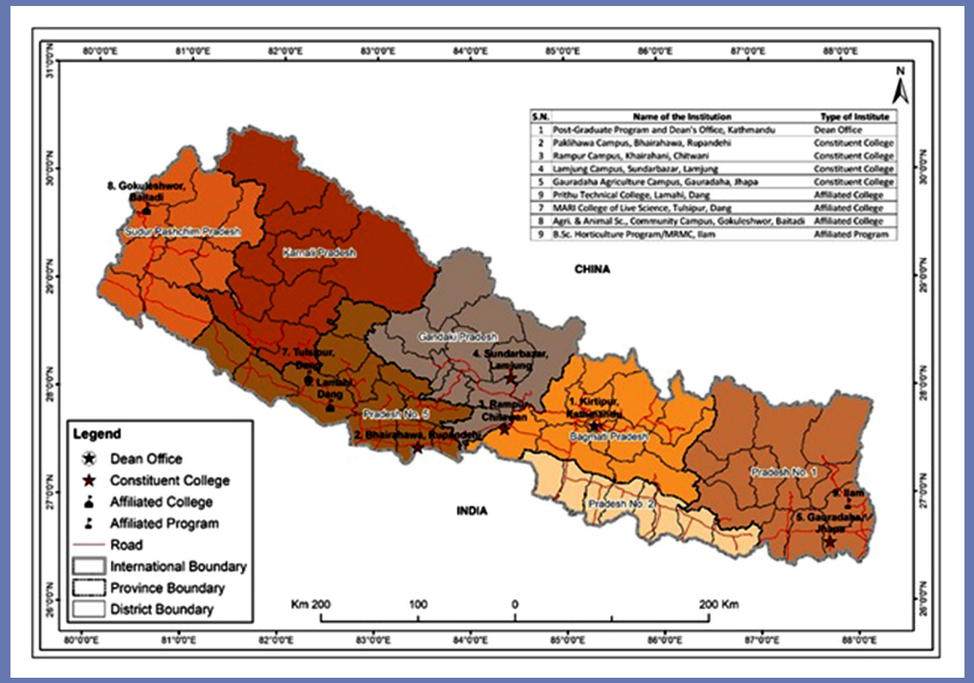
IAAS CURRICULUM

Map showing the geographical distribution of agricultural campuses of Institute of Agriculture and Animal Sciences, Tribhuvan University.



S.N.	Name of the Institution	Type of Institute
1	Post-Graduate Program and Dean's Office, Kathmandu	Dean Office
2	Paklihawa Campus, Bhairahawa, Rupandehi	Constituent College
3	Rampur Campus, Khairahani, Chitwani	Constituent College
4	Lamjung Campus, Sundarbazar, Lamjung	Constituent College
5	Gauradaha Agriculture Campus, Gauradaha, Jhapa	Constituent College
9	Prithu Technical College, Lamahi, Dang	Affiliated College
7	MARI College of Live Science, Tulsipur, Dang	Affiliated College
8	Agri. & Animal Sc., Community Campus, Gokuleshwor, Baitadi	Affiliated College
9	B.Sc. Horticulture Program/MRMC, Ilam	Affiliated Program

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IAAS CURRICULUM

B.V.Sc. & A.H.

IAAS CURRICULUM

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

Tribhuvan University
Institute of Agriculture and Animal Science (IAAS)
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Revised 2020

IAAS CURRICULUM

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

Tribhuvan University

Institute of Agriculture and Animal Science

Revised 2020

The Institute of Agriculture and Animal Science, Tribhuvan University reserves the rights to make changes in this course catalogue without notice. Academic Council of TU had approved this B.V.Sc. and A.H. curricula on 18th March 2020 (2076/11/05 B.S.)

Please direct inquiries and comments to:

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Price:

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Teacher and staff of IAAS:	NRs.100
Government offices/institutions:	NRs. 200
NGOs/INGOs and other agencies :	NRs. 500
Foreigners :	US$.20

FRONT page photograph: Artificial Intelligence generated image symbolizing the Veterinary education.

BACK page photograph: Geographical distribution of agricultural campuses of IAAS on the map of Nepal (Courtesy: Prof. Dr. KR Adhikari)

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TRIBHUVAN UNIVERSITY
Institute of Agriculture and Animal Science
Dean's Office
Kirtipur, Kathmandu, Nepal

Ref. No.

Foreword

The Institute of Agriculture and Animal Science (IAAS) originated as the School of Agriculture in 1957 under the Ministry of Agriculture and became part of Tribhuvan University in 1972. At present, IAAS offers Bachelor's, Master's, and PhD degrees in various subjects of agriculture, animal and veterinary sciences, aiming to be a global leader in education, research, and services.

This bulletin provides details on the Bachelor of Veterinary Sciences and Animal Husbandry (B. V. Sc. & A. H.) program and its revised syllabus, which integrates global advancements to enhance skills, technology, and national productivity. Despite periodic adjustments, a full curriculum revision was overdue since 2011. After extensive evaluation by subject matter committees, IAAS developed a new curriculum focusing on modern veterinary sciences, problem solving, and skill enhancement. It was reviewed in a series of workshops with stakeholders, researchers and academicians. The bulletin also outlines academic regulations, admission requirements, and course descriptions for the five-year B. V. Sc. & A. H. program including six months internship. A significant update includes the development of a micro-syllabus with a strong emphasis on practical learning, entrepreneurship, non-credit courses and clinical exposures. The integrated curriculum reflects IAAS's mission to produce well-rounded veterinary professionals.

Curriculum development is an ongoing process requiring periodic updates. Continuous revisions will ensure the quality of curriculum, so the suggestions are mostly welcome. Appreciation goes to subject committees, faculty, planners, and professionals for their contributions. I am also thankful to the series of editorial team to make the micro-syllabus in this form.

Kishor Chandra Dahal, PhD
Dean

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1. Introduction

1.1 Objectives of IAAS

The Institute of Agriculture and Animal Science (IAAS) is one of the five technical institutes under Tribhuvan University, Nepal. The mission of IAAS is to produce competent manpower in agriculture and allied disciplines, and to promote research, development and technology dissemination in agriculture. The objectives of IAAS are as follows:

a. Design and implement educational programs in agriculture in order to obtain an appropriate balance among established and emerging needs of the agricultural sector in Nepal and outside.
b. Promote excellence in instruction, research and technology dissemination in agriculture.
c. Develop technically competent agricultural graduates ready to apply the knowledge and skills in technical agriculture, agricultural extension, agricultural education, agribusiness and agricultural and rural development programs.
d. Encourage and support faculty members and students for research and scholarly activities relevant to the needs of Nepalese agriculture and farmers.
e. Foster students' self-development, commitment and responsibility for the welfare of Nepalese society.

1.2 History of Development

The IAAS began as a school of agriculture under the Ministry of Agriculture in 1957A.D. to train Junior Technical Assistants (JTAs) in agriculture. In 1968, the school was upgraded to College of Agriculture and a two-year program of Intermediate of Science in Agriculture (I.Sc.Ag.) was started. In 1972, the College of Agriculture was given the status of IAAS under Tribhuvan University. Until that time, the Institute did not have its own buildings and facilities and was operated at *Jagdamba Bhawan* at Pulchowk in Kathmandu. In 1974, the Institute was relocated from Kathmandu to Rampur, Chitwan - a rural site in Central Terai Nepal where 110 hectares of land,

buildings and facilities of the then *Panchayat Training Center* were endowed to IAAS for teaching and research of agricultural science. Later in 1978, Ministry of Agriculture handed over another almost 125 hectares of land to IAAS for developing livestock farm. With the decision of government to establish an Agriculture and Forestry University (AFU) within the premises of Rampur campus, by an Act promulgated in 2010, Rampur campus was relocated to the eastern part of Chitwan in Khairahani municipality. Similarly, Veterinary program was moved to Paklihawa campus and office of the Dean including post-graduate program were shifted to Kirtipur, Kathmandu. At present, the Institute has four constituent campuses located at Khairahani of Chitwan, Sundarbazar of Lamjung (estd. 1975), Paklihawa of Rupandehi (estd. 1978) and Gauradaha of Jhapa (estd. 2018). Each of the campuses represents typical agro-ecological zones. Number of students enrolment during 2075/76 for B.Sc. Ag. program was 100 in each of Lamjung and Paklihawa campuses. In addition, Paklihawa campus admitted 50 students for Bachelor of Veterinary Science and Animal Husbandry (BV. Sc. & AH). Rampur and Gauradaha Agril. Campuses also enroll 50 students per year. Masters level education in Kathmandu is attracting increasing number of students year after year which is proven by the fact that 15 academic departments run Masters Program at full capacity although required infrastructural facilities are still at the early phase of development.

To respond to growing interest of private sector investment in agricultural education, IAAS has provided affiliation to three colleges for offering B.Sc.Ag. degree. They are situated in Gokuleshwor, Baitadi (named as Gokuleshwor Agriculture and Animal Science Campus, affiliated in 2010), and two others in Dang district called as Prithu Technical College, Lamahi and MARI College of Live Sciences, Tulsipur, both affiliated in 2014). Mahendra Ratna Multiple Campus (MRMC) at Ilam runs B.Sc. Horticulture program in private modality which is under the academic control of IAAS (affiliated in 2016).

1.3 **Academic Programs**

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

The B.V.Sc. & A.H. program was started at IAAS, Rampur from the academic year 1993/94 (2050/51 B.S.). The aim of this program is to train skilled and competent manpower in the areas of livestock health, production and management. The regular B.V.Sc. & A.H. program is a five years course after I.Sc. (Basic Science) or 10+2 (Science/Agriculture Science) or I.Sc. (Agriculture), which includes nine semesters of academic courses and a final (10^{th}) semester of internship. The curriculum has been designed to integrate basic, practical and clinical subjects to impart both extensive

and intensive knowledge in veterinary clinical sciences, animal breeding, livestock production and management.

Bachelor of Science in Agriculture (B.Sc.Ag.): The aim of this program is to train academically competent and practical oriented professional agriculturists. The B.Sc. Ag. program is eight-semester (four years) course after I.Sc. (Basic Science) or 10+2 (Science/Agriculture Science) or I.Sc. (Agriculture). Class room teachings, field and lab works and study visits are the parts of the academic curriculum. Generally, there will be 50 students in a theory and 25 students in a practical class. In the currently revised undergraduate curriculum, the final or the 8^{th} semester students undergo "Fundamental of Research, Practices and Seminar (RPS)" course carrying a teaching load of 4 (1+3) cr. hrs. in lieu of previous "Undergraduate Practicuum Assessment" course of 3 (0+3) cr. hrs. The aim of RPS course is to provide students with an opportunity to learn production and marketing methodologies, data analysis, deliver a result seminar and be able to document a scientific report as a mini-thesis. The students must fulfill four years of residential or non-residential learning to complete the requirements of B.Sc. Ag. curriculum.

Bachelor of Science in Horticulture (B.Sc.Hrt.): With the provision of 30 student enrollment, the program was started in 2016 in one of the five departments of MRMC under the academic control of IAAS. The aim of this program is to train skilled and competent manpower in different areas of horticulture harnessing the benefits of unique Mountainous diversities of Eastern Nepal. This is also a four years program with intake of 50 students per year effective from 2020. Generally, there are 50 students in a theory and 25 students in a practical class. A total of 163 cr. hr. are taught in eight semesters including 15 cr. hr. of internship in the last semester.

M.Sc.Ag./M.Sc.An.Sc./M.Sc.Aqua./M.V.Sc.: Master of Science in Agriculture (M.Sc. Ag.) was started in Horticulture, Plant Breeding and Agriculture Economics and Master of Science in Animal Science (M.Sc.An.Sc.) in Animal Nutrition beginning academic year of 1998 A.D. (2055 B.S.). The program was expanded to Agronomy, Plant Pathology, Entomology, Plant Protection, Agriculture Extension and Rural Sociology, Animal Breeding and Fishery (M.Sc.Aqua.) in 1999, Soil Science in 2000 and Livestock Production and Management (LPM) in 2002. M.Sc.Ag. in Environmental Science, M.Sc. in Aquaculture (M.Sc.Aqua.) and Master in Veterinary Science (M.V.Sc.) were initiated in 2004. Currently, Masters program is operating in 15 departments (9 in M.Sc. Ag., 3 in MSc.An.Sc. and 3 in M.V.Sc. Degrees) in Kirtipur, Kathmandu.

Doctor of Philosophy: Doctor of Philosophy (Ph.D.) program in Horticulture and Animal Nutrition was initiated in the January Session of 2002. The program was further expanded to Plant Breeding, Plant Pathology and Entomology in the July Session of 2003. Later on, both coursework-based (Plan-A) and research-based (Plan-B) PhD programs were expanded in many other departments. Currently, the institute runs Ph.D. in many departments except veterinary sciences and plan to include more departments in the future.

1.4 **Research Program**

The research activities at IAAS are coordinated through the Directorate of Research (DOR). DOR is constituted within IAAS system in order to assist Research Committee which is a recognized body under Tribhuvan University. Funding support for the research activities includes IAAS own fund as well as external funding by national and international organizations. The research findings are being published in IAAS Journal (J. Inst. Agric. Anim. Sci.) annually.

1.5 **Extension Program**

Agricultural education and extension program was regularly initiated only after the establishment of the Directorate of Extension (DOE) in 1999. It organizes short courses for farmers, extension and development workers and provides veterinary health services through the mobile veterinary health camps. It also provides technical services through publications, demonstration and agri-fair organized in collaboration with GOs and I/NGOs. Even plant clinics are run time to time to address farmers' problems, for example, fertilization and irrigation in soils, as well as pathological and entomological problems in the farmers' fields during peak periods of cultivation.

1.6 **Physical Facilities**

Classrooms and Laboratories

Each constituent campuses have their own building complex which includes classrooms, laboratories and office space for the faculty members. There are separate building complexes developed for B. Sc. Agriculture and B.V.Sc and A. H. programs at Paklihawa campus. The laboratories are maintained by the respective departments to support practical training prescribed in the courses. The laboratories are equipped with equipment for basic teaching and analytical works. The facilities of laboratories are also utilized to support faculty research program.

Student Hostels

There are separate hostel facilities for boys and girls in Lamjung and Paklihawa campuses. The hostels have facilities of common rooms, mess, indoor games and kitchen gardening in addition to bedrooms. Nominal fees, which include electricity charge, internet cost etc, have been charged for the students to maintain the hostels. However, the facility is not enough to accommodate all the students of B.Sc. as well as B.V.Sc. & A.H. in the hostels. Many students still reside outside the campus hostels for the first two-year of four-year study program. The facilities and infrastructures required for hostels in Rampur and Gauradha campuses are in the process of acquiring grants and construction phase.

Library

All the campuses have section for e-learning and hard copy reading units. There is provision for students and faculty members to borrow books for overnight reading upon exchange for their library cards.

Veterinary Teaching Hospital (VTH)

A veterinary teaching hospital is being developed with modest facilities at Paklihawa campus designed to provide clinical services to farm animals of the farmers from experienced veterinary doctors. Also the veterinary students of latter semesters get practical experience in diseases and other problems faced by the farmers. Veterinary hospital is a most for good practices, and the institute is planning to develop a new veterinary hospital at Paklihawa campus. IAAS is also initiating process to develop a linkage with the government's institutions where intern students involve to increase their practical competency during their final semester.

Farms

Both Lamjung and Paklihawa campuses have their own Agronomy, Horticulture and Livestock farms. These farms support teaching and research requirements and are also used for production purposes. The horticulture farm includes vegetable production block, orchard and space for propagation of fruits, vegetables and ornamental plants. The livestock farm maintains local as well as exotic breeds of cattle, buffaloes, sheep, goat, swine and poultry. Lamjung campus has also a coffee orchard for practical as well as production purposes. Total farm size of Lamjung and Paklihawa campuses is about 16 ha and 35 ha, respectively. The farm products are sold to campus staff and public in a reasonable price. Similarly, newly relocated Rampur campus is acquiring about 236 ha of community forest area in Bhutyaha of Khairahani municipality dominated by Sal trees (*Soria robusta*). In this forest, representative of Inner-Terai riverine ecosystem, banana and pineapples are common understory vegetation which allow for all kinds of

research opportunities of agro-forestry. On the other hand, representative of outer-Terai region, Gauradaha campus in Jhapa occurs in a unique setting allowing for lowland rice based research opportunity including large natural fish ponds which could be utilized for research, study and commercial purposes. Located in Baigundhara of Jhapa district, this lowland rice area of Gauradaha campus spreads over 50 ha.

Fish Ponds

The aquaculture department has all the basic facilities needed to fulfill requirements of the higher levels of education. The department has a farm, well equipped laboratories and hatchery complex which accommodates lab, classroom and office.

Sports and Extra Curricular Activities

The institute has modest facilities for indoor and outdoor sports such as cricket, football, volleyball, basketball, badminton, table tennis and lawn tennis. Television sets have been provided in the boys and the girls' hostels for recreation. The IAAS administration as well as students' clubs and free student union organizes events or sports and extracurricular activities from time to time. Likewise, every campuses are encouraged to hire the services of sports coach through their student welfare directorate.

Transportation and Communication

The institute also maintains a pool of vehicles for transportation and where applicable and feasible faculty and students are provided with regular bus service, in the morning and evening. Campuses are mostly connected by Wi-Fi and telephone, facsimile, internet and electronic mail services available for the students, faculty and staff.

Medical and Health Care

Dispensaries and round the clock ambulatory services are available for minor medical checkup and treatment.

1.7 **Admission, Evaluation and Award of Degree**

Admission Requirements for B.V.Sc. & A.H.

Students with I.Sc. (Basic Science) or I.Sc. (Agriculture) or 10+2 (Science) or 10+2 (Agriculture) or 10+2 (Forestry) or equivalent with compulsory English, Physics, Maths, Chemistry and Biology securing a minimum of 50 percent marks in aggregate from Tribhuvan University or from other recognized universities and boards (equivalent endorsed) are eligible for admission to B.V.Sc. & A.H. program. Selection for admission is on a merit basis through an entrance examination. An admission committee formed by the Dean of IAAS within the framework of TU rules and regulations formulates the

policies concerning student intake and entrance examination. Girls students and students from disadvantage group are provided some preferences in terms of reserved quota and leverages in admission requirements. However, these are subjected to changes in the lines of national and TU policies.

An advertisement regarding the student admission is done on the website of Institute of Agriculture and Animal Science (www.iaas.tu.edu.np) in advance of the date of entrance examination and admission. The exact date of admission process may vary from year to year but it generally starts in September-November and classes starts from end of December.

Evaluation and Examination System

Semester System

The institute follows a semester system of education. There are two semesters in each academic year. One semester covers a period of 90 effective working days of teaching and two weeks for final examination. The academic calendar is prepared in the beginning of academic session by the dean office and circulated to all constituent campus and from campus to their respective departments for effective functioning of academic program.

Teaching Methods: All courses are to be instructed in English. The head of the department or unit of each campus assigns the course to the faculty member after the finalization of the lesson plan as per academic calender of the Dean's Office. All faculty should follow student-centric teaching methods, lecture cum discussion, group-based assignment, and presentation as per the course and title concern. The faculty is most liable to complete the courses on time, however chief or concerned official are responsible to ensure quality of education and timely delivery of lecturers.

Vacations and Holidays

There will be one month vacation at the start of Dashain festival till chhath and total 45 (forty-five) days of vacation during summer and winter with number of days depending on TU policies. The classes work generally remain closed during vacation.

Evaluation and Examination System

The institute follows semester system of examination for evaluation. A total of 20% of full marks in theory in each subject is evaluated internally through an internal assessment. The student must secure at least 40 percent 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 a valid reason.

The Examination Board of TU conducts a separate final theory examination with 80% of total marks and 100% of practical for each level externally through an external system of examination. A student 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 chance exam conducted by the TU Examination Board in each semester after about a month of announcement of final examination result for the previous semester. Such students need not to repeat the course provided they pass the internal assessment and qualify for final examination. Those who failed in the chance examination should enroll the particular semester along with regular students and should appear in internal assessment and other requirements.

Attendance Requirements

A student must attend at least 70% of classes in each subject to be eligible for final examination. Failure to meet the minimum attendance requirement may debar a student from taking the final examination. A student must have taken the internal assessment exam to be qualified for final or the back paper examination. For only practical course, a student must have attended the practical class as reflected in the attendance register of the course instructor. Beside the core courses, the tracking program, guided study circles, entrepreneurial training are mandatory to be completed.

Award of Degree and Transcript Academic Records

A student becomes eligible for the award of degree of B.V.Sc. and A.H. after completion of all the requirements prescribed by the curriculum. No partial degree shall be awarded in case a student fails to complete any of the prescribed requirements. The Controller of Examination of TU issues transcript of Academic Record after the notification of results. The standing of the students is based on aggregate percentage of marks as under:

Distinction	80%
First Division	65%
Second Division	50%
Pass	40%
Fail	less than 40%

1.8 **Students' Welfare**

General

The facilities for students' welfare at the IAAS, respective campuses include students' hostels, health care and medical facilities and facilities for sports, extra curricular activities and recreation. A member from IAAS faculty is appointed as Extra Curricular

Activities chief to organize and coordinate sports and extra curricular activities. In addition, free student union, student clubs and cultural groups also organize extra curricular activities from time to time.

Scholarship

The institute provides scholarship to topper students one from girls and one from boys at the rate of NRs 9000 in each semester. In the first semester, topper students are selected on the basis of overall quiz marks of all the subjects; and in other semesters, on the basis of final results of each semester. In addition, 15% of the students receive freeship, on the same basis as above that waives payment of the tuition fee in each semester. The award of scholarship is however subjected to change depending upon availability of funds and policy of Tribhuvan University.

1.9 Design and Delivery of Curriculum

The curriculum of B.V.Sc. and A.H. program include courses in basic and core disciplines and also courses specific to agro-climatic and physiographic settings of Nepal and Nepalese farming system. The members of Subject Matter Committees of IAAS, and others representing experts from Nepal Agriculture Research Council (NARC), Department of Agriculture under Ministry of Agriculture and Development and other stakeholders, in different areas of agriculture and veterinary sciences, design and propose the courses for periodic revision. The content of the courses are critically discussed and modified by the Faculty Board of the institute. The course curriculum is implemented after approval of the Academic Council of Tribhuvan University. The management and delivery of the courses of both the programs are carried out through the respective departments.

Course Code

The course code listed in this curriculum have a short text of the subject matter. The digits are read from left to right. The first digit indicates the year in which course is offered, the second digit indicates the first (1) or the second (2) semester of the academic year and third digit indicates serial number of the course in sequence in the semester offered by an instructional department. Each theory or practical credit hour 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 lecture per week, and for practical means two to three hours of practical per week.

Internship Program

The internship for one semester is integral part of B.V. Sc & A.H. degree program. The general objective of the program is to provide pre-service field training in the areas of

veterinary science and animal husbandry. Every student of B.V.Sc. and A.H. degree course should undergo compulsory rotating internship upon completion of the ninth semester. The internship period will be minimum period of six calendar months. Students will be eligible for the award of the degree of B.V.Sc and A.H. only after satisfactory performance during internship.

Compulsory rotating internship shall include a full-time training in veterinary and animal husbandry services (including emergencies and night duties, Saturday and holidays). The intern will devote full time to the training. The internship program will also meet the requirements of Nepal Veterinary Council.

1.10 Other Requirements and Rules

The aspects of instruction, evaluation, and other areas of academics not mentioned here are as per rules and regulations of Tribhuvan University by default. The courses are met the requirement of the Nepal Veterinary Council (NVC) and as per its minimum standard regulation-2063 of veterinary education and animal husbandry for undergraduate courses.

Tracking Programs, Study Circles and Entrepreneurship Training

In addition to credit and non-credit courses, there will be various exposure related activities such as tracking program and study circles. These tracking programs and study circles groups will not be displayed in transcript, but students are encouraged to attend such programs during their study period. Students should qualify these activities through the internal assessment by the assigned teacher.

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. Each student has to take any two tracking programs at any semester (one semester duration each) under the supervision of one faculty member as designated by the administration. Evaluation of the students for this program shall be done internally.

List of the tracking programs are given below but not limited depending on the availability and interest of the expert and students:

i) Feline Medicine
ii) Cryobiology of Gametes
iii) Neurosciences
iv) Clinical/ Interventional Nutrition

v) Dermatology/Integument Science
vi) Complementary and Alternative Veterinary Medicine
vii) Ophthalmology
viii) Anaesthesiology
ix) Small Animal Critical Care
x) Non-Mammalian Medicine (Fish, unusual pet health and management)
xi) Sports Animal Medicine
xii) Drug Designing
xiii) Wildlife Medicine

Guided Study Circles

Each student of B.V.Sc. & A.H. degree course may enroll themself for two guided study circle activities during the B.V.Sc. & A.H. degree. 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) One Heath Study Circle
xi) Fish Husbandry Study Circle

Entrepreneurial Training

Each student of B.V.Sc. and A.H. degree course shall be required to compulsorily undertake one of the activities of entrepreneurial training as listed below. Entrepreneurship skill development will be focused on the practical courses of farm management.

Proposed list of entrepreneurial activities are as follows:

(i) Goat Production
(ii) Sheep Production
(iii) Pig Production
(iv) Broiler and Egg Production
(v) Pet Production
(vi) Dairy Production
(vii) Meat Production and Processing

(viii) Feed Production-Mineral Mixture
(ix) Milk Products
(x) Food safety-residue Analysis
(xi) Clinical Investigatory laboratory
(xii) Quality Control-Evaluation (Microbial)
(xiii) Shoeing and Shoe Manufacture
(xiv) Production of Diagnostic
(xv) Pharmaceutical Formulations
(xvi) Fish Production
(xvii) Training and skill transfer in any related topic

Comprehensive Examination on Core Competence:

The presentation of internship works will be evaluated by a committee along with the competencies and professional skills as listed below.

(i) Restraint of cow, sheep, horse, dog and pig. Haltering, snaring, muzzling, tail switch, bandaging of horse for exercise and stable bandaging.
(ii) Animal identification, dentition and ageing of animals.
(iii) Housing layout/requirements of livestock and poultry.
(iv) Computation of ration of livestock of different breeds and age groups in health and disease
(v) Fodder management and interpretation of feed quality evaluation.
(vi) Physical evaluation of livestock health parameters (auscultation, percussion, recording of temperature, pulse, heart rate, respiration rate and other basics).
(vii) Recording and interpretation of cardiovascular response.
(viii) Testing of milk and milk products for quality, clean milk production.
(ix) Carcass quality evaluation (ante-mortem and post-mortem examination).
(x) Specific diagnostic tests for zoonotic diseases.
(xi) Sample collection, handling-and dispatch of biological materials for laboratory examination.
(xii) Staining techniques for routine clinico-pathological examinations.
(xiii) Relating post-mortem lesions to major livestock diseases.
(xiv) Haematological evaluation (total leukocyte count, differential leukocyte count, haemoglobin, packed cell volume, erythrocyte sedimentation rate etc.) and interpretation.
(xv) Tests and their interpretation for haemoprotozoan diseases.
(xvi) Body fluids collection, examination and interpretation as an aid to diagnosis.
(xvii) Urine evaluation procedures and interpretation as indicators for diagnosis of diseases.
(xviii) Fecal examination- procedures and interpretation.
(xix) Examination of skin scrapings and interpretation.

(xx) Interpretation of blood chemistry profile in diseases.
(xxi) Deworming procedures and doses for different species of animals/birds.
(xxii) Managing an outbreak of infectious/contagious disease.
(xxiii) Approach to diagnosis of a given disease condition.
(xxiv) Pre-Anaesthetic administration and induction, maintenance of general anaesthesia and dealing with aesthetic emergencies.
(xxv) Local anaesthetic administration.
(xxvi) Nerve blocks-sites, functional application.
(xxvii) Suture material, suture pattern and tying knots.
(xxviii) Common surgical procedures including dehorning, docking, caesarian section, ovario-hysterectomy, castration, rumenotomy.
(xxix Application of plaster cast/splint for fracture immobilization and other bandaging procedure in large and small animals.
(xxx) Soundness in horses.
(xxxi) Rectal examination - palpation of pelvic/abdominal organs in cattle/ horses/ buffaloes.
(xxxii) Detection of oestrus, artificial insemination, pregnancy diagnosis.
(xxxiii) Management of vaginal/uterine prolapse and dystocia.
(xxxiv) Andrological examination of bull, handing, preservation and evaluation of semen.
(xxxv) Vaccination procedures, vaccination schedules and vaccine types for different diseases.
(xxxvi) Handling of radiograph, interpretation of a given radiograph of large and small animals.
(xxxvii) Client management.
(xxxviii) Managing a clinical practice, ambulatory van, transporting a sick animal requirement, etc.
(xxxix) Dosage regimens of important drugs.
(xl) Drug administration techniques in different species of animals- oral, parenteral, rectal, intra-peritoneal and intra-uterine.
(xli) Identification of major livestock/poultry breeds.
(xlii) Measuring climatic parameters and their interpretation.
(xliii) Communication technology tools.

However other competency skills can be added from time to time according to need which will be decided by internship committee.

Semester-wise Distribution of Courses for B.V.Sc. and A.H.

1st Semester

Course Code	Name of the subject	Credit Hours
VAN 111	Gross Anatomy I	1+2
VAN 112	Gross Anatomy II	2+2
BCH 111	Veterinary Biochemistry	2+1
LPM 111	Ruminant Production and Management	2+1
ANU 111	Principles of Animal Nutrition	1+1
AEC 111	Farm Management and Production Economics	2+1
LPM 112	Animal Housing and Sanitation	1+1
	Total	**11+9**

2nd Semester

Course Code	Name of the subject	Credit Hours
VAN 121	Veterinary Histology and Embryology	2+2
ANU 121	Fodder Production and Pasture Management	2+1
LPM121	Non ruminant Production	2+1
BCH 121	Physiological Biochemistry	2+1
EXT 121	Sociology and Principles of Vet. and A.H. Extension	1+1
LPM 122	Introduction to Dairy Science	2+1
AST 121	Biostatistics for Veterinary and Animal Science	2+1
VPY 121	Physiology I	2+1
	Total	**15+9**

3rd Semester

Course Code	Name of the subject	Credit Hours
VAN 211	Splanchnology and Applied Anatomy	2+2
VPA 211	Parasitology I	1+1
VPY 211	Physiology II	2+1
VPP 211	General Pathology	2+1

ANU 211	Applied Animal Nutrition I	1+1
VMI 211	Microbiology I	2+1
AQF 211	Introductory Ichthyology	1+1
ANB 211	Principles of Genetics and Animal Breeding	2+1
VPT 211	General and Systemic Pharmacology	2+1
LFP 211	Livestock Farm Practice I (Non-credit)	
	Total	**15 +10**

4th Semester

Course Code	Name of the subject	Credit Hours
VPY 221	Physiology III	2+1
VPT 221	Veterinary Neuropharmacology	2+1
VMI 221	Microbiology II	2+1
VPP 221	Systemic Pathology	2+1
ANU 221	Evaluation of Feed Stuff	1+1
ANU 222	Applied Animal Nutrition II	1+1
ANB 221	Animal Breeding and Biotechnology	2+0
VPA 221	Parasitology II	2+1
LPM 221	Bee, Pet and Lab Animal Management	1+1
AQF 221	Principles of Aquaculture	1+1
LFP 221	Livestock Farm Practice II (Non-credit)	
	Total	**16+9**

5th Semester

Course Code	Name of the subject	Credit Hours
VPT 311	Veterinary Chemotherapy	2+1
VPY311	Physiology IV	1+1
VPH 311	Environmental Hygiene	1+1
ANU 311	Applied Human Nutrition	2+0
VMI 311	Microbiology III	2+1
VPA 311	Parasitology III	2+1

EXT 311	Extension Techniques in Veterinary Practices and Livestock Production	1+1
VPP 311	Special Pathology I	2+1
LPT 311	Abattoir Practices and Animal Product Technology	1+1
	Total	**14 + 8**

6th Semester

Course Code	Name of the subject	Credit Hours
BCH 321	Clinical Biochemistry	1+1
VPH 321	Veterinary Epidemiology	2+1
VPA 321	Veterinary Protozoology	2+1
VMI 321	Microbiology IV	2+1
VPP 321	Special Pathology II	2+1
VOG 321	Theriogenology I	2+1
VMC 321	Internal Medicine I	2+1
VCS 321	Veterinary Clinical Service I	0+1
VPT 321	Veterinary Toxicology	2+1
	Total	**15+9**

7th Semester

Course Code	Name of the subject	Credit Hours
VOG 411	Theriogenology II	2+1
VSR 411	Anaesthesiology	1+1
VSR 412	General Surgery	2+1
VMC 411	Internal Medicine II	2+1
VMC 412	Preventive Medicine I	2+1
VCS 411	Veterinary Clinical Service II	0+2
AQF 411	Fish Diseases	2+1
LPT 411	Milk and Milk Product Technology	1+1
VPH 411	Milk and Meat Hygiene, Food Safety and Public Health	2+1
	Total	**14+10**

8th Semester

Course Code	Name of the subject	Credit Hours
LPT 421	Meat and Meat Products Technology	1+1
VOG 421	Theriogenology III	2+1
VSR 421	Radiology and Diagnostic Imaging	1+1
VSR 422	Regional and Clinical Surgery I	2+1
VMC 421	Preventive Medicine II	2+1
VMC 422	Ethics and Jurisprudence	1+0
VCS 421	Veterinary Clinical Service III	0+2
BCH 421	Molecular Biology and Biotechnology	2+1
AEC 421	Agriculture Marketing and Cooperatives	2+0
	Total	**13+8**

9th Semester

Course Code	Name of the subject	Credit Hours
VPH 511	Zoonosis and Public Health	1+1
ANB 511	Livestock and Poultry Breeding	2+1
VOG 511	Theriogenology IV	1+1
VSR 511	Regional and Clinical Surgery II	2+1
VMC 511	Animal Welfare	1+0
VCS 511	Veterinary Clinical Service IV	0+2
VMC 512	Wildlife, Pet and Lab Animal Medicine	1+1
EXT 511	Social Mobilization and Community Development	2+1
LPM 511	Wildlife Production and Management	1+1
VCS512	Veterinarian in Society	1+0
	Total	**12+9**

10th Semester

Internship (Six months) non-credit

Total Credit Hours in B.V.Sc. & A.H. Program 125+81=206

Department Wise Credit Hour

Department	Code	Credit Hour		
		Theory	Practical	Total
Department wise course				
Anatomy	VAN	7	8	15
Bio stat	AST	2	1	3
Livestock Production and Management	LPM	9	6	15
Animal Nutrition	ANU	8	5	13
Agricultural Economics	AEC	4	1	5
Biochemistry	BCH	7	4	11
Agricultural Extension	EXT	4	3	7
Physiology	VPY	7	4	11
Parasitology	VPA	7	4	11
Pathology	VPP	8	4	12
Microbiology	VMI	8	4	12
Aquaculture	AQF	4	3	7
Animal Breeding	ANB	6	2	8
Pharmacology	VPT	8	4	12
Veterinary Public Health	VPH	6	4	10
Animal Product Technology	LPT	3	3	6
Theriogenology	VOG	7	4	11
Medicine	VMC	11	5	16
Clinical Service	VCS	1	7	8
Surgery	VSR	8	5	13
Total		**125**	**81**	**206**
Noncredit courses				
Livestock Farm Practice	LFP			
Internship (Six Months)				

2. Semester-wise Description of Lectures

First Semester Courses

Course Code: VAN 111
Course Title: Gross Anatomy I (Osteology, Arthrology and Biomechanics)
Credit Hours: 3 (1+2) Full Marks: 75 Theory: 25 Practical: 50

Objective

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 identify different bones, joints with their kinetics of locomotion.

Syllabus

It covers the definition of the terms used in veterinary anatomy in general and osteology, arthrology and biomechanics in particular. Osteology covers the terms used in veterinary anatomy, classification and details study of different animals ; Arthrology covers the classification, dissection and description of different types of joints of different animals and Biomechanics covers its application and kinetics of locomotion.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Definition of the terms used in veterinary anatomy and osteology	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:	
	Thoracic girdle (Shoulder)/pectoral girdle, humerus,	1
	Radius/ulna, carpus,	1
	Metacarpus, and digits	1

	(b) Bones of the pelvic limb or hind limb:	
	Pelvic girdle	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.N.	Topic	No. of Practical
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 or fore limb:	
	Thoracic Girdle (Shoulder)/Pectoral Girdle,	1
	Humerus,	1
	Radius/ulna,	1
	Carpus,	1
	Metacarpus,	1
	Digits.	1
	(b) Bones of the pelvic limb or hind limb:	
	Pelvic girdle,	1
	Femur,	1
	Tibia / fibula, patella,	1
	Tarsus,	1
	Metatarsus,	1
	Digits	1
	B. Axial Skeleton	
	Skull,	2
	Cervical vertebra,	1
	Thoracic 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
	Neck,	1
	Trunk,	1
	Tail,	1
	Thorax,	1
	Fore limb,	1
	Hind limb,	1
	Vertebral column	1
3.	Biomechanics and kinetics of locomotion.	1
	Total	**30**

Reference

Dyce, K.M., W.O. Sack and C.J.G. Wensing 1996. Text Book of Veterinary Anatomy, 2nd Edition, W.B. Saunders Company

Sisson, S. and J.D. Grossman 1977. The Anatomy of the Domestic Animals. Vol. 1 & 2 (5th edition), MacMillan, India.

Drake, R., A.W. Vogl, A.W.M. Mitchell, R. Tibbitts and P. Richardson. 2020. Gray's Atlas of Anatomy, 3rd edition.

Orsini, J.A., N.S. Grenagar and A. Lahunta. 2021. Comparative Veterinary Anatomy: A Clinical Approach.

Bhamburkar, R.V. 2018. Veterinary Anatomy: The Regional Gross Anatomy of Domestic Animals.

Course Code: VAN 112

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

Objective

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

Syllabus

Myology includes the structural and functional classification of muscles of different body parts of different species of animals. Neurology includes the study of central, peripheral and autonomic nervous system of different domestic animals. Angiology consists of the study of gross morphology and demonstration of heart, blood and lymphatic vessels in different species of animals. Aesthesiology includes the gross morphological and comparative study of the eye, ear, nose, hoof, horn and skin in Ox/Buffalo.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Introduction and classification of muscle	1
2.	Gross study of different muscles of	
	Head,	1
	Neck,	1
	Thorax,	1
	Abdomen,	1
	Pelvis,	1
	Tail,	1
	Fore limb, and	1
	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
	Forelimb,	1
	Hind limb	1
	Systemic and fetal circulation, &	1
	Hepato-portal and Lymph circulation.	1
6.	Gross study of sense organs and common integuments	
	Eye,	1
	Ear,	1
	Nose,	1
	Tongue,	1
	Skin,	1
	Horn and Hoof.	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	Dissection of muscles of all body regions of bovine, their location, and comparison with other species.	
	Muscles of Head,	2
	Neck,	2
	Thorax,	2
	Abdomen,	1
	Pelvis,	1
	Tail,	1
	Fore limb,	2
	Hind limb	2
2.	Dissection and study of brain, spinal cord, spinal nerve and major nerve trunks 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
	Fore limb,	1
	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, 2nd Edition, W.B. Saunders Company

McLeod, W.M. 1964. Bovine Anatomy, 2nd Edition, Burger Publishing Company.

Sisson, S. and J.D. Grossman 1977. The Anatomy of the Domestic Animals. Vol. I & II, 5th Edition, MacMillan, India.

Drake, R., A.W. Vogl, A.W.M. Mitchell, R. Tibbitts and P. Richardson. 2020. Gray's Atlas of Anatomy, 3rd edition.

Bhamburkar, R.V. 2018. Veterinary Anatomy: The Regional Gross Anatomy of Domestic Animals.

Course Code: BCH 111
Course Title: Veterinary Biochemistry
Credit Hours: 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

The main objective of this course is to teach the students about the biochemical composition of prokaryotic and eukaryotic cells, biomolecules and their functions with respect to animal and veterinary sciences.

Syllabus

Introduction of biochemistry, bacterial cell wall and bacterial enzymes. Biochemical properties of aqueous system. Biochemistry of carbohydrates, lipids, proteins and nucleic acids. Biochemistry of vitamins, enzymes, hormones and snake and insect poisoning. Biochemical techniques.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Introduction of biochemistry and its scope with respect to veterinary science.	1
2.	Structure, functions, and composition of bacterial cell wall, related enzymes of cell organelles, 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 fat soluble 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 centrifugation, spectrophotometry, chromatography and electrophoresis).	3
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	Introduction and uses of laboratory equipment 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, electrophoresis)	3
	Total	**15**

References

Lehninger, D.L. N., and M.Cox Michael. Lehninger Principle of Biochemistry (Latest Edition). MacMillan worth Publisher.

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

Nelson, D.L. and M.M. Cox. 2021. Lehninger Principles of Biochemistry, 8th edition.

Voet, D., J.G. Voet and C.W. Pratt. 2016. Fundamentals of Biochemistry: Life at the Molecular level, 5th edition.

Abali, E.E., S.D. Cline, D.S. Franklin and S.M. Viselli. 2021. Lippincott Illustrated Reviews: Biochemistry, 8th edition.

Course Code: LPM 111
Course Title: Ruminant Production and Management
Credit Hours: 3(2+1) Full Marks : 75 Theory : 50 Practical : 25

Objective

Upon the successful completion of the 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 of dairy animals.

Course Breakdown
Theory

S. N.	Topic	No. of Lectures
1	Introduction	
	Historical background of ruminant production	1
	Future scope, importance and present situation of ruminant and their production	2
	Terminology, zoological classification and constraints of ruminants' production in Nepal.	2

2	Breeds and their characteristics Cattle breeds and their characteristics Jersey, Holstein Friesian, Brown Swiss, Ayrshire Hariyana, Sahiwal, Red Sindhi, Siri, Achhame, Yak, Nak and Chauri Buffalo breeds and their characteristics Murrah, Surti, Jaffarabadi, Nili-rabi, Lime, Parkote and Gaddi Sheep breeds and their characteristics Merino, Rambouillet, Romney, Suffolk, Damascus Bhyanglung, Kage, Baruwal, Lampuchhre Goat breeds and their characteristics Barbari, Beetle, Jamunapari, Kasmiri, Khari, Singhal, Chyangra and Anglo-nubion	 2 2 2 2 3
3.	Housing a. Selection of site for establishing new livestock farm b. Housing system for cattle and buffalo. Merits and demerits of housing system Provision of housing system Building requirements and housing for sheep and goat	 1 2
4.	Care and management Care and management of pregnant cattle/buffalo/sheep/goat Care and management of animal during giving birth Management of newly born calf Weaning and raising young calf artificially Management of lactating cow/buffalo Dry cow/buffalo management Heifer management Managing lambs/kids from weaning to market Bull and buck management Use of draft animals in Nepalese agriculture system	6
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. N.	Topic	No. of Practical
1	A visit to IAAS livestock farm	1
2	Identification and study of lab equipments	1
3	Identification of farm animals a. **Tagging** **b. Branding** **c. Tattooing etc**	2
4	Castration Bloodless method 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	1
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, India.

Jagdish Prasad, 2004. Principle and Practices of Dairy Farm Management. Kalyani Publishers NewDelhi, India.

Jagdish Prasad, 2001. Animal Husbandry and Dairy Science. Kalyani Publishers, NewDelhi, India.

Course Code: ANU 111
Course Title: Principles of Animal Nutrition
Credit Hours: 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives

Upon the completion of the course, students will be able to understand the basic principles of animal nutrition. They will also be able to recognize the functions and deficiency symptoms of nutrients.

Syllabus

Role of Animals nutrition in animal husbandry and its scope in Nepal. Comparative composition of plant and animal cells and tissues. Feed stuffs and their nutrition content with utilization characteristics. Functions and classification of carbohydrates, proteins, lipids and fats. Functions of water in animal body. Characteristics and nutritional importance of minerals, vitamins and feed additives. Digestion, absorption and metabolism of various nutrients in ruminants, non ruminants and birds. Feeding standard in different species and age group of animals.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Introduction of animal nutrition and its role in animal husbandry.	1
2.	Comparative composition of plant and animal cells and tissues.	1
3.	Feed stuff and feed ingredients with nutrient contents, utilization and characteristics of energy rich feed ingredients.	1
4.	Protein rich feed ingredients.	1
5.	Functions of water in animal body	1
6.	Classification, functions and feed sources of protein	1
7.	Classification, functions and feed sources of carbohydrates	1
8.	Classification, functions and feed sources of lipid.	1
9.	Functions, deficiency symptoms and requirement of macro minerals.	1
10.	Functions, deficiency symptoms and requirement of micro minerals.	1
11.	Functions, deficiency symptoms and requirement of water soluble vitamins.	1
12.	Functions, 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.N.	Topic	No. of Practical
1.	Sampling of feed ingredients for proximate analysis	1
2.	Identification of energy rich feed ingredients.	1
3.	Identification of protein rich feed ingredients.	1
4.	Preparation of standard solution for 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.	Distillation 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 sheep and goat.	1
15.	Feeding standard for pig and poultry.	1
	Total	**15**

References

Banerjee, G.C 1984 A Text Book of Animal husbandry: published by Mohan primalani, oxford and IBH publishing company Pvt. Ltd.

Banerjee, G.C 1986 A Text Book of Animals Nutrition. Oxford and IBH publishing company Pvt. Ltd.

Morision, F.B 1984. Feeds and feeding. CBS publishers and distributors, Jain Bhawan, Bhola Nath Nagar, New Delhi, India.

Ranjhan, S.K. 1993. Animal's nutrition and feeding Practice in India, Vikash publishing house. Pvt. Ltd, India.

Course Code: AEC 111
Course Title: Farm Management and Production Economics
Credit Hours: 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

Upon the completion of this course, the 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 measures. Risk and uncertainty management. Linear programming: concept and approach.

Course Breakdown
Theory

S.N.	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 firms in Nepal	1
3.	Management of farm resources- a. land, labour, b. machinery & equipment 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- a. Variable proportion, factor substitution, cost principle, equi-marginal return, b. Opportunity cost principle, time comparison and comparative advantage principle	4

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	1
13.	Risk and uncertainty- concept, types, safeguards and measures	2
14.	Linear programming- concept and approach	2
	Total	**30**

Practical

S.N.	Topic	No. of Practical
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.

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: LPM 112
Course Title: Animal Housing and Sanitation
Credit Hours: 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objectives

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

Syllabus

Housing of Animals: Design and construction of buildings for housing animals and poultry. Site selection, and use of local construction materials, conventional housing system, tail to tail and head to head systems. Poultry housing, deep, litter, cage, battery branding. Housing of small ruminants and swine. Water supply, functions, deficiency symptoms, sources, quality and mean of pollution and purification of water resources 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.N.	Topic	No. of Lectures
1.	Housing: Type of housing for farm animals and poultry	1
2.	Selection of site	1
3	Types 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: Importance and major functions of water	1
12.	Requirements of water for various species of farm animals and poultry birds	1
13.	Sanitation: Drainage, disposal of cow dung, urine and farm animals washings	1
14.	Ventilation: Importance, types and requirements	1
15.	Diseases associated with water, poor housing and ventilation.	1
	Total	**15**

Practical

S.N.	Topic	No. of Practical
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.

Second Semester Courses

Course Code: EXT 121

Course Title: Sociology and Principles of Vet and AH Extension
Credit Hours: 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objective

The main objective of this course is to develop student's understanding of the sociological concepts, and their contribution and application in veterinary and animal husbandry development and in the field of animal husbandry extension system.

Syllabus

Sociology- concept and importance of study of sociology for veterinary extension workers, 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; program planning; livestock marketing extension; sharing and linkage with actors and their relationship to animal husbandry extension.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Introduction to sociology Definition of Sociology, Nature and importance of sociology for veterinary extension worker	2
2.	Relationship of sociology with other social sciences- Rural sociology as Applied to extension education Primary concepts of rural sociology Social group organization Social stratification.	2
3.	Leaders and leadership Cultural factors in society Social norms, value and belief system. Social institutions, function and interrelationship	2
4.	Social problems and social control Social process Social change	1
5.	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	
6.	Extension teaching methods focusing to livestock husbandry Individual teaching method Group teaching method Mass teaching methods	1
7.	Communication to innovation Types of communication The communication process Adoption process Adopters' categories	2
8.	Programme planning and development Principles of program planning Abilities needed in extension personnel	1
9.	Livestock marketing extension The role of livestock in development paradigm Types of farming and system of farming Livestock products' marketing extension	2
	Total	**15**

Practicals

S.N.	Topic	No. of Practical
1.	Visit of a rural community with livestock as a dominating occupation	1
2.	Study about livestock rearing pattern of a society	2
3.	Preparation of individual farm level production plan in livestock production	1
4.	Interaction meeting/visit with VHLSEC and study their planning process and plan of work and calendar of operation and organizational mechanism	1
5.	Assessing the livestock-human relation, sentiments, etc	1
6.	Study of the methods of working through functional leaders in a community	2
7.	Identify social research issue focusing to livestock husbandry and veterinary practices	1
8.	Questionnaire design: types and process	1
9.	Data collection, 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, India

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

Course Code : LPM 122

Course Title : Introduction to Dairy Science

Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

Upon completion of the course students will be able to different the milk constituents and get acquaintance with milk and its properties, milking methods, dairy microbiology, mammary gland and milk letdown process.

Syllabus

Introduction: Dairying in Nepal, its scope and comparison with developed countries. Milk: definition of milk and diagrammatic representation of milk constituents, composition of milk, factors affecting the composition, nutritive values and physical and chemical properties of milk, Physiology of lactation: Mammary of milking, clean milk production, importance and factors affecting the clean milk production. Flavor defects in milk. Dairy microbiology. Types of M.O. their sources of contamination, uses and significance of M.O. in dairy industry. Probiotic bacteria and their importance in human health and importance of biotechnology for increasing the milk yield.

Course Breakdown

Theory

S. N.	Topic	No. of Lectures
1.	Introduction to course outlines and evaluation system.	1
2.	Dairying in Nepal, its scope and comparison with developed countries.	2
3.	Definition of milk and diagrammatic representation of milk constituents.	1
4.	Composition of milk e.g. fat and lactose.	1
5.	Composition of milk e.g. protein.	1
6.	Composition of milk e.g. minerals and enzymes.	1
7.	Composition of milk e.g. vitamins.	1
8.	Nutritive value of milk.	1
9.	Physical and chemical properties of milk.	1
10.	Factors affecting the composition of milk.	2
11.	Importance of organic milk production.	1
12.	Anatomical structure of mammary gland.	1

13.	External and internal features of mammary gland.	1
14.	Physiology of lactation and lactogenesis.	1
15.	Hormones related to mammary growth and development.	1
16.	Biosynthesis of milk and its constituents.	2
17.	Methods milking e.g. hand milking and machine milking in brief.	1
18.	Clean milk production, importance and factors affecting the clean milk production.	2
19.	Flavors and off-flavors of milk.	1
20.	Flavor defects in milk and their causes and prevention measures in brief.	1
21.	Introduction to dairy microbiology and types of M.O. found in milk.	1
22.	Sources of contamination, uses and significance of micro-organism in dairy industry.	1
23.	Probiotic bacteria and their importance in human health.	2
24.	Importance of biotechnology for increasing the milk yield.	2
	Total	**30**

Practicals

S. N.	Topic	No. of Practical
1.	Study of commonly used dairy equipments in lab.	1
2.	Study of milk sampling procedures	1
3.	Sediment test by using disc and sediment tester	1
4.	Study of COB and ethyl alcohol test (ethanol) for checking suitability of the milk for further processing.	1
5.	Estimation of SP. gr. SNF and T.S. in milk by using milk lactometer.	1
6.	Estimation of fat by Gerber's method	1
7.	Study of MBR test for assessing microbiological quality	1
8.	Estimation of titratable acidity of milk by titration method.	1
9.	Study of mammary gland and physiology of lactation.	1
10.	Study of different milking methods, performed at dairy farm.	1
11.	Study of preparation of media, diluents and chemicals for estimation of bacteria.	1
12.	Estimation of total bacterial counts in milk, using SPC method.	1
13.	Determination of mastitis using CMT paddle.	1
14.	Estimation of Lactic acid bacteria from yoghurt or milk.	2
	Total	**15**

References

Clarence, H.E., W.B. Combs and H. Macy. 1994. Milk and milk products. TATA, McGraw-Hill Publishing Company Ltd, India.

Prasad, J. 1997. Animal husbandry and dairy science. Kalyani Publishers, Inida.

Sukumar, De. 2000. Outlines of dairy technology. By Oxford University Press. New Delhi, India.

Chandan, R.C. and Arun, K., 2013, Manufacturing yoghurt and Fermented Milk, 2 nd edition, Willey-Blackwell Publication, USA.

Course Code: VAN 121

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

Objective

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

Introduction to animal cell and types of tissues. Histology and development of different systems- digestive, respiratory, cardiovascular, urinary, reproductive, nervous, endocrine and special sense organs.

Course Breakdown

Theory

S.N.	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.	Fetal membranes and placenta	1
7.	Development of digestive and respiratory system	1
8.	Development of cardiovascular system	1
9.	Development of urogenital 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.N.	Topic	No. of Practical
1.	Study of compound microscope and its parts	1
2.	Histological techniques	2
3.	Study of blood cells	1
4.	Microscopic study of epithelial and connective tissues	2
5.	Microscopic study of muscular and nervous tissues	2
6.	Microscopic study of sperm and ovum of mammals	2
7.	Study of fertilized and unfertilized eggs of fowl	2
8.	Study of serial sections of chicks at different stages of development	2

9.	Microscopic study of digestive system	2
10.	Microscopic study of respiratory system	2
11.	Microscopic study of cardiovascular system	1
12.	Microscopic study of urinary system	2
13	Microscopic study of male reproductive system	1
14..	Microscopic study of female reproductive system	2
15.	Microscopic study of nervous system	1
16.	Microscopic study of endocrine system	2
17.	Microscopic study of lymphoid system	2
18.	Microscopic study of sense organs	1
	Total	**30**

References :

Ghosh, R.K. 2013. Essentials of Veterinary Histology and Embryology, 2nd edition.

Low, P., K. Molnar and G. Kriska. 2016. Atlas of Animal Anatomy and Histology.

Liebich, H. 2019. Veterinary Histology of Domestic Animals and Birds: Textbook and Colour Atlas, 5th edition.

Sinowatz, F. 2009. Essentials of Domestic Animals Embryology.

Sadler, T.W. 2018. Langman's Medical Embryology, 14th edition.

Course Code: ANU 121

Course Title: Fodder Production and Pasture Management
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practical : 25

Objective

The main objectives of this course is to provide basic knowledge on principal and practices of fodder production including cultivation practices; pasture species establishment and their management considering its practical application for feeding livestock.

Syllabus

Terminology of fodder and pastures. Climate and soil type. Factors affecting chemical composition and nutritive value of fodder. 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 grasses. 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.N.	Topic	No. of Lectures
1.	Introduction: feeds and feeding situation in Nepal. Common terminology of folder and pasture.	1
2.	Edaphic factors affecting pasture and fodder crops	
	Climate and its variation	1
	Soil types	1
	Factors associated with fodder production	
	Chemical composition and nutritive value	1
	Species and varietal differences	1
3.	Fodder plant growth, development and yield	1
	Morphology of forage grasses: vegetative grass tiller and reproductive growth in forage grasses	1

4.	Principle of grass seed production Reproductive development Component of seed yield and Actual seed yield	1
5.	Cultivation Practices of common annual and perennial fodder /grasses and legumes.	
	Oats	1
	Jawar, Bajra	1
	Teosinte, Maize	1
	Napier, Blue Panic	1
	Siratro, Centrosema	1
	Molasses, Mulato	1
	Berseem, Lucern	1
	Joint vetch, Desmodium	1
	Stylosanthes, Forage Peanut	1
	Butterfly pen, Glycine	1
6.	Cultivation, establishment and yield of common pasture species: Perennial ryegrass, cocksfoot	
	Tall fescue, Phalaris	1
	White clover	1
	Red clover, Lotus	1
		1
7.	Pasture establishment: seed quality, sowing, soil environment	1
	Cultivated seed beds and management of pasture	1
	Nutrition of grazing animal, nutritive value of pasture, herbage intake and composition	1
8.	Pasture and soil fertility	
	Nutrient cycling, pasture growth and fertilizer	1
	N-fixation and grass/legume balance	1
9.	Preservation and conservation of fodder /forage	
	Hay making, steps, advantages and disadvantages	1
	Silage making process, steps, advantages and Limitations	1
10.	Silvi-pastoral system, concept and importance	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	Common features used in identifying grasses	1
2.	Identification of seasonal fodders (grasses and legumes) at IAAS and vicinity	1
3.	Identification of common pasture grasses	1
4.	Identification of common pasture legumes	1
5.	Identification of fodder trees and tree fodder	1
6.	Preparation of herbarium sheet	1
7.	Cultivation of seasonal fodder covering winter and summer	2
8.	Forage fodder sampling	2
9.	Proximate analysis	3
10.	Determination of green and dry matter yield	1
11.	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. India.

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

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 Research. Birmensdrof, Switzerland.

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

Course Code: VPY 121

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

Objective

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

Syllabus

Introduction types of muscle and its contraction. Rigor mortis and fatigue. Composition of muscle, and its physiological properties. Blood, blood volume, haemograph, erythrocyte, origin, maturation, fate, hemoglobin and its metabolism, anemia, 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. N.	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. Rigor mortis and fatigue of muscle	2
3.	Composition and physiological properties of muscle	1

4.	General functions of blood, blood cells, plasma and serum, anticoagulant, blood volume estimation, hemograph	2
5.	Erythrocytes formation, maturation and fate. Life span of RBC and its fragibility	1
6.	Chemical structure of hemoglobin, its synthesis, catabolism, absorption and anemia	1
7.	Formation of leucocytes and their classification and role of leucocytes in immunity	2
8.	Thrombocytes formation, maturation and fate and its role in blood coagulation.	1
9.	Chemical composition of blood plasma and its protein	1
10.	Composition of lymph and its flow. Cerebrospinal fluid and synovial fluid	1
11.	Heart structure, phenomenon of conduction, cardiac cycle and electrocardiogram	2
12	Normal heart beat and sound, cardiac output and its variation, coronary circulation	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 transportation by blood and gases exchange in lungs and tissues	1
22	Regulation of respiration, respiration center 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. N.	Topic	No. of Practical
1.	Collection of blood samples from various animals and birds, Separation of serum and plasma	1
2.	Separation of serum and plasma	1
3.	Enumeration of erythrocytes, leucocytes, differential leucocyte count, platelets count	2
4.	Erythrocyte sedimentation rate, hematocrit, packed cell volume, Estimation of haemoglobin	2
5.	Blood coagulation time and bleeding time	1
6.	Blood grouping	1
7.	Recording of normal heartbeat of frog	2
8.	Demonstration of effect of temperature (heat and cold) and drugs on heart	1
9.	Demonstration of ECG in various farm animals	3
10.	Recording of respiratory movement and estimation of lung volume	1
	Total	**15**

References

Klein, B. 2019. Cunningham's Textbook of Veterinary Physiology, 6th edition.

Sparks, S. 2020. Textbook of Veterinary Anatomy and Physiology: Basic Guide.

Rutland, C.S. (Editor). 2019. Veterinary Anatomy and Physiology.

Fails, A.D. and C. Magee. 2018. Anatomy and Physiology of Farm Animals, 8th edition.

Aspinall, V. and M. Cappello. 2019. Introduction to Animal and Veterinary Anatomy and Physiology, 4th edition.

Course Code: LPM 121

Course Title: Non- ruminant Production (Pig and Poultry)
Credit Hours: 3 (2+1) Full Marks : 75 Theory : 50 Practical: 25

Objective

Upon 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 indigenous and exotic breeds of pig and poultry. Care, management and feeding of different age groups of pig and poultry. Housing, feeding and management of pig and poultry. Egg formation, selection of eggs for incubation. Factors affecting hatching. Brooding methods. Selection and grading of egg. Vaccination, debeaking, candling and sexing. Selection and culling of layers. Maintenance of bio-security in a commercial farm.

Course Breakdown

Theory

S. N.	Topic	No. of Lectures
1	Introduction and terminology related to pig and poultry	1
2	Present status and importance of pig and poultry industry in Nepal	2
3	Care and management of newborn 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, and 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 broilers)	3
6	Breeds of pig (Nepali local and exotic; Berkshire, Yorkshire, Duroc Jersey, Hampshire, Landrace, Tamworth)	3
7	Brooding and rearing of chicks: System of brooding (advantages and disadvantages); management of chicks in brooder	2

8	Care of chicks during summer; effect of summer heat; physiological mechanism by which chicken adjust rising temperature, Effective managemental practices (Housing, water management feed and nutrition, medication and other managerial practices)	1
9	Care of chicken during monsoon; maintenance of poultry house, feed storage, improvement of water quality, poultry excreta	1
10	Formation, structure, food value, and chemical composition of eggs.	2
11	Collection, handling, grading and egg quality parameters	3
12	Hatching of egg (selection and care of good hatching egg, abnormal egg). Methods of hatching; natural and artificial; advantage and disadvantage. Factors affecting hatching. Management of incubator during incubation.	2
13	Selection and culling of chickens: The points to 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 biosecurity in a commercial farm	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1	Study of the external body parts of pig and poultry	1
2	Tagging and ear notching in pig	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 of poultry	2
7	Study of pig and poultry farm record	1
8	Vaccination of poultry	1
9	Study of housing of 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, New Delhi, Hyderabad, Chennai, Kolkata

Panda, P. C. 1995. Text Book on Egg and Poultry Technology. Vikas Publishing House Pvt Ltd 576, Masjid Road, Jangpura, New Delhi-110014

Course Code: BCH 121

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

Objective

The main objective of this course is to teach the students about the metabolism in systems related to animal physiology.

Syllabus

Classification, numbering and mechanism of action of enzymes. Different types of enzymes in biological system. Metabolism of fat, proteins and purines. Biosynthesis of DNA and RNA. Metabolic functions of macro and micronutrients, lipid and water soluble vitamins.

Course Breakdown

Theory

S.N.	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, enzymes and coenzymes involved in oxidation and reduction reactions	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**

Practical

S.N.	Topic	No. of Practical
1.	Introduction and uses of homogenizer, centrifugation, pH meter, rotary evaporator, spectrophotometer, micropipette, microfilter, lyophilizer etc.	1
2.	Determination of pH of biological fluids.	1
3.	Determination of 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 (14th edition). Tata Mc-Graw Hill Publishing Company Ltd., New Delhi.

Robert K. M, D. K. Granner, P.A. Mayes, V. W. Rodwell. 2003. Harper's Illustrated Biochemistry (26th edition). Lange Medical Books/McGraw-Hill.

Engelking, L.R. 2014. Textbook of Veterinary Physiological Chemistry, 3rd edition.

Course Code : AST 121
Course Title: Biostatistics for Veterinary and Animal science
Credit Hours: 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

Upon the completion of this course, the students will be able to plan, design, organize and analyze the data, and interpret the result confidently. They can also use some statistical software for analysis.

Syllabus

An overview of statistics, descriptive statistics, probability and probability distribution, sampling and sampling distribution, experimental design and clinical trials, test of significance, linear correlation and regression, multiple linear regression, multiple logistic regression, poisson regression, non-parametric statistical methods, Bayesian analysis, measuring agreement, survival analysis, multivariable analysis.

Course Breakdown

Theory

S.N.	Topic	No of Lectures
1	Introduction, definition, scope and limitation of statistics in veterinary and animal science	1
2	Descriptive statistics- 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), Dot diagram, Stem and leaf diagram, Box-and-whisker plot, Scatter diagram	2
3	Descriptive statistics -Measures of central tendency-Definition of arithmetic mean, median, geometric mean and mode with merits, demerits and uses, properties of an ideal measure of central tendency	2
4	Measures of dispersion (spread)- range, interquartile range, variance standard deviation, Coefficient of variation. Moments- Measures of skewness and kurtosis and reference interval	2
5	Probability –relevance of probability to statistics, Definitions of probability, properties of probability, rules of probability	2
6	Probability distributions- Discrete probability distribution-definition, Binomial distribution, Poisson distribution and its properties and problems. Continuous probability distribution- relationship between discrete and continuous probability distributions, probability density function, Normal or Gaussian distribution with its properties and problems. Sampling distributions of mean and differences, students't-distribution, chi-square distribution and F-distribution, relationship between distributions	2

7.	Experimental design – observational and experimental study, cross-sectional and longitudinal study	1
8.	Experimental design- cohort and case-control study	1
9.	Clinical trials- importance of design, control group, assignment of animal to group, randomization, avoidance of bias, precision of estimate, confounding and interaction, protocol, outliers, missing data, analysis by intention to treat, pilot study and cross-over trials.	2
10.	Hypothesis testing – introduction, definition of hypothesis, null and alternative hypotheses, degrees of freedom, levels of significance and types of error (type I and type II), distinction between statistical and biological significance, confidence interval approaches to hypothesis testing, equivalence and non-inferiority study	2
11.	Hypothesis test: t- test: comparing one or two means-one sample t-test, two sample t- test, and paired t- test.	1
12.	Hypothesis test: F-test: comparing two variance or more than two means- The F-test for the quality of two variances, Levene's test for equality of two or more variances, Analysis of variance (ANOVA) for the equality of variance, one way analysis of variance.	2
13.	Hypothesis test: chi-squared test: comparing proportions- single proportion, comparing two proportion of independent group, testing association in an r*c contingency table, comparing two proportions-paired observation and Chi-squared goodness-of-fit.	1 2
14.	Correlation – Definition, types of correlation, scatter diagram, Karl Pearson's coefficient of correlation (linear correlation) and properties.	1
15.	Regression (linear), Regression equations of y on x and of x on y. Relation between correlation coefficient and regression coefficients simple (univariable) linear regression, regression to mean.	1
16.	Multiple linear regressions, multiple logistic regressions-a binary response variable, poison regression.	1
17.	Non-parametric statistical methods- parametric vs nonparametric, sign test, Wilcoxon signed rank test, Wilcoxon rank sum test, non-parametric analysis of variance, spearman's rank correlation coefficient.	2
18.	Elements of vital statistics: Rate & Ratio-mortality, fertility, incidence & prevalence rates. Standardized rates	2
	Total	**30**

Practical

S.N.	Topic	No of Practical
1.	Descriptive statistics – basic calculations: arithmetic mean, median, mode, range, variance, standard deviation, coefficient of variation (examples).	1
2.	Statistical tools in MS Excel. Data files processing: basic statistic parameters. Examples	1
3.	Statistical testing: Tests for Variance hypotheses (F-test). Examples	1
4.	Revision practice: Descriptive characteristics, Tests for variance hypotheses. Examples.	1
5.	Parametric tests (Student´s *t*-test, F-test). Examples	1
6.	MS Excel - Data files processing: F-test, Student's t-test. Graphical presentation of data.	1
7.	Parametric tests in MS Excel (F-test, t-test) – practical examples.	1
8.	MS Excel- Statistical data files processing: basic statistic parameters, F-test, Student's t-test. Individual practice (Model examples I).	1
9.	MS Excel – Statistical data files processing: correlation and regression analysis. Model examples.	1
10.	Model situations in veterinary medicine: F-test, t-test - individual practice (Model examples II – MS Excel).	1
	Chi-Square analysis with examples	
11.	Hands on practice with SPSS software with animal experimental trial examples	1
12.		1
13.	Test of hypothesis in assumed data	1
14.	Design of experiments for large animals	1
15.	Design of experiments for small animals	1
	Design of experiments for birds/poultry	
	Total	**15**

References

Srininasan, P.V. 2006. Veterinary biostatistics, International Book Distributing Company, Lukhnow, India.

Petrie, A. and Watson P. 2013. Statistics for veterinary and animal science (3rd edition.), Willey and Blackwell, UK.

Agrawal, B.L. 1996. Basic Statistics (3rd Edition), New Age International Pvt. Ltd. New Delhi. Chandel, S. R.S. 1984. A hand Book of Agricultural Statistics, Achal Prakashan Mandir, Kanpur, India.

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

Rangaswamy, R. 2010. A Text Book of Agricultural Statistics. 2nd Edition. New Age Intl Publishers

Third Semester Courses

Course Code: VAN 211
Course Title: Splanchnology and Applied Anatomy
Credit Hours: 4 (2+2) Full Marks: 100 Theory: 50 Practical: 50

Objective

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

Syllabus

Splanchnology contains the gross morphological and topographical study of various organ systems; their dissection in ox/buffalo with their comparative anatomy in other species. Applied anatomy includes the different terminologies and anatomical methods applied to oesophagotomy, rumenotomy, gastrotomy, tracheotomy, cystotomy and urethrotomy, palpation of anatomical structures in the abdominal and perineal regions. Radiographic visualization of gross anatomical features of various regions of the body.

Course Breakdown

Theory

S.N.	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 and oesophagus	1
	Stomach (rumen, reticulum, omasum and abomasum)	1
	Small intestine (duodenum, jejunum and ileum)	1
	Large intestine (caecum, colon and rectum)	1
	Liver	1
	Pancreas	1
	Spleen	1
	Salivary gland	1
3.	Gross study of respiratory system and their comparison with other species	

	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 and 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 and vulva	1
	Mammary gland	1
7.	Gross study of endocrine system	
	Pituitary and adrenal	1
	Thyroid, parathyroid and pineal	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	Dissection and study of entire visceral organs	
	Study of organs of digestive system	2
	Study of organs of respiratory system	2
	Study of organs of urinary system	2
	Study of organs of male genital system	2
	Study of organs of female genital system	2
	Study of endocrine system	2
2.	Introduction and importance of applied anatomy	1
3.	Postmortem 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.	Comparative study of male and female genitalia of farm animals	2
7.	Study of location of visceral organs, peripheral lymph nodes, surface veins and palpable arteries	1
8.	Study of sites and tissues encountered during amputation of horn and tail	1
9.	Laparotomy, rumenotomy and gastrotomy,	2
10.	Tracheotomy and oesophagotomy,	2
11.	Cystotomy and urethrotomy	2
11.	Caesarian section, vasectomy and castration in cattle and other species	1
12.	Nerve block, extirpation of eyeball and medial patellar desmotomy	1
13.	Study of organs of various regions of body through radiography	1
14.	Study of developing organs of foetus of cow and other species	1
	Total	**30**

References

Bhardwaj, R.L., R. Rajput, and K.S. Roy. Applied Anatomy of Domestic Animals.

Dyce, K.M., W.O. Sack and C.J.G. Wensing 1996. Text Book of Veterinary Anatomy, 2nd Edition, W.B. Saunders Company

Sisson, S. and J.D. Grossman. 1975. The Anatomy of the Domestic Animals, Robert Getty, 1975. (Vol. 1 & 2), 5th Edition, W.B. Saunders Company Philadelphia, London, Toronto.

Orsini, J.A., N.S. Grenagar and A. Lahunta. 2021. Comparative Veterinary Anatomy: A Clinical Approach.

Bhamburkar, R.V. 2018. Veterinary Anatomy: The Regional Gross Anatomy of Domestic Animals.

Course Code: VPA 211

Course Title: **Parasitology I (General Parasitology and Cestode Parasites)**
Credit Hours: 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objective

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-terminologies, animal association and parasitism, Nomenclature; Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD). Classification of helminthes, characteristics of phylum (Platyhelminthes, Nemathelminthes and Acanthocephala). Salient morphological features of diagnostic importance; Life cycle of the cestode parasite in relation to transmission, pathogenesis, epidemiology, diagnosis. General control measures of following cestode parasites of animals, birds and fish.

Course Breakdown
Theory

S.N.	Topic	No. of Lectures
1.	Introduction (definition of parasitology, terms used in parasitology, short history of parasitology.)	1
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.	1
4.	Resistance of host to parasitic infection/infestation. Immunity against parasitic infections.	1
5.	Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD)	1
6.	Classification of helminths and characteristics of various Phyla: Protozoa, Platyhelminthes, Nemathelminthes, Acanthocephala, Annelida and Arthropoda	1
7.	Morphological features, modes of transmission, life cycle, pathogenesis, symptoms, diagnosis, treatment and control measures. Mesocestoides, Equine tapeworm (*Anoplocephala, Paranophlocephala*)	1
8.	Ruminant tapeworm (Avitellina, Stilesia, Moniezia)	2

9.	Dog tapeworm *(Dipylidium, Taenia hydatigena, Multiceps, Echinococcus*)	1
10.	Human tapeworm (*Taenia spp., Hymenolepis sp*.)	2
11.	Poultry tapeworm (*Davainea, Cotugnea, Railletina, Amoebotaenia*)	2
12.	Fish tapeworm (*Diphyllobothrium*)	1
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	Collection, fixation and preservation of cestode parasites and their larval stages	3
2.	Demonstration of lesion of the cestode or their larval stages caused by adult parasite and their larval stages	3
3.	Visit to slaughterhouse 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:

Zajac, A.M., G.A. Conboy, S.E. Little and M.V. Reichard. 2021. Veterinary Clinical Parasitology, 9th edition.

Mandal, S.C. 2013. Veterinary Parasitology: At a Glance, 2nd Revised and Enlarged Edition.

Bowman, D.D. 2020. Georgis Parasitology for Veterinarians, 11th edition.

Jacobs. D, M. Fox, L. Gibbons and C. Hermosilla. 2015. Principles of Veterinary Parasitology.

Taylor, M, B. Coop and R. Wall. 2015. Veterinary Parasitology, 4th edition.

Course Code : VPY 211

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

Objective

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

Digestive system: Functional anatomy, digestion and absorption. 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. N.	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	1
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	2
	Total	**30**

Practical

S. N.	Topic	No. of Practical
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

Klein, B. 2019. Cunningham's Textbook of Veterinary Physiology, 6th edition.

Sparks, S. 2020. Textbook of Veterinary Anatomy and Physiology: Basic Guide.

Rutland, C.S. (Editor). 2019. Veterinary Anatomy and Physiology.

Fails, A.D. and C. Magee. 2018. Anatomy and Physiology of Farm Animals, 8th edition.

Aspinall, V. and M. Cappello. 2019. Introduction to Animal and Veterinary Anatomy and Physiology, 4th edition.

Course Code: VPP 211

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

Objective

Upon completion of the course, student 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 terminologies.

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 effects, healing and tissue repair, including regeneration, wound healing and modification of the repair response. Immune mechanisms, immune-related diseases. Developmental disturbances and tumor.

Course Breakdown
Theory

S.N.	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, amyloidosis, crystal (oxalate, urates, uric acid, cholesterol clefts), exogenous pigments(anthracosis, silicosis and asbestosis)	1
12	Edema (types, causes and pathophysiology)	1
13	Hyperemia, 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 involved, 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, nomenclature 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, fusion of sex character and monster	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
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	Techniques of postmortem examination of large animals	1
8	Techniques of postmortem 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 inflammation	1
14	Study of histopathological slide showing chronic inflammation	1
15	Collection, preservation and dispatch of morbid animals	1
	Total	**15**

References

V.P. Studdert, C.C. Gay and K.W. Hinchcliff. 2021. Saunders comprehensive veterinary dictionary. Elsevier (5th Edition).

Kierszenbaum, 2007. Histology and Cell Biology - An Introduction to Pathology (5th edition).

Kumar, V., A. Abbas and J. Aster. 2020. Robbins & Cotran pathologic basis of disease. Elsevier (8th Edition).

Slauson and Cooper, 2002. Mechanisms of Disease *(3*rd edition).

Zachary & McGavin. 2017. Pathologic Basis of Veterinary Disease, (*6*th Ed).

Course Code: ANU 211

Course Title: Applied Animal Nutrition I (Ruminant)
Credit Hours: 2(1+1) Full Marks: 50 Theory: 25 Practical :25

Objective

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

Nutrient utilization in ruminants. Feed evaluation, feeding standards and feeding of livestock. Feeding during scarcity periods. Preparation of hay and silage.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Digestion, absorption and metabolism of nutrients in ruminants	2
2.	Feed evaluation: a. Measurement of digestibility, various methods of determining, Digestibility coefficient. In-vitro and in-vivo digestibility. Limitation of digestibility coefficient. Factors affecting digestibility coefficient. Determination of TDN and DCP b. Systems of expressing the energy and protein value of foods: Total digestibility, nutrients the stores equivalent; Partition of foods energy within the animals utilization of metabolization energy. Animals colorimetry: Methods for measuring heat production and energy retention.	2
3.	Feeding standards for maintenance and growth, reproduction, lactation and wool production. Various methods of feeding standards. NRC, ARC and Indian feeding standards.	2
4.	Feeding of dairy cattle and buffaloes, 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 hays, silages and treatments of inferior quality roughages.	3
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	Computation of ration for cattle, buffaloes and calves, sheep and goats.	3
2.	Methods of determining digestibility coefficients: 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 hay	1
9.	Preparation of silage	1
	Total	**15**

References

Ranjhan, S. K. 1993. Animal nutrition and feeding practices, Bikas 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.

Mc-Donald, 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: VMI 211
Course Title: **Microbiology I (General Veterinary Microbiology)**
Credit Hours: 3 (2+1) **Full Marks:** 75 **Theory**: 50 **Practical**: 25

Objective

Upon the completion of this course, students will be able to understand morphology, staining principles 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 with classification. Definition and general properties of bacteria. Methods and principles of sterilization and disinfection. History of virology. Definition, concepts on virus with classification and genetics. Definition and scope of molecular virology. Resistance to viral infection and immunity. Interference phenomenon and interferon. Viral vaccines and chemotherapy. Persistent viral infection and slow viruses.

Course Breakdown:
Theory

S.N.	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 & capsular staining	1
9.	Cultivation (aerobic & anaerobic) and 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 disinfection	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.N.	Topic	No. of Practical
1.	Identification to the laboratory instruments and equipments	1
2.	Introduction of lab and dos and don'ts in lab	1
3.	Microscopy and micrometry (sizes and shapes of microorganisms)	1
4.	Sterilization (Autoclaving, hot air oven, boiling, red hot) & disinfection	1
5.	Preparation of reagents and media plates (BHIA, MAC, and 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, 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**

Reference

Chakraborty, P. A. 2013. Textbook of Microbiology, 3rd edition. New Central Book Agency (P) Ltd. Kolkata, India.

Quinn, P. J., B.K. Markey, F.C. Leonard, E.S. Fitz Patrick and S. Fanning. 2016. Concise Review of Veterinary Microbiology, 2nd edition. Wiley Blackwell Publication. West Sussex, The UK.

McVey, D.S, M. Kennedy and M.M. Chengappa. 2013. Veterinary Microbiology, 3rd edition. Wiely Blackwell Publication. West Sussex, The UK.

Songer, J.G.and K.W. Post. 2004. Veterinary Microbiology; Bacterial and Fungal Agents of Animal Diseases.

Course Code : ANB 211

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

Objective

Upon the completion of this course, students will be able to understand basic principles and fundamentals of genetics and its application in animal breeding.

Syllabus

Study of chromosome, DNA, central dogma and gene expression. Mendelian genetics, population genetics and quantitative genetics. Different types of gene interaction. Selection and mating systems. Animal genetic resources of Nepal and their conservation.

Course Breakdown
Theory

S.N.	Topic	No. of Lectures
1.	Animal cell and cell division	2
2.	Gametogenesis	2
3.	Chromosomal study: karyotyping, chromosomal variation and abbreviation	3
4.	Mendelian genetics: experiment, principle 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-Weinberg law, causes of changing gene and genotype 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.N.	Topic	No. of Practical
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 dominance, Incomplete dominance, sex linked genes, 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

Chandar, N and S. Viselli. 2019. Cellular and Molecular Biology, 2nd edition.

Klug, W.S, M.R. Cummings, C.A. Spencer and M.A. Palladiono. 2016. Concepts of Genetics, 11th edition. Pearson Education, England.

Hartwell, L.H., M.L. Goldbery, J.A. Fisher and L. Hood. 2018. Genetics: From Genes to Genomes, 6th edition.

Nischoll, D.S.T. 2008. An Introduction to Genetic Engineering, 3rd edition. Cambridge University Press, The UK.

Snustad, D.P. and M.J. Simmons. 2012. Principles of Genetics. 6th edition. John Wiley and Sons Inc., USA.

Course Code: VPT 211

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

Objective

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

Syllabus

Introduction, history and scope of pharmacology. Pharmacokinetics and Pharmacodynamics. Drugs acting on digestive system, cardiovascular system, respiratory system, urogenital system and integumentary system. Drugs related to immunity. Hormones and vitamins

Course Breakdown
Theory

S. N.	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 –a. Routes of drug administration, absorption, distribution,	2
	b. Biotransformation and excretion of drugs	2
4	Pharmacodynamics-a. Concept of drug and receptor, dose-response relationship,	2
	b. Terms related to drug activity and factors modifying the drug effect and dosage	2
5	Fundamentals of drugs screening and assay of drugs	2
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: a. Stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics,	2
	Emetics, antiemetics, purgatives, antidiarrhoeals, cholerectics and cholagogues. Rumen pharmacology.	2
8	Drugs acting on cardiovascular system: a. cardiac glycosides, antiarrhythmic drugs, vasodilators and antihypertensive agents, b. haematinics, coagulants and anticoagulants.	2
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	2
13	Pharmacotherapeutics of hormones and vitamins	2
	Total	**30**

Practical

S. N.	Topic	No. of Practical
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	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.

Brunton, L., B. Knollmann and R. Hilal-Dandan. 2017. Goodman and Gilman's The Pharmacological Basis of Therapeutics, 13th edition.

Romich, J.A. 2020. Fundamentals of Pharmacology for Veterinary Technicians, 3rd edition.

Lullmann, H., K. Mohr and L. Hein. 2017. Color Atlas of Pharmacology, 5th edition.

Course Code : AQF 221
Course Title : Introductory Ichthyology
Credit Hour : 2 (1+1) Full Mark: 50 Theory: 25 Practical: 25

Objectives

Upon completion of the course, students will be able to explain types of fishes and their importance, understand their morphology, anatomy and physiology.

Syllabus

Introduction, definitions, economic importance, taxonomy of economically important fishes of Nepal, morphology, anatomy and physiology of different organ systems of fish.

Course Breakdwon

Theory

S.N.	Topic	No. of lecture
1.	Introduction	
1.1	Definition of fish and Ichthyology and other related terms	1
1.2	Economic importance of fish	1
2.	Taxonomy	
2.1	General characters and classification of pisces (Elasmobranchi, Holocephali, Dipnoi and Teleostomi)	1
2.2	Classification of fishes of Nepal (upto Order)	1
3.	Morphology	
3.1	External features of a typical fish (including general shape and size), structure and functions of skin	1
3.2	Structure and functions of scales, fins and lateral line system	1
4.	Anatomy and Physiology:	1
4.1	Study of location and functions of internal organs	
4.2	Structure and functions of different organ systems	
a	Digestive system: Structure & functions of alimentary canal, physiology of digestion	2
b	Respiratory system: Structure and function of gills; mechanism of Respiration; Accessory respiratory organs of fish	2
c	Circulatory system: structure and functions of heart	1

d	Nervous and endocrine systems: structure and functions of brain, hypothalamus, spinal cord & pituitary gland; endocrine functions of testis, ovary & pancreas	2
e	Reproductive system: structure and functions of gonads	1
	Total	**15**

Practical

S.N.	Topic	No. of practical
1	Study of external features of fish	1
2	Study of morphometric measurements and meristic counts of fish	1
3	Study and identification of fishes of Nepal (at least one from each Order)	2
4	Study of different types of scales of fish	1
5	Study and count of lateral line scales of fish	1
6	Study of different types of fins of fish	1
7	Study of Internal organs of fish	1
8	Study of alimentary canal and relative gut length (RGL) of fish	1
9	Study of gills of fish	1
10	Study of accessory respiratory organs of fish	1
11	Study of location and function of heart of fish	1
12	Study of location and function of brain of fish	1
13	Study of male and female reproductive organs of fish	1
14	Study of gonado-somatic index (GSI)	1
	Total	**15**

References

Brown, E.E. and J.B. Gratzek. 1980. Fish farming handbook. AVI publishing company Inc, Westport, Connecticut.

Evans, D.H. and J.B. Claiborne. 2006. The physiology of fishes. CRC Press. Jha, D.K. 1993. Laboratory manual of fish culture. IAAS, TU, Nepal.

Khanna, S.S. 2019. An introduction to fishes. Surjeet publication, India.

Khanna, S.S. and H.R. Singh. 2009. A textbook of fish biology and fisheries. Narendra Publishing House, India.

Kumar, S. and M. Timbhre. 1999. Anatomy and physiology of fishes. Bikas Pub. House Pvt. Ltd. New Delhi, India.

Pandit, N.P. 2015. Introductory ichthyology. NIMS Institute, Bharatpur, Chitwan, Nepal. Shrestha, J. 1981. Fishes of nepal. CDC, TU, Kathmandu, Nepal.

Srivastava, C.B.L. 1999. Fish biology. Narendra Publishing House, Delhi, India.

Course Code : LFP 211

Course Title : Livestock Farm Practice-I

Credit Hours : Non-credit

Hands on training of the students on the overall farm practice of livestock management including cleaning, feeding, watering, grooming, milking, routine health care, record keeping, sanitation, housing and fodder production.

These courses shall be noncredit courses, and the performance of students shall be assessed and recorded internally.

Fourth Semester Courses

Course Code : VPY 221

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

Objective

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

Syllabus

Endocrine system, Hormones, 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, 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. N.	**Topic**	**No. of Lectures**
1.	Endocrine system: general organization and method of study	1
2.	Hormones: definition, classification, mode of action and regulation	2
3.	Endocrine physiology of hypothalamus, hypophysis, thyroid, parathyroid, 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. N.	**Topic**	**No. of Practical**
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

Klein, B. 2019. Cunningham's Textbook of Veterinary Physiology, 6th edition.

Sparks, S. 2020. Textbook of Veterinary Anatomy and Physiology: Basic Guide.

Rutland, C.S. (Editor). 2019. Veterinary Anatomy and Physiology.

Fails, A.D. and C. Magee. 2018. Anatomy and Physiology of Farm Animals, 8th edition.

Aspinall, V. and M. Cappello. 2019. Introduction to Animal and Veterinary Anatomy and Physiology, 4th edition.

Course Code: VPT 221

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

Objective

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

Syllabus

Drugs acting on autonomic nervous system, central nervous system and peripheral nervous system. Autacoids.

Course Breakdown

Theory

S. N.	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	2
	Dissociative anaesthetics;	2
	Hypnotics and sedatives;	1
	Tranquilizers, psychotropic drugs,	1
	anticonvulsants,	1
	opioid analgesic,	1
	nonsteroidal anti-inflammatory drugs, analeptics & others	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.N.	Topic	No. of Practical
1	Demonstration of the effect of CNS depressants and analgesics.	3
2	CNS stimulants	1
3	Muscle relaxants	1
4	Anticonvulsants,	1
5	Local anaesthetics in laboratory animals	2
6	a. Demonstration of the action of adrenergic and cholinergic agonists	3
	and antagonists on isolated and intact preparations of the animals	2
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.

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

Brunton, L., B. Knollmann and R. Hilal-Dandan. 2017. Goodman and Gilman's The Pharmacological Basis of Therapeutics, 13th edition.

Ritter, J., R. Flower, G. Henderson, Y.K. Loke, D. MacEwan and H. Rang. 2019. Rang and Dale's Pharmacology, 9th edition.

Romich, J.A. 2020. Fundamentals of Pharmacology for Veterinary Technicians, 3rd edition.

Course Code: VMI 221
Course Title: **Microbiology II (Veterinary Immunology and Serology)**
Credit Hours: 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

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

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 cells to antigen. Principles of different serological tests.

Course Breakdown:
Theory

S.N.	Topic	No. of Lectures
1.	History of Immunology	1
2.	Types of Immunity: Specific and nonspecific immunity	1
3.	Factors contributing to 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 and immune suppressed	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.	Hemagglutination and Hemagglutination inhibition test	1
20.	Complement fixation test	1
21.	ELISA	1
22.	Major histocompatibility complex (MHC)	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.N.	Topic	No. of Practical
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) hemagglutination 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 commercially available different types of vaccines	1
	Total	**15**

References:

Chakraborty, P. 2013. A Textbook of Microbiology, 3rd edition. New Central Book Agency (P) Ltd. Kolkata, India.

Tizard, I.R. 2012. Veterinary Immunology, 9th edition.

Callahan, G.N. and R.M. Yates. 2014. Basic Veterinary Immunology, 2nd edition.

Day, M.J. and R.D. Schultz. 2014. Veterinary Immunology- Principles and Practice. CRC Press. New York, USA

Murphy, K and C. Weaver. 2017. Janeway's Immunobiology, 9th edition. Garland Science. New York, USA

Course Code : VPP 221

Course Title: Systemic Pathology
Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

Upon completion of this course, students will be able to use the 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.

Syllabus

Pathology of cardiovascular system, hemopoietic and immune system, respiratory system, digestive System, urinary system, genital system, nervous system, musculoskeletal system, sense organs and integumentary system with appendages.

Course Breakdown
Theory

S.N.	Topic	No. of Lectures
1	Cardiovascular system- Developmental defects	1
2	Disease of pericardium, myocardium and endocardium	1
3	Disease of arteries and vein	1
4	Disease of lymph node and lymphatic	1
5	Conditions affecting blood	1
6	Conditions 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 lungs and pleura	1
14	Disease of mouth, pharynx and esophagus	1
15	Disease of stomach and forestomach	1
16	Disease of intestine and peritoneum	1

17	Disease of liver and pancreas	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 disease of spinal cord	1
24	Disease of brain and meninges	1
25	Disease of muscle	1
26	Disease of bones and ligaments	1
27	Disease 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.N.	Topic	No. of Practical
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	Urinalysis – 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 interpretation	1
	Total	**15**

References

Zachary, J.F. 2021. Pathologic basis of Veterinary Disease, 7th edition.

Kumar, V., A.K. Abbas and J.C. Aster. 2020. Robbins and Cotran Pathologic Basis of Disease, 10th edition.

O'Dowd, G., S. Bell and S. Wright. 2019. Wheater's Pathology: A Text, Atlas and Review of Histopathology, 6th edition.

Maxie, M.G. (Editor). 2015. Jubb, Kennedy and Palmer's Pathology of Domestic Animals, 6th edition.

Pugliese, A., A. Gaiti and C. Boiti. 2014. Veterinary Science: Current Aspects in Biology, Animal Pathology, Clinic and Food Hygiene.

Course Code : ANU 221
Course Title: Evaluation of Feed Stuff
Credit Hours : 2 (1+1) Full Marks : 50 Theory : 25 Practical : 25

Objective

Upon the successful completion of the course, students will be able to recognize 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, antinutritional factors, physical and chemical characterization of feed stuffs, feed additives supplements and adulterants. Specification of feed ingredients and mixed feeds. Factors affecting the storability. In vitro and vivo characterization of feedstuffs.

Course Breakdown

Theory

S .N.	Topic	No of Lectures
1.	Introduction, importance, scope and value of feedstuffs analysis	1
2.	History of feedstuffs analysis	1
3	Methods, advantages and disadvantages of feedstuff analysis	1
4.	Characteristics of feedstuffs	1
5.	Chemical composition of feed stuffs	1
6.	Difference in chemical composition and nutritional value of feedstuffs	1
7.	Anti- nutritional factors present in feed stuffs	1
8.	Physical (visual, color, odor and texture) and chemical evaluation of feed stuffs	1
9.	Characterization of feed additives, supplements and adulterants	1
10.	Quality control of mixed feeds	1
11.	Specification of feed ingredients and mixed feed	1
12.	Factors affecting the storability of feed ingredients and mixed feed	1
13.	Methods of digestibility determination	2
14.	Differences, methods, advantages and disadvantages between in vitro and in vivo characterization of feedstuff	1
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	Identification of feed ingredients and mixed feeds	1
2.	Identification and classification of feed additives and supplements	1
3.	Physical, visual, odour, colour, texture, structure and characterization of 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 feedstuffs.	2
7.	Determination of coefficient 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 : LPM 221

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

Objectives

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

Syllabus

Introduction to honeybees and its management. Pet animals and birds, and laboratory animals, their care and management, and prevention and control of associated diseases

Course Breakdown

Theory

S.N.	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	1
7.	Common breeds of pet animals (dogs, cats, etc.) and birds	1
8.	Vices of pet animals and their control measures, 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, rats, guinea pig and rabbit	1
14.	Prophylactic measures against common diseases, hygienic care and control of parasites	1
	Total	**15**

Practical

S.N.	Topic	No. of Practicals
1.	Anatomical and morphological study 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 deworming	1
8.	Detection of heat, mating, whelping (through film or real)	1
9.	Care of new born (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 diseases and parasites of lab animals	1
	Total	**15**

References

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

Chakrabarti A. Dog care and management. Kalyani publishers, New Delhi, India.

Course Code : ANU 222

Course Title: Applied Animal Nutrition II (Non- ruminant)
Credit Hours : 2(1+1) Full Marks : 50 Theory : 25 Practical : 25

Objective

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

Syllabus

Introduction, scope, importance, nutrient requirements and feeds for poultry (broilers layers, ducks, turkeys, quails, ostrich,). Nutrient requirements and feeding of swine, rabbit and squirrel, 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. N.	Topic	No. of Lectures
1	Introduction, scope and importance of non-ruminants' nutrition	1
2.	Poultry nutrition, 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 and feeding of ducks and quails	1
6.	Nutrient requirements and feeding of turkey and ostrich	1
7.	Feeding of milk replaces to early weaner and orphan piglets	1
8.	Nutrient requirements and feeding of lactating sow	
9.	Feeding and breeding stocks (boars, sow, gilt).	1
10.	Feeding of equine	2
11.	Feeding of rabbits	1
12.	Feed additives used in non-ruminant feeding	1
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	Identification and classification of feed ingredients and Mixed feeds for non-ruminants	1
2.	Feed formulation for broiler chicken	2
3.	Feed formulation for layer chicken	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-ruminants	3
8.	Formulation for 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 Council. Washington D.C.

Nutrient requirements for swine. 2011. National Research Council. Washington D.C.

Course Code : ANB 221

Course Title: Animal Breeding and Biotechnology

Credit Hours : 2(2+0) Full Marks: 50 Theory: 50 Practical: 0

Objective

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

Syllabus

Fundamental concepts of biotechnology- isolation and detection of DNA and RNA, PCR, cloning of gene and expression of protein. Production of transgenic animals. Applications of biotechnology in animal reproduction.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Introduction 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

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

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

Warwick, E.J. and J.E. Legates. 1979. Breeding and Improvements of Farm Animals (7th edition). McGraw-Hill Book Company, New York.

Klug, W.S, M.R. Cummings, C.A. Spencer and M.A. Palladiono. 2016. Concepts of Genetics, 11th edition. Pearson Education, England.

Snustad, D.P. and M.J. Simmons. 2012. Principles of Genetics. 6th edition. John Wiley and Sons Inc., USA.

Course Code : AQF 221

Course Title : Principles of Aquaculture

Credit Hour : 2 (1+1) Full Mark: 50 Theory: 25 Practical: 25

S.N.	Topic	No. of lectures
1.	Introduction	
1.1.	Definition of fisheries and aquaculture and other related terms; and desirable characters of fish for culture	1
1.2.	Biology of cultivated fishes (carps, catfish, trout and tilapia)	1
2.	Pond construction and management	
3.	Site selection and pond construction	1
4.	Water quality: temperature, turbidity, dissolved oxygen, pH, total hardness, total alkalinity and plankton	2
5.	Pond management: liming and fertilization, feeding; aquatic weeds, weed & predatory fishes and predators and their control	2
6.	Fish farming system: classification on the basis of intensity, enclosure, water mass, fish species and integration and their cultivation	2
7.	Fish Breeding; Sexual dimorphism, management of brood fish	1
	Breeding of common carp, Chinese carps and Indian major carps	2
8.	Common fish diseases & parasites: causal organisms, symptoms & control measures of Saprolegniasis, EUS, Tail/finrot, White spot, Dactylogyrosis, Gyrodactylosis, Argulosis, Asphyxiation & Gas bubble disease	2
9.	Introduction to postharvest technology of fish	1
	Total	**15**

Practical

S.N.	Topic	No. of practical
1.	Visit of fish farm facilities of local campus/in the locality	1
2.	Identification of cultivated fishes of Nepal	1
3.	Methods of water sampling	1
4.	Determination of water quality parameters: temperature, transparency, DO & pH	1
5.	Study of collection and identification of planktons	1

6. Study of methods of pond fertilization and liming	1
7. Study of methods of feeding and feed preparation	1
8. Identification of fish breeding equipment	1
9. Identification of brood fish; study of breeding of cultured fish species	1
10. Study and identification of fish inducing agents (natural and synthetic): collection and preservation of fish pituitary gland	1
10. Study of identification and use of fishing gears	1
11. Study of behavioral signs of diseased fish	1
12. Study of examination of skin and gills	1
13. Identification of common drugs and chemicals used in fish health management	1
14. Study of various methods of fish preservation	1
Total	**15**

References

ICAR. 2006. Handbook of fisheries and aquaculture. ICAR, New Delhi.

Jha, D.K. 1991. Laboratory manual of Fish disease. Tribhuvan University, IAAS, Rampur.

Shrestha, M.K. and N.P. Pandit. 2012. A text book of principles of aquaculture (2nd ed.). Aquaculture Department, IAAS, Chitwan, Nepal.

Shrestha, T.K. and D.K. Jha. 1993. Introduction to Fish culture. IAAS, Chitwan, Nepal. Sinha, V.R.P. and V. Ramchandran. 1985. Freshwater Fish culture. ICAR, New Delhi.

Course Code: LFP 221

Course Title: Livestock Farm Practice-II

Credit Hours: Non-credit

Hands on training of the students on the overall farm practice of livestock management including cleaning, feeding, watering, grooming, milking, routine health care, record keeping, sanitation, housing and fodder production.

These courses shall be noncredit courses, and the performance of students shall be assessed and recorded internally.

Course Code: VPA 221
Course Title: Parasitology II (Helminthology and Leeches)
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 the trematodes, nematodes, acanthocephalan and leech parasites and their eggs their larval stages and their control measures.

Syllabus

General description of trematodes, nematodes, acanthocephala, leeches which affect 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 helminths of animals and birds. Trematodes, nematodes and spiny headed worms. International regulations for control of different helminthic diseases.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Important helminth parasites of domestic animals and birds and general description	1
2.	Classification and characteristics of helminth parasites: a. Platyhelminthes, b. Nemathelminthes, c. Acanthocephala d. Annelida	1
3.	Trematode parasites: Liver flukes- *Fasciola*, *Dicrocoelium* and *Opisthorchis* b. Intestinal fluke- *Fasciolopsis*	2
4.	Blood flukes (*Schistosoma nasalis*, *S. bovis*, *S. spindale*, *S. indica*, *S. incognitum*) and cercarial dermatitis due to *Schistosoma* and *Ornithobilharzia*	2
5.	Amphistomes/immature amphistomiasis (*Paramphistomum, Cotylophoron, Gigantocotyle, Gastrothylax, Gastrodiscus, Gastrodiscoides, Pseudodiscus*).	2
6.	Lung fluke- *Paragonimus*. Oviduct fluke- *Prothogonimus*	2
7.	Nematode parasites (*Ascaris, Parascaris, Toxocara, Toxascaris, Ascaridia, Oxyuris* and *Heterakis)*	3
8.	Bursate worms (*Strongyloides, Strongyles, Chabartina, Syngamus, Oesophagostomum)*	3
9.	Kidney worms- *Stephanurus* and *Dictophyma*	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 worms- *Dracunculus*	1
	Total	**30**

Practical

S.N.	Topic	No of Practical
1.	Methods of collection, fixation, preservation, mounting of trematode, nematode and acanthocephala parasites	2
2.	Identification of important trematodes, nematodes, acanthocephala and annelid parasites	2
3.	Study of morphological characters of adults and their larval stages and damages caused by them	1
4.	Examination of faecal samples 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

Zajac, A.M., G.A. Conboy, S.E. Little and M.V. Reichard. 2021. Veterinary Clinical Parasitology, 9th edition.

Mandal, S.C. 2013. Veterinary Parasitology: At a Glance, 2nd Revised and Enlarged Edition.

Bowman, D.D. 2020. Georgis Parasitology for Veterinarians, 11th edition.

Jacobs. D, M. Fox, L. Gibbons and C. Hermosilla. 2015. Principles of Veterinary Parasitology.

Taylor, M, B. Coop and R. Wall. 2015. Veterinary Parasitology, 4th edition.

Fifth Semester Courses

Course Code: VPT 311
Course Title: Veterinary Chemotherapy
Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

The objective of this course is to enable students to understand antibiotics, antibacterials, antifungals, 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, antifungal agents, anthelmintics, antiprotozoal agents.

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.

Course Breakdown

Theory

S. N.	Topic	No. of Lectures
1	Antibacterial agents: general principles in antibacterial chemotherapy,	1
	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, and broad spectrum anthelmintics.	3
5	Antiprotozoal agents: Drugs used in trypanosomiasis, theileriosis, babesiosis, coccidiosis, amoebiasis, giardiasis and trichomoniasis	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.N.	Topic	No of Practical
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 Potassium 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. 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. Papich, M.G. 2020.

Lees, P. 2010. Comparative and Veterinary Pharmacology.

Riviere, J.E. and M.G. Papich. 2017. Veterinary Pharmacology and Therapeutics, 10th edition.

Course Code: VPY 311

Course Title: Physiology IV (Growth, Environment and Climatology)

Credit Hours: 2 (1+1) **Full Marks: 50** **Theory: 25** **Practical: 25**

Objective

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

Syllabus

Physiology of growth and behavior, Climatology. Reaction of animals in different environmental conditions. Temperature regulation in animals and birds.

Course Breakdown

Theory

S. N.	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. N.	Topic	No. of Practical
1.	Measures and measurement of growth in various species	5
2.	Climatic changes related to environmental physiology	5
3.	Climatology- instruments and equipment's used in climatology, meteorological assessments	5
	Total	**15**

References

Klein, B. 2019. Cunningham's Textbook of Veterinary Physiology, 6th edition.

Sparks, S. 2020. Textbook of Veterinary Anatomy and Physiology: Basic Guide.

Rutland, C.S. (Editor). 2019. Veterinary Anatomy and Physiology.

Fails, A.D. and C. Magee. 2018. Anatomy and Physiology of Farm Animals, 8th edition.

Aspinall, V. and M. Cappello. 2019. Introduction to Animal and Veterinary Anatomy and Physiology, 4th edition.

Course Code: VPH 311

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

Objective

The main objective of this course is to teach the students about the sources of contamination of water, air pollution, sanitation and prevention of air and water borne diseases in animals and man.

Syllabus

Different aspects of air and water which are important in human and animal health. Properties of air and water as well as their sources of air and water pollution, health aspects and control pollution. Prevention and control of diseases transmitted through air and water.

Course Breakdown

Theory

S.N.	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 with in 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 diseases of man and animals	2
11	Atmospheric pollution and its method of control	2
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	Sampling of water for sanitary examination	1
2	Physical examination of water, estimation of color, 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 ventilation 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 (latest edition).

Sherikar, A.T., V.N. Bachhil and D.C. Thapliyal. 2004.

Text Book of Elements of Veterinary Public Health. ICAR, New Delhi. [ISBN: 81-7164-024-9].

Course Code: ANU 311

Course Title: Applied Human Nutrition

Credit Hours: 2 (2+0) **Full Marks: 50** **Theory: 50** **Practical: 0**

Objective

Upon the completion of the course, students will be able to recognize nutrient deficiency and nutrient requirements in humans. They will be able to know the functions of nutrients.

Syllabus

Role of food and nutrition in human health. Carbohydrates, lipids, proteins, vitamins, minerals and trace minerals, and their functions. Food toxicity, food processing and diseases related to nutrition.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Nutrition and human health, human health needs and major health problems	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, (b) nutrition, cancer, heart disease and diabetes mellitus	2
4.	Bioactive phytochemicals in food and their mechanism of action to promote health	2
5.	Carbohydrates: a. Classification b. Dietary fiber and its roles. Physiological effects of dietary fiber. Dietary fiber recommendation. Special functions of carbohydrates in body tissues.	3
6.	Lipids: Classification, function, requirements and food sources, cholesterol and its role to promote human health. Cholesterol and health concern	3
7.	Proteins: Essential or non- essential amino acids, functions of proteins, protein requirement Factors affecting protein requirement, protein turnover, functions of dietary protein. Measures of protein requirements, deficiency symptoms of proteins.	3

8. Minerals: Major and minor minerals, functions of minerals in human body, deficiency symptoms, mineral requirement, food sources

9. Water, electrolyte and mineral balance 3

10. Energy metabolism and physical work performance, factors influencing base metabolism

Energy requirements for various physiological functions 2

11. Nutritional deficiency disorders: Protein energy malnutrition, causes of malnutrition, Methods to solve malnutrition, government strategy to solve malnutrition 2

12. Food toxicities: Naturally occurring toxicants in food, chemical contaminants in food 2

13. Food processing: Effect of food processing on nutritional status 2

14. Diet, nutritional and degenerative diseases 3

(a) Coronary heart disease

(b) Diabetes mellitus

(c) Cancer

(d) Gastro- intestinal problems

(e) Renal 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 and V. Reddy (eds). 1989. Text book of Human Nutrition. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, Calcutta.

Course Code: VMI 311

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

Objective

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, resistance and laboratory diagnosis of bacterial and fungal diseases.

Course Breakdown

Theory

S. N.	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 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, Nocardia	1
21	Mycobacterium	1
22	Mollicutes : Mycoplasma, Acholeplasma	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. N.	Topic	No. of Practical
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 and 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

Chakraborty, P. A. 2013. Textbook of Microbiology, 3rd edition. New Central Book Agency (P) Ltd. Kolkata, India.

Quinn, P. J., B.K. Markey, F.C. Leonard, E.S. Fitz Patrick and S. Fanning. 2016. Concise Review of Veterinary Microbiology, 2nd Edition. Wiley Blackwell Publication. West Sussex, The UK.

McVey, D.S, M. Kennedy and M.M. Chengappa. 2013. Veterinary Microbiology, 3rd edition. Wiley Blackwell Publication. West Sussex, The UK.

Songer, J.G. and K.W. Post. 2004. Veterinary Microbiology; Bacterial and Fungal Agents of Animal Diseases.

Carter, G.R. and D.J. Wise. 2004. Essentials of Veterinary Bacteriology and Mycology.

Course Code: VPA 311

Course Title: Parasitology III (Veterinary Entomology and Acarology)

Credit Hours: 3(2+1) Full Marks: 75 Theory: 50 Practical:25

Objective

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

Syllabus

General description of insecta and arachnida affecting domestic animals and birds. Arthropods as direct/indirect parasites. Broad classification, general morphological features, distinguishing characteristics of arthropods as disease transmitters on livestock and poultry. Life-cycle and vector potentiality in relation to disease transmission, pathogenesis and control of arthropods affecting animals, birds and man. Anti-tick immunoprophylaxis. Damages to hide and skins due to ectoparasitic infestation.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1	Introduction of arthropods, general description of insects and arachnids affecting domesticated animals and birds	2
2	Classification of arthropods Terminologies used in entomology and acarology	2
3	General morphology, exoskeleton, internal structure, circulatory system, respiration, nervous system, alimentary canal, excretory system and reproductive system of arthropods. Wing venation, types of larva and pupa General morphology, bionomics, life cycle, vector potentiality, pathogenesis and control measures of following important arthropods affecting man, animals and birds-	2

4	The biting midges- *Culicoides* Buffalo/Black fly or gnats- *Simulium*	1
5	Sandflies- *Phlebotomus, Lutzomyia*	1
6	Mosquitoes- *Anopheles, Culex and Aedes*	1
7	Tabanidae – *Tabanus* (horse fly), *Chrysops* (deer fly)	1
8	Filth flies: Muscidae- *Musca* (houseflies), *Stomoxys* (stable flies)	1
9	Myiasis flies: Calliphoridae-*Lucilia* and *Calliphora*	1
10	Bot flies: Gasterophidae- *Gasterophilus* (bots), *Oestrus* (nasal flies)	2
11	Sarcophagidae – *Sarcophaga* (blowflies) Hypodermatidae- *Hypoderma* (warble flies)	1
6	Hippoboscidae (wingless flies)- *Hippobosca,* *Melophaga* (the sheep ked) Glossinidae- *Glossina sp.*	2
7	Bugs- *Cimex, Triatoma sp.*	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	General morphology and body parts of ticks and mites	1
11	Soft ticks (Argasidae)- Argas, Otobius and Ornithodoros	1
12	Hard ticks (Ixodidae)- Boophilus, Hyaloma, Amblyomma, Rhipicephalus, Haemophysalis, Dermacenter and Ixodes	2
13	Mites- Dermanyssus (red mites of poultry), Ornithonyssus (tropical mite of poultry), Knemidocoptes (scaly leg mite of poultry)	1 1
14	Psoroptes, Sarcoptes and Demodex (parasitic mites of mammals).	1
15	Damage to hide and skin due to ectoparasite infestation	1
16	International regulation for control of different protozoan diseases. Anti-tick immunoprophylaxis	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1	Demonstration of different morphological structures of insects and arachnids	2
2	Demonstration of representatives of various groups of insects, through charts, specimen and mounted slides	2
3	Demonstration of representatives of various groups of ticks through charts, specimen and mounted slides	2
4	Demonstration of representatives of various groups of mites through charts, specimen and mounted slides	2
5	Study of biological stages of insect and arachnids	1
6	Methods of collection, fixation, preservation, mounting and identification of arthropod parasites	2
7	Collection of insects and arachnids from IAAS farm vicinity, their identification and preservation	2
8	Demonstration of enteric myiasis, and their collection and preservation	2
	Total	**15**

References

Deplazes, P., J. Eckert, A. Mathis, G.V. Samson-Himmelstjerna and H. Zahner. 2016. Parasitology in Veterinary Medicine.

Zajac, A.M., G.A. Conboy, S.E. Little and M.V. Reichard. 2021. Veterinary Clinical Parasitology, 9th edition.

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Jacobs. D, M. Fox, L. Gibbons and C. Hermosilla. 2015. Principles of Veterinary Parasitology.

Taylor, M, B. Coop and R. Wall. 2015. Veterinary Parasitology, 4th edition.

Course Code: EXT 311

Course Title: Extension Techniques in Veterinary Practices and Livestock Production

Credit Hours: 2(1+1) Full Marks: 50 Theory: 25 Practical:25

Objective

Upon the completion of this course, the students will be able to understand the basic concept of extension techniques in veterinary and livestock production practices. This course will be helpful to develop student's understanding and ability 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 methods 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. N.	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 methods – 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 methods 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. N.	Topic	No. of Practical
1.	Graphics in communication – line, bar, pie and pictorial graphs	2
2.	Preparation of various kinds 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 VHLSEC, 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 local and provincial livestock service centers at the grass root level study, their program planning process, plan of work and implémentation	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 VHLSEC 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 and H.G. Paul.1982. Communication Strategies –A Guide for Agricultural Change. University of Missouria, Colombia.

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

Course Code: VPP 311

Course Title: Special Pathology I

Credit Hours: 3(2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

Upon 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 morphological abnormalities and the students will be required to describe the pathogenesis of disease processes, name possible etiological agents, list differential diagnosis and determine a reasonable prognosis.

Syllabus

Introduction, etiology, pathogenesis, clinical signs, postmortem lesion and microscopic lesions of diseases of livestock animals, dog and horse. Pathogenesis and pathological findings of toxicity due to heavy metals.

Course Breakdown

Theory

S.N.	Topic	No. of Lecturers
1	Tuberculosis	1
2	Johne's disease	1
3	Actinomycosis and Actinobacillosis	1
4	Anthrax	1
5	Bovine bacillary hemoglobinurea and Malignant edema, Braxy and Gas gangrene	1
6	Nocardiosis, Campylobacteriosis, Hemophilus, Salmonellosis	1
7	Tetanus and Black Quarter	1
8	Enterotoxaemia and Botulism, Colibacillosis in swine.	1
9	CCPP and CBPP	1
10	Strangles and Glanders	1
11	Brucellosis, Q-fever and Ehrlichiosis	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, Jaagsiekte, Scrapie	1
18	Rabies, Aujeszkey's disease, Bovine and feline spongiform encephalopathies	1
19	Canine distemper, Canine parvovirus, Feline panleukopenia, Infectious canine hepatitis	1
20	Hog cholera, Diseases caused by Rota and corona viruses	1
21	Infectious bovine rhinotracheitis, Caprine encephalitis-arthritis complex	1
22	Rinderpest, 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, Cryptococcosis 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, Trypanosomiasis –Surra, Anaplasmosis	1
29	Pathological 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.N.	Topic	No. of Practicals
1	Postmortem examination of animals suspected for infectious diseases	2
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	4
4	Postmortem examination, gross lesion identification, tissue collection for histopathology, microbiology, immunohistochemistry and toxicology	2
5.	Test result interpretation and making differential diagnosis of at least one case suspected for infectious disease	3
	Total	15

References

Van Dijk, J.E., E. Gruys and J.M.V.M. Mouwen. 2007. Color atlas of veterinary pathology. Saunders Elsevier (2nd Edition).

Jones, T.C., R.D. Hunt and N.W. King. 1997. Veterinary Pathology. Wiley (6th Edition).

Maxie, M. 2015. Jubb, Kennedy & Palmer's pathology of domestic animals. Saunders,(5th Edition).

Carlton, W., McGavin and F. Zachary. 2000. Thomson's special veterinary pathology. 2000. Mosby Publications (3rd Edition).

Vegad, J.L and A.K. Katiyar. 2008. A textbook of veterinary special pathology: Infectious diseases of livestock and poultry. IBDC publishers

Course Code: LPT 311

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

Objectives

The objective of the course is to enable the students to understand abattoir practices that will help to 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 animals and birds at lairage. Inspection of slaughter animals and birds. Slaughter procedure and methods of stunning, location and layout of abattoir, slaughterhouse feature, water supply, ventilation and light. Hygiene practices, abattoir environment impact and mitigation. Roles of local government and entrepreneurs 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	Slaughterhouse 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	Biosecurity 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.N.	Topic	No. of Practical
1	Layout of slaughterhouse, slaughter slab	1
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 equipment and knives	1
11	Cleaning and disinfection of the abattoir	1
12	Visit to small scale, commercial scale slaughterhouse/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, Freexran and Company. San-franciesco

Wiggin and Welson (latest ed). Color atlas of meat and poultry inspection-VanNostrand Reixhold Company N.Y. Sanfrancisco

Warris P.D. 2000. Meat science – An Introductory Text. CABI- Publishing.

AMIF. 1960. The science of Meat and Meat Products. AMIF, WHF Freeman and Company Sanfrancisco and London.

Sixth Semester Courses

Course Code: BCH 321

Course Title: Clinical Biochemistry

Credit Hours: 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objective

The main objective of this course is to teach the students to determine the health and disease condition of animal.

Syllabus

Biochemistry of renal, hepatic and pancreatic functions and their clinical applications. Importance of enzymes in different disease conditions. Laboratory tests to assess serum biochemistry and their clinical interpretation. Biochemistry of toxicity due to toxic metals, agrochemicals, toxic plants and drugs.

Course Breakdown

Theory

S.N.	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, atherosclerosis, jaundice, disease related to hormones.	3
6	Recent laboratory techniques to assay chemical, biochemicals, immunochemical 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.N.	Topic	No. of Practical
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 Na, Cl, K and fluoride in serum	1
7	Enzyme linked immunosorbent assay test, Dot immunoassay	1
8	Blood gas analysis	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	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. Text Book of biochemistry with clinical correlation. Wiley-liss, publication.

Kaneko, J.J, J.W. Harvey and M.L. Bruss. 2008. Clinical Biochemistry of Domestic Animals, 6th edition.

Course Code: VPH 321

Course Title: Veterinary Epidemiology

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

This course aims to expose students to the application of epidemiology for animal disease control, outbreak investigation, health research and current public health, animal health and pursue the overall concept of One Health and its application in Nepalese society.

Syllabus

Definitions and application of epidemiology, ecological concepts of epidemiology, concepts of the interrelationships between Agent-Host-Environment, 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. N.	Topic	No. of Lectures
1.	Basic concepts of veterinary epidemiology:	
	Challenges to today's Veterinary Medicine, Veterinary Epidemiology	1
	Evidence-based Veterinary Medicine (EBVM), Evidence-based Veterinary Medicine in Practice , Basic Epidemiological Concepts	1
	Causation of diseases	
2.	Descriptive epidemiology:	
	Measurement of Disease Frequency and Production, Survival	2
	Standardization of Risk	2

3.	Analytical epidemiology:	
	Introduction, Epidemiological Studies	2
	Concept of Risk	1
	Identification of Risk Factors	2
	From Association to Inference in Epidemiological Studies	
4.	Sampling of animal populations:	
	Introduction	2
	Sample Size Considerations	2
5.	Interpretation of diagnostic tests:	
	Uncertainty and the Diagnostic Process, Diagnostic Tests	1
	Evaluation and Comparison of Diagnostic Tests	1
	Test Performance and Interpretation at the Individual Level	1
	Methods for choosing Normal/Abnormal Criteria	1
	Likelihood Ratio, Combining Tests, Decision Analysis	
6.	Ecological concept of disease	1
7.	Disease Surveillance	2
8.	Investigation of an epidemic (Outbreak Investigations)	2
9.	Prevention, control and eradication of diseases	1
10.	Laws regulating animal diseases	1
11.	International organizations regulating emerging and spreading diseases of animals and birds; Office Internationale Des epizootic (OIE), its functions , its categorization of diseases that are transmissible	1
12.	Regulations regulating handling, import and export of biomaterials.	1
13.	Veterinary Economics	1
14.	Risk-analysis	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
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, prevalence and incidence	2
3	Determination of associations and risks: relative risk, Odd's	1
4	ratio	1
5	Kappa ratio, attributable risk,, Logistic regression, factor analysis	1
6	Evaluation of diagnostic tests	1
7	Survey of an animal disease on a farm	2
8	GIS (Geographical information system)	2
9	Use of statistical soft wares like SPSS,	2
10	Epidemiological software like open Epi, win Epi	2
	Total	15

References

Thrusfield, M. 2018. Veterinary Epidemiology, 4th edition. Blackwell publication. The UK.

Sergeant, E and N. Perkins. 2015. Epidemiology for Field Veterinarians- An Introduction. CABI, The UK.

Gordis, L. 2014. Epidemiology, 5th edition. Elsevier.

Pfeiffer, D.U. 2002. Veterinary Epidemiology- An Introduction.

Course Code: VPA 321

Course Title: Veterinary Protozoology (Parasitology IV)

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

After the completion of this course, students will be able to evaluate the protozoan diseases based on their pathogenesis and symptoms, 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. International regulation for control of different protozoan diseases.

Course breakdown

S.N.	Topic	Lectures
1	Introduction and general description to protozoa and their development.	2
2	Differentiate protozoa from Protophyta, bacteria and rickettsia.	2
3	Classification, life cycle, mode of transmission, pathogenesis, symptoms, diagnosis, treatment and control measures of following parasites of animals, birds and man.	
	Entamoeba: Intestinal amoebiasis in mammals and reptiles. Amoebic meningoencephalitis. Balantidium coli ,	3
	Giardia, Hexamita, Histomoniasis	2
	Trypanosomes, Surra	1
	Leishmania, Kala azar, Post Kala Azar Dermal Leishmanoid (PKDL),	2
	Plasmodium	1

	Eimeria: Enteric coccidiosis, Avian coccidiosis, Bovine coccidiosis, Summer coccidiosis, Winter coccidiosis, Ovine coccidiosis, Caprine coccidiosis, Equine coccidiosis, Rabbit coccidiosis, Swine coccidiosis , Canine coccidiosis, Feline coccidiosis, ,	3
	Isospora, Cryptosporium	1
	Babesia,	1
	Theileria,	1
	Hepatozoon,	1
	Toxoplasma,	1
4	Sarcocystis, Hemoproteus	2
5	Neospora, Leucocytozoon	2
6.	Besnoitia and Anaplasma	2
7.	Recent development in protozoan vaccines for field use	2
8.	International regulation for the control of different protozoan diseases	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1	Examination of fecal materials for identification of intestinal protozoa, coccidia and flagellates	2
2	Demonstration of different organs/tissue of hosts affected by protozoan parasite	2
3	Preparation 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 protozoan parasites	3
5	Identification of representative slides of protozoan parasites	3
6	Identification of drugs against the protozoan diseases	3
	Total	**15**

References

Deplazes, P., J. Eckert, A. Mathis, G.V. Samson-Himmelstjerna and H. Zahner. 2016. Parasitology in Veterinary Medicine.

Zajac, A.M., G.A. Conboy, S.E. Little and M.V. Reichard. 2021. Veterinary Clinical Parasitology, 9th edition.

Mandal, S.C. 2013. Veterinary Parasitology: At a Glance, 2nd Revised and Enlarged Edition.

Jacobs. D, M. Fox, L. Gibbons and C. Hermosilla. 2015. Principles of Veterinary Parasitology.

Taylor, M, B. Coop and R. Wall. 2015. Veterinary Parasitology, 4th edition.

Course Code: VMI 321

Course Title: Microbiology IV (Systematic Veterinary Virology)

Credit Hours: 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

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

General properties and classification of virus. General features, morphology, replication, cultivation, transmission, biochemical and antigenic properties, resistance, pathogenicity, diseases and laboratory diagnosis of DNA and RNA viruses and prions of veterinary importance. Exotic and emerging animal and poultry viruses.

Course Breakdown

Theory

S. N.	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 Hepatitis Virus, 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 : Malignant Catarrhal Fever, Pseudorabies Virus, Marek's Disease Virus, Infectious Laryngotracheitis Virus, Infectious Rhinotracheitis Virus, Equine Abortion Virus	1
7.	Asfarviridae: African Swine Fever Virus	2
8.	Irridoviridae	2
9.	Parvoviridae: Canine and Other Parvovirus	1
10.	Circoviridae: Chicken Infectious Anaemia Virus	1

11.	Reoviridae: Reovirus, Rotavirus, Blue tongue virus, African Horse Sickness Virus	1
12.	Birnaviridae: Infectious Bursal Disease Virus	1
13.	Picornaviridae: FMD Virus, Duck Hepatitis Virus, Avian Encephalomyelitis Virus	1
14.	Togaviridae: Swine Fever Virus, Mucosal Diseases, Equine Encephalitis Virus	2
15.	Coronaviridae: Infectious Bronchitis Virus, Transmissible Gastroenteritis Virus	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, Arenaviridae: Lassa Virus	1
20	Bunyaviridae: Phlebovirus. Flavivirldae: Classical Swine Fever, Virus, Bovine Viral Diarrhoea Virus	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.	2
	Total	**30**

Practical

S. N.	Topic	No. of Practical
1.	Orientation of Virology laboratory	1
2.	Preservation and transportation of clinical samples for virological investigations	1

3.	Demonstration of virus propagation by egg inoculation and 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 like ELISA for HIV, RPHA for Hbs Ag, Hemagglutination	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

Chakraborty, P. A. 2013. Textbook of Microbiology, 3rd edition. New Central Book Agency (P) Ltd. Kolkata, India.

Quinn, P. J., B.K. Markey, F.C. Leonard, E.S. FitzPatrick and S. Fanning. 2016. Concise Review of Veterinary Microbiology, 2nd Edition. Wiley Blackwell Publication. West Sussex, The UK.

McVey D.S, M. Kennedy and M.M. Chengappa. 2013. Veterinary Microbiology, 3rd edition. Wiely Blackwell Publication. West Sussex, The UK.

Maclachlan, N.J. and E.J. Dubovi. 2016. Fenner's Veterinary Virology, 5th edition.

Murphy,F.A., E.P.J. Gibbs, M.C. Horzinek and M.J. Studdert. 1999. Veterinary Virology, 3rd edition.

Course Code: VPP 321

Course Title: Special Pathology II (Poultry, Fish and Diagnostic Pathology)

Credit Hours: 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

Upon completion of the 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.

Syllabus

Introduction, etiology, pathogenesis, clinical signs, postmortem and microscopic lesions of important diseases of poultry and fish. Hematological and biochemistry approaches to diagnose fish diseases. Molecular approaches in diagnosis of disease.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1	Biopsy and Cytology -Its scope, Methodology and limitation in the diagnosis of lesions	1
2	Exfoliative cytology	1
3	Anatomy, physiology, immunology and inflammatory response in fish	1
4	Morphological diagnosis in fish disease	1
5	Histopathology in fish disease diagnosis	2
6	Hematology and biochemistry in fish disease diagnosis	1
7	Use of fish in toxico-pathology study.	1
8	Cleavage of DNA into fragments, DNA cloning and probes	1
9	Polymerase chain reaction	1
10	Restriction fragment length polymorphism	1
11	Southern, western and eastern blotting	1
12	Immunoperoxidase and Immunohistochemistry technique in disease diagnosis	1

13	Tumerogenic disease- introduction, etiology, pathogenesis clinical signs, post mortem lesions and microscopic lesions of Marek's disease and Avian leukosis complex	1
14	Pullorum disease, typhoid and paratyphoid	1
15	Fowl coryza and fowl cholera	1
16	Colibacillosis and clostridial diseases (botulism, necrotic enteritis, gangrenous dermatitis, ulcerative enteritis)	1
17	Mycoplasma gallisepticum infection (chronic respiratory disease), Mycoplasma synoviae infection, Avian chlamydiosis (psittacosis).	1
18	Tuberculosis and spirochaetosis	1
19	New castle disease and Infectious bronchitis, ILT	1
20	Avian nephritis, infectious stunting syndrome, and reovirus infections.	1
21	Avian influenza, and Gumboro disease	1
22	Inclusion body hepatitis, hydro-pericardium syndrome,	1
23	Avian encephalomyelitis, Fowl pox	1
24	Chicken infectious anemia, and EDS-76,	1
25	Aspergillosis, Thrush, Favus and Mycotoxicosis	1
26	Pathogenesis, gross and microscopic pathology of aflatoxicosis, ochratoxicosis and trichothecenes.	1
27	Parasitic infestation- pathogenesis and pathology (flukes, cestodes, nematodes), protozoal diseases (coccidiosis, histomoniasis), ectoparasites, Avian malaria	1
28	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
29	Miscellaneous diseases: Pathology of important vices and miscellaneous conditions.	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1	Normal anatomy and histology of fin fish and shell fish	1
2	Ante-mortem and post-mortem examination of fish	1
3	Blood collection in fish	1
4	Hematology and biochemistry analysis of fish	1
5	Histopathology of commonly occurring diseases of fish.	2
6	Post mortem examination and diagnosis of poultry diseases based upon clinical signs and gross lesions and Writing of postmortem report.	2
7	Collection, preservation and dispatch of morbid materials in poultry diseases.	1
8	Study of gross specimens and histopathological slides of different diseases of poultry.	1
8	Study of gross specimens and histopathological slides of different diseases of fish.	1 1
9	Demonstration of immunoperoxidase technique	1
10	Demonstration of immunohistochemistry technique	1
11	Demonstration of PCR technique	1
	Total	**15**

References

Dijk, J.V., E. Gruys and J. Mouwen. 2007. Color Atlas of Veterinary Pathology. Saunders Elsevier (2nd Edition).

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 (2nd edition) BIOS Scientific Publishers ltd. Oxford.

Sirois, M., McBride and F.C.V. Douglas. 1996.Veterianry Clinical Laboratory Procedures: Livestock and Poultry. IBDC publishers, USA.

Strafuss, A.C., C. C. and T. Springfield. 2004. Necropsy: Simplified procedures and Basic diagnostic methods for practicing veterinarians.

Course Code: VOG 321

Course Title: Theriogenology I (Animal Reproduction and Gynecology)

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

Upon the completion of this course, students will be able to explore the origin of life in higher animal species, describe the structure, developmental abnormalities of reproductive organs. The roles played by neuroendocrine hormones on female reproductive system and reproductive behavior of major livestock species.

Syllabus

Structure, development and physiology of female reproductive system in domestic animals. Ovulation, fertilization, organogenesis and pregnancy in domestic animals and the related anomalies.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Genesis of Beast from ancient knowledge to current Science. Terminologies used in Theriogenology	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 hypophyseal 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	1

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 fetus in uterus	1
16.	Number of fetuses, 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 fetus	1
23.	Period of organogenesis	1
24.	Fetal membranes and placentation	2
25.	Anomalies of development	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1	To study the bony pelvis and its associated structures	1
2	To study the different organs of female reproductive system (slaughter house material from doe/ewe)	1
3	To study the different organs of female reproductive system (slaughter house material from buffalo)	1
4	To study the different organs of female reproductive system (Bitch)	1
5	To study the different organs of female reproductive system with respective measurements and observation	1
6	To study the preparation and approach for rectal palpation in large animals	1
7	To be able to palpate the cervix, uterus and ovaries	2
8	To study the normal or pathological organs of reproductive system by rectal palpation and be able to diagnose the status	2

9	To detect estrous in farm animals	1
10	Collection and examination of vaginal mucous by various techniques in normal cyclic and pathological condition	2
11	Vaginitis and its treatments	1
12	Metritis in cattle and buffaloes	1
	Total	**15**

References

Arthur, G.H. 1977. Veterinary Reproduction and Obstetrics (latest Edition). The ELBS and Bailliere Tindall.

Hefez, E.S.E. and B. Hafez. 1997. Reproduction in Farm Animals (latest Edition). Lea and Febiger Philadelphia.

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

Course Code: VMC 321

Course Title: Internal Medicine I (Systemic)

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

Students are expected 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 systems.

Syllabus

History and importance of veterinary medicine, Concept of health and disease in relation to general medicine. Definition, classification, etiology, pathogenesis, clinical signs, 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.N.	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 signs, diagnosis, differential diagnosis and treatments of alimentary diseases of teeth, stomatitis, glossitis	1
3	Parotitis, pharyngitis, esophagitis, 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	Intussusception and proctitis	1
11	Definition, classification, etiology, pathogenesis, clinical signs, diagnosis, differential diagnosis and treatments of hepatitis and cirrhosis	1
12	Jaundice, pancreatitis, peritonitis, ascites	2
13	Definition, classification, etiology, pathogenesis, clinical signs, diagnosis, differential diagnosis and treatments of rhinitis, epistaxis	1
14	Laryngitis, bronchitis	1
15	Pneumonia, pulmonary emphysema, pleurisy, broken wind in horses and respiratory failure	2
16	Pneumothorax, hydrothorax, lungs, abscess, asthma	1
17	Definition, classification, etiology, pathogenesis, clinical signs, diagnosis, differential diagnosis and treatments of , pericarditis, myocarditis, endocarditis	2
18	Hypertrophy and dilatation of heart, congestive heart failure, haemorrhage, toxaemia,	2
19	Anaemia, leukemia, leukopenia	1
20	Lymphangitis, lymphadenitis and diseases of lymphatic system	1
21	Nephritis, nephrosis, renal colic, albuminurea, haemoglobinurea	2
22	Urinary incontinence, uremia, urethritis, urolithiasis, cystitis pyelonephritis, and orchitis	2
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1	History taking of animals	1
2	Morbidity and mortality rate determination	1
3	Identification of equipment 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	Collection, 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 faeces 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 Kalyani Publishers, India (Third revised Edition)

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

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

Course Code: VCS 321

Course Title: Veterinary Clinical Service I

Credit Hours: 1(0+1) **Full Marks: 25** **Theory: 0** **Practical: 25**

Objective

Upon the successful 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.N.	Topic	No. of Practical
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 system, 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	Handling, 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 technique methods and sedimentation technique methods	1
11	Techniques of skin scraping methods	1
12	Examination of cases of anestrus, silent estrus and conception failure	1
13	Prescription writing	1
14	Postmortem techniques in poultry	1
	Total	**15**

References

Blood D.C. and O.M. Radostits. 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. Lea and Febiger Philadelphia (latest Edition).

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

Course Code: VPT 321

Course Title: Veterinary Toxicology

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

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

Syllabus

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 metals and non-metals, plants, weeds and agrochemicals. Toxicology of radioactive substances, commonly used drugs, venomous bites and stings, residues, food and feed additives.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1	Definitions, terminology and 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: a. Antimony, arsenic, calcium, lead, mercury, copper, selenium, phosphorous, cobalt, b. Fluorine, iodine, iron, magnesium, nitrates and nitrites, common salt. 2	2
6	Toxicology of agro chemicals: (a) Insecticide: organophosphates, carbamates, chlorinated hydrocarbons, pyrethroids.	2

7	(b) Herbicides: Phenoxyderivatives of fatty acids, Dinitrocompounds	1
8	(c) Fungicides: Organic: Sulphur; Inorganic: Phthalimides, Dithiocarbamates, Pentachlorophenol (PCP)	1
9	(d) Rodenticides: Fluoroacetates, Reserpine, Alphanapthylthiyourea, Zinc phosphide	1
10	(e) Fumigants: Organic & inorganic fumigants	1
11	Toxicology of Radioactive substances: Sources 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 molds & larger fungi)	1
15	Toxicity due to plants a. Cyanogenetic, jowars, lantana, dhatura, nuxvomica b. Castor, selenium containing plants, oxalate containing plants	2 2
16	Residue toxicology: Hazards of residues, concepts of withdrawal time and MRLs, minimizing drug and toxic residues in animal products	3
17	Toxicology of food and feed additives: Antioxidants, coloring agent, flavoring agent, preservatives, growth & performance enhancer	2
	Total	**30**

Practical

S.N.	Topic	No of Practical
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 toxicological 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**
4.	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. Text Book of Veterinary Toxicology, Kalyani Publishers, Ludhiana.

Gupta, R.C. 2018. Veterinary Toxicology: Basic and Clinical Principles, 3rd edition.

Caras, R. and S. Foster. 1998. Peterson Field Guide: Venomous Animals and Poisonous Plants.

Seventh Semester Courses

Course Code: VOG 411

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

Objective

Upon the successful 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

Diagnosis of pregnancy in cattle and other livestock by different techniques and tests. Pregnancy related diseases and disorders. Parturition and dystocia.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Pregnancy diagnosis - external, internal and differential diagnosis	2
2.	Chemical, radiological and biological tests in different species	2
3	Classical and novel approaches in pregnancy diagnosis	1
4	Disease and accidents - prolonged, prematures and early embryonic mortality (EEM)	2
5	Interventions in managing consequences of EEM	1
6	Abortion in cattle, horse, sheep, goat, swine and dog	2
7	Mummification and maceration of fetus	1
8	Induced abortion and extra uterine pregnancy	1
9	Dropsy of fetal membranes and fetus	2
10	Abdominal hernia	1
11	Torsion of uterus and vagina	1

12	Cervical prolapse	1
13	Paraplegia of pregnancy	1
14	Accidents during pregnancy	1
15	Parturition - symptoms, stages and involution of uterus	2
16	Artificial interferences of normal parturition	2
17	Care and diseases of new born	2
18	Dystocia - types and causes	2
19	Diagnosis; handling and treatments of dystocia	3
	Total	**30**

Practical

S.N.	Topic	No. of Practical
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 fetal malpresentation	2
6.	Corrections of uterine torsion	1
7.	Retention of fetal membranes	1
8.	Prolapse of vagina and uterus	2
9	Attending several cases of dystocia	2
	Total	15

References

Arthur, G.H. 1977. Veterinary Reproduction and Obstetrics (latest Edition). The ELBS and Bailliere Tindall.

Hefez, E.S.E. & B. Hafez. 1997. Reproduction in Farm Animals (latest Edition). Lea and Febiger Philadelphia.

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

Course Code: VSR 411

Course Title: Anesthesiology

Credit Hours: 2 (1+1) **Full Marks: 50** **Theory: 25** **Practical: 25**

Objectives

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

Syllabus

History and terminology of anesthesia, general considerations in selection of anesthesia, preanesthetic medication, local and regional anesthesia, general anesthesia, balance anesthesia and stages of anesthesia, muscle relaxants, electro-anesthesia, acupuncture and hypothermia, anesthetic complications, emergencies and their remedies, anesthesia of laboratory animals and birds, restraining of zoo and wild animals and euthanasia.

Course Breakdown

S.N.	Topic	No. of Lectures
1.	History and importance of anesthesia in veterinary surgery	1
2.	Introduction, types of anesthesia and definition of common terms	1
3.	General considerations in selection of anesthetic agents	1
4.	Preparation of patients for anesthesia	1
5.	Preanesthetic medication in domestic animals	1
	Anticholinergics, tranquillizers (reasons and contraindications, effects on body systems)	1
	Narcotic and sedatives (reasons and contraindications, effects on body systems)	

6.	Local and regional anesthesia Introduction, indications and clinically useful local analgesic drugs. Methods of producing local analgesia (surface, infiltration, instillation, field block and nerve block) Methods of producing regional anesthesia (epidural, paravertebral, intravenous)	1 1 1
7.	General anesthesia Anaesthetic drugs (parentral and inhalation) Balance anesthesia and stage of anesthesia	1 1
8.	Muscle relaxants, electro-anesthesia, acupuncture and hypothermia (definition level)	1
9.	Anaesthetic complications, emergencies and their remedies	1
10.	Anesthesia of laboratory animals and birds	1
11.	Restraining of zoo and wild animals	1
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	Familiarization with anesthetic apparatus, endotracheal device, laryngoscopes, gadgets for monitoring	1
2.	Laboratory tests of the patients before anesthesia	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 anesthesia in dogs, cats and pigs	1
8.	Endotracheal intubation in animals	1
9.	Artificial ventilation to the patients	1
10.	Anesthetic machines and their systems	1

11.	Demonstration and monitoring of general anesthesia	1
12.	Postanesthetic intensive care of animals and management of anesthetic emergencies	1
13.	Induction of anesthesia 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 Anesthesia- A Quick Reference, Elseviers Saunders.

Hall, L.W., K.W. Clark and C.M. Trim. 2001. Veterinary Anesthesia (10th Ed). WB Saunders Company, London, Edinburgh.

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

Paddleford, RR 1999. Manual of Small Animal Anesthesia (2nd Ed). WB Saunders Company, Philadelphia, London.

Seymour, C and R. Gleed, 1999. Manual of Small Animal Anesthesia and Analgesia (1st Edn). British Small Animal Veterinary Association, Kingsley House, Church Lane, UK.

Course Code: VSR 412

Course Title: General Surgery

Credit hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

Upon the completion of course , students will be able to learn the basic principles of tissue handling, basic surgical instruments, suture materials and suturing patterns, hemorrhage and haemostasis, and aseptic techniques of surgery, nutritional support for veterinary surgical patients, fluid & electrolyte infusion and blood transfusion.

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.N.	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 techniques and post-operative considerations)	2
4.	Sterilization of surgical materials and instruments	2

5.	Suture and Ligature-	
	Knot tying, suture characteristics, specific suture materials, ligation technique	1
	Surgical needle, principles of choosing a surgical needle and types of needle	1
	Principles of suture selection, common suturing techniques and suture removal	1
6.	Nutritional support to surgical patients	1
	Introduction, consequences of malnutrition, metabolic changes associated with starvation,	1
	Dietary requirement, enteric feeding, parental nutrition	1
7.	Infection control	2
	Factors in wound infection, surgical asepsis, antimicrobial prophylaxis	
	Treatment of wound infections, nosocomial infections	
8.	Wound and Wound Healing	
	Introduction, classification, symptoms, diagnosis and treatment	1
	Pathways of wound healing, stages and phases of wound healing	1
	Factors affecting wound healing, complications of wound and their management	1
9.	Haemorrhage, haemostasis	1
	Shock	1
10.	Differential diagnosis and surgical treatment of inflammation, abscess,	1
	tumors, cyst,	1
	haematoma and hernia	1
11.	Differential diagnosis and surgical treatment of necrosis, gangrene,	1
	burn, scalds, frost bite, sinus and fistula	1
12.	Bandages and physical therapy	1
	Applications, layers and bandaging techniques	1
	Applications, regimens and adjunct to physical therapy	

13.	Principles of fluid and blood transfusions	
	Indications, major body compartments and body water distribution, various electrolytes solutions, replacement solutions and colloid	1
	Assessment of dehydration, hypovolemic shock, assessment of fluid requirements and	1
	Intraoperative fluid therapy and blood transfusion	
14.	Affections and management of-	
	Blood vessels, lymphatics and bursa	1
	Muscles and nerves	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	An introduction to the layout of operation theater and theater management	1
2.	Acquaintances of common equipment and surgical instruments	1
3.	Care of surgical instruments	1
4.	Restraint 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**

References

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

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.

Code: VMC 411

Course Title: Internal Medicine II (Metabolic and Deficiency Diseases)

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

Students are expected to learn the skills on interpretation of results of diagnostic tests, identifying new problems and subsequently diagnose the animals affected by metabolic diseases, deficiency diseases and diseases of muscle, skin, eye and ears.

Syllabus

Definition, classification, etiology, pathogenesis, clinical signs, diagnosis, differential diagnosis and treatments of milk fever, downer's cow syndrome, hypomagnesemia 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.N.	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	Pregnancy toxemia in cows	1
7	Azoturia, Eclampsia, Obesity	2
8	Vitamin deficiency- 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.N.	Topic	No. of Practical
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 TextBook 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 Merck Veterinary Mannual (8th Edition). 1991. S.E. Aiello (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. WB Saunders.

Course Code: VMC 412

Course Title: Preventive Medicine I (Bacterial, Fungal and Rickettsial Diseases)

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

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

Course Breakdown

Theory

S.N.	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 Degnala disease	2
23	Q fever and Anaplasmosis	1
	Total	30

Practical

S.N.	Topic	No. of Practical
1.	Collection, preservation and dispatch of materials for bacteriology and mycology	1
2	Preparation of glass wares 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 Tuberculosis 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 diseases	2
	Total	15

References

Blood D.C. and O.M. Radostits. 2007. A Text Book of the diseases of cattle, sheep, pigs, goats and horses (10th Edition). ELBS Publication.

Chakrabarti, A. 2011. Text Book of Preventive Veterinary Medicine. Kalyani Publishesrs, India

Merck. Veterinary Manual (10th Edition). 2010. Merc and Co, USA

Course Code: VCS 411

Course Title: Veterinary Clinical Service II

Credit Hours: 2(0+2) **Full Marks: 50** **Theory:0** **Practical: 50**

Objective

Upon the successful 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.N.	Topic	No. of Practical
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	2
8	Treatment of fresh wound and chronic wound	2
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	Treatment, control and prevention of paramphistomiasis and fascioliasis in cattle and buffalo	2
19	Treatment and 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 O.M. Radostits. 2007. A textbook of the diseases of cattle, sheep, pigs, goats and horses (10th Edition). ELBS publication.

Hefez, E.S.E. 1997. Reproduction in farm animals (latest Edition). Lea and Febiger Philadelphia

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

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

Course Code: AQF 411

Course Title: Fish Diseases

Credit hours: 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

Upon completion of the 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. N.	Topic	No. of Lecture
1.	Introduction: Importance of health management, status of fish disease, OIE listed diseases, host- pathogen - environment interaction, Modes of disease transmission, Factors affecting fish health: Genetic and physiological profiles, environment, feed and feeding, injuries and pathogens, Signs of sickness of fish	3
2.	Fish disease diagnosis technique- history taking, environment assessment, water quality parameter, physical examination, biopsy, cytology, hematology, culture, necropsy, histopathology .	3
3.	General treatment procedure for disease of fish (prophylactic measures, test and slaughter, sanitation of aquaculture, quarantine and restriction of movement, curative measures, swabbing, dip bath, flush pond treatment, systemic treatment.	2
4.	Common fish diseases: Causes, pathogenesis, epidemiology, lesions symptoms, diagnosis and treatments	
	Infectious diseases: Bacterial- Ulcer, Dropsy, Eye disease, Fin rot;	2
	Fungal diseases- Saprolegniasis, Branchiomycosis, Epizootic Ulcerative Syndrome (EUS);	3

Protozoan diseases- Ichthyophthiriasis, Trichodinosis, Coastiasis, Whirling disease;	3
Diseases caused by worms- Dactylogyrosis, Gyrodactylosis, Ligulosis;	2
Diseases caused by Crustaceans- Argulosis, Learneasis, Ergasilosis	2
Non-infectious diseases- Asphyxiation, Gas bubble disease, Aflatoxin, mechanical trauma, temperature, pH, nutritional diseases	2
5. Disease monitoring, surveillance, epidemiology, quarantine, certification and import risk Analysis	3
6. Application of health management protocols and biosecurity principles in aquaculture	2
7. Vaccines and vaccination, probiotics and bio remedial measures	3
Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	Study of lesion of external organs of fish	1
2.	Study of lesion of internal organs of fish (Carp, Catfish and Tilapia)	1
3.	Morphological diagnosis of fish lesions	1
4.	Identification of commonly used equipment in fish health examination	1
5.	Sampling procedure, preservation technique (slide preparation)	1
6.	Examination of skin, fins and gills, alimentary canal of fish	1
7.	Study of fungal organisms of fish	1
8.	Identification and use of common drugs and chemicals	1
9.	Skin, fin and gill biopsy, bacterial culture, fecal examination, blood test	2
10.	Shipping fish to disease diagnosis, laboratory preparing fish pathology report	1
11.	Disease outbreak investigation in fish	2
12.	Calculation of chemicals for the treatment of fish	1
13.	Methods of treatment	1
	Total	**15**

References

Jha, D.K. 1991. Laboratory manual of fish diseases Nepal. Tribhuvan university. IAAS, Rampur.

Kabata, Z. 1985. Parasites and diseases of fish cultured in the tropics. Taylor and Farancis, London.

Lucky, Z.1977. Methods for the diagnosis of fish diseases. Glenn L. Hoffman (Ed.). Amerind Publishing Company Pvt. Ltd. New Delhi India.

Noga, E.J. 2008. Fish diseases: Diagonosis and Treatment. St. Louis, Mosby.

Post, G.W. 1983. Text book of fish heath. T.F.H. Publication, INC.Ltd.

Course Code: LPT 411

Course Title: Milk and Milk Product Technology

Credit Hours: 2(1+1) **Full marks: 50** **Theory: 25** **Practical: 25**

Objective

Upon the completion of the course, the 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

Composition and nutritive value of milk. Factors affecting the composition, nutritive value and physical and chemical properties of milk, processing of milk. Different dairy products, Method of preparation, types and nutritive value of different dairy products: and their quality control.

Course Breakdown

Theory

S. N.	Topic	No. of Lectures
1.	Definition of 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 milk products	1
10.	Products processing: Methods of preparation, type, flow diagram, nutritive values and uses of the dairy products. e.g. cream, butter, ghee, khoa, chhena, dahi (Yogurt), panner, ice-cream, powder milk, condensed milk and cheese	3
11.	Sweets prepared from chhena and khoa	2
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	Study of dairy equipment 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: a. Chhena, khoa, paneer	2
	b. Butter and ghee	2
8.	Preparation of ice -cream	1
9.	Preparation of condensed milk	1
10.	Preparation of sweets from chhena 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: VPH 411

Course Title: Milk and Meat Hygiene, Food Safety and Public Health

Credit Hours: 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

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

Microbial contamination of milk and milk products, and its control. Inspection of meat animals, poultry and fish. Issues and legalizations related to slaughter and transport of food animals and their products. Food safety and public health, toxic residues and bio-hazards.

Course Breakdown

Theory

S.N.	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.N.	Topic	No. of Practical
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 count, coliform, fecal streptococcal, psychrophilic, 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 health 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 house)	1
10	Demonstration of speciation of meat	1
11	Physical and bacteriological quality of meat and aquatic foods (fish).	1
12	Demonstration of toxic chemicals and microbiological residues in milk and meat	1
	Total	**15**

References

Forsythe, S.J. and P.R Hayes, Food Hygiene, Microbiology and HACCP (3rd Ed). 1998., An Aspen Publishers, Gaithersberg, Maryland.

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

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

Gracey, J., S. C. David and R. Huey. 1999 Meat Hygiene (10th Ed), WB Saunders Company Ltd., London, UK

James M. J. 2000. Modern Food Microbiology (6th Ed). An Aspen Publishers, Gaithersberg, Maryland.

Eighth Semester Courses

Course Code: LPT 421
Course Title: Meat and Meat Products Technology
Credit Hours: 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objective

Upon completion of the 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 products common of in Nepal. Curing methods and ingredients.

Course Breakdown

Theory

S.N.	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 in Nepal	1
11	Curing methods and ingredients	1
	Total	**15**

Practical

S. No	Topic	No. of Practical
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 equipment 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**

References

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

Price and Schweigert. (The Science of Meat and Meat production (latest ed). Freeman and Company, Sanfrancisco

Wiggin and Welson Color Atlas of Meat and Poultry Inspection (latest ed). Van Nostrand Reixhold Company N.Y. Sanfrancisco

Forest et a.l 1975 Principles of Meat Science. (latest ed). WH Freeman and company, Sanfrancisco

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: VOG 421

Course Title: Theriogenology III (Gynecology and Obstetrics)

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

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

Syllabus

Fertility, infertility, anestrous, 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, anestrous and its causes, repeat breeding and management problems. Obstetrical operation for relieving dystocia, mutation, forced extraction, embryotomy/fetotomy, caesarean section/hysterectomy. Injuries and disease of puerperal period, postpartum haemorrhage, laceration, contusion of the birth canal and adjustment structures, rupture of the uterus, perineum, vagina, and 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. Postpartum paraplegia, milk fever, clinical uses of hormones and prostaglandins.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Introduction and definition of the courses	1
2.	Fertility, infertility and sterility	1
3	Anestrus, ovarian hypoplasia, adrenal virilism in different domestic animals	2
4.	Trichomoniasis, vibriosis, brucellosis and their diagnosis and treatment	2
5.	Granular Venereal Disease and Pustular Vulvo vaginitis	1

6.	Hormonal disturbances resulting in infertility	2
7.	Cyst and Cystic ovarian condition	1
8.	Anestrus, 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 management	1
17.	Vaginal and uterine prolapse, 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 PGF2α to improve reproductive efficiency	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	Manipulative delivery of fetal malpresentation-anterior	1
2	Manipulative delivery of fetal malpresentation-posterior	1
3	Manipulative delivery of fetal malpresentation- others	1
4	Use of gynaecological appliances	2
5	Fetotomy in animals	2
6	Preparation for hysterectomy in cow	1
7	Hysterectomy in animals	2
8	Preparation for in Caesarean-section in cow/buffalo	1
9	Caesarean-section in animals	2
10	Post operative care	2
	Total	**15**

References

Arthur, G.H. 1977. Veterinary Reproduction and Obstetrics (latest Edition). The ELBS and Bailliere Tindall.

Hefez, E.S.E. & B. Hafez. 1997. Reproduction in Farm Animals (latest Edition). Lea and Febiger, Philadelphia, USA

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

Course Code: VSR 421

Course Title: Radiology and Diagnostic Imaging

Credit Hours: 2 (1+1) **Full Marks: 50** **Theory: 25** **Practical: 25**

Objective

This course will enable students to take X-rays of the affected parts and their processing and interpretation and to 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-ray 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 effects of radiation 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.N.	Topic	No. of Lectures
1.	Introduction and historical background 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 uses Advantages 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 effects, 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.N.	Topic	No. of Practical
1.	Familiarization with and operation of x-rays equipment, x-rays accessories and dark room equipment	1
2.	Positioning and radiography of different parts of body in small and large animals	1
	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	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	1
9.	Techniques and application of diathermy, electrical stimulators, ultrasonographic therapy. Use of cold and hot application, massage and planned exercise, infrared and ultraviolet rays and their precautions	1
10.	Familiarization of ultrasonography	1
11.	Ultrasonography of abdomen	1
12.	Ultrasonography of thorax	1
	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 Singh, J. 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 422

Course Title: Regional and Clinical Surgery I

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

This course will enable students to diagnose and correct major surgical affections regarding orthopaedics, lameness in animals, ophthalmology, ear, nose and throat.

Syllabus

Bone and fracture. Affections of vertebral column, fore and hind limbs, eye, ear, guttural pouches, lips and cheeks, tongue, salivary gland, palate, horns, neck, esophagus and trachea, larynx and pharynx, and their management. Lameness, rupture of ligament and paralysis.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Bone as a tissue: formation of bone, structural and cellular elements of bone, and blood circulation to fractured bone	1
2.	Fracture: Definition, etiology, classification, diagnosis Process of fracture healing. Factors affecting fracture healing and complications of fracture healing Techniques of fracture reduction and fixations Fracture of the sternum, sternal fistula and pneumocele	 1 1 2
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, its 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, trochanteric 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, hydrophthalmia, glaucoma, panophthalmia, 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 otorrhea, tumors of the ear	1
14.	Affections and treatment of the guttural pouches, chondritis, tympanitis, sinusitis, pus in the sinus	1
15.	Affections and treatments of lips and cheeks: hare lip, lip fold pyoderma, edema of conical papillae of cheek Teeth: 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 tumors Nose: 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, torticollis and affection of the withers	1
21.	Affections and treatment of esophagus and trachea: Stenosis, ulcers, dilation and diverticulations, choking, collapse of the trachea and tracheal tumors	2
22.	Affections of the larynx and pharynx: foreign bodies, abscess, traumatic injuries and fistula	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
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**

References

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: VMC 421

Course Title: Preventive Medicine II (Viral, Protozoal and Parasitic Diseases)

Credit Hours: 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

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

Syllabus

Definition, incidence, etiology, transmission, pathogenesis, clinical signs, diagnosis, treatment, prevention and control of viral, protozoal and parasitic diseases of livestock, horse, poultry and pets

Course Breakdown

Theory

S.N.	Topic	No of. Lectures
1.	Rabies and Pseudorabies, FMD	2
2	Infectious bovine rhinotracheitis and Bovine viral diarrhoea, Rinderpest	2
3	Bovine malignant catarrhal and Ephemeral 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	Trypanosomiasis and Theileriosis	2
18	Babesiosis and Coccidiosis	2
19	Amphistomiasis and Fascioliasis	1
20	Schistosomiasis and Echinococcosis	1
21	Cysticercosis and Trichomonosis	2
	Total	**30**

Practical

S.N.	Topic	No. of Practical
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 O.M. Radostits. 2007. A Text Book of the diseases of cattle, sheep, pigs, goats and horses (10th Edition). ELBS Publication.

Chakrabarti, A. 2011. TextBook of Preventive Veterinary Medicine. Kalyani Publishers, India

Mercks. Veterinary Manual, 2010 (10th Edition). Merc and Co, USA.

Course Code: VMC 422

Course Title: Ethics and Jurisprudence

Credit Hours: 1 (1+0) Full Marks: 25 Theory: 25 Practical: 0

Objective

Upon the completion of this course, students will be able to know about the ethics, duties and laws related to veterinary practice, and they will also be able to practice different acts related to veterinary 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.N.	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 Slaughterhouse and Meat Inspection Act, 1999 (2055), and its Regulations 2001 (2057)	1
10	Insurance Policy for livestock and poultry	1
11	Nepal Veterinary Council Act (2055) and its regulations. 2057 (2000)	2

12	Animal Health and Livestock Service Act 1999 (2055) and its regulations 2000 (2056)	1
13	Laws relating to Nepali Muluki Ain	1
	Total	**15**

References

Blood D.C. and O.M. Radostits. 2007. A Textbook of the diseases of cattle, sheep, pigs, goats and horses. ELBS Publication (10thEdition).

Dabas, S.P.S and O.P. Saxena. 2001. Veterinary Jurisprudence and Post mortem (2nd edition). International, Book Distribution

Nepal Veterinary Council Rules, 2057 (2000).

Course Code: VCS 421

Course Title: Veterinary Clinical Service III

Credit Hours: 2(0+2) **Full Marks: 50** **Theory: 0** **Practical: 50**

Objective

Upon the successful 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.N.	Topic	No. of Practical
1	Ambulatory clinical activity (medicine, gynaecology and obstetrics, surgery) in field conditions	3
2	Diagnosis and treatment of common clinical cases like pneumonia	1
3	Diagnosis and treatment of common clinical cases like hemoglobinuria and hematuria	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 broilers 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	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 O.M. Radostits. 2007. A Text Book of the diseases of cattle, sheep, pigs, goats and horses (10th Edition). ELBS publication

Hefez, E.S.E. 1997. Reproduction in farm animals (latest Edition). Lea and Febiger Philadelphia

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

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

Course Code: BCH 421

Course Title: Molecular Biology and Biotechnology

Credit Hours: 3(2+1) Full Marks : 75 Theory: 50 Practical: 25

Objective

Upon 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.

Syllabus

Structure and properties of nucleic acids, recombinant DNA technology, biotechnological applications in animal improvement, nutritional biotechnology, animal tissue culture, molecular diagnosis, fermentation process, regulatory issues in biotechnology, bioinformatics and modern vaccine. Genetic diseases and gene therapy.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1	Overview of DNA and RNA structure, DNA replication 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 Polymerase 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, 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 Bioinformatics	1
30	Genetic diseases & Gene therapy	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
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 techniques	2
8	Use of Multimedia and audio-visual aids for molecular biology aspects.	2
9	Tissue culture techniques	2
	Total	**15**

References

Karp, G and G. John... 1999. Cell and molecular Biology, Concepts and experiments latest edition). Wiley and Sons.

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

Malacinski and J. Freifelder. 1996. 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: AEC 421

Course Title : Agriculture Marketing and Cooperatives

Credit Hours : 2 (2+0) Full Marks: 50 Theory: 50 Practical: 0

Objective

Upon the completion of this course, the 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.N.	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	3

2.	Theory of consumer behavior: concept of utility and measuring approaches; demand function and factors affecting consumer's behavior, and market equilibrium; consumer's 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: a. Marketable surplus; market structure,	2
	b. Price determination and price discrimination.	2
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	3
10.	Cooperatives- a. Concept, definitions, history, role, organization, structure; b. Cooperative law and bylaws, cooperative farming, cooperative marketing.	3
	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

Ninth Semester Courses

Course Code: VPH 511

Course Title: Zoonosis and Public Health

Credit Hours: 2 (1+1) **Full Marks: 50** **Theory: 25** **Practical: 25**

Objective

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

Syllabus

Definition of zoonoses, classification of zoonoses, role of domesticated pets and wild animals, transmission of zoonotic diseases, study of important zoonotic disease of the region, methods of prevention, control and eradication of zoonotic diseases.

Course Breakdown

Theory

S. N.	Topic	No. of Lectures
1.	Definition 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 Rabies, Brucellosis, Japanese encephalitis, influenza, Anthrax, Tuberculosis, Leptospirosis, Listeriosis, Plague, Rickettsiosis, Chlamydiosis and Dermatophytosis. Foodborne 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.N.	Topic	No. of Practical
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 center/human hospital and study of the common diseases affecting rural/urban population and probable relationship 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 (2nd Edition). Pan American Health Organization, USA,

Krauss, H. Zoonoses: Infectious Diseases Transmitted from Animals to Human Being (latest edition).

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

Pathak, K.M.L: Fundamentals of Parasitic Zoonoses (latest edition).

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

Course Code: ANB 511

Course Title: Livestock and Poultry Breeding

Credit Hours: 3(2+1) Full Mark: 75 Theory: 50 Practical: 25

Objective

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

Syllabus

Heritability, repeatability, variance and gene actions. Selection and mating of livestock and poultry. Breeding of laboratory animals. Genetic aspects of poultry breeding-inheritance of traits, disease resistance, use of dwarf gene.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
	Concept of heritability and repeatability	1
	Breeding values, dominance and epistasis values.	2
	Variance and different types of gene actions	2
	Inbreeding, coefficient of inbreeding and relationship, measure of inbreeding and relationship, resemblance among relatives, inbreeding methods for the 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, methods, basic and genetic effects 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 maintenance of control population of poultry.	1
12.	Disease resistance mechanism in poultry.	1
13.	Development, maintenance and uses of inbred lines in poultry	2

14.	Utilize *dw* (dwarf gene) for broiler production	1
15.	Intra population selection schemes of poultry	1
16.	Egg production characters of laying poultry	1
17.	Di-allele crossing	1
18.	Random sample test and its importance in poultry research.	1
	Total	**30**

Practical

S.N.	Topic	No. of Practical
1.	Estimation of heritability and repeatability	1
2.	Estimation of breeding value, dominance and epistasis value	1
3.	Calculation of variance and different gene actions	1
4.	Inbreeding, coefficient of inbreeding and relationship, measure of inbreeding and relationship	2
5.	Different mating systems crossing in the light of cattle, buffalo, sheep, goat, pig and poultry	3
6.	Estimation of selection parameters and genetic effects 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.	Diallele crossing	1
10.	Random sample test and importance in poultry research	1
	Total	**15**

References

Crawford, R.D.2003. Poultry, Breeding and Genetics (3rd edition). Elsevier.

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

Lasley, J. F. 1987. Genetics of Livestock Improvements. Prentice-Hall, Inc. Eagle Wood Cliff, N.J.

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

Warwick, E.J. and J.E. Legates. 1979. Breeding and Improvement of Farm Animals (7th edition). McGraw-Hill Book Company, New York.

Course Code: VOG 511

Course Title: Theriogenology IV (Veterinary Andrology and Reproductive Techniques)

Credit Hours: 2 (1+1) **Full Marks: 50** **Theory: 25** **Practical: 25**

Objective

Upon the successful completion of this course, students will be able to sterilize the Artificial Insemination (AI) and Artificial Vagina (AV) equipment for large and small animals, poultry and other birds and gain the knowledge on collection, processing, evaluation, preservation of semen as well as conduction of AI. Students will be able to learn overall management of sires kept for breeding purposes and advancement in assisted reproduction.

Syllabus

Growth, development and physiology of male reproductive system. Libido and semen collection. Recent advances in animal reproduction.

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Fertility and male reproduction	1
2.	Comparative study during development of male gonads and genitalia	1
3	Growth, puberty and sexual maturity	1
4.	Factors affecting libido	1
5.	Training and maintenance of bull	1
6.	Preputial sampling	1
7.	Sterilization of equipment's	1
8.	Parts and assembling of Artificial Vagina set	1
9	Semen collection	1
10.	Evaluation, dilution and preservation of semen	2
11.	Synchronization, super-ovulation	1
12.	Artificial insemination technique	1
13	Embryo transfer technique	2
	Total	**15**

Practical

S.N.	**Topic**	**No. of Practical**
1.	Sterilization of A. V. equipment	1
2.	A.V. preparation	1
3	Collection of semen	2
4.	Evaluation of semen by classical and automated methods	2
5.	Live and dead count	1
6.	Total concentration	1
7.	Extension of semen by classical and commercial extenders	1
8.	Preservation and transportation of semen	1
9	Artificial Insemination-basics and at farm level	2
10.	Synchronization of estrus by established protocols	2
11.	Embryo Transfer Technique	1
	Total	15

References

Hafez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animal (6th Edition). Lea and Febiger, Philadelphia, USA.

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

Roberts, S.J. 1971. Veterinary Obstetrics and Genital Diseases (latest edition). CBS Publishers and Distributors, India.

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

Course Code: VSR 511

Course Title: Regional and Clinical Surgery-II

Credit Hours: 3 (2+1) **Full Marks: 75** **Theory: 50** **Practical: 25**

Objective

Upon the completion of the course, the students will be able to diagnose and correct the major surgical affections of thoracic cavity, gastrointestinal system, urogenital system, 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.N.	**Topic**	**No. of Lectures**
1.	Thoracic Surgery-	
	Surgical approaches to the thorax, general considerations for thoracic surgery	2
	Thoracocentesis, pneumothorax, hydrothorax, pyothorax, chylothorax, heart worm in dogs, tumors and abscess of lungs, diaphragmatic abscess	2
2.	Hernia- classification, etiology, diagnosis and treatment in various species, umbilical hernia, perineal hernia,	2
	ventral/lateral hernia, inguinal/scrotal hernia, diaphragmatic hernia	1

3.	Affections and surgical management of simple and compound stomach:	
	Cardiac and pyloric stenosis, torsion of stomach, gastric ulceration, stomach tumors, foreign bodies in stomach,	2
	Ruminal impaction, traumatic reticulitis, omasal impaction, abomasal displacements	2
4.	Affections and surgical management of intestine-	
	Principles of intestinal surgery, colic, intestinal obstruction,	2
	intussusceptions, strangulations, volvulus and paralytic ileus	1
	Caecal dilatation and caecal torsion. Perforation of intestine, perforated wound and fistula of abdomen	2
	Supra rectal abscess, recto-vaginal fistula, paralysis of the rectum, prolapse of the rectum, atresia ani, atresia ani, -et-recti-et-coli, hemorrhoids, stenosis of the rectum and anus	2
5.	Affections of the anal glands and their surgical management	1
6.	Affections and surgical management of liver, spleen and pancreas	2
7.	Affections and corrections of urogenital system:	
	Congenital malformations: anorchidism and monorchidism, cryptoorchidism, ectopic testes, hypospadiasis, persistent penile frenulum. Retention of urine, rupture of the bladder and urethra and urolithiasis	2
	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 venereal granuloma, Neoplasms and other diseases	2
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.N.	Topic	No. of Practical
1.	Familiarization with landmark for approach to various visceral organs, thoracocentesis, abdominocentesis	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**

References

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.

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

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

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

Course Code: VMC 511

Course Title: Animal Welfare

Credit Hours: 1(1+0) Full Marks: 25 Theory: 25 Practical: 0

Objective

Upon the completion of the course, the students shall be able to define animal welfare within the context of the five freedoms, understand the various spectrum of animal welfare, manifest the appreciation of the importance of the five freedoms to animals, and express own practice of applying learned concepts in animal welfare.

Syllabus

Different aspects of animal welfare and its assessment. Welfare of laboratory animals, farm animals, pet and companion animals and wild animals, and during natural calamities. Euthanasia and animal welfare legislations.

Course Breakdown

Theory

S.N.	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 program	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	Development 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, Giles. 2000. Veterinary Ethics: An Introduction. New York: Continuum

Fraser A.F. and D.M. Broom 1997. Farm Animal Behaviour and Welfare. (3rd 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: VCS 511

Course Title: Veterinary Clinical Service IV

Credit Hours: 2(0+2) **Full Marks: 50** **Theory: 0** **Practical: 50**

Objective

Upon the successful 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.N.	Topic	No. of Practical
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 program in the field	1
23	Ambulatory clinics (medicine, gynaecology and surgery) in the field conditions	3
	Total	**30**

References

Blood D.C. and O.M. Radostits. 2007. A Text Book of the diseases of cattle, sheep, pigs, goats and horses (10th Edition). ELBS publication

Hafez, E.S.E. 1997. Reproduction in farm animals (latest Edition). Lea and Febiger Philadelphia

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

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Course Code: VMC 512

Course Title: Wildlife, Pet and Lab Animal Medicine

Credit Hours: 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

Objective

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

Syllabus

Habitat, housing, population dynamics, nutrient requirement and handling of zoo and wild animals. Diseases of zoo and wild animals, pet animals and birds, and laboratory animals along with their prevention, control and treatment.

Course Breakdown

Theory

S.N.	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 organizations 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.N.	Topic	No. of Practical
1	Visit nearby wildlife sanctuary/zoo/wild animal centers 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	Postmortem 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**

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Course Code : EXT 511

Course Title: Social Mobilization and Community Development

Credit Hours: 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

Objective

This course will enable the students to select and apply the most appropriate process, approach and techniques in developing rural and community development program by appreciating the importance of socially organized groups and their mobilization in the development activities.

Syllabus

Concept of development, development indicators, dimension, theories, trends, approach and its characteristics ,concept, principle and strategies of sustainable development, community development: concept, types, principle, characteristics and steps, modernization, modern society, relative deprivation and human poverty, poverty, poverty alleviation and social mobilization, decentralization for development: practice, strategies and issues in Nepal, gender concept and terminologies, concept of migration, remittance use in agriculture, gender implication of migration, social mobilization: concept, process, typologies, stage and challenges, history of social mobilization, participatory planning in social mobilization process, monitoring and evaluation of social mobilization, participatory learning and action tools for social mobilization.

Course outline

Theory

S.N.	Title	No of Lectures
1	Concept of development: Development characteristics, indicators, dimension Difference between: Change, growth and the development	1
2	Overviews of development theories: Economic and non economic theories of development	1
3	Overview of approach, trends & development practice of Nepal	1
4	Concept of modernization: Overview of modernization theory Rostow's model of economic development Major process of change in modernization process	1

5	Concept, principle and strategies of sustainable development	1
6	Concept of community and society: Basic characteristics of community Community development: Process, methods, program and procedure Guiding principle, types of community development programs	2
7	Basic values of community development Basic steps of community development	1
8	Relative deprivation, human poverty and human poverty index Methods of calculating human poverty index and human development index	1
9	Concept and definition of decentralization and principle of subsidiary Forms of decentralization, brief history of decentralization practice in Nepal	1
10	Overview of local government reforms and federalization in Nepal	1
11	Major characteristics of current decentralization practice of Nepal Advantages, disadvantages, issues of decentralization practice in Nepal	
12	Concept of sex and gender, gender stereotypes, gender roles and gender need Social stratification and gender, gender based discrimination in Nepal Concept of equity and equality	1
13	Gender analysis and guiding question, Gender analysis tools Gender sensitive planning, Gender budgeting, Gender mainstreaming: process and procedure, domains and levels of change GoN actions for gender mainstreaming	2
14	Concept of social inclusion social inclusion mapping BPFA, CEDAW, gender and social inclusion strategies and actions	1
15	Origin and concept of WID, WAD, GAD and its differences	1
16	Concept of migration, remittance, current migration & remittance status Migration & its gender implication in development Positive and negative consequences of migration in development	1

17	Social mobilization: Definition, concept and meaning, Transformational and transactional social mobilization Social mobilization and social transformation process	1
18	Concept, meaning and purpose of social mobilization Terminologies and typologies of social mobilization	1
19	Conceptual and program package of social mobilization	1
20	Stages/phases/dialogues of social mobilization	1
21	Qualities of social mobilizer: Social mobilization brand, Social mobilization and good governance	1
22	Relationship of poverty alleviation and social mobilization	1
23	Participatory planning in social mobilization process Principle and assumption of participatory planning, Major portfolio of planning	1
24	Major activities of program planning of social mobilization Fundamental question preparation before planning step of planning cycle	1
25	Implementation process and procedure of social mobilization Challenges and issues of implementation of social mobilization	1
26	Participatory learning and action tools for social mobilization Concept of PRA, RRA, PLA and its use in development Tools & techniques of PRA/RRA used in social mobilization process	1
27	Observation & analysis: participants observation, transect walk, trend analysis, livelihood analysis	1
28	Matrix and ranking: wealth being ranking, priority matrix, problems matrix, direct matrix ranking, pair-wise ranking	
29	Discussion and interview: Focused group discussion, semi structure interview	1
30	Diagram and mapping: Resource mapping, venn diagram, social mapping, mobility map, daily activity profile, problem solving tree, seasonal calendar	1
	Total	**30**

Practical

S.N.	Title	No. of Practical
1	Visit DDC/municipality/rural municipality to study social mobilization process	1
2	Study of Resource mobilization/social mobilization guideline of GoN	1
3	Case study of implementation of rural development/community program in Nepal	1
4	Sensitization of participatory learning and action tools for social mobilization	1
5	Tools & techniques of PRA/RRA used in social mobilization process. Selection of appropriate tools of participatory learning and action	1
6	Conduct transect walk, night halt in a community and prepare report	1
7	Conduct wealth being ranking, conduct focused group discussion	1
8	Exercise on calculation of HPI, HDI, GDI, GEI based on CBS's current data	1
9	Conduct resource mapping, Venn diagram, social mapping	1
10	Conduct priority matrix, problems matrix, direct matrix ranking	1
11	Conduct mobility map for any one of the task/events most people follow	1
12	Conduct FGD and prepare problem tree/problem solving tree	1
13	Conduct stakeholders analysis with response to implement any community development program	1
14	Preparation of venn diagram and institution mapping	1
15	Conduct gender analysis by using any gender analysis tools	1
	Total	**15**

References

Khan, S.S & J. S. Sha, 2001. Social mobilisation manual based on Synaja experiences, social mobilisation Experimentation and learning Centre

UNDP. 2001. Governance and poverty reduction: National Human Development Report. (NHDR), Kathmandu

Ministry of Local Development, 2068. Village Development Committee: Social Mobilisation Guideline.

Chambers, R. 2016. Revolution in development enquiry (Nepal edition). Earthscan, New York.

Course Code: LPM 511

Course Title: Wildlife Production and Management

Credit Hours: 2(1+1) Full Marks: 50 Theory: 25 Practical: 25

Objective

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

Syllabus

Different aspects of wildlife (current status and management) and wildlife conservation (legislation, conservation areas, conservation organizations).

Course Breakdown

Theory

S.N.	Topic	No. of Lectures
1.	Introduction, definition and values of wild life.	1
2.	Present and future status of wild life population course Vision and management in Nepal	1
3.	Wild life law enforcement.	1
4.	Distribution, habitats and housing of various classes of wild life	2
5.	Care of various classes 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, wild life reserves and other protected areas in Nepal	1
9.	International organizations concerning wild life conservation	1
10.	Common diseases of wild animals and their control strategies	2
	Total	**15**

Practical

S.N.	Topic	No. of Practical
1.	A day visit to National park for observation	1
2.	External body points of different classes of wild animals	1
3.	Identification of feeds and fodder for wild life	1

4.	Visit to central zoo for practical demonstration-restraining, capturing, handling of zoo animals, transportation of wild animals rescue in natural calamities-flood, forest fire, etc.	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.	De-ticking and deworming	1
9.	Study about administration of drugs	1
10.	Physical examination of wild animals	1
11.	Checklist of wild animals and birds found in National parks	1
	Total	**15**

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Majupuria, T.C. 1989. Wildlife Wealth of Indian (Researches and Management), Tec Press Service, LP Bangkok, Thailand.

Negi, S.S. 1992. Himalayan wildlife: Habitat and Conservation. Indus publishing Co. New Delhi.

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

Course Code: VCS 512

Course Title: Veterinarian in Society

Credit hours: 1 (1+0) Full Marks: 25 Theory: 25 Practical: 0

Objective

The objective is to familiarize the students with the different roles of veterinarians in the society and the importance of veterinary profession in safeguarding animal and public health. The purpose of the course is also to raise awareness of foreign, emerging and exotic animal diseases among veterinary students and veterinarians.

Syllabus

Man, animal and society. Client dealing, information management, biomedical ethics and clinical evaluation. Human-animal bonds, role of veterinary public health in society. Professional development, communication skills, societal responsibilities, professional interactions with health authorities. Role of veterinarians in natural disasters.

Course Breakdown

Theory

S. N.	Topics	No. of Lectures
1.	Man, animal and society; Man-animal interaction, Ethno-veterinary medicine; Social-ecological interactions in animal rearing	1
2.	Client oriented approach to physical examination of animals; client dealing, client service, 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 communication; communication styles, functions of interpersonal communication	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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