SEMESTER V

POULTRY NUTRITION AND FEED TECHNOLOGY 2 (1-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Identify avian anatomical and physiological factors which influence feeding and nutrient requirements.
2. Describe various feedstuffs used in poultry feeding and their potential limitations.
3. Describe feeding strategies used in raising poultry for meat and egg production.
4. Explain methods of feed presentation in both conventional and modern production units
5. Perform manual and software based feed formulation for different classes of poultry.
6. Identify emerging areas of interest and concern in poultry feeding and nutrition.

Theory:

Avian digestive anatomy and physiology. Classification of poultry feed ingredients and their chemical composition. Anti-nutritional factors in feed stuffs for poultry. Feed additives in poultry nutrition. New concepts in poultry feeding. Nutrition of broiler, layer and breeder birds. Nutritional deficiency diseases in poultry. Feed stuff handling and storage at poultry feed mill. Feed stuff processing: grinding, mixing, pelleting and extrusion. Current and future prospects of poultry nutrition.

Practical:

Identification of poultry feed ingredients. Bulk feed stuff sampling, sample preparation and handling for laboratory analysis. Raw material handling and storage. Feed formulation for different classes of poultry bird: Manual method, MS excel, computer software. Preparation of wholesome feed at farm level. Quality control management in poultry feed production. Feeding practices at poultry farm. Compound animal feed stuff act. Visit to a commercial poultry feed mill.

Textbook:

1. Lesson, S. and J.D. Summers. 2002. Scott's Nutrition of the Chicken. International Book Distributing Co. Guleph, Ontario, Canada.

Recommended Books:

1. Lesson, S. and J.D. Summers, 1991. Commercial Poultry Nutrition University Books, Guleph, Ontario, Canada.
2. Lesson, S. and J. D. Summers, 2001. Broiler Breeder Production. University Book, Guleph, Ontario, Canada.
3. Nutrient Requirements of Poultry. 1994. National Academy Press, Washington, D.C.

ANIMAL BREEDING AND GENETICS - II 3 (2-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Define population genetics
2. Describe concepts of genetic parameters
3. Elaborate principles of selection and methods for improvement of farm animals
4. Explain role of animal breeding in genetic improvement
5. Describe various breeding plans and systems and their application

Theory:

Population Genetics: Gene and genotypic frequency; Hardy-Weinberg law, forces affecting gene frequency and genetic structure of a population; Genetic basis of variation; Quantitative characters and their inheritance; Concepts of heritability and repeatability, methods of their estimation; Genetic and phenotypic correlations; Animal breeding: role of animal breeding; breeding systems; random mating, inbreeding, line-breeding, outbreeding, outcrossing, crossbreeding and grading up; Selection: kinds of selection, methods of selection, basis of selection, selection of superior animals, genetic gain and its measurement; traits of economic importance in cattle, buffalo, sheep, goat and poultry; animal genetic resources, their conservation and preservation; emerging breeding technologies; national breeding policy; constraints and future breeding plans; Role of breed registry societies/associations in developed countries and its application in Pakistan.

Practical:

Calculation of gene and genotypic frequencies; Estimation of heritability, repeatability and genetic correlations; Measurement of coefficient of inbreeding and relationship; evaluation of livestock on the basis of own performance, pedigree and progeny; Construction of selection index; Calculation of breeding values from single and repeated records; Estimation of genetic gain.

Textbook:

1. Bourdon, R. M., 2000. Understanding Animal Breeding. Prentice-Hall, Inc. Upper Saddle River, New Jersey.

Recommended Books:

1. Lasley, J. F., 1987. Genetics of Livestock Improvement. Prentice-Hall International Inc. Englewood Cliffs, New Jersey.
2. Legates, J. E. and E. J. Warwick, 1990. Breeding and Improvement of Farm Animals. McGraw-Hill Publishing Co., New York.
3. MINFAL, 1991. National Agricultural Policy. Ministry of Food, Agriculture and Cooperatives. Government of Pakistan, Islamabad.
4. Oldenbroek, J. K., 1999. Gene banks and the conservation of Farm Animal Genetic Resources. DLO Institute for Animal Science and Health, The Netherlands.
5. Willis, M. B., 2001. Dalton's Introduction to Practical Animal Breeding. Blackwell Science, Oxford.

CLINICAL VETERINARY PATHOLOGY 1 (0-1)

Learning Outcomes:

1. Diagnose diseases conditions based on laboratory tests
2. Perform and interpret biochemical tests
3. Interpret results of molecular diagnostic tests

Practical:

Organization of clinical pathology lab; collection, preservation and dispatch of laboratory specimens, haematological examination in diseases of different animals, diagnosis and interpretations of hematological disorders, anaemia and its classifications, diagnosis of various neoplastic conditions of blood, coagulation disorders, bone marrow response in various diseases and its evaluation, urinalysis, liver function tests (LFTs) and renal function tests (RFTs), plasma protein profile, blood electrolytes, exfoliative cytology, demonstration of molecular diagnostic techniques, case studies.

Recommended Books:

1. Latimer, K.S., E.A. Mahaffey and K.W. Prasse, 2003. Duncan & Prasse's Veterinary Laboratory Medicine Clinical Pathology. 4th Ed., Iowa State Press, Ames, Iowa, USA.
2. Kaneko, J.J., J.W. Harvey and M.L. Bruss, 2008. Clinical Biochemistry of Domestic Animals. 6th Ed. Academic Press, USA.

VETERINARY ENTOMOLOGY AND ACAROLOGY 3 (2-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Describe life cycle, vector importance/pathogenesis and control of insects and arachnids.
2. Collect and process biological samples and parasite specimens for identification / diagnosis
3. Assess the prevalence, economic / public health significance of parasitic diseases in an environment.

Theory:

General introduction of entomology: arthropods and their economic significance; classification of arthropoda; respiratory, digestive, nervous and reproductive systems of arthropods; different types of mouthparts of insects and arachnids and their significance in disease transmission; classification, morphology, life cycle, pathogenesis, diagnosis and control of the species of the following families of arthropods: Haematopinidae, Linognathidae, Pediculidae, Cimicidae, Reduvidae, Culicidae, Ceratopogonidae, Simulidae, Psychodidae, Tabanidae, Gastrophilidae, Glossinidae, Muscidae, Calliphoridae, Oesteridae, Hypodermatidae, Cuterebridae, Hippoboscidae, Ixodidae, Argasidae, Demodicidae, Sarcoptidae, Psoroptidae, Dermanyssidae and Cheylotodae, role of insects and arachnids as vector.

Practical:

Methods for collection, fixation and preservation of arthropods; methods for preparation of permanent mounts and pinning of insects and arachnids; examination of skin scrapings for mange; Identification of lice, bugs, fleas, flies, ticks and mites; field visit for practical exposure to ectoparasitic infestations; demonstration of application of insecticides by arranging visits to livestock farms

Textbook:

1. Urquhart G.M., J. Armour, J.L. Duncan, A.M. Dunn, F.W. Jennings, 2000. Veterinary Parasitology. Longman Scientific and Technical, U.K.

Recommended Books:

1. Schmidt G.D. and L.S. Roberts, 2013. Foundations of Parasitology. 9th Edition, W.C.B. Company, U.K.
2. Bowman D.D., 2013. Georgi's Parasitology for Veterinarians. Saunders Elsevier, 10th Ed.
3. Foreyt, W.J., 2001. Veterinary Parasitology, Reference Manual Iowa State Press, Blackwell Publishing Company.
4. Zajac A.M. and G.A. Conboy, 2006. Veterinary Clinical Parasitology 7th Edition Blackwell Publishing AAVP
5. Taylor, M.A., L.L. Coop, and R.L. Wall, 2007. Veterinary Parasitology. 3rd Ed. Blackwell Publishing, UK
6. Iqbal, Z., M.N. Khan and A. Jabbar, 2003. An Illustrated Textbook of Veterinary Entomology. Friends Science Publishers, Faisalabad- Pakistan.

VETERINARY VIROLOGY 3 (2-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Elaborate strategic planning for short listing the diseases during the process of diagnosis of unknown viral diseases
2. Provide description for methods of sample collection for submission to veterinary diagnostic labs.
3. Describe entry of viruses into the body of animals, their pathogenesis, excretion in the environment and dissemination
4. Elaborate clinical and laboratory based disease diagnosis
5. Describe preventive vaccination, disinfection and other bio-security measures for control of animal viral diseases.

Theory:

Introduction, etiology, pathogenesis, transmission, diagnosis and control of following DNA containing viral diseases of veterinary importance: Herpesviridae: Infectious bovine rhinotracheitis, Marek's disease, Infectious laryngotracheitis (ILT); Papillomaviridae: Warts- livestock; Adenoviridae: Avian adenovirus-HPS, IBH, EDS, canine adenovirus; Poxviridae: Fowl pox, Cow pox, Capri pox, sheep pox; Parvoviridae: Canine parvovirus, Feline panleucopenia, bovine parvovirus; Circoviridae: Chicken anemia virus. Introduction, etiology, pathogenesis, transmission, diagnosis and control of following RNA containing

viral diseases of veterinary importance: Picornaviridae: FMD virus; Paramyxoviridae: Newcasle disease virus, PPR, RP, Canine distemper; Orthomyxoviridae: Avian influenza virus; Rhabdoviridae: Rabies, Bovine ephemeral fever; Birnaviridae: Infectious bursal disease; Reoviridae: Blue tongue, Avian tendosynovitis; Coronaviridae: Infectious bronchitis- poultry, Bovine and canine diarrhea; Togaviridae: Eastern, western, venezuelan equine encephalitis; Pestivirus: BVD; Retroviridae: Avian leukosis, Prions-BSE.

Practical:

Sources of sample; sample collection and transportation of samples for virus isolation, Processing of samples for virus isolation, Cultivation of NDV in chicken embryos, Cultivation of AIV in chicken embryos, Establishment of monolayer of BHK-21 cell line, FMD Virus cultivation in BHK-21, PPR Virus cultivation in vero cell line, HPS virus growth in broilers, EM and demonstration of Negri bodies (through simulations & images), Sero-characterization of NDV-HA&HI tests, Virus neutralization test, Sero-characterization of FMD virus by ELISA, Sero-characterization of PPR virus by CFT, Sero-characterization of IBDV by AGPT, Evaluation of attenuated live NDV virus vaccine and Evaluation of killed FMD virus vaccine, study tour of Research Institutes / Biological Production Units.

Textbook:

1. Quinn, P.J., M.E. Carter, B.K. Markie and G.R. Carter, 1994. Clinical Veterinary Microbiology. Wolf, London.

Recommended Books:

1. Anonymous, 1999. A laboratory manual for the isolation and identification of avian pathogens.6th Ed. American Association of Avian pathologists, Iowa State University Press, Ames, Iowa.
2. Cstro, A.E. and W.F. Henschele, 1992. Veterinary Diagnostic Virology. Mosby yearbook, Inc., Baltimore.
3. Fenner, F.J., E.P. Gibbs, F.A. Murphy, M.J. Studdert and D.O. White, 1993. Veterinary Virology 2nd Ed., Academic Press London.
4. OIE, 2000. Manual of standards for diagnostic tests and vaccines. Off. Intl. Des. Epiz., Paris.
5. Talaro, K. and A. Talaro, 1996. Foundation in Microbiology. 2nd Ed., Win C. Brown Publ., Iowa.
6. Virella, G., 1997. Microbiology and Infectious Disease. 3rd Ed., Williams and Wilkins, Baltimore.

VETERINARY REPRODUCTIVE PHYSIOLOGY 3 (2-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Describe structures and functions of male and female reproductive systems
2. Describe reproductive processes of male and female animals (equines, small ruminants and companion animals)
3. Describe mechanisms of pregnancy and parturition

Theory:

Anatomy and physiology of male and female reproductive system, Embryogenesis of male and female reproductive systems, Neural and neuroendocrine reflexes, Mechanisms of action of protein and steroid hormones, Classification of reproductive hormones, Roles of reproductive hormones, Factors affecting the onset of puberty, Factors influencing reproductive cyclicity, Folliculogenesis and oogenesis, Oocyte maturation and ovulation, Physiology of estrous cycle: Follicular Phase, Physiology of estrous cycle: Luteal Phase, Luteinisation and luteolysis, Reproductive behaviour, Sequence of spermatogenesis, Factors influencing sperm production, Physiology of copulation and ejaculation, Sperm transport in the female reproductive tract, Capacitation and fertilization, Early embryogenesis, Maternal recognition of pregnancy, Implantation and placentation, Sex differentiation, Endocrinology of gestation, Endocrinology of parturition, Physiology of puerperium, Physiology of equine reproduction, Physiology of caprine reproduction, Physiology of ovine reproduction, Physiology of canine reproduction, Physiology of feline reproduction

Practical:

Table palpation and biometry of female reproductive organs, Live palpation and biometry of female reproductive organs, Demonstration of male reproductive organs, Demonstration of normal semen parameters, Demonstration of artificial insemination instruments, Practice of passing AI rod, Preparation of semen extenders, Evaluation of fresh and frozen thawed semen, Cumulus Oocyte Complexes (COC) aspiration and grading of oocytes, Demonstration of embryo transfer instruments.

Textbook:

1. Senger, P.L., 2003. Pathways to pregnancy and parturition. 2nd Ed. Current Conceptions Inc. Pullman USA.

Recommended Books:

1. Hafez, E.S.E. and B. Hafez, 2000. Reproduction in Farm Animals. 7th Ed. Lippincott, USA
2. Salisbury, G.W., N.L. Van Demark and J.R. Lodge, 1985. Physiology of Reproduction and AI. 2nd Ed, CBS India
3. Penner, P., R. Ed Empringham and P.A. Watson, 1993. Bovine AI Technical Manual. 2nd Ed, Ontario, Canada

GENERAL AND SYSTEMIC VETERINARY MEDICINE 3 (2-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Describe systemic states induced by various disease processes in animal's body.
2. Explain clinical manifestations and principles of treatment infectious and non-infectious conditions/diseases of different body organs and/or systems.

3. Restrain animals for clinical examination.
4. Perform clinical examination procedures, analyze information, diagnose, and prescribe.
5. Demonstrate different routes of drug administration in different animal species.

Theory:

History and scope of veterinary medicine, Concept of animal diseases, General terminology used in veterinary medicine; **General Systemic states:** Fever, Hyperthermia, Hypothermia, Toxemia/Septicemia, Bacteremia/Viremia, Shock, Hypersensitivity, Allergy/anaphylaxis; Disseminated intravascular coagulopathy; **Diseases of alimentary system:** Principles of alimentary dysfunction, Stomatitis/parotitis, Pharyngitis/esophagitis, Pharyngeal obstruction/esophageal obstruction, Colic, Gastritis, Vomiting, Peritonitis, Simple indigestion, vagal indigestion, Ruminal acidosis and alkalosis, Ruminal tympany/bloat, Diseases associated with hardwares/Traumatic reticuloperitonitis, Enteritis/diarrhoea, Left sided abomasal displacement, Neoplasms of alimentary tract; **Diseases of liver and pancreas:** Principles of hepatic dysfunction, Hepatitis, jaundice, Cholilithiasis, Pancreatitis, Diabetes mellitus; **Diseases of cardiovascular system:** Principles of circulatory failure, Pericarditis/traumatic pericarditis, Myocarditis/endocarditis, Acute heart failure, Congestive heart failure; Peripheral circulatory failure; **Diseases of haemolymphatic and immune system:** Disorders of white blood cells, Anemia, Oedema, Hemorrhage, Lymphadenopathy; **Diseases of respiratory system:** Principles of respiratory insufficiency, Rhinitis, Laryngitis/tracheitis/bronchitis, Pulmonary congestion and edema, Pneumonia/aspiration pneumonia, Pulmonary emphysema, Hydrothorax/ haemothorax/pneumothorax, Pleurisy, Epistaxis/haemoptysis; **Diseases of nervous system:** Principles of nervous dysfunction, Meningitis, Encephalitis, Encephalomalacia, Traumatic injury to brain and spinal cord, Focal diseases of brain; **Diseases of renal system:** Principles of renal insufficiency, Nephritis, Nephrosis, Pyelonephritis, Cystitis, Urolithiasis; **Diseases of musculoskeletal system:** Myositis, Myopathy, Arthritis/synovitis, Arthropathy Osteomyelitis, Osteomalacia, Osteodystrophy; **Diseases of integumentary system:** Pitryasis, hyperkeratosis, Parakeratosis, Patchyderma, Urticarial, Seborrhea, Dermatitis, Photosensitization, Tumors and cysts of skin; **Diseases of eye:** Ophthalmic manifestations of systemic diseases, Conjunctivitis and keratoconjuctivitis, Cataract, Glaucoma; **Diseases of ear:** Otitis, Ear hematoma

Practical:

Orientation of Veterinary Clinics, Animal restraint, History taking, Clinical examination of individual animal and herd (General examination, Physical examination), Recording cardinal signs of health (temperature, pulse rate, respiration rate), Rectal examination (Palpation of pelvic/abdominal organs of cattle, buffalo, horse etc.), Art of prescription writing, Methods of drug administration (oral, parenteral, topical), Passing of stomach tube, probing, urinary catheter, trocar and cannula etc., Special examination, clinical manifestations and principles of treatment of alimentary system, respiratory

system, nervous system, cardiovascular system, musculoskeletal system, renal system, integumentary system, eye, ear and bovine udder.

Textbook:

1. Radostitis, O.M., C.C. Gay, K.W. Hincheliff and P. D. Constable. 2007. A Text Book of Veterinary Medicine, 10th Ed. Saunders Elsevier, PA, USA.

Recommended Books:

1. Kelly, W. R., 1984. Veterinary Clinical Diagnosis. 3rd Ed. Bailliere Tindall & Corsell, London, UK.
2. Kahn C.M., 2010. The Merck Veterinary Manual. 10th Ed. Merch & Company., INC, Whitehouse Station, N.J., USA.
3. Pinsent, P.J.N. and C.J. Fulle, 1997. Outline of Clinical Diagnosis in Horse. Blackwell Science, Oxford, UK.
4. Howard J.L, 1999. Current Veterinary Therapy, Food Animal Practice. W.B. Saunders, Co., USA.
5. Hungerford. T.G., 1991, Hungerford's Diseases of Livestock 9th Ed. McGraw-Hill Book Company, Sydney, Australia.

ISLAMIC STUDIES 1 (1-0)

Objectives:

This course is aimed at:

1 To provide Basic information about Islamic Studies
2 To enhance understanding of the students regarding Islamic Civilization
3 To improve Students skill to perform prayers and other worships
4 To enhance the skill of the students for understanding of issues related to faith and religious life.

Detail of Courses:

Introduction to Quranic Studies

1) Basic Concepts of Quran
2) History of Quran
3) Uloom-ul-Quran

Study of Selected Text of Holly Quran

1) Verses of Surah Al-Baqara Related to Faith(Verse No-284-286)
2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)
3) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
5) Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)

Study of Selected Text of Holly Quran

1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6, 21, 40, 56, 57, 58.)

2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
3) Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W) I

1) Life of Muhammad Bin Abdullah (Before Prophet Hood)
2) Life of Holy Prophet (S.A.W) in Makkah
3) Important Lessons Derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) II

1) Life of Holy Prophet (S.A.W) in Madina
2) Important Events of Life Holy Prophet in Madina
3) Important Lessons Derived from the life of Holy Prophet in Madina

Introduction to Sunnah

1) Basic Concepts of Hadith
2) History of Hadith
3) Kinds of Hadith
4) Uloom –ul-Hadith
5) Sunnah & Hadith
6) Legal Position of Sunnah

Selected Study from Text of Hadith

Introduction to Islamic Law & Jurisprudence

1) Basic Concepts of Islamic Law & Jurisprudence
2) History & Importance of Islamic Law & Jurisprudence
3) Sources of Islamic Law & Jurisprudence
4) Nature of Differences in Islamic Law
5) Islam and Sectarianism

Islamic Culture & Civilization

1) Basic Concepts of Islamic Culture & Civilization
2) Historical Development of Islamic Culture & Civilization
3) Characteristics of Islamic Culture & Civilization
4) Islamic Culture & Civilization and Contemporary Issues

Islam & Science

1) Basic Concepts of Islam & Science
2) Contributions of Muslims in the Development of Science
3) Quran & Science

Islamic Economic System

1) Basic Concepts of Islamic Economic System
2) Means of Distribution of wealth in Islamic Economics
3) Islamic Concept of Riba
4) Islamic Ways of Trade & Commerce

Political System of Islam

1) Basic Concepts of Islamic Political System
2) Islamic Concept of Sovereignty

3) Basic Institutions of Govt. in Islam

Islamic History

1) Period of Khlaft-E-Rashida
2) Period of Ummayyads
3) Period of Abbasids

Social System of Islam

1) Basic Concepts of Social System of Islam
2) Elements of Family
3) Ethical Values of Islam

Reference Books:

1) Hameed ullah Muhammad, "Emergence of Islam" , IRI, Islamabad
2) Hameed ullah Muhammad, "Muslim Conduct of State"
3) Hameed ullah Muhammad, 'Introduction to Islam
4) Mulana Muhammad Yousaf Islahi,"
5) Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" leaf Publication Islamabad, Pakistan.
6) Ahmad Hasan, "Principles of Islamic Jurisprudence" Islamic Research Institute, International Islamic University, Islamabad (1993)
7) Mir Waliullah, "Muslim Jurisprudence and the Quranic Law of Crimes" Islamic Book Service (1982)
8) H. S. Bhatia, "Studies in Islamic Law, Religion and Society" Deep & Deep Publications New Delhi (1989)
9) Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia" Allama Iqbal Open University, Islamabad (2001)

ETHICS **1 (1-0)**

Learning outcomes:

At the end of the course, students will be able to:

1. Define ethics and describe ethical teaching of world religions
2. Describe ethics to be followed in business, biomedical, society, and interactions with animal

Theory:

Definition, scope and nature of ethics, development of ethical theory, ethical teachings of world religions, promotion of moral values through family and institutions, general review of moral standard as duty and happiness with reference to Kant and Mill, general review of business ethics, profits and ethics, ethics of stakeholders, general review of biomedical ethics, ethical implications of euthanasia (ethics of care), ethical implications of abortion, general review of ethics and ecology, the right to liveable environment and animals.

Recommended Books:

1. William, L.A., 1982. Introduction to Ethics, Mathuen & Co. Ltd., London, UK.

2. Garewal, S. M., 1985. Pakistan Way of Life and Culture. United Ltd., Lahore, Pakistan
3. Joseph, G., 1984 What the Great Religions Believe, New American Library, New York, USA.

SEMESTER VI

ZOONOSES AND FOOD SAFETY 3 (2-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Define and describe the basics of zoonotic diseases and principles of food safety
2. Describe laws and regulations impacting food animal, processing industries and food consumers
3. Describe approaches to microbiological and physical foodborne hazard identification, testing and sampling; and foodborne hazard prevention and control.
4. Describe the route(s) of transmission of major zoonotic diseases, individual and population prevention and control methods for major zoonotic diseases.

Theory:

Introduction to zoonoses and its classification, Impact of zoonotic diseases on human health and economy, Global prevalence of zoonotic diseases, Role of veterinarians in preventing zoonotic diseases, Zoonoses: Viral, Bacterial, Parasitic and Fungal, Companion animals and zoonoses, Handling of zoonotic diseases (e.g. wool sorter's diseases), Regulations regarding zoonotic diseases. Food safety as global issue, Foodborne disease surveillance and outbreak investigation, Food safety monitoring, Drug Resistance and food safety, Surveillance and reporting of food borne illness, Hygienic handling and processing of milk and meat products. Water, Milk- and Meat-borne diseases, Microbiological standards of water, milk, meat, eggs and their by-products, Intoxications associated with food products of animal origin, Residues in food products of animal origin, WTO standards, Importance and need of Communication with media, Role of national and international agencies in controlling emerging and re-emerging diseases, HACCP certification, ISO 22000 and Global Gap program for food safety.

Practical:

Collection, transportation and bacteriological examination of water, milk, eggs and meat samples, Qualitative standards for food safety certification of milk and meat, Quantitative standards, most probable number (MPN) and plate count (APC), Testing of residues (Antibiotics, heavy metals etc), Isolation and identification of pathogens from milk products and molecular diagnostic methods for food pathogens, Schematic sketch for isolation and characterization of bacteria, Screening and diagnosis of brucellosis, Screening