Course Code : VMI 201
Course Title : Microbiology I (General Veterinary Microbiology)
Credit Hours : 3 (2+1) Full marks 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand morphology, staining principle and identification of bacteria, bacterial metabolism, growth of bacteria, general properties of fungi and virus.

Syllabus:

History, development and concepts of Microbiology with special emphasis on Bacteria. Definition and general properties of Bacteria. Differentiation of prokaryote from eukaryote. Morphology, microscopic and ultramicroscopic structures including their composition and function of Bacteria. Nutrition, cultivation and growth of Bacteria. Physiology and metabolism of Bacteria. Bacterial genetics: Replication of DNA and RNA, plasmid, gene transfer (transformation, conjugation, transduction, F-factor, C-factor and R-factor) mutation and their effects. Pathogenic microorganisms and their relationship to diseases; Mechanisms of infection. Microbial virulence: Factors influencing virulence, Koch's postulate.Toxins: Exotoxin, endotoxin and their effect on host tissues; role of antitoxin against toxins. Sterilization and disinfection: Methods of sterilization, types of disinfectants and their characteristics. Classification of bacteria. History of Virology, definition, general properties of Virus and differentiation of Virus from other Microorganisms. Composition and functions of viral structures, antigenic determinants or epitopes. Physical, chemical and biological properties of Viruses. Nomenclature and classification of Viruses. Viral genetics: Scope, Genetic map and viral genome organization. Inactivation and preservation of Viruses. Purification of Viruses. Replication of Viruses and their effects on host at cellular and multi-cellular level. Molecular Virology: Definition and scope of Molecular Virology. Viral DNA and RNA, PCR, RT-PCR, Gel electrophoresis, Pulse-field gel electrophoresis, Recombinant DNA technology: Cloning and gene expression, Hybridization techniques, SDS-PAGE, Western blotting and Immuno-chemiluminescent assay. Bacteriophage. Epidemiology of Viral Infection. Resistance to Viral infection and immunity: Interference phenomenon and interferon. Viral vaccines and chemotherapy. Persistent Viral infection and slow Viruses.

Course Breakdown
Theory

S. No.	Topic	No.of Lectures
1.	Highlight on developmental history of veterinary cum medical microbiology	1
2.	Microscopy-bright field, dark field, ultraviolet, fluorescent, phase contrast and electron microscope	1
3.	Microbiology of unicellular organisms and their classification	1
4.	Classification and nomenclature of bacteria, Identification of bacteria	1
5.	Bacterial and colonial morphology and structure/anatomy of bacteria	1
6.	Cell wall, capsule, nucleus, cytoplasmic inclusion, flagella, motility.	2
7.	Endospores, sporulation, vegetative reproduction	1
8.	Bacterial stains, principles of Gram, acid fast, flagellar and capsular staining.	1
9.	Cultivation (aerobic and anaerobic) of bacteria, nutritive requirement of bacteria.	1
10.	Culture media, bacterial growth, growth curve, continuous culture, measurement of growth	1
11.	Bacterial pure culture, culture characteristic	1
12.	Sterilization, disinfection, factors influencing sterilization and disinfections	1
13.	Break in asepsis and defective sterilization, aseptic handling of sterilized materials. Life of sterile status, HACCP	1
14.	Energy relationship, sources of energy and catabolism	1
15.	Dissimilation of carbohydrates, proteins and fats	1
16.	Antibiotics, drug resistance and antimetabolites	1
17.	Bacterial genetics, Plasmid, mutation and variation associated with virulence.	1
18.	Introduction, morphology, classification of fungi.	1
19.	Growth, nutrition, reproduction of fungi	1
20	Pathogenic fungi	1
21	General properties of virus, morphology and electron microscopy.	1
22	Classification, cultivation and replication of viruses.	1
23	Viral genetics, cellular changes caused by viral infection, interference, interferon, inclusion bodies	1
24	Bacteriophage, viral proteins, nucleic acid and lipids	1
25	Viral haemagglutination, and antiviral therapy	1
26	Oncogenic and latent viruses	1
27	Introduction of dairy (Udder sanitation/sterilization, microbiology of milk), fish and food Microbiology	3
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Identification to the laboratory instruments and equipments.	1
2.	Introduction of Lab and does and don't in la.	1
3.	Microscopy and micrometry (sizes and shapes of microorganisms)	1
4.	Sterilization (Autoclaving, Hot air oven, boiling, red hot) and disinfection.	1
5.	Preparation of reagents and media plates (BHIA, MAC, BHI)	1
6.	Preparation of Blood agar, Antibiotic media	1
7.	Culture techniques and study of colony characteristics.	1
8.	Aseptic technique and transfer of microorganisms.	1
9.	Isolation and maintenance of pure culture.	1
10.	Staining- Gram's, Acid-fast, capsular, spore.	1
11.	Finding Colony Formation Unit (CFU) in liquid and food.	1
12.	Identification of bacteria through biochemical testing, motility test	1
13.	Antibiotic sensitivity test	1
14.	Slide preparation of fungi	1
15.	HA and HI	1
Total		**15**

REFERENCES:

Buxton, A. and G. Frazer. 1977. Animal Microbiology, Vol. 1. Blackwell Scientific Publication.

Davis, B.D. 1980. Microbiology. Harper and Row Publication.

Freeman, B.A. 1979. Burrows TextBook of Microbiology (1st Edition). W.B. Saunders Company; Philadephia. London, Toronto.

Kumar, H.D. 2000. Molecular Biology (2nd Edition). Vikas Publishing House. Pvt. Ltd.

Marchant, I. A. and R.A. Packer. 1967.Veterinary Bacteriology and Virology (7th Edition). The Lows state University Press, Ames, lowa, USA.

Course Code : VMI 202
Course Title : Microbiology II (Veterinary Immunology and Serology)
Credit Hours : 3(2+1) Full marks 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to describe different classes of antigen and antibodies, immune response system, hypersensitivity, autoimmunity and immunoprophylaxix.

Syllabus:

History and modern concepts of Immunology and Serology. Organs and cells associated with immunity. Definition and types of immunity and resistance. General features and mechanism of immune response. Antigen: Definition, composition, properties, types and functions. Processing of antigen and their relationship with Major Histo-compatibility Complex (MHC) molecules. Response of B and T cell to antigen. Antigen binding sites and their genetics. Antibody: Definition, properties, types and function. Theory of antibody (Ab) production. Antigen-antibody reaction and their consequences. Chemical Mediators of the Immune system. Complement system and their role in immunity. Induction of immune response and immune effector mechanisms. Hypersensitivity and immune tolerance: Different types of hypersensitivity, factors responsible for immune tolerance. Principles of different serological tests: Agglutination test, precipitation test, hemagglutination activity, Hemagglutination–inhibition, Passive hemagglutination tests, Complement fixation test, Fluorescent antibody technique (FAT), Radioimmunoassay, Immunohistochemistry, Enzyme linked immunosorbent assay (ELISA), Immunodiffusion test, Serum neutralization test (SNT), Focus inhibition test (FIT), counter immuno-electrophoresis and Protection test (PT).

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	History of Immunology	1
2.	Type of Immunity: Specific and nonspecific immunity	1
3.	Factors contributing immunity and factors that influences immunity	1
4.	Phase cytosis	1
5.	What Happens when an organism comes in contact with the body	1
6.	Antigenicity, Immunogenicity and Antibody	1
7.	Epitopes, Haptens, Polyclonal and monoclonal antibodies	1
8.	Adjuvants, mechanism of action and its types	1
9.	Immunodeficiency, Immunotolerance, immune competent, Immune compromised an immune suppressant	1
10.	General immunoglobulin structure	1
11.	Structure and function of specific immunoglobulin	1
12.	The lymphoid system, cells involved in the immune response	1
13.	Events in the induction of immune response	1
14.	Mechanism of antibody production	1
15.	Theories of antibody production	1
16.	Complement system and its Classification	1
17.	Alternative pathways of complement system	1
18.	Agglutination reaction; precipitation; immunodiffusion	1
19.	Haemagglutination and Hemagglutination inhibition test	1
20	Complement fixation test	1
21	ELISA	1
22	Major histocompatability complex	1
23	Blood groups, typing and transfusion	1
24	Hypersensitivity, factors affecting and steps involved in Hypersensitivity	1
25	Type I, Type II, Type III	1
26	Type IV, Type V, Type VI	1
27	Immunization	1
28	Type of vaccines	1
29	Autoimmunity/autoimmune disease	1
30	Recent development in immunology	1
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Methods of injections in animals	1
2.	Methods of staining blood from laboratory animals	1
3.	Preparation of bacterins for immunization	1
4.	Preparation of immune serum for agglutination and precipitation test	1
5.	Preparation of one percent Chicken RBC and 8HA unit of antigen	1
6.	Passive (indirect) haemagglutinations test	1
7.	Hemagglutination inhibition test	1
8.	Preparation of Phosphate Buffer Saline (PBS) and anticoagulant solution	1
9.	Precipitation by gel diffusion test	1
10.	Complement fixation test	1
11.	ELISA	1
12.	Demonstration of Anaphylactic shock in a guinea pig	1
13.	Demonstration of tuberculin reaction	1
14.	Human blood group typing	1
15.	Study of commercial available different type of vaccines	1
Total		**15**

REFERENCES:

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Dale, J.W. 1998. Molecular Genetics of Bacteria (3rd Edition). John Wiley and Sons, Inc. 605, Third Avenue, New York.

Roit. I.M. 1980. Essential Immunology. Blackwell Scientific Publication.

Smith, G.R. (Ed). 1984. Topley and Wilson's Principles of Bacteriology, Virology and Immunity, Vol, 1.2 and 3. Arnold Heinemann.

Course Code : VMI 303
Course Title : Microbiology III (Systematic Veterinary Bacteriology and Mycology)
Credit Hours : 3(2+1) Full marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to learn the morphology, isolation, identification, growth, colonial, biochemical and antigenic properties, pathogenicity and diagnosis of important pathogenic bacteria and fungi.

Syllabus:

Study of important pathogenic bacteria and fungi in relation to their morphology, isolation, identification, growth, colonial, biochemical, antigenic properties, pathogenicity, resistacne and diagnosis of bacterial and fungal diseases caused by the following genera:

Bacteria: Sphaerophorus, Staphylococcus, Streptococcus, Bacillus, Corynebacterium, Erysipelothrix, Listeria, Clostridium, Filamentous bacteria : Actinomyces, Mycobacterium, Enterobacteriaceae (E.coli, Salmonella, Yersinia, Klebsiella, Shigella and Proteus), Pasturellacea: Pasteurella and Mannheimia, Actinobacillus, Haemophilus, Bordetella, Brucella, Pseudomonas and Burkholderia, Aeromonas, Francisella, Moraxella, and Taylorella, Listeria, Actinomyces, Nocardia, Arcanobacterium and Corynebactehum, Nocardia, Dermatophillus, Spirochaetes : Borrelia, Brachyspira, Compylobacter, Arcobacter, Helicobacter, Leptospira, Vibrio, Spirillium, Gram negative anaerobes, Rickettsia, Chlamydia, Coxiella, Ehrlichia and Chlamydophll. Mollicutes: Mycoplasma, Achoplasmas

Fungi: Dermatophytes, Rhinosporidium, Sporotrichum, Candida, Mycetomal fungi, Histoplasma Cryptococcus, Candida, Aspergillus, Zygomycetes, Penicillium and Dimorphic fungi, Fungi causing Mastitis, Abortion and Mycotoxicosis.

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
	Study of the important pathogenic bacteria in relation to their morphology, staining, isolation, growth, colonial biochemical and antigenic properties, pathogenicity, resistance, diseases caused and their diagnosis of the following:	
1.	Escherichia	1
2.	Salmonella	1
3.	Yersinia, Shigella	1
4.	Proteus, Klebsiella	1
5.	Pasteurella, Mannheimia	1
6.	Actinobacillus	1
7.	Haemophilus	1
8.	Bordetella, Brucella	1
9.	Pseudomonas, Aeromonas	1
10.	Francisella, Moraxella	1
11.	Borrelia, Brachyspira,	1
12.	Campylobacter, Arcobacter	1
13.	Helicobacter, Leptospira, Vibrio, Spirillium	1
14.	Sphaerophorus	1
15.	Streptococcus and Enterococcus	1
16.	Staphylococcus	1
17.	Bacillus, Corynebacterium	1
18.	Erysipelothrix, Listeria	1
19.	Clostridium	1
20	Filamentous bacteria: Actinomyces, Nocard	1
21	Mycobacterium	1
22	Mollicutes : Mycoplasma, Achoplasmas	1
23	Rickettsia, Coxiella	1
24	Ehrlichia, Chlamydia	1
25	Dermatophytes, Rhinosporidium	1
26	Sporotrichum, Aspergillus	1
27	Mycetomal fungi, Histoplasma	1
28	Cryptococcus, Candida	1
29	Zygomycetes, Penicillium	1
30	Fungi causing mastitis, abortion and Mycotoxicosis	1
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Collection of samples for bacteriological investigations.	1
2.	Methods of sterilization, preparation of culture media and staining techniques.	1
3.	Cultural characteristics of bacteria.	1
4.	Isolation and identification of bacteria by animal inoculation, biochemical tests, serological tests and molecular techniques: PCR, SDS-PAGE, Western blotting.	1
5.	Drug sensitivity of different types of bacteria	1
6.	Laboratory identification of agents of Mastitis, Haemorrhagic septicaemia.Enteric infections. Brucellosis. Black quarter, Enterotoxemia, Tuberculosis and Johne's disease, Clostridial infections, Wooden tongue and Lumpy jaw, Anthrax, Glanders, Aspergillosis, Tetanus. Dermatophytosis,	1
7.	Demonstration of other agents of importance (Phycomycetes, yeasts etc.).	1
8.	Bacteriological examination of water, milk and pathological specimen, Enumeration of microorganisms	1
9.	Diagnosis of fungi by culture, staining, biochemical tests and molecular techniques.	1
10.	Extraction and analysis of genomic and plasmid DNA from selective bacteria.	1
11.	Endospore stain and bacterial motility	1
12.	Isolation and identification of enterobacteriaceae and pseudomonas	1
13.	Obtaining pure cultures from a mixed population	1
14.	Isolation and identification of streptococci and staphylococci	1
15.	Obtaining pure cultures from a mixed population	1
Total		**15**

REFERENCES:

Carter & Wise. Essentials of Veterinary Microbiology

Dale, J.W. 1998. Molecular Genetics of Bacteria. 3rd Edition. John Wiley and Sons, Inc. 605, Third Avenue, New York.

Dwight C. H. Veterinary Microbiology

Qiunn & Carter. Clinical Veterinary Microbiology

Smith, G.R. (Ed. 1984). Topley and Wilson's Principles of Bacteriology, Virology and Immunity, Vol, 1.2 and 3. Arnold Heinemann.

Course Code : VMI 304
Course Title : Microbiology IV (Systemic Veterinary Virology)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon completion of this course, students will be able to know the general properties, morphology, replication, cultivation, pathogenicity, transmission, diagnosis and immunity of different viruses.

Syllabus:

Brief history, classification and characteristics of various families of DNA and RNA viruses causing diseases in livestock and poultry, laboratory diagnostic techniques, immunity to viral infections, systemic virology including: DNA viruses: Adenoviridae - Infectious canine hepatitis, egg drop syndrome (EDS), Inclusion body hepatitis-Hydropericardium syndrome (IBH-HPS). Papillomaviridae: Papillomatosis, Poxviridae: Pox viruses of cow, sheep, goat and fowl, Herpesviridae: Aujeszky's disease, malignant catarrhal fever, infectious bovine rhinotracheitis, equine abortion. Marek's disease, infectious laryngyotracheitis. Asfarviridae: African swine fever, Parvoviridae: Canine Parvovirus. Circoviridae: Chicken infectious anaemia.

RNA viruses: Reoviridae: African horse sickness and blue tongue, Calf Rotavirus, Birnaviridae: Infectious bursal disease. Picornaviridae: foot and mouth disease (FMD), duck viral hepatitis, Avian Encephalomyelitis Virus. Togaviridae: Swine Fever, Mucosal Diseases, Equine encephalitis, Arteriviridae: equine viral arteritis, Calciviridae: vesicular exanthema Coronaviridae: avian infectious bronchitis, transmissible gastroenteritis, Rhabdoviridae: Rabies, vesicular stomatitis, ephemeral fever. Paramyxoviridae: Rinderpest, PPR, canine distemper and Ranikhet disease Orhomyxoviridae: Swine, equine and Avian influenza. Filoviridae: Ebola Virus, Arenaviridae: Lassa Virus, Bunyavirdae: Phlebovirus. Flavivirldae: Classical swine fever, bovine viral diarrhoea. Retroviridae: Avian leucosis group, Equine Infectious Anaemia Virus. Hepadnaviridae: Hepatitis B Virus. Lentiviruses- Equine infectious anemia virus, Sheep pulmonary adenomatosis, Maedi, Visna. Prions: Scrapie (Sheep), Bovine Spongiform Encephalopathy, Mad Cow Disease, Exotic and emerging animal and poultry viruses.

Course Breakdown

Theory

S. No.	Topic	No.of Lectures
1.	General properties of various families of RNA and DNA virus.	1
2.	Classification of virus	1
3.	Adenoviridae: Infectious Canine Hepatitits, Aviadenovirus (Inclusion Body Hepatitis), Egg Drop Syndrome	1
4.	Papovaviridae: Papilloma Virus, Polyoma Virus, Vacuolating Virus	1
5.	Poxviridae: Cowpox Virus, Fowl Pox Virus, Capripoxvirus, Pseudocow Pox	1
6.	Herpesviridae : Malliganant Catarrhal Fever, Pseudorabies Virus, Marek's Disease Virus, Infectious Laryngyotracheitis Virus, Infectious Rhinotracheitis, Equine Abortion	1
7.	Asfarviridae: African Swine Fever Virus	2
8.	Irridoviridae	2
9.	Parvoviridae: Canine and Other Parvovirus	1
10.	Circoviridae: Chicken infectious anaemia1	
11.	Reoviridae: Reovirus, Rotavirus, Blugtongue virus, African Horse Sickness	1
12.	Birnaviridae: Infectious Bursal Disease Virus	1
13.	Picornaviridae: FMD Virus, Duck Hepatitis Virus, Avian Encephalomyelitis Virus	1
14.	Togaviridae: Swine Fever, Mucosal Diseases, Equine Encephalitis	2
15.	Coronaviridae: Infectious Bronchitis, Transmissible Gastroenteritis	1
16.	Rhabdoviridae: Rabies Virus, Vesicular Stomatitis Virus, Bovine Ephemeral Fever Virus.	1
17.	Paramyxoviridae: New Castle Disease Virus, Rinderpest Disease Virus, PPR Disease Virus, Bovine Respiratory Syncytial Virus.	2
18.	Orthomyxoviridae: Swine, Equine Influenza Virus, Avian Influenza Virus	2
19.	Filoviridae: Ebola Virus, Arenavirdae: Lassa Virus	1
20	BunyaBunyaviridae: Phlebovirus. Flavivirldae: Classical swine fever, bovine viral diarrhoea.	1
21	Retroviridae: Avian leucosis group, Equine Infectious Anaemia Virus.	1
22	Hepadnaviridae: Hepatitis B Virus	1
23	Lentiviruses- Equine infectious anemia virus, Sheep pulmonary adenomatosis, Maedi, Visna.	1
24	Prions: Scrapie (Sheep), Bovine Spongiform Encephalopathy, Mad Cow Disease, Exotic and emerging animal and poultry viruses.	1
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1.	Orientation of Virology laboratory	1
2.	Preservation and transportation of clinical samples for virological investigations	1
3.	Demonstration virus propagation by egg inoculation, animal inoculation	1
4.	Study of cytopathogenesis, viral inclusions, diagnostic procedures, serological techniques	1
5.	Preparation of glassware for tissue culture (washing, sterilization)	1
6.	Preparation of media like Hanks, MEM	1
7.	HA and HI test	1
8.	AGID	1
9.	Recognition of CPE in tissue cultures	1
10.	Demonstration of cell culture	1
11.	Serological tests ELISA for HIV, RPHA for HbsAg, Haemagglutination	2
12.	Diagnostic procedures for Peste des petits ruminants (PPR), FMD, Ranikhet disease (RD), Blue tongue, Infectious bronchitis (IB), Infectious bursal disease (IBD) and other viral agents.	3
Total		**15**

REFERENCES.

Bets, A.O. and C.J. York. 1967. Viral and Rickettsial Infection of Animal. New York Academic Press.

Joklik, W.K. 1988. Principles of Animal Virology. Appletoncentury-Crofts, New York.

Murphy, Gibbs, Horzineck and Studert. Veterinary Virology

Qiunn, Markey & Carter. Veterinary Microbiology & Microbial Diseases.

Russel, P.H. and N. Edingon. 1985. Veterinary Viruses. Edington Russel Publisher.

Veterinary Pathology and Clinics

Course Code : VPP 201
Course Title : General Pathology
Credit Hours : 3(2+1) Full Marks: 75 Theory:50 Practical:25

Objectives:

Upon the completion of the course, students will be able to understand the basic disease processes that affect tissues of animals, will gain appreciation of the relationship between clinical manifestations of disease processes and their underlying biochemical and morphologic abnormalities, will be expected to describe pathological changes, understand the pathogenesis of specific disease processes, make a morphological diagnosis based on the gross and/or histological findings presented and students are expected to learn and use medical terminology.

Syllabus:

Introduction to pathology, Introduction to concepts of disease. Mechanisms of disease caused by viruses, bacteria and other agents. Cellular injury, degeneration and necrosis including mechanisms of cell injury, alteration to cells, the response of cells, Pigments and other tissue deposits, Circulatory and vascular changes including fluid and hemodynamic derangement associated with diseased or inflamed tissues, thrombosis, embolism, infarction, and shock, Inflammatory processes, including acute and chronic inflammation, and their systemic affects, healing and tissue repair, including regeneration, wound healing and modification of the repair response. Immune mechanisms, immune-related diseases. Developmental disturbances. Classification, nomenaclature, types, and Immunity against tumor. Structure, appearance, growth, spread, Diagnosis and systemic effect of cancer.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Introduction, definitions, history, language of pathology and scope of pathology.	1
2	Definition of homeostasis cellular adaptation, cell injury, necrosis and apoptosis.	1
3	Cellular adaptation of growth and differentials (atrophy, hypertrophy, hyperplasia, hypoplasia, aplasia, metaplasia and dysplasia)	1
4	Causes of cell injury	1
5	Mechanism of cell injury (general and biochemical)	1
6	Ischemic and hypoxic cell injury	1
7	Chemical injury	1
8	Morphology of reversible cell injury (cell swelling and fatty changes)	1
9	Morphology of irreversible cell injury (necrosis, apoptosis and gangrene)	1
10	Lipid, protein and glycogen accumulation, endogenous pigments (lipofuscin, ceroid, melanin, copper, hemosiderin, bilirubin, hematoidin and acid hematin.	1
11	Pathological calcification, amyloid, amyliodosis, crystal (oxalate, urates, uric acid, cholesterol clefts), exogenous pigments (anthracosis, silicosis and asbestosis)	1
12	Edema (types, causes and pathophysiology)	1
13	Hypermia,and congestion, dehydration	1
14	Ischemia, hemostasis, hemorrhage, thrombosis and embolism	1
15	Infarction and DIC	1
16	Shock	1
17	definition, classification and cardinal signs of inflammation	1
18	Acute inflammation(chemical mediators and exudation)	1
19	Cells of acute inflammation, fever	1
20	Hypersensitivity and autoimmune disease mechanism	1
21	Chronic inflammation (cells involve, mechanism, types)	1
22	Repair and fibrosis mechanism	1
23	Wound healing, granulation tissue	1
24	Healing in kidney, lungs, brain and heart	1
25	Classification and nomenaclature and types of tumor	1
26	Structure, appearance, growth and spread of tumor	1
27	Etiology of cancer	1
28	Immunity against cancer and systemic effect	1
29	Diagnosis of cancer (cytology, molecular tools, tumor markers and staging)	1
30	Agenesis, aplasia, hypoplasia, atresia, fissure, fussion of sex character and monster	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Collection of specimens for histopathology, and fixation of tissues	1
2	Methods of processing of tissue for histopathology	1
3	Methods of section cutting and staining	1
4	Collection of gross pathological specimens and gross morphological diagnosis.	1
5	Collection of gross pathological specimens and gross morphological diagnosis.	1
6	Collection of gross pathological specimens and gross morphological diagnosis.	1
7	Technique of post mortem examination of large animals	1
8	Technique of post mortem examination of small animals	1
9	Study of histopathological slide showing growth disturbances (hypertrophy, hyperplasia, atrophy, metaplasia, dysplasia)	1
10	Study of histopathological slide showing circulatory disturbances (congestion, hemorrhage, edema and hyperemia)	1
11	Study of histopathological slide showing degenerative process (hydropic degeneration, and fatty degeneration)	1
12	Study of histopathological slide showing necrotic condition	1
13	Study of histopathological slide showing acute infammation	1
14	Study of histopathological slide showing chronic infammation	1
15	Collection, preservation and dispatch of morbid animals	1
Total		**15**

REFERENCES:

Blood, Studdert, Gay. 2006. Saunders Comprehensive Veterinary Dictionary, 3rd Ed.

Kierszenbaum, 2007. Histology and Cell Biology - An Introduction to Pathology, 2nd Ed.

Meuten, D.J. 2003. Tumors in Domestic Animals. Iowa State Press, 4th Ed.

Robbins & Cotran. 2009. Pathologic Basis of Disease, Kumar, et al. 8th Ed.

Slauson and Cooper. 2002. Mechanisms of Disease, *3*rd Ed.

Zachary & McGavin. 2012. Pathologic Basis of Veterinary Disease, *5*th Ed.

Course Code : VPP 202
Course Title : Systemic Pathology
Credit Hours : 3(2+1) Full Marks: 75 Theory:50 Practicals:25

Objectives:

Upon completion of this course, students will be able to use principles learned in general pathology to understand the unique ways each system reacts to injury and will be able to understand the pathological processes occurring in different systems of the body and correlate them with specific disease with emphasis on diseases of importance in Nepal. Students will be able to continue learning and using the language of medicine, in particular the appropriate terminology in pathology.

Syllabus:

Pathology of Cardiovascular system, Hemopoietic and immune system, Respiratory system, Digestive System, Urinary system, Genital system, Nervous system, Musculoskeletal system, Sense organs, and Integumentery system with appendages

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Cardiovascular system- Developmental defects	1
2	Disease of pericardium, myocardium and endocardium	1
3	Disease of artries and vein	1
4	Disease of lymph node and lymphatic	1
5	Conditions affecting blood	1
6	Coditions affecting spleen and bone marrow	1
7	Anemia	1
8	Primary immunodeficiency disease	1
9	Secondary immunodeficiency disease	1
10	Autoimmunity	1
11	Respiratory system- Developmental malformation	1
12	Disease of nasal cavities, larynx and bronchi	1
13	Disease of lung and pleura	1
14	Disease of mouth and pharynx and esophagus	1
15	disease of stomach and forestomach	1
16	Disease of intestine and peritonium	1
17	Disease of liver and pancrease	1
18	Disease of kidney	1
19	Disease of bladder, ureter, and urethra	1
20	Disease of male genital system and accessory sex glands	1
21	Disease of female genital system	1

22	Disease of mammary gland	1
23	Terminology and disesae of spinal cord	1
24	Disease of brain and meninges	1
25	Disease of muscle	1
26	Disease of bones and ligaments	1
27	Disesae of eyes	1
28	Disease of ears	1
29	Disease of skin	1
30	Disease of hoof, nails and horns	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Post-mortem examination of large animals	1
2	Post-mortem examination of small animals	1
3	Post-mortem examination of wild animals and birds	1
4	Post-mortem techniques of veterolegal cases and report writing	1
5	Collection and dispatch techniques of morbid materials to forensic laboratory	1
6	Study of histopathological slides of cardiovascular, Hemopoietic and immune system	1
7	Study of histopathological slides of digestive and respiratory system	1
8	Study of histopathological slides of urinary and genital system	1
9	Study of histopathological slides of musculoskeletal and nervous system and skin	1
10	Urinanalysis – sample collection, storage, gross appearance, specific gravity determination and dipstick examination and interpretation	1
11	Urinalysis- urine sediment technique, examination and interpretation	1
12	Hematology – collection of blood from different animals and preservation	1
13	Hematology- determination of TLC, DLC, TEC, Hb, PCV, ESR, TP and fibrinogen	1
14	Skin scraping technique and interpretation	1
15	Collection of CSF and interpretatioon	1
Total		**15**

REFERENCES:

Dijk, J.V., E. Gruys and J. Mouwen. 2006. Color Atlas of Veterinary Pathology. 2006. ISBN-13: 978-0-7020-2758-1 Saunders.

Jones, Hunt, and King. Williams & Wilkins. 1997. Veterinary Pathology, 6th Ed.

Jubb and Kennedy. 2007. Palmer Pathology of Domestic Animals (5th Edition). Academic Press.

Mc Gavin, Zachary.2011. Pathologic Basis of Veterinary Disease (5th Edition), Elsevier.

Meuten DJ . 2003.Tumors in Domestic Animals (4th Edition). Iowa State Press.

Thomsons' Special Veterinary Pathology. 2005. Carlton, McGavin and Zachary. Mosby Publications.

Course Code : VPP 303
Course Title : Special Pathology I
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practicals: 25

Objectives:

Upon the completion of this course, students will be able to understand the relationship between clinical manifestations of disease in an animal and the underlying biochemical and morphologic abnormalities and students will be required to describe the pathogenesis of disease processes, name possible etiologic agents, list differential diagnoses, and determine a reasonable prognosis.

Syllabus:

Bacterial disease(general introduction, etiology, pathogenesis, clinical signs, macroscopic and microscopic lesions, sequele and diagnosis of Tuberculosis Johne's disease, Actinomycosis and actinobacillosis, Anthrax and black Quarer, Bovine bacillary hemoglobinurea and malignant edema, Braxy and gas gangrene ,nocardiosis, campylobacteriosis, Hemophilus, salmonellosis, Tetanus Enterotoxaemia and Botulism, colibacillosis in swine, CCPP and CBPP, Strangles and Glanders, Brucellosis, Q-fever and ehrlichosis, Mastitis, porcine enzootic pneumonia, chlamydial group of diseases, Hemorrhagic septicaemia, Leptospirosis and swine erysipelas, Listeriosis, Viral disease- general introduction, etiology, pathogenesis, clinical signs, macroscopic and microscopic lesions, and diagnosis of: FMD, Vesicular stomatitis ,and pox bovine viral diarrhea and malignant catarrhal fever, vesicular exanthema, maedi, jaagziekte, scrapie, Rabies, Aujeszkey's disease, bovine and feline spongiform encephalopathies, Canine distemper, canine parvovirus, feline panleukopenia, Infectious canine hepatits, Hog cholera, diseases caused by rota and corona viruses, infectious bovine rhinotracheitis, , caprine encephalitis-arthritis complex, Rinder pest, PPR and Blue tongue, Equine infectious anemia, equine influenza, equine viral arteritis, African Horse sickness, equine encephalomyelitis and equine rhinopneumonitis, Fungal disease -Introduction, and lesions of: Ring worm, favus, , zygomycosis, histoplasmosis, cryptococosis and candidiasis, Aspergillosis, aflatoxicosis and degnal disease, ochratoxicosis, trichothecosis and ergotoxicosis. Intoduction, etiology, pathogenesis, clinical signs and diagnosis of: fascioliasis, amphistomiasis, ascariasis, strongylosis, hemonchosis, spirocercosis, filariasis, hookworm, tapeworm infections, coccidiosis, toxoplasmosis, babesiosis, Theileriosis, Trypnosomiasis –Surra, Anaplasmosis. Pathogical changes in nutritional and metabolic diseases-deficiency/excess of carbohydrates, proteins, fats, minerals and vitamins and in conditions like milk fever, pregnancy toxaemia, post-parturient haemoglobinuria, ketosis, hypomagnesemic tetany, azoturia, piglet anaemia and sway back/enzootic ataxia and Rheumatism like syndrome. Pathogenesis, gross and microscopic pathology of heavy metal toxicities like arsenic, copper, lead, mercury, cadmium, strychnine, nitrate/nitrite, hydrocyanic acid (HCN), fluoride, oxalate toxicities and insecticide/pesticide poisoning

Course Breakdown
Theory

S.No.	Topic	No.of Lecturers
1	Tuberculosis	1
2	Johne's disease	1
3	Actinomycosis and actinobacillosis	1
4	Anthrax and black Quarer	1
5	Bovine bacillary hemoglobinurea and malignant edema, Braxy and gas gangrene	1
6	Nocardiosis, campylobacteriosis, Hemophilus, salmonellosis	1
7	Tetanus	1
8	Enterotoxaemia and Botulism, colibacillosis in swine.	1
9	CCPP and CBPP	1
10	Strangles and Glanders	1
11	Brucellosis, Q-fever and ehrilichosis	1
12	Mastitis, porcine enzootic pneumonia, chlamydial group of diseases	1
13	Hemorrhagic septicaemia	1
14	Leptospirosis and swine erysepalas	1
15	Listeriosis	1
16	FMD, Vesicular stomatitis ,and pox, bovine viral diarrhea and malignant catarrhal fever, vesicular exanthema	1
17	Maedi, jaagziekte, scrapie	1
18	Rabies, Aujeszkey's disease, bovine and feline spongiform encephalopathies.	1
19	Canine distemper, canine parvovirus, feline panleukopenia, Infectious canine hepatits	1
20	Hog cholera, diseases caused by rota and corona viruses,	1
21	infectious bovine rhinotracheitis, caprine encephalitis-arthritis complex	1
22	Rinder pest, PPR and Blue tongue	1
23	Equine infectious anemia, equine influenza, equine viral arteritis	1
24	African Horse sickness, equine encephalomyelitis and equine rhinopneumonitis	1
25	Ring worm, favus, zygomycosis, histoplasmosis, cryptococosis and candidiasis.	1
26	Aspergillosis, aflatoxicosis and degnala disease, ochratoxicosis, trichothecosis and ergotoxicosis	1
27	Fascioliasis, amphistomiasis, ascariasis, strongylosis, hemonchosis, spirocercosis, filariasis, hookworm, tapeworm infections, coccidiosis, toxoplasmosis	1
28	babesiosis Theileriosis Trypnosomiasis –Surra, Anaplasmosis	1
29	Pathogical changes in nutritional and metabolic diseases: (deficiency/excess of carbohydrates, proteins, fats, minerals and vitamins and in conditions like milk fever, pregnancy toxaemia, post-parturient haemoglobinuria, ketosis, hypomagnesemic tetany, azoturia, piglet anaemia and sway back/enzootic ataxia and Rheumatism like syndrome)	1
30	Pathogenesis, gross and microscopic pathology of heavy metal toxicities like arsenic, copper, lead, mercury, cadmium, strychnine, nitrate/nitrite, hydrocyanic acid (HCN), fluoride, oxalate toxicities, insecticide/pesticide poisoning	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Post mortem examination of animals suspected for infectious disease	1
2	Study on gross lesions from the gross specimens of infectious disease and gross morphological diagnosis	4
3	Histopathological slide interpretation of infectious disease and microscopic morphological diagnosis	7
4	Post mortem examination, gross lesion identification, tissue collection for histopathology, microbiology, immunohistocemistry, and toxicology, test result interpretation and making differential diagnosis of at least one case suspected for infectious disease.	3
Total		**15**

REFERENCES:

Dijk, J.V., E. Gruys and J. Mouwen, 2006. Color Atlas of Veterinary Pathology. ISBN-13: 978-0-7020-2758-1 Saunders

Jones, Hunt, and King. Williams & Wilkins. 1997. Veterinary Pathology., 6th Ed.

Jubb and Kennedy. 2007. Palmer Pathology of Domestic Animals. Academic Press, 5th Ed.,

Thomsons' Special Veterinary Pathology .2005. Carlton, McGavin and Zachary. Mosby Publications.

Vegad, J.L. TextBook of Special Veterinary Pathology-Infectious Diseases of Livestock and Poultry. IBDC publishers

Zachary & McGavin. 2012. Pathologic Basis of Veterinary Disease, 5th Ed.

Course Code : VPP 304
Course Title : Special Pathology II (Poultry, Fish and Diagnostic Pathology)
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand the basic disease processes that affect tissues of poultry and fish, will gain appreciation of the relationship between clinical manifestations of disease processes and their underlying biochemical and morphologic abnormalities. Students will be expected to describe pathological changes, understand the pathogenesis of specific disease processes, make a morphological diagnosis based on the gross and/or histological findings presented, name possible etiologic agents, list differential diagnoses, and determine a reasonable prognosis and will be able to understand technique and use of biopsy, cytology and DNA technology and antibody in disease diagnosis.

Syllabus:

Biopsy and Cytology, Fish pathology (Anatomy, physiology, immunology and inflammatory response in fish Viral diseases affecting fish bacterial, diseases affecting fish mycotic and parasitic diseases affecting fish Nutritional and toxic pathology Miscellaneous non-infectious diseases associated with physicochemical abnormalities of water. Neoplasia of teleosts.), DNA technology and antibody in disease diagnosis, Tumerogenic disease of poultry- introduction, etiology, pathogenesis clinical signs, post mortem lesion and microscopic lesion of Mareks disease and Avian leukosis complex. Bacterial disease- introduction, etiology, pathogenesis, clinical signs, PM lesion and diagnosis of: Pullorum disesae, typhoid and paratyphoid, Fowl coryza and fowl cholera, Collibacillosis and clostridial diseases (botulism, necrotic enteritis, gangrenous dermatitis, ulcerative enteritis) Mycoplasma gallisepticum infection (chronic respiratory disease), Mycoplasma synoviae infection, Avian chlamydiosis (psittacosis) tuberculosis and spirochaetosis. Viral disease- introduction, etiology, pathogenesis, clinical signs, PM lesion and diagnosis of New castle disease and Infectious bronchitis, ILT, Avian nephritis, infectious stunting syndrome, and reovirus infections, Avian influenza, and Gumboro disease, inclusion body hepatitis, hydro-pericardium syndrome Avian encephalomyelitis, fowl pox, Chicken infectious anemia, EDS-76. Fungal infection-intrduction, etiology, pathogenesis and lesions of Aspergillosis, thrush, Favus and mycotoxicosis. Pathogenesis, gross and microscopic pathology of Aflatoxicosis, ochratoxicosis and trichothecenes. Nutritional, metabolic and Miscellaneous diseases- Pathogenesis, gross and microscopic pathology of major diseases due to deficiency/excess of carbohydrates, proteins, minerals and vitamins in poultry. Miscellaneous Diseases: Pathology of important vices and miscellaneous conditions.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1	Biopsy and Cytology -Its scope, Methodology and limitation in the diagnosis of lesions	1
2	Exfloative cytology	1
3	Anatomy, physiology, immunology and inflammatory response in fish.	1
4	Viral diseases affecting fish	1
5	Bacterial, diseases affecting fish	1
6	mycotic and parasitic diseases affecting fish	1
7	Nutritional and toxic pathology.	1
8	Miscellaneous non-infectious diseases associated with physicochemical abnormalities of water. Neoplasia of teleosts.	1
9	Cleavage of DNA into fragments, DNA cloning and probes	1
10	Polymerase chain reaction	1
11	Restriction fragment length polymorphism	1
12	Southern, western and eastern blotting	1
13	Immunoperoxidase and Immunohistochemistry technique in disease diagnosis	1
14	Tumerogenic disease- introduction, etiology, pathogenesis clinical signs, post mortem lesion and microscopic lesion of Mareks disease and Avian leukosis complex	1
15	Pullorum disesae, typhoid and paratyphoid	1
16	Fowl coryza and fowl cholera	1
17	Collibacillosis and clostridial diseases (botulism, necrotic enteritis, gangrenous dermatitis, ulcerative enteritis)	1
18	Mycoplasma gallisepticum infection (chronic respiratory disease), Mycoplasma synoviae infection, Avian chlamydiosis (psittacosis).	1
19	tuberculosis and spirochaetosis	1
20	New castle disease and Infectious bronchitis, ILT	1
21	Avian nephritis, infectious stunting syndrome, and reovirus infections.	1
22	Avian influenza, and Gumboro disease	1
23	Inclusion body hepatitis, hydro-pericardium syndrome,	1
24	Avian encephalomyelitis, fowl pox	1
25	Chicken infectious anemia EDS-76,	1
26	Aspergillosis, thrush, Favus and mycotoxicosis	1
27	Pathogenesis, gross and microscopic pathology of Aflatoxicosis, ochratoxicosis and trichothecenes.	1
28	Parasitic infestation- pathogenesis and pathology (flukes, cestodes, nematodes), protozoal diseases (coccidiosis, histomoniasis), ectoparasites, Avian malaria	1
29	Nutritional and metabolic diseases Pathogenesis, gross and microscopic pathology of major diseases due to deficiency/excess of carbohydrates, proteins, minerals and vitamins in poultry	1
30	Miscellaneous Diseases: Pathology of important vices and miscellaneous conditions.	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Normal anatomy and histology of finfish and shellfish	2
2	Ante-mortem and post-mortem examination of fish	1
3	Haematology of fish	1
4	Histopathology of important viral, bacterial, fungal and parasitic diseases.	2
5	Post mortem examination and diagnosis of poultry diseases based uppn clinical signs and gross lesions and Writing of postmortem report.	2
6	Collection, preservation and dispatch of morbid materials in poultry diseases.	1
7	Study of gross specimens and histopathological slides of different diseases of poultry.	3
8	Demonstration of immunoperoxidase technique	1
9	Demonstration of immunohistochemistry technique	1
10	Demonstration of PCR technique	1
Total		**15**

REFERENCES:

Dijk, J.V., E. Gruys and J. Mouwen, 2006. Color Atlas of Veterinary Pathology. ISBN-13: 978-0-7020-2758-1 Saunders

Mugera G.M. 2000. Veterinary Pathology in the Tropics- For Students & Practitioners.New Age International (P) Ltd, New Delhi.

Newton, C.R. & A. Graham. 1997. Introduction to Biotechniques – PCR. II Edition. BIOS Scientific Publishers ltd. Oxford.

Sirois, M., D. McBride, F. C.V. Mosby 1996 . Livestock and Poultry. IBDC Publishers Veterinary Clinical Laboratory Procedures USA .

Strafuss, A.C and C. Charles, T. Springfield. Necropsy: Simplified procedures and Basic diagnostic methods for practicing veterinarians.

Course Code : VCS 301
Course Title : Veterinary Clinical Service I
Credit Hours : 1(0+1) Full Marks: 25 Theory: 0 Practical: 25

Objectives:

Upon the completion of this course, students will be able to diagnose and treat the cases of different animals.

Syllabus:

Handling of cases brought at veterinary teaching hospital, clinical examination of animals, collection and preparation of samples for laboratory analysis, prescription writing, drug administration and preparation of clinical records.

Course Breakdown
Practical

S.No.	Topic	No. of Practicals
1	Orientation to veterinary clinics including teaching hospital.	1
2	Registration, filling of registration cards and history taking.	1
3	Familiarization and practice of first aid procedures and emergency medicine.	1
4	Clinical practice comprising of clinical examination of the patient with emphasis on history taking, examination techniques e.g. palpation, percussions and auscultation.	1
5	Systematic examination of various systems recording of clinical observation viz temperature, respiration, pulse, cardiac sounds.	2
6	Functional motility of digestive systems, routes and techniques of administration of medicaments.	1
7	Practice of i/m, s/c, i/v, i/p subconjunctival and i/mammary infusion.	1
8	H1andling, examination, diagnosis and treatment of sick animals under field conditions.	1
9	Pregnancy diagnosis techniques by rectal palpation.	1
10	Faecal examination techniques VIZ Direct smear methods, floatation techniques methods and sedimentation techniques methods.	1
11	Techniques of skin scraping methods.	1
12	Examination of cases of anoestrus, silent oestrus and conception failure	1
13	Prescription writing	1
14	Postmortem techniques in poultry	1
Total		**15**

REFERENCES:

Blood, D.C. and G.M. Radostitis. 2007. A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (10th Edition). ELBS publication.

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins

Venugopalan, A. 2002. Essentials of Veterianry Surgery (8th Edition). Oxford & IBH publishing Co. Pvt. Ltd.

Course Code : VCS 402
Course Title : Veterinary Clinical Service II
Credit Hours : 2(0+2) Full Marks: 50 Theory:0 Practical: 50

Objectives

Upon the completion of this course, students will be able to diagnose and treat the cases of different animals.

Syllabus

Handling of cases brought at veterinary teaching hospital, clinical examination of animals, collection and preparation of samples for laboratory analysis, prescription writing, drug administration and preparation of clinical records and ambulatory clinics.

Course Breakdown

Practical

S.No.	Topic	No. of Practicals
1	Hospital management involving out patient department (OPD)	1
2	Indoor patient, critical care, intensive care unit, sanitation, up keeping, practice management	1
3	Diagnosis and treatment of common clinical cases like pharyngitis, laryngitis, stomatitis	1
4	Diagnosis and treatment of common clinical cases like indigestion, ruminal impaction, Tympany	1
5	Diagnosis and treatment of common clinical cases like enteritis, traumatic reticulo peritonitis	2
6	Diagnosis and treatment of common clinical cases like traumatic pericarditis	1
7	Treatment of cases of metritis, cervicitis and vaginitis	3
8	Treatment of fresh wound and chronic wound	1
9	Treatment of broken horn injury and horn cancer	1
10	Passing of stomach tube and gastric tube	2
11	Use of antiseptic and disinfectants	1
12	Treatment of magotted wound	1
13	Castration of goat, bulls and pig	1
14	Treatment and prevention of omphalitis and colibacillosis in poultry	1
15	Treatment and prevention of Infectious Bursal Diseases and Newcastle Diseases	1
16	Treatment of Ascarid worms and tapeworms in poultry	1
17	Treatment control and prevention of ticks, lice and flea infestation in cattle buffalo and dogs	1

18	Tr19eatment control and prevention of paramphistomiasis and fascioliasis in cattle and buffalo	2
19	Treatment control of calf scour	1
20	Treatment control and prevention of coccidiosis in poultry and bovine	2
21	Treatment, control and diagnosis of clinical and subclinical mastitis in cattle and buffalo	1
22	Diagnosis treatment and control measures in Actinobacillosis and Actinomycosis	1
23	Allergy and its treatment	1
24	Handling storage and security of drugs and instruments	1
Total		**30**

REFERENCES:

Blood, D.C. and G.M. Radostitis. 2007. A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (10th Edition). ELBS publication.

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins

Venugopalan, A. 2002. Essentials of Veterianry Surgery (8th Edition). Oxford & IBH publishing Co. Pvt. Ltd.

Course Code : VCS 403
Course Title : Veterinary Clinical Service III
Credit Hours : 2(0+2) Full Marks: 50 Theory: 0 Practical: 50

Objectives:

Upon the completion of this course, students will be able to diagnose and treat the cases of different animals.

Syllabus:

Handling of cases brought at veterinary teaching hospital, clinical examination of animals, collection and preparation of samples for laboratory analysis, prescription writing, drug administration and preparation of clinical records and ambulatory clinics

Course Breakdown

Practical

S.No.	Topic	No. of Practicals
1	Ambulatory clinical activity (medicine, gynaecology and obstetrics, surgery) infield conditions	3
2	Diagnosis and treatment of common clinical cases like pneumonia	1
3	Diagnosis and treatment of common clinical cases like haemoglobinuria and haematuria	1
4	Diagnosis and treatment of common clinical cases like milk fever and ketosis	1
5	Diagnosis and treatment of common clinical cases like rickets and osteomalacia	1
6	Diagnosis and treatment of common clinical cases like organophosphorus and lead poisoning	1
7	Diagnosis and treatment of common forage poisoning	1
8	Handling of cases of retention of placenta	1
9	Management of Prepartum and postpartum prolapse of vagina	1
10	Examination and preliminary handling of dystocia cases	2
11	Rectal examination of genitalia and vaginal examination practice	2
12	Familiarization with antiseptic dressing techniques	1
13	Treatment and management of inflammation, wounds, abscess, cysts, tumors	1
14	First aid in fractures and dislocation and other affections of joints, fascial paralysis	1

15	Diagnosis and treatment of ephemeral fever and swine fever	1
16	Diagnosis treatment and control measures in Marek's and Avian Leukosis complex (ALC)	1
17	Prevention and control measures of LPAI and HPAI in poultry bird	1
18	Vaccination program in Broiler and layers	2
19	Vaccine and vaccination program in large animals	2
20	Correction of uterine torsion and repeat Breeding syndrome in large animals	2
21	Treatment and control measures of rabies diseases	1
22	Treatment and control measures of PPR and CCPP in caprine	1
23	Treatment and preventive measures in Degnala disease in bovine	1
Total		**30**

REFERENCES:

Blood, D.C. and G.M. Radostitis. 2007. A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (10th Edition). ELBS publication.

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins

Venugopalan, A. 2002. Essentials of Veterianry Surgery (8th Edition). Oxford & IBH publishing Co. Pvt. Ltd.

Course Code : VCS 504
Course Title : Veterinary Clinical Service IV
Credit Hours : 2(0+2) Full Marks: 50 Theory: 0 Practical: 50

Objectives:

Upon the completion of this course, students will be able to diagnose and treat the cases of different animals.

Syllabus:

Handling of cases brought at veterinary teaching hospital, clinical examination of animals, collection and preparation of samples for laboratory analysis, prescription writing, drug administration and preparation of clinical records and ambulatory clinics

Course Breakdown

Practical

S.No.	Topic	No. of Practicals
1	Treatment and prevention of Brucellosis and Trichomoniasis in bovine species	1
2	Treatment and prevention of FMD, BQ, HS and RP	2
3	Treatment and control measures of canine distemper and parvo virus infection in canine	1
4	Treatment and control of hypocalcaemia and Downer's Cow syndrome	1
5	Treatment and control measures of salmonellosis in poultry	1
6	Treatment and control measures of fowl Typhoid	1
7	Treatment and prevention of visceral and Articular gout in poultry	1
8	Treatment and prevention of mycotoxicosis in poultry	1
9	Treatment and control of epistaxis and choking	1
10	Surgical correction of upper fixation medial patellar ligament	2
11	Treatment and prevention of retention of urine	1
12	Bacteriological culture and antibiotic sensitive test	2
13	Examination of blood smear for diagnosis of blood protozoan disease	2
14	Examination of horse for soundness and preparation of certification of soundness	1
15	Familiarization with burn injuries and their treatment techniques	1
16	Clinical management of mastitis	2
17	Familiarization with epistaxis and nasal polyps and their treatment	1
18	Treatment and prevention of corneal opacity	1
19	Treatment and prevention of udder oedema	1
20	Treatment and prevention of stress and Ascites in poultry birds	1
21	Practice of feeding of sick animals	1
22	Vaccination and other disease prevention and control programmes in the field	1
23	Ambulatory clinics (Medicine, gynaecology and surgery) in the field conditions	3
Total		**30**

REFERENCES:

Blood, D.C. and G.M. Radostitis. 2007. A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats, and Horses (10th Edition). ELBS publication.

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins

Venugopalan, A. 2002. Essentials of Veterianry Surgery (8th Edition). Oxford & IBH publishing Co. Pvt. Ltd.

Veterinary Surgery and Pharmacology

Course Code: VPT 201
Course Title: General and Systemic Pharmacology
Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objectives:

Upon the completion of the course, students will be able to understand pharmacokinetics, pharmacodynamic properties of drugs, drugs acting on different system, and will be able to prepare drugs in pharmacy as per prescription.

Syllabus:

Historical development branches and scope of Pharmacology, Sources and nature of drugs. Pharmacological terms and definitions. Principles of drug activity: Pharmacokinetics - Routes of drug administration, absorption, distribution, biotransformation and excretion of drugs. Pharmacodynamics-Concept of drug and receptor, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage. Fundamentals of drug/screening and assay of drugs. Adverse drug reactions, drug interaction, drug- designing and development, bio prospecting of drugs. Introduction to biopharmaceutics and gene therapy. Drugs acting on digestive system: Stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics, emetics, antiemetics, purgatives, antidiarrhoeals, cholerectics and cholagogues. Rumen pharmacology.

Drugs acting on Cardiovascular system: cardiac glycosides, antiarrhythmic drugs, vasodilators and antihypertensive agents, haematinics, coagulants and anticoagulants. Drugs acting on respiratory system: Expectorants and antitussives, respiratory stimulants, bronchodilators and mucolytics. Drugs acting on urogenital system: Diuretics, urinary alkalizers, and acidifiers, fluid therapy, ecbolics and tocolytics.
Pharmacotherapeutics of hormones and vitamins.
Drugs acting on skin and mucous membranes: Emollients, demulcents and counter irritants. Bio-enhancers, Immunostimulants and immunosuppressants. New drugs and drug formulations.

Course Breakdown
Theory

S. No.	Topic	No. of Lectures
1	Historical development, Branches and scope of Pharmacology, Pharmacological terms and definitions.	1
2	Sources and nature of drugs	1
3	Pharmacokinetics - Routes of drug administration, absorption, distribution, biotransformation and excretion of drugs.	4

4	Pharmacodynamics-Concept of drug and receptor, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage.	4
5	Fundamentals of drugs screening and assay of drugs.	1
6	Adverse drug reactions, drug interaction, drug- designing and development, bio prospecting of drugs. Introduction to biopharmaceutics and gene therapy.	2
7	Drugs acting on digestive system: Stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics, emetics, antiemetics, purgatives, antidiarrhoeals, cholerectics and cholagogues. Rumen pharmacology.	4
8	Drugs acting on Cardiovascular system: cardiac glycosides, antiarrhythmic drugs, vasodilators and antihypertensive agents, haematinics, coagulants and anticoagulants.	4
9	Drugs acting on respiratory system: Expectorants and antitussives, respiratory stimulants, bronchodilators and mucolytics.	2
10	Drugs acting on urogenital system: Diuretics, urinary alkalizers, and acidifiers, fluid therapy, ecbolics and tocolytics.	2
11	Drugs acting on skin and mucous membranes: Emollients, demulcents and counter irritants.	2
12	Immunostimulants and immunosuppressants. New drugs and drug formulations.	1
13	Pharmacotherapeutics of hormones and vitamins.	2
Total		**30**

Practical

S. No.	Topic	No.of Practicals
1	Pharmacy appliance, Principles of compounding and dispensing	1
2	Metrology: systems of weights and measures, pharmacy calculations. Pharmaceutical processes	2
3	Pharmaceutical dosage forms	1
4	Prescription writing, incompatibilities	1
5	Drug standards and regulations,	1
6	Compounding and dispensing of powders, ointments, ,	3
7	Mixtures, liniments, lotions, liquors	3
8	Tinctures, emulsions, and electuaries.	3
Total		**30**

REFERENCES :

Brander, G.C., D.N. Pugh, R.J. Bywater and W.L. Jenkins. 1991. Veterinary Applied Pharmacology and Therapeutics. Bailliere Tindal, London.

Gooodman G.A., T.W. Rali, A.S. Nies and P. Taylor. 1992. The Pharmacological Basis of Therapeutics. Mcgraw-Hill, Singapoore.

Richard, H. A. 2001. Veterinary Pharmacology and Therapeutics (8th Edition). IOWA State University Press, USA.

Course Code : VPT 202
Course Title : Veterinary Neuropharmacology
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand the drugs acting on the CNS, autonomic nervous system, and peripheral nervous system.

Syllabus:

Drugs acting on autonomic nervous system: Neurohumoral transmission, adrenoceptors agonists and antagonists, adrenergic- neuron blockers, cholinoceptors agonists and antagonists, ganglionic stimulants and blockers.

Autacoids: Histamine and antihistamine agents, 5-Hydroxytryptamine and its antagonists, prostaglandins, angiotensin and bradykinin.

Drugs acting on central nervous system (CNS): Pharmacology of neurotransmitters, History of general anaesthetics and theories of anaesthesia. Inhalent, intravenous and dissociative anaesthetics; hypnotics and sedatives; tranquilizers, psychotropic drugs, anticonvulsants, opioid analgesic, nonsteroidal anti-inflammatory drugs, analeptics and other CNS stimulants, central muscle relaxants. Drugs acting on somatic nervous system: Local anaesthetics and peripheral muscle relaxants. New drugs and drug formulations.

Course Breakdown
Theory

S. No.	Topic	No.of Lectures
1	Drugs acting on autonomic nervous system: Neurohumoral transmission,	1
	adrenoceptors agonists and antagonists,	2
	adrenergic- neuron blockers,	1
	cholinoceptors agonists and antagonists,	2
	ganglionic stimulants and blockers.	1
2	Autacoids:	
	Histamine and antihistamine agents,	2
	5-Hydroxytryptamine and its antagonists,	1
	prostaglandins, angiotensin and bradykinin.	2
3	Drugs acting on central nervous system (CNS):	
	Pharmacology of neurotransmitters	1
	History of general anaesthetics	1
	theories of anaesthesia.	1
	Inhalent, intravenous and dissociative anaesthetics;	4
	hypnotics and sedatives;	1
	tranquilizers, psychotropic drugs,	1
	anticonvulsants,	1
	opioid analgesic,	1
	nonsteroidal anti-inflammatory drugs, analeptics and other	2
	CNS stimulants, central muscle relaxants.	2
	Drugs acting on somatic nervous system: Local anaesthetics and peripheral muscle relaxants.	2
	New drugs and drug formulations.	1
Total		**30**

Practical

S.No.	Topic.	No.of Practicals
1	Demonstration of the effect of CNS depressants, analgesics,	3
2	CNS stimulants,	1
3	Muscle relaxants	1
4	Anticonvulsants,	1
5	Local anaesthetics in laboratory animals	2
6	Demonstration of the action of adrenergic and cholinergic agonists and antagonists on isolated and intact preparations of the animals	5
7	Alternate use of animals as model for demonstration	2
Total		**15**

REFERENCES:

Brander, G.C., D.N. Pugh, R.J. Bywater and W.L. Jenkins. 1991. Veterinary Applied Pharmacology and Therapeutics. Bailliere Tindal, London.

Gooodman G.A., T.W. Rali, A.S. Nies and P. Taylor. 1992. The Pharmacological Basis of Therapeutics. Mcgraw-Hill, Singapoore.

Richard, H. A. 2001. Veterinary Pharmacology and Therapeutics (8th Edition). IOWA State University Press, USA.

Course Code : VPT 303
Course Title : Veterinary Chemotherapy
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand about antibiotics, antibacterials, antifungal, anthelmintics, antiprotozoans, antineoplastic, ectoparacidals hormones and indigenous drugs.

Syllabus:

Antibacterial agents: Classification, general principles in antibacterial chemotherapy, antibacterial resistance. Sulphonamides and their combination with diaminopyrimidines, sulfones, nitrofurans, nalidixic acid and fluoroquinolones.

Antibiotics: Penicillins and cephalopsorins, aminoglycosides, tetracyclines, chloramphenicol, macrolides, polypeptides. Miscellaneous agents: methenamine, bacitracin. Rifampin. novobiocin, viginamycin, lincosamides and vancomycin.

Antifungal agents: Topical and systemic agents including anti-fungal antibiotics.
Anthelmintics: Drugs used against cestodes, trematodes, nematodes, drug resistance, broadspectrum anthelmintics.
Antiprotozoal agents: Drugs used in trypanosomosis, theileriosis, babesiosis, coccidiosis, amoebiosis, giardiosis and trichomonosis.

Ectoparasiticides, Antiviral and anticancer agents. Antiseptics and disinfectants. Growth promoters. Common indigenous drugs of plant origin with proven pharmacological and therapeutic efficacies in various animal ailments.

New drugs and drug formulations. Therapeutic drug monitoring.

Course Breakdown
Theory

S. No.	Topic	No.of Lectures
1	Antibacterial agents:general principles in antibacterial	1
	chemotherapy, antibacterial resistance.	1
	Sulphonamides and their combination with	
	diaminopyrimidines, sulfones, nitrofurans,	2
	nalidixic acid and fluoroquinolones	2
	Penicillins and cephalopsorins,	3
	aminoglycosides,	2
	tetracyclines,	2
	chloramphenicol,	1
	macrolides, polypeptides.	1

2	Miscellaneous agents: methenamine, bacitracin. Rifampin. novobiocin, virginamycin, lincosamides and vancomycin.	2
3	Antifungal agents: Topical and systemic agents including anti-fungal antibiotics.	2
4	Anthelmintics: Drugs used against cestodes, trematodes, nematodes, drug resistance, broadspectrum anthelmintics.	3
5	Antiprotozoal agents: Drugs used in trypanosomosis, theileriosis, babesiosis, coccidiosis, amoebiosis, giardiosis and trichomonosis.	2
6	Ectoparasiticides,	1
7	Antiviral and anticancer agents.	1
8	Antiseptics and disinfectants	1
9	Growth promoters. Common indigenous drugs of plant origin with proven pharmacological and therapeutic efficacies in various animal ailments.	1
10	New drugs and drug formulations; Therapeutic drug monitoring	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Bacterial sensitivity test for different chemotherapeutic agents by disc diffusion method	2
2.	Preparation and formulation of indigenous drugs, their pharmacological properties and usages	2
3.	Study of source, physical characteristic, composition of commonly used drugs and their clinical use	4
4.	Monitoring of drug-plasma concentration and dose-response curve	4
5	Preparation of Pot. Permanganate solution, lugol's iodine, gentian, violet solution, Preparation of boric acid ointment, zinc oxide ointment, ointment of salicylic acid with benzoic acid	3
Total		**15**

REFERENCES:

Prescott, J.F., J.D. Baggot and R.D. Walker. 2005. Antimicrobial Therapy in Veterinary Medicine (Latest edition). Blackwell Scientific Publications, IOWA, USA.

Rang, H.P., M.M. Dale and P.K. Moore. 2003. Pharmacology (5th Edition). Churchill Livingstone, Edinburgh, UK.

Tripathi, K.D. 2003. Essentials of Medical Pharmacology. Jaypee brothers Medical Publishers (P) Ltd., New Delhi.

Course Code : VSR 401
Course Title : Anaesthesiology
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be familiar with different preanaesthetics, anaesthetics with their antidotes, other emergency drugs and their proper use in veterinary field.

Syllabus:

History and terminology of anaesthesia, general considerations in selection of anaesthesia, preanaesthetic medication, local and regional anaesthesia, general anaesthesia, balance anaesthesia and stage of anaesthesia, muscle relaxants, electro-anaesthesia, acupuncture and hypothermia, anaesthetic complications, emergencies and their remedies, anaesthesia of laboratory animals and birds, restraining of zoo and wild animals and euthanasia.

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1.	History and importance of anaesthesia in veterinary surgery	1
2.	Introduction, types of anaesthesia and definition of common terms	1
3.	General considerations in selection of anaesthetic agents	1
4.	Preparation of patients for anaesthesia	1
5.	Preanaesthetic medication in domestic animals Anticholinergics, tranquillizers (reasons and contraindications, effects on body systems)Narcotic and sedatives (reasons and contraindications, effects on body systems)	2
6.	Local and regional anaesthesiaIntroduction, Indications and clinically useful local analgesic drugsMethods of producing local analgesia (surface, infiltration, instillation, field block and nerve block) Methods of producing regional anaesthesia (epidural, paravertebral, intravenous)	3
7.	General anaesthesiaAnaesthetic drugs (parentral and inhalation) Balance anaesthesia and stage of anaesthesia	2
8.	Muscle relaxants, electro-anaesthesia, acupuncture and hypothermia (definition level)	1
9.	Anaesthetic complications, emergencies and their remedies	1
10.	Anaesthesia of laboratory animals and birds	1
11.	Restraining of zoo and wild animals	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Familiarization with anaesthetic apparatus, endotracheal device, laryngoscopes, gadgets for monitoring	1
2.	Laboratory tests of the patients before anaesthesia	1
3.	Methods of local infiltration (Ring block, diamond block, T-block, inverted L- block)	1
4.	Epidural and paravertebral block (Regional blocks)	1
5.	Intravenous regional block	1
6.	Methods of administration of anaesthesia in horse, cattle, sheep and goat	1
7.	Methods of administration of anaesthesia in dogs, cats and pig	1
8.	Endotracheal Intubation in animals	1
9.	Artificial ventilation to the patients	1
10.	Anaesthetic machines and their systems	1
11.	Demonstration and monitoring of general anaesthsia	1
12.	Postanaesthetic intensive care of animals and management of anaesthetic emergencies	1
13.	Induction of anaesthesia in laboratory animals and birds	1
14.	Chemical method of restraints of zoo and wild animals	1
15.	Euthanasia: Indications, various methods and agents used	1
Total		**15**

REFERENCES:

Blaze and Glowaski. 2004. Veterinary Anaesthesia- A Quick Reference, Elseviers Saunders.

Hall, L.W., KW Clark, and CM Trim, 2001. Veterinary Anaesthesia. 10th Ed., WB saunders Company, London, Edinburgh.

Lumb, W.V. and E.W. Jones, 1996. Veterinary Anaesthesia. Williams & Wilkins -A Waverely Copmany, Baltimore, Philadelphia, London.

Paddleford, R.R. 1999. Manual of Small Animal Anaesthesia, 2nd Ed., WB Saunders Company, Philadelphia, London.

Seymour, C. and R. Gleed, 1999. Manual of Small Animal Anaesthesia and Analgesia, 1st Ed, British Small Animal Veterianry Association, Kingsley House, Church Lane, UK.

Course Code : VSR 402
Course Title : General Surgery
Credit hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the Completion of this course, students will be able to understand the basic principles of tissue handlings, basic surgical instruments, suture materials and suturing patterns, haemorrhage and haemostasis and aseptic techniques of surgery, nutritional support for veterinary surgical patients, fluid & electrolyte infusion and blood transfusions.

Syllabus:

Introduction, branches, history and development of veterinary surgery, reasons of surgery, principles of tissue handling and general surgical principles, proficiency in veterinary surgery, sterilizations of surgical materials and instruments, suture and ligature, nutritional support to surgical patients, infection control, wound and wound healing, haemorrhage, haemostasis and shock, surgical management of necrosis, gangrene, burn, scalds, frost bite, sinus and fistula, bandages and physical therapy, principles of fluid and blood transfusions, affections and surgical managements of blood vessels, lymphatics, bursa, muscles and nerves.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Introduction, branches, history and development of veterinary surgery	1
2.	Reasons of surgery, principles of tissue handling and general surgical principles	1
3.	Proficiency in veterinary surgery (pre-operative preparations, operative technique and post-operative considerations)	2
4.	Sterilizations of surgical materials and instruments	2
5.	Suture and Ligature-Knot tying, suture characteristics, specific suture materials, ligation techniqueSurgical needle, principles of choosing a surgical needle and types of needle Principles of suture selection, common suturing techniques and suture removal	3
6.	Nutritional support to surgical patientsIntroduction, consequences of malnutrition, metabolic changes associated with starvation, Dietary requirement, enteric feeding, parental nutrition	2
7.	Infection controlFactors in wound infection, surgical asepsis, antimicrobial prophylaxisTreatment of wound infections, nosocomial infections	2
8.	Wound and Wound HealingIntroduction, classification, symptoms, diagnosis and treatmentPathways of wound healing, stages and phases of wound healingFactors affecting wound healing, complications of wound and their management	3
9.	Haemorrhage, haemostasis and shock	2
10.	Differential diagnosis and surgical treatment of inflammation, abscess, tumors, cyst, haematoma and hernia	3

11.	Differential diagnosis and surgical treatment of necrosis, gangrene, burn, scalds, frost bite, sinus and fistula	2
12.	Bandages and physical therapyApplications, layers and bandaging techniquesApplications, regimens and adjunct to physical therapy	2
13.	Principles of fluid and blood transfusionsIndications, major body compartments and body water distribution, various electrolytes solutions, replacement solutions and colloid Assessment of dehydration, hypovolaemic shock, assessment of fluid requirements and Intraoperative fluid therapy and blood transfusion	3
14.	Affections and managements of- Blood vessels, lymphatics and bursaMuscles and nerves	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	An introduction to the layout of operation theater and theater management	1
2.	Acquaintances of common equipments and surgical instruments	1
3.	Care of surgical instruments	1
4.	Restraints of various species of animal	1
5.	Clinical examination of animals	1
6.	Nutritional support to surgical patients	1
7.	Administration and dispensing of medications	1
8.	Peri-operative fluid therapy to surgical patients	1
9.	Preparation and sterilization of surgical packs and equipment for theatre	1
10.	Preparation of the patient for theatre	1
11.	Preparation of the surgical team	1
12.	Familiarization with various suture materials and suture and their handling	1
13.	Different types of incision and pattern of suturing	1
14.	Postoperative care of the surgical patients	1
15.	Dressings and bandages	1
Total		**15**

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Oehme, F.W. and J.E. Prier, 1976. Text Book of Large Animal Surgery, 3rd Edn, Williams & Wilkins A Waverely Copmany, Baltimore, Philadelphia, London.

Slatter, H.S. 1993. Textbook of Small Animal Surgery. Vol-I & II, 2nd Edn, WB Saunders Company, Philadelphia, London.

Tyagi, R.P.S. and J. Singh, 2002. Ruminant Surgery, CBS Publishers and Distributors, Delhi, India.

Venugopalan, A. 2002. Essentials of Veterianry Surgery. 8th Edn, Oxford & IBH Publishing Co. Pvt. Ltd.

Course Code: VSR 403
Course Title: Radiology and Diagnostic Imaging
Credit Hours: 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to take X-rays of the affected parts and their processing and interpretation and acquire fundamental knowledge about ultrasonography, CT scan, MRI, echocardiography, scintigraphy, gamma camera, xeroradiography and Doppler.

Syllabus:

Introduction and historical backgrounds of veterinary radiology, production and properties of X-rays, working principles of x-rays machine and radiographic accessories, processing of radiograph, factors influencing production of radiographs, intensifying screen and its uses, advantages and disadvantages of fluoroscopy, contrast radiography, interpretation X-rays films, biological effect of radiation hazards and safety measures, principles of ultrasonography, CT scan, MRI, echocardiography, scintigraphy, gamma camera, xeroradiography and Doppler and their applications in veterinary practice, physical therapy

Course Breakdown

Theory

S.No.	Topic	No.of Lectures
1.	Introduction and historical backgrounds of veterinary radiology	1
2.	Production and properties of X-rays	1
3.	Working principles of x-rays machine and radiographic accessories, Processing of Radiograph	1
4.	Factors influencing production of radiographs (Radiographic factors and photographic factors)	1
5.	Intensifying screen and its usesAdvantages and disadvantages of fluoroscopy	1
6.	Contrast radiography: classification, materials used, indications, and contraindications	1
7.	Principles of viewing and interpreting X-rays films, classification of radiographic lesions	1
8.	Biological effect, measurement of the radiation, hazards, and safety measures	1
9.	Principles of ultrasonography and its applications in veterinary practice.	1
10.	Principles of radiation therapy, isotopes, and their uses in diagnosis and therapy	1
11.	Principles of physical therapy, its classification, scope and limitations	2
12.	Mechanism, applications, indications and contraindications of cold and heat therapy, massage, hydrotherapy, infrared and ultraviolet therapy	1
13.	Mechanism, applications, indications and contraindications of short wave, microwave diathermy and ultrasonic therapy	1
14.	Principles and application of CT scan, MRI, echocardiography, scintigraphy, gamma camera, xeroradiography and Doppler	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Familiarizations with and operation of X-rays equipments, X-rays accessories and dark room equipments	1
2.	Positioning and radiography of different parts of body in small and large animals Processing of X-ray films	1
3.	Handling, viewing and interpreting of an X-ray film, familiarization with film contrast, density and detail, spot film viewing, common defects of X-ray films, interpretation and classification of lesions	1 2
4.	Radiographic pathology of skull of large and small animals (Clinical cases/transparencies)	1
5.	Radiographic pathology of bones and joints of small and large animals	2
6.	Radiographic pathology of thorax and abdominal cavity	1
7.	Demonstration of contrast techniques in small animals	1
8.	Familiarization with fluoroscopic examination and ultrasonography.	1
9.	Techniques and application of diathermy, electrical stimulators, ultrasonographic therapy	2
10.	Use of cold and hot application, massage and planned exercise, infrared and ultraviolet rays etc their precautions	2
Total		**15**

REFERENCES:

Hoque, M. and G.R. Singh. 2004. Ultrasonography in Animals- Technical Bulletin, ICAR Publication, Izatnagar India.

Lavin, L.M. 1999. Radiography in Veterinary Technology, 2nd Edn, WB Saunders Company, Philadelphia, London.

Singh, A.P. and J. Singh. 2004. Veterinary Radiology- Basic Principles and Radiographic Positioning, 1st Edn, CBS Publishers and Distributors, Delhi, India.

Singh, G.R. and M. Hoque. 2004. Manual of Veterinary Radiology, ICAR Publication, Izatnagar India.

Course Code : VSR 403
Course Title : Regional and Clinical Surgery I
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon completion of this course, students will be able to diagnose and correct major surgical affections regarding orthopaedics, lameness in animals, ophthalmology, ear, nose and throat.

Syllabus:

Bone as a tissue, fracture-fracture healing, fracture reduction and fixations, differentiation between fracture and dislocation, affections of the joints, ligaments and tendons, affections of the vertebral columns including contusion fracture of the ribs, injuries to the costal cartilage, Lameness- it's definition and classification, body confirmation in relation to lameness and diagnosis of lameness, affections of the fore and hind limbs and their treatments on different domestic animals, anatomy of the foot, examination of the foot and their treatments, declawing, therapeutic shoes and corrective shoeing, crural paralysis, subluxation of sacro-iliac ligaments, rupture of round ligament, trochantric bursitis, femoral nerve paralysis, upward luxation of patella and stringhalt, examination of eye and diagnosis of eye diseases, principles of ophthalmic surgery, affections of the eye and their surgical management: entropion, ectropion, growth and tumors of the eyelid, occlusion of the nasolacrimal duct, squint, affections of the cornea and conjunctiva and their management, hydropthalmia, glaucoma, panopthalmia, injuries and affections of the anterior and posterior chambers, worm in the eye, affections and surgical management of ear, guttural pouches, lips and chicks, teeth, tongue, salivary gland, palate, nose, horns, neck and withers, esophagus, trachea, larynx and pharynx.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Bone as a tissue: formation of bone, structural andcellular elements of bone, and blood circulation to fractured bone	1
2.	Fracture: definition, etiology, classification, diagnosisProcess of fracture healingFactors affecting fracture healing and complications of fracture healingTechniques of fracture reduction and fixationsFracture of the sternum, sternal fistula and pneumocele	4
3.	Differentiation between fracture and dislocation, affections of the joints, ligaments and tendons	2
4.	Affections of the vertebral columns including contusion fracture of the ribs, injuries to the costal cartilage	1
5.	Lameness, it's definition and classification, Body confirmation in relation to lameness (trunk, fore and hind limbs), Diagnosis of lameness	1
6.	Affections of the fore and hind limbs and their treatments on different domestic animals (e.g. cattle, dog, horse, sheep and goat)	2
7.	Anatomy of the foot, examination of the foot and their treatments (contusion and ulceration of the sole, septic and chronic laminitis, avulsion of the hoof and declawing, therapeutic shoes and corrective shoeing)	2
8.	Crural paralysis, subluxation of sacro-iliac ligaments, rupture of round ligament, trochantric bursitis	1
9.	Femoral nerve paralysis, upward luxation of patella and stringhalt	1
10.	Examination of eye and diagnosis of eye diseases, Principles of Ophthalmic surgery	1
11.	Affections of the eye: entropion, ectropion, growth and tumors of the eyelid and conjunctivitis, occlusion of the nasolacrimal duct, squint	1
12.	Eye Ball: Affection of the cornea, hydropthalmia, glaucoma, panopthalmia, injuries and affections of the anterior and posterior chambers, Worm in the eye.	2
13.	Affections of the ear and their treatment: haematoma of the ear, ear cropping, necrosis and ulceration of the conchal cartilage, chronic ottorhoea, tumors of the ear	1
14.	Affections and treatment of the guttural pouches, chondritis, tympanitis, sinutitis, pus in the sinus	1
15.	Affections and treatments of lips and chicks: hare lip, lip fold pyoderma, edema of conical papillae of cheekTeeth: Congenital abnormalities, irregular molars	1
16.	Affections and treatment of tongue: strangulation, sublingual abscess, necrosis and gangrene, self suck	1
17.	Affections and treatment of salivary gland: fistula, mucoceles & ranulas, neoplasm, abscess, sialoliths and sialocele	1
18.	Affections and treatment of palate: cleft, lampasas, palatine tumorsNose: atheroma, nasal polyps, parasites in the nasal chambers, necrosis of the turbinates	1

19.	Affections and treatment of horns: avulsion of the horns, broken horns, horn cancer, fracture and fistula of the horn, disbudding and amputation	1
20.	Affections and treatment of neck: yoke gall, yoke-abscess, yoke-tumors, torticollosis and affection of the withers	1
21.	Affections and treatment of esophagus and trachea: Stenosis, ulcers, dilation and diverticulations, chocking, collapse of the trachea and tracheal tumors	1
22.	Affections of the larynx and pharynx: foreign bodies, abscess, traumatic injuries and fistula	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Familiarization of the various orthopedic instruments	1
2.	Plaster of Paris bandage in animals	1
3.	Intramedullary pinning in the dog	1
4.	Demonstration of the corrective shoeing, examination and paring of the bovine foot	1
5.	Examination of horse for soundness and preparation of certificates for lameness	1
6.	Amputation of limbs	1
7.	Medial patellar desmotomy and operation for string halt	1
8.	Operation of the corneal ulcer, technique of sub-conjunctival injection, blepharoplasty for entropion and ectropion and excision of dermoids	1
9.	Enucleating of the eye/extirpation of the eye and operation for draining the guttural pouches	1
10.	Disbudding and amputation of horns	1
11.	Exploration of the mouth using various mouth gags and tooth rasping	1
12.	Ear cropping, operation for aural haematoma and Zepp's operation	1
13.	Oesophagotomy	1
14.	Tracheotomy and tracheostomy	1
15.	Amputation of the tail	1
Total		**15**

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Alexander, J.W. 1985. Leonard's Orthopaedic Surgery of the Dog and Cat. 3rd Edn, WB Saunders Company, Philadelphia.

Bojrab, M.J. 1990. Current Techniques in Small Animal Surgery. 2nd Edn, Lea & Febiger 600 Washington Square, Philadelphia.

Kumar, A. 2004. Veterinary Surgical Techniques, Vikas Publishing House Pvt. Ltd, India.

Slatter, H.S. 1993. TextBook of Small Animal Surgery. Vol-I & II, 2nd Edn, WB Saunders Company, Philadelphia, London.

Venugopalan, A. 2002. Essentials of Veterianry Surgery. 8th Edn, Oxford & IBH publishing Co. Pvt. Ltd.

Course Code : VPT 304
Course Title : Veterinary Toxicology
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand toxicology of metals, non-metals, agro-chemicals, radioactive substances, venoms toxins and plants.

Syllabus:

General Toxicology: Definitions, fundamentals and scope of toxicology. Sources and mode of action of poisons. Factors modifying toxicity. General approaches to diagnosis and treatment of poisoning. Toxicity caused by metal and non-metals: Arsenic, lead, mercury, copper, selenium, molybdenum, phosphorus, nitrates and nitrites, common salt and fluoride. Toxicity caused by plants and weeds: Cyanogenetic plants, abrus, lantana, ipomoea, nerium, datura, nux vomica, castor, selenium containing plants oxalate producing plants, plants causing thiamine deficiency. Drug toxicity and toxicity caused by agrochemicals: organophosphates, carbamates, chlorinated hydrocarbons, pyrethroids. herbicides, fungicides, rodenticides and urea.
Residue toxicology: Hazards of residues, concepts of withdrawal time and MRLs, minimizing drug and toxic residues in animal products Venomous bites and stings: Snake bite, scorpion, spider, wasp stings and toad poisoning. Radiation hazards and industrial toxicants. Toxicity caused by food additives and preservatives.

CourseBreakdown
Theory

S.No.	Topic	No.of Lectures
1	Definitions, Terminology, Scope of Toxicology	1
2	Sources of poisoning, mode of action of poisons. Factors modifying toxicity. Classification of toxicants	1
3	Collection, preservation and dispatch of samples for toxicological laboratory.	1
4	General approaches to diagnosis of poisoning and line of treatment.	1
5	Toxicology of metals & non metals: Antimony, Arsenic, calcium, lead, mercury, copper, selenium, phosphorous, cobalt, fluorine, iodine, iron, magnesium, nitrates and nitrites, common salt.	4
6	Toxicology of Agro chemicals:	
	(a) Insecticide: organo phosphates, carbamates, chlorinated hydrocarbons, pyrethroids.	2
7	(b) Herbicides: Phenoxy derivatives of fatty acid, Dinitrocompounds	1
8	(c) Fungicides: Organic: Sulphur; Inorganic: phthalimides, Dithiocarbamates, Pentachlorophenol(PCP)	1
9	(d) Rodenticides : Fluoroactates, Reserpine, Alphanapthylthiyourea, Zinc phosphide	1

10	(e) Fumigants: Organic & inorganic fumigants	1
11	Toxicology of Radioactive substances: Source of radiation, biological effects of ionizing radiation, somatic effect of radiation	1
12	Toxicology of commonly used drugs: Anaesthetics (Tranquilizer, Sedatives, Hypnotics), analgesics, anthelmentics, antibiotics, antibacterials, antihistaminics, antiseptics& disinfectants, coccidiostats, digitalis, purgatives, quinuronium derivatives, hormones, vitamins & CNS stimulants	3
13	Toxicology of venomous bites & Stings(snake, toads,Spiders, Bees,Wasps)	2
14	Toxins(Mycotoxins by moulds &larger fungi)	1
15	Toxicity due to plants (Cyanogenetic, jowars, lantana, Dhatura, nuxvomica, castor, selenium containing plants, oxalate containing plants etc.)	4
16	Residue toxicology: Hazards of residues, concepts of withdrawal time and MRLs, minimizing drug and toxic residues in animal products	2
17	Toxicology of Food &Feed additives: Antioxidants, Coloring agent, Flavoring agent, preservatives, growth & performance enhancer	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	Demonstration of commonly used drug toxicity in lab animals (Antibacterial, Antibiotics, Anthelmintics, coccidiostats etc.)	2
2	Identification of commercially available antidotes & their use in toxicologica cases (Organophosphophate poisoning, cyanide poisoning, etc.)	2
3	Collection of sample, its preservation and dispatch of material for toxicological laboratory.	2
4	Method & procedure of analysis of samples for diagnosis of poisoned cases in lab.	3
5	Identification and collection of toxic plants.	1
6	Analysis of milk, meat, fodder & agricultural by products for residual of drugs & agrochemicals.	3
7	Case recording of clinical cases of poisoning.	2
Total		**15**

REFERENCES:

Garg, S.K. 2000. Veterinary Toxicology, CBS Publishers & Distributors, New Delhi.

Roy, B.K. 2001. Veterinary Pharmacology and Toxicology, Kalyani Publishers, New Delhi.

Sandhu, H.S. and R.S. Brar. 2000. TextBook of Veterinary Toxicology. Kalyani Publishers, Ludhiana.

Course Code : VSR 505
Course Title : Regional and Clinical Surgery-II
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to diagnose and correct major surgical affections of thoracic cavity, gastrointestinal system, urogenital system and udder & mammary glands.

Syllabus:

Surgical approaches to the thorax, general considerations for thoracic surgery, major affections of thoracic cavity and their management, Hernia- Classification, etiology, diagnosis, and treatment in various species, affections and surgical managements of- Simple and Compound Stomach, Intestine, anal glands, liver, spleen and pancreas, affections and corrections of urogenital system, castration in various species, scrotal ablation, ovariohysterectomy in various species, their indications, techniques and complications, caesarian section in domestic animals, affections of udder and teat and their surgical management.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Thoracic Surgery- surgical approaches to the thorax, General considerations for thoracic surgery Thoracocentesis, pneumothorax, hydrothorax, pyothorax, Chylothorax, Heart worm in dogs, Tumors and abscess of lungs, Diaphragmatic abscess	4
2.	Hernia- classification, etiology, diagnosis, and treatment in various species Umbilical Hernia, perineal hernia, ventral/lateral hernia Inguinal/scrotal hernia, diaphragmatic hernia	3
3.	Affections and surgical managements of simple and compound stomach: Cardiac and pyloric stenosis, torsion of stomach, Gastric ulceration, stomach tumors, foreign bodies in stomach, Ruminal impaction, traumatic reticulitis, Omasal impaction, abomasal displacements,	4
4.	Affections and surgical managements of intestine- Principles of intestinal surgery Colic, intestinal obstruction, intussusceptions. Strangulations, volvulus and paralytic ileus Caecal dilatation and caecal torsion Perforation of intestine, perforated wound and fistula of abdomen . Supra rectal abscess, rectovaginal fistula, paralysis of the rectum, Prolapse of the rectum, Atresia ani, atresia ani-et-recti-et-coli, haemorrhoids, stenosis of the rectum and anus	7
5.	Affections of the anal glands and their surgical managements	1
6.	Affections and surgical management of liver, spleen and pancreas	2
7.	Affections and corrections of urogenital system: Congenital malformations: Anorchidisim and monorchidisim, cryptoorchidism, ectopic testes, hypospadiasis, persistent penile frenulum Retention of urine, rupture of the bladder and urethra and urolithiasis Urinary fistula, hydrocele, hypertrophy of the prostate gland, phimosis and paraphimosis, haematoma of penis, priapism, penile fracture, preputial prolapse, Episiotomy, prolapse of vagina and uterus, canine vinereal granuloma, Neoplasms and other diseases	4
8.	Castration in various species, scrotal ablation	1
9.	Ovariohysterectomy in various species, their indications, techniques and complications	1
10	Caesarian section in domestic animals, persistent hymen	1
11.	Affections of udder and teat and their surgical management-Imperforate teats, teat fissure, obstruction of the teat canal, teat fistula, papilloma, Contusions, open wounds, gangrenous mastitis, abscess, tumor, ulcers, botryomycosis	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Familiarizations with landmark for approach to various visceral organs, thoracocentesis, abdomino-centesis	1
2.	Thoracotomy (demonstration)	1
3.	Laparotomy and visualization of viscera in dog	1
4.	Gastrotomy in small animals	1
5.	Laparotomy and palpation of viscera in large animals, Rumenotomy	1
6.	Surgical correction of abomasal displacement	1
7.	Enterotomy, enterectomy and intestinal anastomosis	1
8.	Anal gland ablation in small animals	1
9.	Cystotomy	1
10.	Urethrotomy	1
11.	Castration, vasectomy, caudectomy	1
12.	Ovario-hysterectomy	1
13.	Caesarian section in domestic animals	1
14.	Episiotomy and Technique of Buhner's suture application	1
15.	Amputation of udder and teat	1
Total		**15**

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Bojrab, M.J. 1990. Current Techniques in Small Animal Surgery. 2nd Edn, Lea & Febiger 600 Washington Square, Philadelphia.

Harari, J. 1996. Small Animal Surgery. The National Veterinary Medical Series, 1st Edn, Williams & Wilkins.

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Tyagi, R.P.S. and J Singh. 2002. Ruminant Surgery, CBS Publishers and Distributors, Delhi, India.

Veterinary Theriogenology

Course Code: VOG 301
Course Title: Theriogenology I (Animal Reproduction and Gynecology)
Credit Hours: 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to describe the structure and developmental abnormalities of reproductive organs, and the roles of hormones on reproductive system.

Syllabus:

Introduction, description of pelvic bones and ligaments in domestic animals. Embryology of the female genital tract - development of ovaries and female genital tract. Physiology of reproductive hormones - pituitary, ovarians, placental and other hormones growth, puberty, estrous cycle, sexual maturity in relation to reproduction, role of hormones on various phases of reproduction in females. Symptoms of estrus and estrous cycle in domestic animals. Factors affecting estrous cycle, palpation of genital organs for changes during estrous cycle, coitus, oogenesis, ovulation. Transportation of sperm and ova, fertilization, zygote formation. Shape and location of pregnant uterus. Position and number of foetus in the uterus. Twining and multiple births in unipara, sex parity, bacterial flora of the pregnant uterus, length of pregnancy. Hormonal control of gestation, duration and rate of reproduction. Abnormalities of fertilization and gestation. Mammary gland and lactation. Period of ovum, embryo, and foetus, organogenesis. Foetal membranes - placenta, umbilical cord. Anomalies of the development. Teratology - inherited and non-inherited anomalies.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Introduction, definition of animal reproduction and gynaecology	1
2.	Clinical evaluation and abnormalities of reproductive tracts in domestic animals	1
3	Comparative description of pelvic bones and ligaments in domestic animals	1
4.	Development of ovaries and female genital tract	1
5.	Physiology of hypothalamic and hypophysial reproductive hormones	1
6.	Ovarian, placental and other sources of hormones	1
7.	Growth, puberty and estrous cycle	1
8.	Role of hormones on various phases of reproduction	1
9	Symptoms of estrous and factors affecting estrous cycle	1

10.	Palpation of different organs of reproductive system for changes during estrous cycle	2
11.	Sexual behavior, coitus and oogenesis	1
12.	Mechanism of Ovulation, transport of ova	1
13.	Fertilization and zygote formation	1
14.	Shape and location of pregnant uterus	1
15.	Position of foetus in uterus	1
16.	Number of foetuses, twining and multiple birth in uniparous	2
17.	Sex parity and bacterial flora of the pregnant uterus	1
18.	Pregnancy and its duration in different species	2
19.	Hormonal control and rate of gestation and reproduction	1
20.	Abnormalities of fertilization and gestation	2
21.	Mammary gland and lactation	2
22.	Period of ovum, embryo and foetus	1
23.	Period of organogenesis	1
24.	Foetal membranes and placentation	2
25.	Anomalies of developments	1
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1	To study the bony pelvis and its associated structures	1
2	To study the different organs of female reproductive system (slaughter house material)	3
3	To study the different organs of female reproductive system with respective measurements and observation	1
4	To study the contents of the pelvis through rectal palpation	3
5	To study the organs of reproductive system by rectal palpation	2
6	To detect estrous in farm animals	1
7	Collection and examination of vaginal mucous by various techniques	2
8	Vaginitis and its treatments	1
9	Metritis in cattle and buffaloes	1
Total		**15**

REFERENCES:

Noakes, D.E., T.J. Parkinson and G.C.W. England. 2001. Arthur's Veterinary Reproduction and Obstetrics (Eighth Edition). W. B. Saunders.

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins .

Robert, S.J. 1971. Veterinary Obstetrics and Genital Diseases (Second Edition, Reprint 2004). CBS Publishers and Distributors, New Delhi.

Course Code : VOG 402
Course Title : Theriogenology II (Gynecology and Obstetrics)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to diagnose pregnancy and differentiate it with various pathological conditions, and identify diseases during gestation period.

Syllabus:

Pregnancy diagnosis (PO) in cow - external, internal, clinical, hormonal, ultrasonic, radiographic and differential diagnosis of pregnancy. Mare- rectal and vaginal examination. Biological tests. PD in Ewe, Sow, Bitch and Queen. Disease and accidents during gestation period- prolonged gestation, premature birth, early embryonic death, abortion in cattle, horse, sheep, goat, swine, cat and dog. Mummification of foetus, fetal maceration, induced abortion, extra uterine pregnancy, dropsy of fetal membranes and foetus, abdominal hernias. Torsion of uterus, vagina cervical prolapse, paraplegia of pregnancy. Accidents during pregnancy. Parturition - symptom and initiation of parturition. Stages of parturition. Involution of uterus. Artificial interferences of normal parturition. Case and diseases of new born and dam. Eutocia, Dystocia, types, causes, handlings of dystocia - diagnosis and treatments of dystocia.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Pregnancy diagnosis - external, internal and differential diagnosis	2
2.	Chemical, radiological and biological tests in different species	3
3	Disease and accidents - prolonged, prematures and early embryonic death	3
4.	Abortion in cattle, horse, sheep, goat, swine and dog	2
5.	Mummification and maceration of foetus	1
6.	Induced abortion and extra uterine pregnancy	1
7.	Dropsy of foetal membranes and foetus	2
8.	Abdominal hernia	1
9	Torsion of uterus and vagina	1
10.	Cervical prolapsed	1
11.	Paraplegia of pregnancy	1
12.	Accidents during pregnancy	1
13.	Parturition - symptoms, stages and involution of uterus	2
14.	Artificial interferences of normal parturition	2
15.	Care and diseases of new born	2
16.	Dystocia - types and causes	2
17.	Diagnosis; handling and treatments of dystocia	3
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Pregnancy diagnosis	2
2.	Observation of normal parturition	1
3	Handling and use of Gynecological Instruments	2
4.	To irrigate the uterus having endometritis with normal saline solution	2
5.	Manipulation of foetal malpresentation	2
6.	Corrections of uterine torsion	1
7.	Retention of foetal membranes	1
8.	Prolapse of vagina and uterus	2
9	Attending several cases of dystocia	2
Total		**15**

REFERENCES:

Noakes, D.E., T.J. Parkinson and G.C.W. England. 2001. Arthur's Veterinary Reproduction and Obstetrics (Eighth Edition). W. B. Saunders.

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins .

Robert, S.J. 1971. Veterinary Obstetrics and Genital Diseases (Second Edition, Reprint 2004). CBS Publishers and Distributors, New Delhi.

Course Code : VOG 403
Course Title : Theriogenology III (Gynecology and Obstetrics)
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to proceed for manipulative delivery, embryotomy, caesarian section, hysterectomy, correction of prolapsed and retention of foetal membrane.

Syllabus:

Fertility, infertility, anoestrous, hypoplasia, adrenal virilism, genital diseases and infertility of cow, mare, saw, doe, bitch. Infectious diseases- trichomoniasis, vibriosis, brucellosis, granular venereal diseases, pustular vulvo vaginitis, miscellaneous (Infection of bovine female genital tract). Hormonal disturbances - resulting in infertility - cysts, cystic ovaries, anoestrous and its causes, repeat breeding and managemental problems. Obstetrical operation for relieving dystocia, mutation, forced extraction, embryotomy/fetotomy, caesarean section/hysterectomy. Injuries and disease of puerperal period, post-partum haemorrhage, laceration, contusion of the birth canal and adjustment structures, rupture of the uterus, perineum, vagina, prolapse vaginal and uterine prolapse. Abdominal or pelvic visceral prolapse, metabolic diseases of post partum period, post-partum infections and diseases, retention of placenta and septic metritis, infection of cervix, vagina and vulva. Post partum paraplegia milk fever, clinical uses of hormones and prostaglandins.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Introduction and definition of the courses	1
2.	Fertility, infertility and sterility	1
3	Anoestrus, hypoplasia, adrenal virilism in different domestic animals	2
4.	Trichomoniasis, vibriosis, brucellosis and their diagnosis and treatment	2
5.	Granular Venereal Disease and Pustular Vulovaginitis	1
6.	Hormonal disturbances resulting in infertility	2
7.	Cyst and Cystic ovarian condition	1
8.	Anoestrous,its causes,diagnosis and treatments.	1
9	Repeat breeding, its causes, diagnosis and treatment	2
10.	Managemental problem- identification and solution	1
11.	Embryotomy/Fetotomy its procedure and removal	2
12.	Mutation, forced extraction and treatment	1
13.	Caeserean section, its procedure and post-operative care	2
14.	Hysterectomy, its procedure and post-operative care	2
15.	Post partum haemorrhage and its control	1
16.	Rupture of uterus, perineum and vagina and their managment	1
17.	Vaginal and uterine prolapsed, its control measures and treatment	2
18.	Metabolic diseases during pregnancy	2
19.	Retention of placenta, its removal and treatments	1
20.	Use of GnRH to improve reproductive efficiency in bovines	1
21.	Use of PGF2á to improve reproductive efficiency	1
Total		**30**

Practicals

S.No.	Topic	No.of Practicals
1.	Manipulative delivery of foetal malpresention	3
2.	Use of gynaecological appliances	2
3	How to perform foetotomy	2
4.	How to perform Hysterectomy	3
5.	How to perform caesarean section	3
6.	Post operative care	2
Total		**15**

REFERENCES:

Noakes, D.E., T.J. Parkinson and G.C.W. England. 2001. Arthur's Veterinary Reproduction and Obstetrics (Eighth Edition). W. B. Saunders.

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins .

Robert, S.J. 1971. Veterinary Obstetrics and Genital Diseases (Second Edition, Reprint 2004). CBS Publishers and Distributors, New Delhi.

Course Code : VOG 504
Course Title : Theriogenology IV (Veterinary Andrology and Reproductive Techniques)
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to sterilize the Artificial Insemination (AI) and A.V. equipments, and gain the knowledge on collection, processing, evaluation, preservation of semen as well as conduction AI.

Syllabus:

Introduction, development, comparative study of male genitalia and gonads, growth, puberty,sexual maturity, behavior, libido. Factors affecting libido. Forms of male infertility, factors affecting infertility in males, diagnosis and treatment. Abnormalities, malformations, diseaseof male genitalia and coital injuries, their diagnosis and treatments. Training andMaintenance of Bulls – prepare samples, sterilization of equipments - metals, glass, rubberequipments, -assembling of A.V.,Examination of reproductive functions, semen - collectionevaluation, dilution, preservation, and Artificial Inseminations, estrussynchronization, superovulation, conceptus and application of E.T. Techniques and cloning.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Introduction and definition of the course	1
2.	Comparative study during development of gonads and genitalia	1
3	Growth, puberty and sexual maturity	1
4.	Factors affecting libido	1
5.	Training and maintenance of bull	1
6.	Prepucial sampling	1
7.	Sterilization of equipments	1
8.	Parts and assembling of Artificial Vagina set	1
9	Semen collection	1
10.	Evaluation, dilution and preservation of semen	2
11.	Synchronization, superovulation	1
12.	Artificial Insemination Technique	1
13	Embryo transfer technique	2
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Sterilization of A. V. equipment	1
2.	A.V. preparation	1
3	Collection of semen	2
4.	Evaluation	2
5.	Live and dead count	1
6.	Total concentration	1
8.	Preservation of semen	1
9	Artificial Insemination	2
10.	Synchronization	2
11.	Embryo Transfer Technique	1
Total		**15**

REFERENCES:

Hefez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals (Seventh Edition). Lippincott Williams and Wilkins.

Robert, S.J. 1971. Veterinary Obstetrics and Genital Diseases (Second Edition, Reprint 2004). CBS Publishers and Distributors, New Delhi.

Perry, E.J. 1969. The Artificial Insemination of Farm Animals (Latest Edition). Oxford and IBH Publishing, New Delhi.

Salisbury, G.W. and N.L. Van Demark. 1978. Physiology of Reproduction and AI in Cattle (Latest Edition).

Livestock Production and Management

Course Code : LPM 101
Course Title : Ruminant Production and Management
Credit Hours : 3(2+1) Full Marks : 75 Theory : 50 Practical : 25

Objectives:

Upon the completion of this course, students will be able to identify and recognize different breeds of cattle, buffalo, sheep and goats. They will also be acquainted with the principles of housing systems and art of commercial rearing of ruminant animals.

Syllabus:

Introduction, terminology, prominent exotic and indigenous breeds of cattle, buffalo, sheep and goat. Classification of Indian cattle breeds. Principle and types of housing for ruminant's animal. Care and management of cattle, buffalo, sheep and goat. Artificial raising of calf and orphan lambs/kids. General management such as grooming, dehorning, identification, castration, barn sanitation, milking methods and practices, docking, dipping and drenching judging and selection dairy animal.

Course Breakdown
Theory

S. No.	Topic	No. of Lectures
1	Introduction:	
	a) Historical back ground of ruminant production	1
	b) Future scope, importance and present situation of ruminant and their production	2
	c) Terminology, zoological classification and constraints of ruminants' production in Nepal.	2
2	Breeds and their characteristics	
	a) Exotic cattle breeds and their characteristics	2
	• Jersey, Holstein Friesian, Brown Swiss, Ayreshire.	
	b) Indigenous cattle breeds and their characteristics	2
	• Hariyana, Sahiwal, Red Sindhi, Siri, Achame, Yak Nak and Chauri.	
	c) Indigenous buffalo breeds and their characteristics	2
	• Murrah, Surti, Jaffarabadi, Nili-rabi, Lime, Parkote and Gaddi.	
	d) Exotic sheep breeds and their characteristics	2
	• Merino, Rambouillet, Romney, Suffolk, Sannan, Damascus.	
	e) Indigenous goat breeds and their characteristics	2
	• Barbari, Beetle, Jamunapari, Kasmiri, Khari, Sinhgal Chyngra and Anglo-nubian	
	• Bhyanglung, Kage, Baruwal, Lampuchhre	
3.	Housing	
	a) Selection of site for establishing new livestock farm	2
	b) Housing system for cattle and buffalo.	2
	• Merit and demerit of housing system	
	• Provision of housing system	
	• Building requirements. Housing for sheep and Goat	
4.	Care and management	6
	a) Care and management of pregnant cattle/buffalo/ sheep/goat	
	b) Care and management of animal during a living	
	c) Management of newly born calf	
	d) Weaning and raising young calf artificially	
	e) Management of lactating cow/buffalo	
	f) Dry cow/buffalo management	
	g) Heifer management	
	h) Managing lambs/kids from weaning to market	
	i) Bull and buck management	
	j) Use of draft animal in Nepalese agriculture system	
5	Nature and grading of wool and factors affecting the value/quality of wool	2
6	Shearing care , storing and marketing of wool	1
7	Judging and selection of ruminant	2
Total		**30**

Practical

S. No.	Topic	No. of Practicals
1	A visit to AFU livestock farm	1
2	A visit and study of LPM lab equipments	1
3	Identification of farm animals a. Tagging b. Branding c. Tattooing etc	2
4	Castration a) Blood les methods b) Surgical method	1
5	Dehorning/disbudding in calf	1
6	Grooming in lactating cattle/buffalo	1
7	Barn sanitation	1
8	Study of milking methods and practices	1
9	Study of wool shearing steps and practices	1
10	Judging and selection of cattle/buffalo	2
11	Docking practices	1
12	Dipping and drenching	2
13	Preparation of farm records	1
Total		**15**

REFERENCES:

Banerjee, G. C.1991. A Text Book of Animal Husbandry (7Th Edition). Oxford and IBH Publishing, New Delhi.

Jagdish Prasad, 2004. Principle and Practices of Dairy Farm Management. Kalyani Publishers Ludhiana, NewDelhi, Hyderabad, Chennai, Kolkata.

Jagdish Prasad, 2001. Animal Husbandry and Dairy Science. Kalyani Publishers Ludhiana, New Delhi, Hyderabad, Chennai, Kolkata.

Course Code : LPM 102
Course Title : Pig and Poultry
Credit Hours : 3 (2+1) Full Marks : 75 Theory : 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to identify different breeds of pig and poultry and rear them with the application of scientific management practices.

Syllabus:

Importance, constraint, scope and statistics of pig and poultry in Nepal. Prominent breeds of pig and poultry (Local, Exotic; Berkshire, Yorkshire, Hampshire, Duroc, Jersey Landrace, Tamworth) Housing, feeding and management of pig and poultry. Hatching, Brooding, selection and grading of egg. Selection and culling of layers. Maintenance of bio-security in a commercial farm.

Course Breakdown
Theory

S. No.	Topic	No. of Lectures
1	Introduction and terminology related to pig and poultry	1
2	Present status, future and importance of pig and poultry industry in Nepal.	2
3	Care and management of new born piglet, gilt and sow, pregnant and breeding boar	2
4	Housing and housing system of pig and poultry: needs of housing, site selection, housing requirement, house equipment, system of housing, advantage and disadvantage.	3
5	Nomenclature and breeds of fowl; classification of fowl and their characteristics (Aseel and Ghagus, white leghorn, Rhode Island Red, Plymouth Rock, Australorp, Sussex, New Hampshire and commercial breed layers and broiler)	3
6	Breed of pig (Nepali local; Berkshire, Yorkshire, Duroc Jersey, Hampshire, Landrace, Tamworth)	3
7	Brooding and rearing chicks: System of brooding (advantage and disadvantage); management of chicks in brooder	2
8	Care of the chicks during summer; effect of summer heat; physiological mechanism by which chicken adjust rising temperature, Effective manage mental practices (Housing, water management feed and nutrition, medication and other managerial practices)	1
9	Care of the chicken during monsoon; maintenance of poultry house, feed storage, improvement of water quality, care of poultry excreta)	1

10	Formation, structure, food value, and chemical composition of eggs.	2
11	Collection, handling, grading and egg quality parameter (quality parameters; exterior quality factors; interior egg quality)	3
12	Hatching of egg (selection and care of good hatching egg, abnormal egg, Methods of hatching; natural and artificial; advantage and disadvantage. Factors effecting hatching Management of incubator during incubation.	2
13	Selection and culling of chickens: The points consider during disqualifying the birds, Meat production standards, Egg production standards, Additional standards of good strains, culling the growing stock:	2
14	Care and management of broilers, pullet, breeding and laying hen.	2
15	Maintenance of bio-security in a commercial farm	1
Total		**30**

Practical

S. No.	Topic	No. of Practicals
1	Study the external body parts of pig and poultry	1
2	Identification of pig tagging and ear notching	1
3	Castration of piglet	1
4	Needle teeth clipping of piglet	1
5	Breed identification of pig and poultry	1
6	Debeaking and caponization poultry	2
7	Study of pig and poultry farm record	1
8	Vaccination of poultry	1
9	Study the housing pig and poultry	1
10	Calculation of average egg production per bird	1
11	Feed formulation and feeding of pig and poultry	2
12	Selection of layers and non layers	1
13	Grading of egg	1
Total		**15**

REFERENCES:

Banerjee, G. C.1991. A Text Book of Animal Husbandry (7Th Edition). Oxford and IBH Publishing, New Delhi.

Prasad and Niraj 2012. Poultry Production and management. Kalyani Publishers Ludhiana, NewDelhi, Hydrabad, Chennai, Kolkata.

Panda, P. C. 1995. Text Book on Egg and Poultry Technology. Vikas Publishing House Pvt Ltd576, Masjid Road, Jangpura, New Delhi-110014.

Course Code: LPM 103
Course Title: Animal Housing and Sanitation
Credit Hours: 2(1+1) Full Marks : 50 Therory : 25 Practical :25

Objectives

Upon the completion of this course, students will be able to construct houses for farm animals and poultry and also they will be able to maintain sanitation on the farms.

Syllabus

Housing of Animals: General principle, affecting design and construction of buildings for housing animals and poultry. Site selection, traditional housing, use of local construction materials, conventional housing systems of housing, tail to fail and head to head, advantages and disadvantages. Poultry housing, deep, litter, cage, battery branding. Housing of small ruminants and swine.

Sanitation: Water supply, fanctions, deticiency symptoms sources, quality and mean of pollution and purification water requirements and supplies. Sanitation and ventilation, diseases associated with water, air and environment costing, site selection design familiarization with different housing water supply and ventilation.

Course Breakdown

Theory

S.No.	Topic	No. of Lectures
1.	Housing: Type of housing for farm animals and poultry	1
2.	Selection of site	1
3.	Type of buildings	1
4.	Building materials and quality	1
5.	Traditional (rural) animal housing	1
6.	Conventional (urban) animal housing	1
7.	Systems of housing (head to head and tail to tail, advantages and disadvantages)	1
8.	Housing for small ruminants	1
9.	Housing for swine	1
10.	Housing for poultry (deep litter ,cage system, battery brooding etc)	1
11.	Water: Importances, major functions and of water	1
12.	Requirement of water for various species of farm animals and poultry birds	1
13.	Sanitation: Drainage, disposal of cowdung, urine and farm animals washings	1
14.	Ventilation: Importance of ventilation and its types and requirements	1
15.	Diseases associated with water, poor housing and ventilation.	1
Total		**15**

Practical

S.No	Topic	No. of Practicals
1.	Familiarization with the various types of animal housing	1
2.	Housing of poultry	1
3.	Housing of swine	1
4.	Cost estimation for large ruminants	1
5.	Costing of poultry housing	1
6.	Costing of swine housing	1
7.	Design of housing of small ruminants	1
8.	Preparation of compost	1
9.	Use of cow dung for biogas production	1
10.	Familiarization of rural and commercial housing	1
11.	Familiarization with poultry housing	1
12.	Brooding of day-old chicks	1
13.	Study of calf sheds	1
14.	Study of water quality and water supply schemes	2
Total		**15**

REFERENCES:

Ranjhan, S.K. and N.H Pathak .1991.Text Book on Buffalo Production. Vikas Publishing House Pvt. Ltd. New Delhi.

May, C. 2010. Cattle Management, Roston, publishing Co, Irc.Roston, Virginia USA.

Course Code : LPM 204
Course Title : Bee, Pet and Lab Animal Management
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will able to recognize bee, pet and lab animals and their proper care and management.

Syllabus:

Introduction to agriculture and its prospects in Nepal. Common bee races its morphology and anatomy. Management honey bee products and its extraction. Disease, insects and other enemies of honeybees. Introduction importance of pet animals in Nepal. Common breeds pet animals/birds (dogs/cats) Vices of pet animals and their control measures care and management of pet animals. Method of restraining and controlling of dog and cats. Selection of pup, habitat, food and feeding of pets. Common parasites and diseases with their control measures. Importance of laboratory animals. Care and housing standard of lab animals eg.mice, rats and guinea tigs etc.general consideration on feeding and nutritional requirements, important consideration in breeding of lab animals.Propphylactic measures against common disease of lab animals. Hygienic care and control parasites.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1.	Introduction of agriculture and its prospects in Nepal	1
2.	Common bee races, its morphology and anatomy	1
3.	Management-seasonal management of honey bees	1
4.	Honey bee products and its extraction	1
5.	Disease, insects and other enemies of honey bee and their control measures	1
6.	Introduction and importance of pet animals in Nepal	l
7.	Common breeds of pet animals (dogs, cats, etc) and birds	1
8.	Vices of pet animals and their control measure, restraining and controlling of pet animals	1
9.	Care and management, selection of pup, habitat, food and feeding of pet.	2
10.	Common diseases and parasites of pets with their control.	1
11.	Introduction and importance of lab animals.	1
12.	Care and housing system and space requirement for lab animals.	1
13.	Computation and compound of balanced diet for lab animals mainly Mice, rates, guinea pig and rabbit	1
14.	Prophylactic measure against common disease and hygienic care and control of parasites	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Anatomical and morphological stady of honey bee.	1
2.	Types of bee hives.	1
3.	Honey bee extraction.	1
4.	Bee forages	1
5.	Mites and insect pests of honeybee.	1
6.	Handling of pet animals for examination (dog/cats)	1
7.	Deticking and dewarming	1
8.	Detection of heat, mating, whelping (through film or real)	1
9.	Care of new bron (nail and tooth care)	1
10.	Administration of medicines.	1
11.	Identification of body parts and handling of lab animals	1
12.	Marking for identification of lab animals	1
13.	Selection of breeding stock of lab animals	1
14.	Balanced ration for lab animals	1
15.	Common disease and parasites of lab animals	1
Total		**15**

REFERENCES:

Abrol, D.P. 1997. Bees and Beekeeping in India. Kalyani publishers, New Delhi, India.

Chkrabarti A. Dog Care and Management. Kalyani publishers, New Delhi, India.

Course Code : LPM 505
Course Title : Wild Life Production and Management.
Credit Hours : 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to recognize the basics and importance of wild life production and its management.

Syllabus:

Taxonomy of wild animals. Future and present status of wildlife conservation and management in Nepal, wild life low enforcement. Distribution habitats and housing of various class of wild animals. Care of wild animals feeding habits, feeds and feeding system of wild animals. Methods of restraint, capture, handling and physical examination of wild animals .National park, reserves and other protected areas in Nepal. International organizations concerning wild life conservation Common diseases and control strategies against it.

Course Breakdown
Theory

S.No	Topic	No .of Lectures
1.	Introduction, definition and values of wild life.	1
2.	Present and future status of wild life population course - Vation and management in Nepal	1
3.	Wild life low enforcement.	1
4.	Distribution, habitats and housing of various class of wild life	2
5.	Care of various class of wild life.	2
6.	Feeding habits, feeds and feeding system of wild animals.	2
7.	Methods of restraint, capture, handling and physical examination of wild animals.	2
8.	National park, reserver and other protected areas in Nepal	1
9.	International organization concerning wild life conservation.	1
10.	Common diseases of wild animals and their control strategies.	2
Total		**15**

Practical

S.No.	Topic	No. of Practicals
1.	A visit to Chitwan National park for observation [one day]	1
2.	External body points of different class of wild animals	1
3.	Identification of feeds and fodder for wild life	1
4.	Visit to central zoo for practical demonstration ie Restraining, Capturing, handling of 2002 animals and transportation of wild animal.	3
5.	Study about habitat of wild animals	2
6.	Care and management of zoo animals.	2
7.	Feeding of different species of animals	1
8.	Deticking and deworaing	1
9.	Study about administration of drugs	1
10.	Physical examination of wild animals	1
11.	Checklist of wild animal and birds found in chitwan National park.	1
Total		**15**

REFERENCES:

Majupuria, T.C.M. Wild Life Wealth of India (Research and Management), Tec Press Service, LP Bangkok, Thailand.

Negi, S.S. Himalayan Wild Life: Habitat and Conservation - Indus publishing co. New Delhi.

Saharia, V.B. 1982. Wild Life in India. Natraj Publisher. India.

Majuparia, T.C. Wild Life of Nepal,.

Course Code : LPT 301
Course Title : Abbatoir Practices and Animal Product Technology
Credit Hours : 2(1+1) Full Marks:50 Theory :25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand a battoir practices that will help produce wholesome and hygienic meat through proper waste water and sludge disposal.

Syllabus:

History, definition, and present situation of abattoir and slaughter slab in Nepal. Handling and care of slaughter animal and birds at lairage. Inspection of slaughter animals and birds. Slaughter procedure and methods of stunning, location and layout of abattoir, slaughter house feature, water supply, ventilation and light. Hygiene practices, abattoir environment impact and mitigation. Roles of local Government and entrepreneur for environment protection. Biosecurity, Fabrication and preservation of meat. Facilities required for health safety and by products utilization.

Course Breakdown
Theory

S. No.	Topics	No. of Lectures
1	History, definition, and present situation of abattoir and slaughter slab in Nepal.	1
2	Handling and care of slaughter animal and birds at lairage.	1
3	Inspection of slaughter animals and birds (Ante and postmortem)	1
4	Slaughter procedure and methods of stunning,	2
5	Location and layout of abattoir	2
6	Slaughter house features	1
7	Water supply, ventilation and light.	1
8	Hygiene practices,.	1
9	Abattoir environment impact and mitigation.	1
10	Roles of local Government and entrepreneur for environment protection	1
11	Bio-security and slaughter house and meat inspection act 2055	1
12	Fabrication and preservation of meat.	1
13	Facilities required for health safety and by products utilization	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1	Layout of slaughter house Slaughter slab	2
2	Animals and birds care at the stockyard/cages	1
3	Inspection of animals before slaughter and after slaughter (ante and post mortem inspection)	1
4	Inspection of birds before slaughter and after slaughter (ante and post mortem inspection)	1
5	Slaughter procedure of animals (stunning/sticking/severing)	1
6	Slaughter procedure of birds (stunning/sticking/severing)	1
7	Process of bio-security	1
8	Whole sale cut and retail cutting and fabrication of carcass	2
9	Different cuts of pig, goat/sheep and buffalo	2
10	Identification of different equipments and knives	1
11	Cleaning and disinfection of the abattoir	1
12	visit to small scale/commercial scale slaughter house/slab for large and small animals and birds	1
13	Report writing and submission of the visit	1
Total		**15**

REFERENCES:

Lawrie, R.A. 1985. Meat Science (4th ed.). Oxford, Newyork.

Price and Scheing Ert (Latest ed.) The science of meat and meat production, Freeman and Company, San Francisco

Wilson, T. Tan and Linda B. Mabesa ---. Sensorry evaluation of foods. Laboratory Manual IFST. COA, UPLB.

Forest et al (1975d). Principles of meat science WH.Freeman and company, San Francisco

Warris P.D. 2000. Meat science. An introductry text. CABI publishing.

AMIF (–) 1960. The science of meat and meat products. W.H. Freeman and Co, San Francisco (–) edited by. A.W. Salisbury and E.W.O. Crampton.

Course Code : LPT 402
Course Title : Milk and Milk Product Technology
Credit Hours : 2(1+1) Full marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to collect milk sample and perform quality control tests, determine different component of milk (TS, SNF, FAT), process milk and milk products.

Syllabus:

Milk: definition of milk and diagrammatical representation of milk constituents Composition of milk. Factors affecting the composition, nutritive values and physical and chemical properties of milk, Processing of milk. Different dairy products, Method of preparation, types, and nutritive value of following dairy product: butter, ice-cream, cheese, powder milk and condense milk, sweets, prepared from chhenna and khoa and their quality control.

Course Breakdown
Theory

S. No.	Topic	No. of Lectures
1.	Definition milk and diagrammatic representation of milk constituents	1
2.	Composition of milk: Fat, Lactose, protein, energy, Vitamin and minerals	2
3.	Nutritive value of milk.	1
4.	Physical and chemical properties of milk	1
5.	Factors affecting the composition of milk	1
6.	Natural flavor and off- flavor of milk	1
7.	Milk processing: receiving weighing, sampling, platform test, Straining, filtration and clarification	1
8.	Cooling system, transportation, emulsification homogenization	1
9.	Pasteurization, sterilization, packaging, distribution and storage of milk and products	1
10.	Products processing: Methods of preparation, type, flow diagram, nutritive values and uses of following dairy products e.g. cream, butter, ghee, khoa.chhana, dahi (yogurt) planner, ice-cream, powder milk, condensed milk and cheese	3
11.	Sweets prepared from chhana and khoa	1
Total		**15**

Practical

S. No.	Topic	No. of Practicals
1.	Study of commonly uses dairy equipments in a lab	1
2.	Study of milk sampling procedures	1
3.	Clot on boiling (COB) and titrable acidity test in milk	1
4.	Estimation of fat by Gerber's method	1
5.	Estimation of specific gravity SNF, and TS in milk.	2
6.	Study of MBR test for assessing microbial quality	1
7.	Preparation of milk products: Chhana ,khoa, paneer, butter and ghee	4
8.	Preparation of ice -cream	1
9.	Preparation of condensed milk	1
10.	Preparation of sweets from chhana and khoa	2
Total		**15**

REFERENCES:

Clarence, H.E., W.B. combs and H.Macy.1994. Milk and Milk Products, TATA. MC Graw-Hill Publishing Co. Ltd. India

Prashad, J.1997 Animal Husbandry and Dairy science Kalyani publishers, India

Sukumar, De.2000. Outline of Dairy Technology. Oxford Univ. press, New Delhi.

Course Code : LPT 403
Course Title : Meat and Meat Product Technology
Credit Hours : 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand about meat, its structure, composition and nutritional value and the products prepared from meat and their preservation and best utilization.

Syllabus:

Definition, prospects and problems of meat industry in Nepal. Pre-slaughter care and handling effect on meat quality. Structure and growth of muscles, chemical and biochemical constitution of muscles. Conversion of muscle to meat. Eating quality of meat, methods of preservation and maintenance of quality. Edible and inedible carcass and their utilization and handling. Microbiology, deterioration and contamination of meat. Comminuted and emulsified meat product common of in Nepal. Curing methods and ingredients.

Course Breakdown
Theory

S. No.	Topics	No. of Lectures
1	Definition , Prospects, and problems of meat industry in Nepal	1
2	Pre-slaughter care and handling effect on meat quality	1
3	Structure and growth of muscles	2
4	Chemical and biochemical constitution of muscles.	2
5	Eating quality of meat	1
6	Meat preservation and maintenance of quality	2
7	Edible and inedible carcass and their utilization and handling.	2
8	Conversion of muscle to meat.	1
9	Microbiology, deterioration and contamination of meat.	1
10	Comminuted and emulsified meat product common of in Nepal.	1
11	Curing methods and ingredients	1
Total		**15**

Practical

S. No.	Topic	No. of Practicals
1	Judging and selection of meat animals	1
2	Meat identification/Bones of chicken, pork and lamb	1
3	Approximate yield of whole sale cuts of lamb, pork and beef/Identification of meat carcass	2
4	Pre-slaughter and post slaughter evaluation of birds and animals Ante/post mortem inspection	1
5	Identification of equipments used in the fabrication of meat	1
6	Handling and packaging of meat	1
7	Curing of meat	2
8	Comminuted and emulsified meat product preparation (Ham, Bacon, Sausage, Meat loaf, dry meat)	2
9	Sensory evaluation of meat	2
10	Visit of meat processing plant/slaughter house	1
11	Report writing and submission	1
Total		**15**

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Wilson, T. Tan and Linda B. Mabesa ---. Sensorry evaluation of foods. Laboratory Manual IFST. COA, UPLB.

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Warris P.D. 2000. Meat science. An introductry text. CABI publishing.

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Animal Nutrition and Fodder Production

Course Code : ANU 101
Course Title : Principles and Practices of Fodder Production and Pasture Management
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practical : 25

Objectives:

Upon the completion of this course, students will be able to understand principles and practices of fodder production including cultivation practices; pasture species establishment and their management considering it's practical application for feeding livestock.

Syllabus:

Terminology of fodder and pastures. Climate and soil type. Factors affecting chimical compoisition and nutritive value of folder. Fodder plant growth development and yield morphology of forage grasses. Principle of grass seed production. Cultivation practices of common annual and perennial fodder legumes and grass. Common pasture species and their management. Pasture establishment, cultivated seed beds and nutrition of grazing animals. Pasture and soil fertility. Preservation and conservation: hay and silage making .Silvi-pastoral system and its importance.

Course Breakdown
Theory

S.No.		Topic	No.of Lectures
1.			
	1.1	Intrdouction:feeds and feeding situation in Nepal common terminology of folder and pasture	1
2.			
	2.1	Edaphic factors affecting pasture and fodder crops	
	2.1.1	Climate and its variation	1
	2.1.2	soil types	1
	2.2	Factors associated with folder production	
	2.2.1	Chemical composition and nutritive value	1
	2.2.2.	Species and varietal differences	1
3.			
	3.1	Fodder plant growth , development and yield	
	3.2	Morphology of forage grasses: vegetative grass tiller, and reproductive growth in forage grasses	1

4.			
	4.1	Principle of grass seed production	1
	4.1.1.	Reproductive development	
	4.1.2.	Component of seed yield and Actual seed yield	1
5.			
	5.1	Cultivation Practices of common annual and Perennial fodder /grasses and legumes.	
	5.1.1.	Oats	
	5.1.2.	Jawar,Bajra	1
	5.1.3.	Teosinte, Maize	1
	5.1.4.	Napier, Blue Panic	1
	5.1.5.	Siratro,Centrocema	1
	5.1.6.	Molases, Mulato	1
	5.1.7.	Berseem,Lucern	1
	5.1.8.	Joint vetch,Desmodium	1
	5.1.9.	Stylosanthes, Forage Peanut	1
	5.1.10.	Butterfly pen, Glycine	1
6.			
	6.1.	Cultivatinon, establishment and yield of common pasture species:	1
	6.1.1	Perennial ryegrass, cocksfoot	
	6.1.2	Tall fescue, Phalaris	1
	6.1.3	White clover	1
	6.1. 4	Red clover, Lotus	1
7.			
	7.1.	Pasture establishment : seed quality, sowing, soil environment	1
	7.2	Cultivated seed beds and management of pasture	1
	7.3.	Nutrition of grazing animal , nutritive value of pasture, herbage intake and composition	1
8.			
	8.1	Pasture and soil fertility	
	8.1.1	Nutrient cycling pasture growth and fertilizer	1
	8.1.2	N fixation and grass/legume balance	1
9.	9.1	preservation and conservation of foldder /forage	
	9.1.2	Hay making ,steps , advantages and disadvantages	1
	9.1.2	Silage making,process,steps,advantages and Limitatations	1
10.			
	10.1	Silvi-pastoral system concept and importance	1
Total			**30**

Practical

S.No.	Topic	No.of Practicals
	Common features used in identifying vegetative grasses	1
	Identification of seasonal fodders (grasses and legumes) at IAAS and vicinity	1
	Identification of some common pasture grasses	1
	Identification of some common pasture legumes	1
	Identification of fodder trees and common tree fodder	1
	Preparation of herbarium sheet	1
	Cultivation of seasonal fodder covering winter and summer	2
	Forage fodder sampling	2
	Proximate analysis	3
	Determination of green and dry matter yield	1
	Determining/estimating botanical composition of the pasture mass	1
Total		**15**

REFERENCES:

Bayer, W. and A.W. Bayer.1998.Tropical Agriculture Forage Husbandry. ICAR, MacMillan.

Devkota, N.R. 2005. A Practical Manual on Basics of Pasture Research and Study. Devkota and Devkota family ;Publishing, Kathmandu, Nepal.P50.

Pandey, R.S. 1997. Fodder and Pasture development in Nepal. Udaya R.D. Service (p.) Ltd.kathmandu Nepal.

Pandey, K.k 1982. Fodder tree and tree fodder in Nepal. Swiss Federal Institute of Forestry Reasearch. Birmensdrof , Switzerland.

Pathak, N.N. and R.C Jakhmila. 1983. Forage and livestock production. Bikash publishing house. New Delhi.

Course Code : ANU 102
Course Title : Principles of Animal Nutrition
Credit Hours : 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand the basic principles of animal nutrition and will be able to recongnize the function and deficiency symptoms of nutrients.

Syllabus:

Role of Animals nutrition in Animals husbandry and its scope in Nepal .Comparative composition of plant and animals cells and tissues .Feed stuffs and their nutrition content with utilization characteristics functions and classification of carbohydrates,protein,lipid and fats function of water in animals body characterizes and nutritional imporatnces of minerals and vitamins feed additives and their role.Digestion,absorption and metabolism and various nutritents ruminants non ruminants and birds feeding standard in different species and age group of animals.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1.	Introduction about animal nutrition and its role in animal husbandry.	1
2.	Comparative composition plant and animal cell and tissues.	1
3.	Feed stuff and feeding gradients with nutrient contains utilization and characteristics of energy rich feeding gradients.	1
4.	Protein rich feeding gradients.	1
5.	Function of water in animals' body	1
6.	Classification function and food source of protein	1
7.	Classification function and feed source of carbohydrates	1
8.	Classification functions and feed sources of lipid.	1
9.	Function deficiency symptom and requirement of micro minerals.	1
10.	Function deficiency symptom and requirement of micro minerals.	1
11.	Function deficiency symptom and requirement of water soluble vitamins.	1
12.	Function deficiency symptoms and requirement of fat soluble vitamins.	1
13.	Digestion of food nutrition in ruminants.	1
14.	Metabolism of food nutrient.	1
15.	Feed additives used in animals feeding.	1
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Sampling of feed ingredients far froximate analysis	1
2.	Identification of energy rich feedingredients.	1
3.	Identification of protein rich feedingredients.	1
4.	Preparation of standard solution of chemical analysis.	1
5.	Determination of dry matter.	1
6.	Determination of ether extract.	1
7.	Determination of crude fiber.	1
8.	Determination of crude protein.	1
9.	Digestion process.	1
10.	Distilation process.	1
11.	Determination of nitrogen free extract.	1
12.	Determination of gross energy.	1
13.	Feeding standard for cattle and buffalo.	1
14.	Feeding standard for cattle and pig.	1
15.	Feeding standard for cattle and birds.	1
Total		**15**

REFERENCES:

Benerjee, G.C. 1984. A Text Book of Animal Husbandry. Mohan Primalani, Oxford and IBH Publishing Company Pvt. Ltd.

Benerjee, G.C 1986. A Text Book of Animal Nutrition.

Morision, F.B. 1984. Feeds and Feeding. CBS Publishers and Distributors Jain Bhawan, Bhola Nath Nagar, New Delhi, India

Ranjhan, S.K.1993. Animal Nutrition and Feeding Practice in India. Vikash Publishing House.Pvt.Ltd, India.

Ranjhan S.K.1993. Animal Nutrition in the Tropics. Vikash Publishing House Pvt. Ltd ,India.

Course Code : ANU 203
Course Title : Applied Animal Nutrition-I
Credit Hours : 2(1+1) Full Marks: 50 Theory : 25 P ractical :25

Objectives:

Upon the completion of this course, students will be able to recognize the different chambers of the digestive system of ruminants, and feeding of ruminants.

Syllabus:

Digestion, absorption and metabolism of nutrients in ruminants. Evaluation of foods: Digestibility, measureless of digestibility, factors affecting digestibility, system of expressing the energy value of foods. breeding standards: for maintenance and growth, reproduction, milk production, MRC, ARC, and India feeding standard Balance ration a feeding of livestock: Breeding dairy cattle and buffaloes, feeding goats for meat and milk production. Feeding of sheep, Racing cattle and buffaloes for meat production. Feeding ruminants during scarcity periods.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1.	Digestion, absorption and metabolism of nutrients in ruminants	2
2.	Feed evaluation:	2
	a. Measurement of digestibility, various method of determining, digestibility's. Invitro and non-vivo digestibility. Limitation of digestibility cofficiency.Factors affectingdigestibility cofficiency. Determination TDN and DCP	
	b. systems of expressing the energy and protein value of foods: Total digestibility, nutrients the stores equivalent; Partation of foods energy within the animals utilization of metabolization energy. Animals colorimetory: Methods for measuring heat production and energy retention.	
3.	Feeding standards for maintenance and growth,reproduction, lactation and wool production various methods of feeding standards.NRC,ARC and India feeding standards.	2
4.	Feeding dairy cattle and buffalos,goats,sheep,yak and nak.	2
5.	Feeding of young calves,kids and lambs	1
6.	Raising cattle and buffaloes for meat production	1
7.	Feeding ruminants during scarcity periods: Urea -molasses liquid feeds Urea- molasses minerals blocks Urea- treatments of straws	2
8.	Preparation of Hags, silages and treatments of inferior quality roughages.	3
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Computation of ration for cattle, buffalo and calves, sheeps and goats.	3
2.	Methods of determining digestibty cofficents: digestion trail.	2
3.	Urea - treatment of rice and wheat straw	2
4.	Urea molasses mineral blocks preparation	2
5.	Urea molasses liquid feeding	2
6.	Preparation of concentrate mixture	2
7.	Preparation of hays	1
9.	Prepration of silase.	1
Total		**15**

REFERENCES:

Ranjhan, S.K. 1993. Animal Nutrition and Feeding Practices.Vikas Publishing House Pvt. Ltd.

Banerjee G. C. 1998. A Text Book of Animal Husbandry, Oxford and IBH publishing Co. Pvt. Ltd. 66 Janpath, New Delhi.

Mcdonald, P., R.A. Edwards and S.R.D. Greenhalgh. 1995. Animals Nutrition: LBs with longman.

Aroro, S.P. and H. Kaur. Principle of Animal Nutrition and Nutrition Dynamics.

Course Code : ANU 204
Course Title : Evaluation of Feed Stuffs
Credit Hours : 2 (1+1) Full Marks : 50 Theory : 25 Practical : 25

Objectives:

Upon the completion of this course, students will be able to recogrize good quality of feedstuffs, characterize feedstuffs chemically and biologically.

Syllabus:

Introduction, scope, importance, history and value of feedstuffs analysis and quality control. Methods, advantages and disadvantages of chemical analysis ,chemical composition and nutritive value,antinutiritional factors,physical and chemical characterization of feeding stuffs, feed additives supplements and adultirants. Specitication feed ingredients and mixed feeds. Factors affecting the storability. In vitro and vivo characterization of feedstuffs.

Course Breakdown
Theory

S .No.	Topic	No of Lectures
1.	Introduction, Importance, scope, and value of feedstuffs of analysis	1
2.	History of feedstuffs analysis	1
3	Methods, advantages and advantages of feedstuff analysis	1
4.	Characteristics of feedstuffs	1
5.	Chemical composition of feeding stuffs	1
6.	Difference between chemical composition and nutritional value of Feedstuffs	1
7.	Ant nutritional factors present in feedingstuffs	1
8.	Physical, (visual, colour, odour and textture) and chemical evaluation of feeding stuffs	1
9.	Characterization of feed additives, supplements and adveterants	1
10.	Quality control of mixed feeds	1
11.	Specification of feed ingredients and mixed feed	1
12.	Factors affecting the storability feed ingredients and mixed feed	1
13.	Methods of digestibility determination	2
14.	Differences, methoods, advantages and disadvantages between in virto and in vivo characterization of feedstuff	1
Total		**30**

Practical

S.No.	Topic	No. of Practicals
1.	Identification of feeds ingredients and mixed feeds	1
2.	Identification and classification of feed additives and supplements	1
3.	Physical, visual, odom, colom, texture and structure characterization and feed Ingredients	2
4.	Proximate analysis of feed ingredients and mixed feed	3
5.	Determination of ADF, NDF and lignin (Vastest method of CF Determination)	3
6.	Determination of Ca and P in feedstaffs.	2
7.	Determination of coefficant of digestibility of feed ingredients and mixed feeds	3
Total		**15**

REFERENCES:

AOAC, IOLO. Association of Analysis Chemists, Washington DC, USA

Reddy, D.V. 2001. Applied Nutrition: LIvestock, Poultry, Human, Pet, Rabbit and Laboratory Animal Nutrition, Oxford and IBH Piblishing, New Delhi.

Course Code : ANU 205
Course Title : Applied Animal Nutration II
Credit Hours : 2(1+1) Full Marks : 50 Theory : 25 Practical : 25

Objectives:

Upon the completion of this course, students will be able to determine nutrient requirements and feed non- ruminant farm animals and avian species.

Syllabus:

Introduction scope important, nutrat requirements and for feeds poultry (broilers layer, ducks, turkeys, quails, ostrich,). Nutrient requirements and feeding of swine,rabbit and squires feed processing.compounding of diets for poultry,swine,rabbits and Equine,preparation and mixing of different types of diets for non-ruminants(poultry,swine,horse, and rabbits),feed additives used in non-ruminant formulation.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1.	Introduction Scope and important of non-ruminants nutrition	1
2.	Poultry nutration, different species of poultry bird	1
3.	Nutrient requirements and feeding of broilers chicken	2
4.	Nutrient requirements and feeding of layers chicken	3
5.	Nutrient requirements feeding of ducks and quails	1
6.	Nutrient requirements feeding of turkey and ostrich	1
7.	Feeding of milk replaces to early wearer and orphan piglets	1
8.	Nutrient requirements and feeding of lactating sow.	
9.	Feeding and breeding stocks(boars, sow, gilt)	1
10.	Feeding of Enquire	2
11.	Feeding of rabbits	1
12.	Feed additives used in non-ruminant feeding.	1
Total		**15**

Practical

S.No.	Topic	No. of Practicals
1.	Identification and classification of feed ingredient and mixed feeds for non-ruminants .	1
2.	Feed formulation for broiler chicken	2
3.	Feed formulation for layer chickens	2
4.	Preparation of milk replaces for piglets	1
5.	Formulation for swine	2
6.	Concentrate feed preparation and mixing	2
7.	Evaluation of feedstuffs for non-ruminant	3
8.	Formulation Rabbits	1
9.	Types of feeds for rabbits and horses	1
Total		**15**

REFERENCES:

Donald M.C., P.R..A. Edwards and I.F.D. Green Halgh. 1987. Animal Nutrition (4th Edition). ELBS /Longman Publication.

Nutrient Requirements for Poultry. 2010. National Research Courcil, Washington D.C.

Nutrient Requirement for Swine. 2011. National Research Council. Washington D.C.

Course Code : ANU 306
Course Title : Applied Human Nutrition
Credit Hours : 2 (2+0) Full Marks: 50 Theory: 50 Practical: 0

Objectives:

Upon the completion of this course, students will be able to recognize nutrient deficiency of human nutrient requirements and health of humans. Also they will be able to know the Functions of Nutrients.

Syllabus:

Nutrition and human health: Human health needs major Nepalese health problems; Nutritional guides for health promotion, Nutrition guidelines for prevention or health diseases and Cancer, Relation of food and nutrition to health. Food classification, bioactive physiochemical in food saw their mechanism of action to promote human health carboliydrate. Classification, dictory filer and its role, Types of fiber, Physiologic effect of dictor ,fiber, dietary fifer recommendation, Special functions of carboliydrate in sody tissue, lipid essential falty acids and its role, types of fat functions of fat in human nutrition and health. Cholesteras and its role in human nutrition,
Proteins : essential and non- essential amino acides, functions of protein, protein requirement , factors affecting protein requirements , protein turnover, functions or dictory protein, measures of protein requirements , vitamins, functions or fat and water solasce vitamins, Dieticiary symptons, requirements and food sources of vitamins.Minerals: Minerals in human nutrition, major minerals its functions, delicioncy symptions and food sources. trace elements its functions, delicioncy symptons and food sources water, electrolyte and minerals balance, energy metabolism and physical work performance. Nutritional deficiency disorder: Protin energy malnutrition causes of malnutrition.Method to solve malnutrition problem,food facilities: naturally occurred toxicants' in foods chemicals contamination in foods.Foods fortification: principles and applications .Nutrition improvement program in Nepal. Food processing 13lkgs of foods processing on nutrition status.Diet, nutrition and digestive disease (coronary, heart disease, diabetics, mellitus; cancer, gastro-intestinal problem, renal disorders, urolithiasis, food factors and cataract).

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Nutrition and human health, human health needs major Nepalese health problem.	1
2.	Nutritional guides for health, promotion: cancer and heart disease, foods and its classification	2
3.	Relation of food and nutrition to health (a) Nutrition and aging, nutrition and mental function,weight control, nutrition cancer, heart disease and diebeties mellitus	2
4.	Bioactive phytochemicals in foods and their mechanism of action to promot health	1
5.	Carbohydrates: a. classification b. Dietary fiber and in rote. physilogic effects of dietry fiber. Dietary fiber Recommendation Special function of carbohydrates in body tissues.	3
6.	Lipids: Classification,function, requirements and food source cholesterol and its role to Promote human health. Cholesterol and health concern	3
7.	Proteins: Essential or non- essential amino acids, functions of proteins, proteins requirement Factors affecting protein requirement, protein turnover, functions of dietary protein. Measure of protein requirements, deficiency symptoms of proteins	3
8.	Minerals: Major and Minor minerals functions of minerals in human body deficiency symptons as minerals, miniral requirement, food sources	
9.	Water, electrolyte and mineral balance	2
10.	Energy metabolism and physical work performance, factors influencing base metabolism Energy requirements for various physiolosical functions.	2
11.	Nutritional deficiency disorders: Protein energy malnutrition, cases of malnutrition, Methods fo solve malnutrition, governments strategy to solve malnutrition	2
12.	Food toxicities: Naturally occurring toxicants' in food, chemical contaminarals I foods.	1
13.	Food processing: Elhect of food processing on nutritional status	2
14.	Dict, nutritional and degenerative disease6 (a) Coronary heart disease (b) Diabetes mellitus (c) Cancer (d) Bastro- intestinal problems (e) Rent disorders (f) Urolithiasis (g) Food factors and Cataract.	
Total		**30**

REFERENCES:

Williams, S.R.1989. Nutrition and Diet Therapy. Times Mirror / Mobby College Publishing, St. Lous, Toronto , Boston , Losaltos

Mahatab B., N. Pralhad Rao, V. Reddy (Eds) 1986. Text book of Human Nutrition. Oxford and IBH Publishing Co. Pvt. LTD. New Delhi, Calculta.

Animal Breeding and Biotechnology

Course Code : ANB 201
Course Title : Principles of Genetics and Animal Breeding
Credit Hours : 3(2+1) Full Marks : 75 Theory : 50 Practical : 25

Objectives:

Upon the completion of this course, students will be able to understand basic principles and fundamentals of Mendalian genetics, molecular population and quantitative genetics to understand application of animal breeding (selection and mating system).

Syllabus:

Animal cell, gametogenesis, chromousomalstudy: Karyotyping chromosomal variation and abbretation. Mendalian genetics: Experiment principles and extension of Mendelian genetics (Gene action and interaction) linkage, crossing -over, recombination, gene mapping. DNA and its structure, replication, transcription and translation, gene regulation and expression. Population genetics: gene frequency, hardy and Weinberg law, causes of changing the gene and genotypic frequency and quantitative genetics: phenotypic variantion causes of variations, estimation and concept of heritability and repeatability, Concept of selection and mating system, traits of economic importance of different livestock species, estimation of different genetic parameters.

Practical: Problems related to theory topics, calculation of gene and genotypic frequency, linkage, crossing over etc.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1.	Animal cell and cell division	2
2.	Gametogenesis	2
3.	Chromosomal study: karyotyping, chromosomal variation and abbretation	3
4.	Mendalian genetics: experiment, principal and extension	3
5.	Gene interaction and epistasis	2
6.	Linkage, crossing over, recombination and gene mapping	3
7.	DNA and its structure, DNA replication, transcription, translation and expression	3
8.	Proteins and Gene regulation	2
9.	Population genotypic frequency, hardy and Weinberg law, causes of changing gene and genetics frequency in the population	2
10.	Quantitative genetics: phenotypic variation, estimation and concept of heritability and repeatability	3
11.	Concept of selection and mating systems	2
12.	Animal genetic resources and their conservation in Nepal	3
Total		**30**

Practical

S.No.	Topic	No. of Practicals
1.	Demonstration of cell and cell division	1
2.	Calculation of linkage map, coincidence, interference	2
3.	Demonstration of DNA structure, DNA replication, transcription and Translation	2
4.	Calculation of gene and genotypic frequency: complete dominant, Incomplete dominant, sex linked gene, multiple genes, selection, mutation, migration	3
5.	Estimation of repeatability	2
6.	Estimation of heritability	2
7.	Estimation of selection parameters	2
8.	Estimation of heterosis	1
Total		**15**

REFERENCES:

1. Burns, J.W. 1980. The Science of Genetics, 4th ed. Macmillan Publishing company. Inc.,

2. Charles E Stufflebeam. 1989. Genetics of Domestic Animals. Prentice-Hall international (UK) London.

3. Charlotte J. Avers. 1980. Genetics. D. Van Nostrand Company. Litton Edu. Pub Inc. New York, USA.

4. Geoff Simm. 2002. Genetic Improvement of Cattle and Sheep. The Book Depository Limited, UK

5. Hutt, F.B. 1982. Animal Genetics. John Wiley & Sons, Inc, New York.

6. John B. Jenkins. 1979. Genetics. Houghton Mifflin Company. Boston, Dallas. USA

7. Richard M. Bourdon. 2013. Understanding Animal Breeding. The Book Depository Limited, UK

8. Stansfifled, W. D. 1983. Theory and Problems of Genetics, 2nd ed. McGrawHill Book Company, New York.

Course Code : ANB 202
Course Title : Animal Biotechnology and Breeding
Credit Hours : 2(2+0) Full Marks: 50 Theory: 50 Practical: 0

Objectives:

Upon the completion of this course, students will be able to understand basic principles and fundamentals of molecular genetics and biotechnology for genetic improvement of livestock and able to apply biotechnology in animal breeding.

Syllabus:

Basic molecular biology, isolation, handling radio- labeling of DNA and RNA. Nucleic Acid hybridization, gel electrophoresis and DNA sequencing, restriction and DNA modifying enzyme. The biology of genetic engineering. Cloning selection, screening and analysis of recombinant genetic engineering in action: Analysis of gene structure and function, making proteins, transgenic animals. Molecular breeding approaches for genetic improvement of domestic animals. Recent advances in AI, ET, NT.Manippulation of genetic constitution, gene transformation, transgenic animal production and its role in genetic improvement. Genetic principle of diseases resistance and gene therapy. Animal biotechnology in Nepal and genetic progress achieved through biotechnological approaches in anima.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1.	Introducation of basic molecular biology	1
2.	Isolation of DNA and RNA, radiolabelling of nucleic acids	2
3.	Nucleic acid hybridization, Gel electrophoresis,	2
4.	DNA sequencing	1
5.	Restriction enzymes, DNA modifying enzymes and DNA ligase	2
6.	Host cell types, plasmid, bacteriophage and other vectors,	2
7.	Cloning strategies: cloning from mRNA, genomic DNA	2
8.	Expression of cloned genes	1
9.	The polymerase chain reaction	1
10.	Selection screening and analysis of recombinants	1
11.	Analysis of gene structure and function, making proteins	1
12.	Transformation of genes	1
13.	Molecular breeding approaches in domestic animals	2
14.	Recent advances in AI, ET, NT.	2
15.	Transgenic animal production and its role in genetic improvement	2
16.	Genetic principle of disease resistance and gene therapy	2
17.	Animal biotechnology in Nepal	3
18.	Genetic progress achieved through biotechnological approaches	2
Total		**30**

REFERENCES:

1. Geoff Simm. 2002. Genetic Improvement of Cattle and Sheep. The Book Depository Limited, UK

2. Lasley, J.F. 1987. Genetics of Livestock Improvements. Prentice-Hall, IncEngle wood Cliffs, N J.

3. Nicholl. 1994. An introduction to genetic engineering. Cambridge Press.

4. Purohit, S.S and S.K. Mathur. 1990. Biotechnology Fundamentals and Applications. Agro Botanica Pub & Dis Delhi. India.

5. Richard M. Bourdon. 2013. Understanding Animal Breeding. The Book Depository Limited, UK

6. Warwick, E.J. and J.E. Legates. 1979. Breeding and Improvements of Farm animals 7th ed. McGraw-Hill Book Company, New York.

Course Code : ANB 503
Course Title : Livestock and Poultry Breeding
Credit Hours : 3(2+1) Full Mark: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand basic principles and fundamentals of Livestock breeding, pig and poultry breeding for their genetic improvement.

Syllabus:

Concept of heritability and repeatability, Breeding values, dominance and epistemic values Variance and different gene action .Inbreeding, coefficient of inbreeding and relationship, measure of inbreeding and relationship, resemblance among relatives ,inbreeding methods for development of breed, strain, lines and family. Different mating systems crossing in the light of cattle, buffalo, sheep, goat, pig and poultry. Lab animals their breeding , handling and uses. Selection, selection parameters, principles, method, basis and genetic effect of selection. Effective selection procedure for genetic improvement of cattle ,buffalo, goats ,sheep, pig and poultry. Inheritance of morphological, economic, polymorphic, threshold and sex linked traits in poultry. Breeding plan for meat an egg production in poultry for hilly region of Nepal. Formation and maintenance of control population of poultry. Selection criteria breeding for chicken meat and egg production. The disease resistance mechanism in poultry. Inbred lines are developed and maintained in poultry. Utilize dw (Swarf gene) for broiler production. Intra population selection schemes in poultry. The Egg production characters of laying poultry. Diallel crossing. Random sample test and is important in poultry research. The effect of dwarf gene on economic performance of poultry.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1.	Concept of heritability and repeatability.	1
2.	Breeding values, dominance and epitasis values.	2
3.	Variance and different of gene actions.	2
4.	Inbreeding, coefficient of inbreeding and relationship, measure of Inbreeding and relationship, resemblance among relatives, inbreeding method for development of breed, strain, lines and family.	3
5.	Different mating systems crossing in the light of cattle, buffalo, sheep, goat, pig and poultry.	3
6.	Lab animals their breeding, handling and uses.	2
7.	Selection parameters, principles, method, basic and genetic effect of selection.	1
8.	Effective Selection procedure for genetic improvement of cattle, buffalo, goat, sheep, pig and poultry.	2

9.	Special breeding plan for cattle, buffalo, sheep, goat, pig and poultry.	3
10.	Inheritance of morphological, economic, polymorphic, threshold and Sex linked traits in poultry.	2
11.	Formation and maintenances of control population of poultry.	1
12.	The disease resistance mechanism in poultry.	1
13.	In bred lines are developed, uses and maintained in poultry.	2
14.	Utilize *dw* (dwarf gene) for broiler production.	1
15.	Intra population selection Schemes of poultry.	1
16.	The egg production characters of laying poultry.	1
17.	Diallel crossing	1
18.	Random sample test and is important in poultry research.	1
Total		**30**

Practical

S.No.	Topic	No. of Practials
1.	Estimation of heritability and repeatability.	1
2.	Estimation of Breeding value, dominance and epistasic value	1
3.	Calculation of Variance and different gene action	1
4.	Inbreeding, coefficient of inbreeding and relationship, measure of inbreeding and relationship.	2
5.	Different mating system crossing in the light of cattle, buffalo, sheep, goat, pig and poultry	3
6.	Estimation of selection parameters, and genetic effect of selection.	1
7.	Preparation of breeding plan for cattle, buffalo, sheep, goat, pig, and poultry	3
8.	Formation and maintenance of control population of poultry.	1
9.	Diallel crossing.	1
10.	Random sample test and important in poultry research	1
Total		**15**

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1. Geoff Simm. 2002. Genetic Improvement of Cattle and Sheep. The Book Depository Limited, UK

2. Lasley, J.F. 1987. Genetics of Livestock Improvements. Prentice-Hall, IncEngle wood Cliffs, N J.

3. Richard M. Bourdon. 2013. Understanding Animal Breeding. The Book Depository Limited, UK

4. Warwick, E.J. and J.E. Legates. 1979. Breeding and Improvements of Farm animals 7th ed. McGraw-Hill Book Company, New York.

Aquaculture and Fisheries

Course Code : AQU 201
Course Title : Principles of Aquaculture
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of the course, students will be able to explain the characteristics of cultivable and cultivated fish species, principles and practices of culture systems, various management required, and disease control.

Syllabus:

Definition and biological characteristics; water quality management; pond management; fish farming systems; fish breeding, nursing and rearing; common fish diseases and parasites.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Introduction: Definition of fish, fishery and aquaculture, General characteristics of fish, desirable characters of fish for culture, Importance of fish.	1
2	Biology of cultivated fish species: Morphological characters, feeding habits, growth rate and reproductive behavior of Common carp, Chinese carps, Indigenous major carps, Tilapia, Trout, Catfishes, Sahar, Silver barb and Freshwater prawn.	2
3.	Water quality management: Physical parameters – Temperature and Turbidity; Chemical parameters - DO and pH; Biological parameters- Plankton	2
4.	Pond management: Site selection for pond construction, Liming, fertilization, Feed and Feeding, Aquatic weeds and Predators control	3
5.	Fish farming systems (FFS): Introduction; Classification of FFS on the basis of intensity, enclosure, fish species and integration	2
6.	Fish breeding: Basic principles of fish breeding; Breeding of common carp, Chinese carps and Indigenous major carps, Fish seed rearing and transportation	3
7.	Common fish diseases and parasites: Introduction, causal organisms, symptoms and control measures of Saprolegniasis, Tail rot/fin rot, White spot disease, Dactylogyrosis, Argulosis; and Asphyxiation	2
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Visit of a fish farm	1
2	Morphology of cultivated fishes of Nepal	1
3.	Anatomy of fish (internal organs - alimentary canal, gills, gonads)	1
4.	Pond types and measurements of a typical pond	1
5.	Pond liming and fertilization	1
6.	Water quality measurements (temperature, transparency, DO and pH)	1
7.	Feed formulation and Feeding	1
8.	Study of different fish farming system	1
9.	Common carp breeding	3
10.	Study of fishing gears and pond netting	1
11.	Examination of skin and gills	1
12.	Identification of common drugs and chemicals used in fish health management	1
13.	Lab wrap up	1
Total		**15**

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ICAR. 2006. Handbook of Fisheries and Aquaculture. Indian Council of Agricultural Research (ICAR), New Delhi.

Jha, D.K. 1991. Laboratory Manual of Fish Disease. Tribhuvan University, IAAS, Rampur

Jhingran, V.G. and R.S.V. Pullin. 1985. A Hatchery Manual for the common, Chinease and Indian Major Carps. Asian Development Bank, ICLARM, Manila, Philippines.

NACA. 1989. Integrated Fish Farming in China Technical Manual 7. A World Food Day Publication of the Network of Aquaculture Centre in Asia and the Pacific, Bangkok Thailand.

Shrestha, M.K. and N.P. Pandit. 2012. A Text Book of Principles of Aquaculture (Second Edition). Aquaculture Department, Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal.

Shrestha, T.K. and D.K. Jha. 1993. Introduction to Fish Culture. Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal.

Woynarovich, E. and L. Horvath. 1984. The Artificial Propagation of Warm Water Finfishes, A Manual for Extension.

Course Code : AQU 402
Course Title : Fish Diseases
Credit hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be able to diagnose and treat common fish diseases.

Syllabus:

Introduction: principles and importance of fish health management; Common fish diseases: causes, symptoms and treatment; Different methods of disease control: Prophylactic measures and Curative measures; Bio-security and best management practices; Common drugs, chemicals, probiotics and their application.

Course Breakdown
Theory

S. No.	Topic	No. of Lectures
1.	Introduction: Importance of health management, Status of fish disease, OIE listed diseases, Host- pathogen - environment interaction, Modes of disease transmission, Factors affecting is health: Genetic and physiological profiles, environment, feed and feeding, injuries and pathogens, Signs of sickness of fish	6
2.	Common fish diseases: Causes, symptoms and treatments a. Infectious diseases: Bacterial- Ulcer, Dropsy, Eye disease, Fin rot; Fungal diseases- Saprolegniasis, Branchiomycosis, Epizootic Ulcerative Syndrome (EUS); Protozoan diseases- Ichthyophthiriasis, Trichodinosis, Coastiasis, Whirling disease; Diseases caused by worms-Dactylogyrosis, Gyrodactylosis, Ligulosis; Diseases caused by Crustaceans- Argulosis, Learneasis, Ergasilosis b. Non-infectious diseases- Asphyxiation, Gas bubble disease, Aflatoxin, Mechanical trauma, Temperature, pH, Nutritional diseases	4
3.	Different methods of disease control: Prophylactic measures: Test and slaughter, Sanitation of aquaculture equipments, Quarantine and restriction of movements; Curative measures: Swabbing, Dip, Bath, Flush, Pond (indefinite) treatment, Systemic, Vaccination	4
4.	Bio-security and best management practices	2
5.	Common drugs, chemicals, probiotics and their application	2
Total		**30**

Practical

S.No.	Topic	No. of Practicals
1.	Study of external organs of fish	1
2.	Study of internal organs of fish (Carp, Catfish and Tilapia)	3
3.	Identification of commonly used equipments in fish health examination	1
4.	Sampling procedure, preservation technique (slide preparation)	3
5.	Examination of skin, fins and gills alimentary canal of fish	2
6.	Study of fungal organisms of fish	1
7.	Identification and use of common drugs and chemicals	1
8.	Calculation of chemicals for the treatment of fish	1
9.	Methods of treatment	2
Total		**15**

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Brown, E.E. and J.B. Gratzek. 1980. Fish Farming Hand Book. AvI publishing company , Inc. Westport Connecticut.

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Agricultural Department Courses

Course Code : EXT 101
Course Title : Sociology and Principles of Veterinary and Animal Husbandry Extension
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, students will be able to understand sociological concepts, and their contribution and application in veterinary and animal husbandry development and animal husbandry extension system.

Syllabus:

Sociology- the concept and importance of study of sociology for veterinary extension worker, basic concept of sociology and rural sociology as applied to extension education; Principles of extension in relation to animal husbandry; extension teaching methods, communication to innovation; programme planning; livestock marketing extension; sharing and linkage with actors and their relationship to animal husbandry extension.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	**Introduction to sociology**	2
	Definition of Sociology	
	Nature and importance of the study of sociology for Veterinary extension worker	
	Relationship of sociology with other social sciences	
2.	**Rural sociology as applied to extension education**	5
	Primary concepts of rural sociology	
	Social group organization	
	Social stratification	
	Leaders and leadership	
	Cultural factors in society	
	Social norms, value and belief system	
	Social institutions, function and interrelationship	
	Social problems and social control	
	Social process	
	Social change	
3.	**Principles of extension in relation to livestock husbandry**	2
	Concept of veterinary and animal husbandry extension	
	Principles of extension	
	Philosophy of extension	
	Sharing and linkage partnerships an emerging concept in animal husbandry	
	development and the extension service of DLS	
4.	**Extension teaching methods focusing to livestock husbandry**	1
	Individual teaching method	
	Group teaching method	
	Mass teaching methods	
5.	**Communication to innovation**	2
	Types of communication	
	The communication process	
	Adoption process	
	Adopters categories	
6.	**Programme planning and development**	1
	Principles of programme planning	
	Abilities needed in extension personnel	
7.	**Livestock marketing extension**	2
	The role of livestock in development paradigm	
	Types of farming and system of farming	
	Livestock product's marketing extension	
Total		**15**

Practical

S.No.	Topic	No.of Practicals
1.	Introductory visit of a given rural community with livestock as a dominating occupation	1
2.	Study about livestock rearing pattern of a given society	2
3.	Preparation of individual farm level production plan in livestock production	1
4.	Interaction meeting/ visit with DLS and study their planning process and plan of work and calendar of operation and organizational mechanism	1
5.	Assessing the livestock man relation, sentiments, fads etc	1
6.	To study the methods of working through functional leaders in a given community	2
7.	Identify social research issue focusing to livestock husbandry and veterinary practices	1
8.	Questionnaire design: types and process	1
9.	Data editing, coding, entry and analysis	1
10.	Data analysis: classification, tabulation and application of statistical tools	1
11.	Report writing	2
12.	Presentation of report	1
Total		**15**

REFERENCES:

Malhialagan, P. 2007. Text Book of Animal Husbandry and Livestock Extension: Third Revised and Enlarged Edition. International Book Distribution Co, India.

Bhusan, V. and D. R. Sachdeva 2000. An Introduction to Sociology. Kitab Mahal, Allahabad, India.

Harlambos and Holborn 2000. Sociology. Themes and Perspectives. Collins Educational Harper Collins Publishers Limited, London.

Rao, S.C. N. 2005. Sociology: Principles of Sociology with and Introduction to Sociological thought. S. Chand and Company Ltd.: New Delhi.

Ban, A. W. Van Den and H. S. Hawkins 1998. Agricultural Extension. S. K. Jain for CBS Publishers and Distributors, New Delhi.

Course Code : AST 302
Course Title : Biostatistics and Computer Application
Credit Hours : 3(2+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives:

Upon the completion of this course, the students will be able to organize and analyze the data, and interpret the result, and can use computer for statistical analysis.

Syllabus:

Basic statistics

An overview of statistics- introduction and importance, Frequency distribution, Measures of central tendency &dispersion, Probability & Probability distributios, correlation & Regression, Tests of significance (Z,t, F & ÷2) , Elements of vital statistics – Rate & Ratio- mortality, fertility , incidence & prevalence rates – Standardized rates.
Computer application, Introduction to personal computer, operating system data management and analysis, use of LAN & other networking statistical computation of different parameters and analysis, Introduction with programming C.

Course Breakdown
Theory

S.No.	Topic	No of Lectures
1.	Introduction to statistics, Definitions, scope and limitations.	1
2.	Definition of a population, sample; characteristics of a good sample, sampling methods-simple random sampling – sample selection from an agricultural field by simple random sampling, probability proportional to size, stratified random sampling, systematic sampling, cluster sampling, multistage sampling, sampling error.	1
3.	Measures of central tendency, Definition of Arithmetic mean, Median Mode with merits, demerits and uses, properties of an ideal measure of central tendency, partition values- quartiles, Deciles and percentiles.	1
4.	Frequency Distribution – presentation and summarization of data by different classification methods- Exclusive and inclusive, Diagrammatic– Bar and Pie, and graphical methods- Histogram, Frequency polygon, Frequency curve, Ogives (cumulative frequency curves).	1
5.	Measures of dispersion, Range, Quartile deviation, Mean Deviation, Standard Deviation and Variance, Coefficient of variation. Moments-Measures of skewness and kurtosis	1

6.	Probability – Definitions of random experiment, sample space, events –independent and dependent, trial, mutually exclusive events, exhaustive events, equally likely events, simple and compound events, Definitiions of probability (classical and statistical), simple problems based on probability. Addition and Multiplication theorems, conditional probabilities.	1
7.	Probability distributions- Binomial distribution, properties and simple problems, Poisson distribution and its properties and problems. Normal distribution with its properties and problems. Sampling distributions of mean and differences	1
8.	Correlation – Definition, types of correlation, scatter diagram, Karl Pearson's coefficient of correlation (linear correlation), properties,	1
9.	Regression (linear), Regression equations of y on x and of x on y. Relation between correlation coefficient and regression coefficients.	1
10.	Tests of significance – introduction, definition of hypothesis, null and alternative hypotheses, degrees of freedom, levels of significance and types of error. Significance of means – one sample and two sample means in large samples (Z-test).	2
11.	Significance of means in small samples (t-test)- one sample, two samples and two related samples mean test (paired t-test), test for correlationh coefficient, F test, $\div^2$ (chi-square) test – test of independence and goodness of fit.	2
12.	Elements of vital statistics: Rate & Ratio- mortality, fertility, incidence & prevalence rates, 2 standardized rates.	2
Total		**15**

Practical

S.No.	Topic	No of Practicals
1.	Introduction to personal computer and its peripherals	1
2.	Operating systems (DOS and Windows)	2
3.	Introduction to Database Management system-	2
4.	Introduction to data analysis software package-	2
5.	Use of LAN and other networking system	1
6.	Statistical computation: Mean, Mediam standard deviation, correlation, regression	2
7.	Statistical analysis – t –test, , $\div^2$ test	3
8.	Introduction with programming C	2
Total		**15**

REFERENCES:

Agrawal, B.L. 1996. Basic Statistics (3rd Edition), New Age Internatiional Pvt. Ltd. New Delhi.

Chandel, S. R.S. 1984. A hand Book of Agricultural Statistics, Achal Prakashan Mandir, Kanpur, India.

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Singh, S. and R.P.S. Verma. 1982. Agricultural Statistics, Rama Publishers Meerut.

Tripathi, P.N. 1991. A Manual on Introductory Agricultural Statistics, Tribhuvan University,

IAAS, Chitwan Nepal. Kalicharan, N. 2001. An Introduction to Computer Studies. Cambridge University Press.

Taxali, R. K. 2001. Software Made Simple. Tata McGRaw Hill Publishing Company Limited.

Course Code : EXT 302
Course Title : Extension Techniques in Veterinary Practices and Livestock Production
Credit Hours : 2(1+1) Full Marks: 50 Theory: 25 Practical:25

Objectives:

Upon the completion of this course, students will be able to understand the basic concept of extension techniques in veterinary and livestock production practices, their principle, method, type, system and media preparation. They will also be able to apply audio-visual aids in extension techniques for the dissemination of innovation to the farming community.

Syllabus:

Meaning, concept , definition scope and type of extension teaching, their process, steps and criteria for effective teaching learning. Extension teaching method and their approaches, classification of audio visual aids, concept of information technologies, multimedia projection and computer aids for extension teaching. Present trend, role issues in agricultural communication. Communication in satellite system, role of private, governmental and non-governmental agencies in agricultural extension development.

Course Breakdown
Theory

S. No.	Topic	No.of Lectures
1.	Meaning, concept, definition of extension teaching learning process	2
2.	Steps in extension teaching process, cone of experience and criteria for effective teaching learning	2
3.	Extension teaching method – individual, group and mass and their approaches and merit and demerits	3
4.	Classification of audio-visual aids and selection criteria of audio- visual aids, emerging concept of information technologies for extension	2
5.	Multimedia projection and computer aided teaching aid for animal husbandry extension	2
6.	Selection of different extension method for dissemination of animal husbandry technologies and media- mix	2
7.	Role of private, governmental and non-governmental agencies in agricultural extension development	2
Total		**15**

Practical

S. No.	Topic	No.of Practicals
1.	Graphics in communication – Line, Bar, Pie and pictorial graphs	2
2.	Preparation of various kind of charts – Flow, tree, suspense, flip etc.	1
3.	Preparation of pamphlet, leaflet and booklet	1
4.	Preparation of poster and pictorial book, radio script, drama	1
5.	Interaction visit and meeting with DLS, ADB/N, and LDO and study their program planning process, plan of work, organizational setup and calendar of operation	3
6.	Interaction visit and meeting with an NGO/CBOs/ Co-operatives/Private sectors and its local group and study their program planning process, plan of work and implementation	3
7.	Visit and observation of LSC/LSSC of DLS at the grass root evel study their program planning process, plan of work and implementation	2
8.	Preparation of general community level plan of production in livestock (selective and simulated)	1
9.	Visit and interaction meeting with commercial farmer's group formed by DLS for extension program	1
Total		**15**

REFERENCES:

Sandhu, A. S.. 2000. A Text Book of Agricultural Communication Process & Method.

Dongol, B. B. S. 2004. Extension Education. Prativa Singh Dongol printers Gopal tole Kathmandu, Nepal.

Kumar, B. and B. S. Hunsra. 2000. Extension Education for Human Resource Development

Lionberger, H.F. and H. G. Paul.1982. Communication Strategies – A Guide for Agricultural Change. University of Missouria, Colombia.

Dahama, O. P. and O. P. Bhatnagar. 1998. Education and Communication for Development. Oxford and IBH publishing company Private Limited. New Delhi.

Mathialagan, P. 2007. A text book of Animal Huabandry & Livestock Extension. International Book ook distributing Co. India.

Oakley, P. and C. garforth. 1985. A guide to Extension Training. University of Reading UK.

Course Code : AEC 401
Course Title : Farm Management and Production Economics
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objectives:

Upon the completion of this course, students will be acquainted with the principles of farm management and production economics dealing with the analysis of farm resources having alternative under constraint conditions.

Syllabus:

Definition, nature, scope and importance of farm management in relation to other sciences. Farm resource management- land, labour, machinery and civil works. Farm management problems in Nepal. Production relationship- factor-product, factor-factor and product-product relationships. Principles of farm management decisions- principle of variable proportion, cost principle, factors substitution, equi-marginal return, opportunity cost, principles of comparative advantages, the principle of time comparison. Farm planning and budgeting. Farm record and account. Farm efficiency measure. Risk and uncertainty management. Linear programming: concept and approach.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Concept, nature, subject matter and scope of farm management	2
2.	Importance of farm management and problems related to management of setup and calendar firms in Nepal	1
3.	Management of farm resources- land, labour, machinery and equipments and civil works	4
4.	Production relationships – Factor-product relationships	2
5.	Factor-factor relationship and least cost combination	2
6.	Product-product relationship and comparative advantage	2
7.	Principles of farm management decisions- variable proportion, factor substitution, cost principle, equi-marginal return, opportunity cost principle, time comparison and comparative advantage principle	5
8.	Farm planning-characteristics and techniques	2
9.	Farm budgeting- enterprise and partial budgeting	1
10.	Farm inventory, depreciation and valuation technique of farm assets	2
11.	Farm records keeping- balance sheet, income statement and cash flow statement	3
12.	Farm efficiency measures	
13.	Risk and uncertainty- concept, types, safeguards and measures	2
14.	Linear programming- concept and approach	2
Total		**30**

Practical

S.No.	Topic	No.of Practicals
1.	Determination of optimum input use and maximization of profit using only one input	1
2.	Least cost combination of inputs	1
3.	Revenue maximization through optimum enterprise combination	1
4.	Farm record keeping	1
5.	Preparation of farm inventory	1
6.	Development of new farm plan	1
7.	Preparation of Balance Sheet of a farm	1
8.	Preparation of Income Statement of farm	1
9.	Development of Cash Flow budget of a farm	1
10.	Farm physical efficiency measures	1
11.	Farm financial efficiency measures	1
12.	Computation of depreciation of farm assets	1
13.	Valuation techniques of farm assets	1
14.	Exercise on time value of money	1
15.	Exercise on linear programming	1
Total		**15**

REFERENCES:

Panda, S. C. 2007. Farm Management and Agricultural Marketing. Kalyani Publishers, New Delhi

Manson, J. 1996. Farm Management. Kangaroo Press, Pennsylvania State University.

Kay, R.D. and W.M. Edwards. 1994. Farm Management. McGraw Hill, Inc., New Delhi.

Kahlon, A. S. and K. Singh. 1992. Economics of Farm Management in India. Allied Publishers, New Delhi.

Shankhyan, P. L. 1983. Introduction to Farm Management, Tata, McGraw-Hill, Co. Ltd., New Delhi.

Johl, S. S. and T. R. Kapoor. 1973. Fundamentals of Farm Business Management . Kalyani Publishers, New Delhi.

Course Code : AEC 402
Course Title : Agriculture Marketing and Cooperatives
Credit Hours : 2 (2+0) Full Marks: 50 Theory: 50 Practical: 0

Objectives:

Upon the completion of this course, students will be able to understand the meaning, concept and importance of agricultural marketing and cooperatives. Students will also develop analytical techniques in agricultural marketing research.

Syllabus:

Concept and definition – Market and marketing, importance of agricultural product prices and marketing of both inputs and outputs. Meaning and concept of utility, consumers behavior, consumer and market equilibrium, revealed preference, consumer surplus, demand for agricultural products and their derivation. Supply of agricultural products and their derivation. Price, income and cross elasticity of demand and supply, relationship among elasticity and their use. Life cycle and development of products, marketing strategy, market and product promotions. Market structures, price determination and equilibrium in pure competition, monopoly, and oligopoly; Price discrimination. Marketing functions, marketing channels and costs. Marketing margins and price spreads. Spatial and temporal price variation. Marketing research, Marketing efficiency and its measurement, economic models for price analysis. Government intervention and public institutions in marketing, Cooperatives- concept, history, definitions, role, organization, structure, cooperative law and by laws, developing agriculture cooperatives, cooperative marketing, cooperative farming, strength and opportunities.

Course Breakdown
Theory

S.No.	Topic	No.of Lectures
1.	Agricultural marketing: concepts of market and marketing; nature of agricultural commodities; classification of markets; importance of product prices and agricultural marketing for socioeconomic progress	2
2.	Theory of consumer behavior: concept of utility and measuring approaches; demand function and factors affecting, consumer's behavior, and market equilibrium; consumers' and producer's surplus	3
3.	Elasticities: various elasticities of demand, supply and their relationship	2

4.	Theory of firm: theory and characteristics of firms; supply function and its derivation; life cycle and development of products; marketing strategy, market and product promotions	3
5.	Market structure and equilibrium: marketable surplus; market structure, price determination and price discrimination.	4
6.	Marketing functions and channels: marketing functions: physical, exchange and facilitating functions; marketing channels, marketing cost; marketing margins and price spreads	3
7.	Price variation: price movement over time: seasonal and cyclic price variation; spatial price variation; spatial distribution of commodities and regional equilibrium models	3
8.	Marketing research: research in agricultural marketing; marketing efficiency and its measurement;	3
9.	Government intervention and public institutions: role of government in product pricing and agricultural marketing; public institutions related to production, marketing and their promotion	2
10.	Cooperatives- concept, definitions, history, role, organization, structure, cooperative law and bylaws, cooperative farming, cooperative marketing.	5
Total		**30**

REFERENCES:

Rhodes, V. J. 1983. The Agricultural Marketing Systems. John, Wiley, and Sons, Inc. Singapore.

Koutsoyiannis, A. K. 1994. Microeconomics, Printice Hall, India

Barker, J. 1989. Agricultural Marketing. 2nd Ed. Oxford University Press. UK

Acharya, N. L. 1985. Agricultural Marketing in India, Surya Publication Tomek, W. 1984 Agriculture Product Prices

Course Code : EXT 503
Course Title : Social Mobilisation and Community Development
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Pracitcal: 25

Objectives:

Upon the completion of this course, students will be able to apply the most appropriate process, approaches and techniques in developing rural community development programs by their mobilization in the developmental activities.

Syllabus:

Meaning and concepts of development, rural development, community development and the transition in thoughts and application of these aspects developmental process over the period of time to currents stage in their historical perspectives. Rural poverty, causes and consequences, and efforts made in the past and present strategies, introductory concepts of and recent experiences in poverty reduction programs through various models and processes of social mobilization and participatory program planning at the grassroots level, preparing portfolio of opportunities and investment plans; implementation of plans; participatory monitoring and evaluation; an overview of gender concepts overtime, issues, and strategies in developmental activities, gender sensitive development planning.

Course Breakdown
Theory

S.No.	Topic	No. of Lectures
1	Concept of development, sustainable development, rural and community development, principle of community development, a brief overview of efforts and approaches of rural development in Nepal over the last decades	3
2	Factors and goals of development, cultural and social heritage and dilemma in the rural development of Nepal	2
3	Major problems and issues of rural and community development in Nepal.	2
4	Poverty, human poverty, relative deprivation, poverty in SAARC countries, SAARC declaration on poverty Elimination	3
5	Concept of social mobilization, definition, purposes, strategy of implementing social mobilization	3
6	Process of social mobilization, institutional development, participatory planning, implementation of plans and sustainable utilization of results	3
7	Social mobilization in multi-ethnic communities and conflict situation	1
8	History of social mobilization in Nepal, lesson learned	2

9	Decentralization for development, definition, strategy and current status of decentralization in Nepal.	2
10	Concept of micro-finance and its role in poverty alleviation; practices of micro-finance in Nepal	3
11	Actors of rural development and poverty alleviation programs, linkages and coordination, problems and issues.	2
12	Introduction to gender concepts, gender segregation and stratification, discrimination, equity and social inclusion.	1
13	Gender needs, roles, analysis, gender sensitive planning, gender audit, gender mainstreaming in development in general and poverty in particular with specific focus at the resource poor women.	2
14	Origin and concept of WID, WAD, GAD and GESI	1
Total		**30**

Practical

S.No.	Topic	No. of Practicals
1	Conducting baseline survey into a rural community and analyzing the situation	2
2	Preparing village profile	2
3	Exposure on techniques of organization development through audio visual media, role play and making site visits to observe the real action at the grassroots	2
4	Conducting a participatory social action planning exercise to prepare portfolio of opportunities and community investment plans, aggregation	2
5	Business plan preparation (Livestock and poultry bird related enterprises)	1
6	Observing VDC level planning and process.	2
7	Practical exercise on participatory monitoring and evaluation system	2
8	Practical exercise on exploring equity and inclusion issues and resolving them	1
9	Practical on MIS through observing a real case at the grassroots.	1
Total		**15**

REFERENCES:

Khan, S. S. and J. S. Sah. 2001. Social Mobilisation Manual Based on Syangja Experience, Social Mobilisation Experimentation and Learning Centre.

UNDP. 2001. Governance and Poverty Reduction: National Human Development Report, Kathmandu

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