Faculty of Veterinary and Animal Science

Outcome come based Course Curriculum and Syllabus for Doctor of Veterinary Medicine

Hajee Md. Danesh Science and Technology University

Dinajpur-5200, Bangladesh

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Overview of the Hajee Md. Danesh Science and Technology University (HSTU)

HSTU is relatively new as a university having been established in 1999. However, as an academic institution its history dates back to 1979 when it started its journey as an Agricultural Extension Training Institute (AETI) created to offer three-year diploma course in Agriculture. In a matter of a decade, it was elevated to degree-giving institution in 1988 and named as Hajee Mohammad Danesh Agricultural College. Ultimately based on the performance of Agricultural College but more importantly to cater to the crying need for highly skilled manpower in Science and Technology and for promotion of research in these vital areas Prime Minister of that time Sheikh Hasina declared to upgrade Hajee Mohammad Danesh Agriculture College to Science and Technology University in February 1999 in a public meeting. On 6th September the property liabilities were handed over of former Agriculture College from Ministry of Agriculture to Ministry of Education. On the history of establishment of this University the 11th of September is a glorious day. On this day of 1999 the Prime Minister of Peoples Republic Bangladesh Sheikh Hasina inaugurates the activities of this University by setting the foundation stone. First batch of the students were admitted at that time (1999-2000 session). The Act of the University was passed on 8 July 2001 in the Jatio Shongsad (National Assembly) was followed by a gazette notification on 8 April 2002. At its inception it had inherited only the faculty of Agriculture but soon nine faculties were added to it.

Hajee Mohammad Danesh Science and Technology University is a public University. It is the first Science and Technology University in the northern region of Bangladesh. It stands away from the urban Dinajpur and bustle at a beautiful and scenic location some 13km north of Dinajpur town by the side of the intercity highway that links Dinajpur to Dhaka, the capital of Bangladesh. It is a matter of satisfaction that the university has made steady progress in a relatively short period of time in terms of expansion of its physical infrastructure and academic programmes. The HSTU has been growing rapidly in terms of quality, recognition, activities, number of courses, student intake, staff, outreach and research during the recent years. The university provides multidiscipline education. Presently there are many international students (undergraduate and postgraduate) are studying in this university; they are from Nepal, Bhutan, India, Djibouti, Nigeria, Ethiopia and Somalia.

In the continuing task of nation building, HSTU is trying to promote excellence in higher education for a vibrant and inclusive society through knowledge creation and dissemination. It is

making sincere efforts to contribute its mite by providing the right kind of human resources. It is striving hard to impart quality education to meet national and global challenges, towards accomplishing its mission. For students, the degree represents certification of competence, and a passport to advanced education or gainful employment, and livelihood and prosperity. Therefore, it is of immense importance for me to make sure that teaching, research outreach activities and training is being imparted efficiently in all faculties of the university.

Overview of the Veterinary and Animal Science Faculty

The faculty of Veterinary and Animal Science started functioning in 2002 when it was named Dinajpur Government Veterinary College. It is one of the nine faculties of this University. It was started in 2002-2003 session with a vision to generate competent and skilled general graduate in the field of agriculture. The name of the degree is DVM. 1st July 2008 Government Veterinary College included with Hajee Mohammad Danesh Science and Technology University as a faculty of Veterinary and Animal Science. The faculty of Veterinary and Animal Science started functioning in 2002 initially with 8 departments: namely Department of Microbiology, Department of Pathology and Parasitology, Department of Dairy and Poultry Science, Department of Anatomy and Histology, Department of General Animal Science and Nutrition, Department of Genetics and Animal Breeding, Department of Medicine, Surgery and Obstetrics and Department of Physiology and Pharmacology. The curriculum is general and consisted of courses of Animal disease, Animal production and management, Agricultural Extension, Biochemistry and agricultural economics etc. The VAS faculty fulfills the vital need of the country by providing broad, vocationally directed, science-based education sufficient to prepare veterinary graduates for life-long development within diverse veterinary careers.

Vision

i) To advance the professional competencies of Vet. Profession competencies of Vet. Profession and Production through individual career coaching and professional development opportunities.
ii) To build up linkage between university and stakeholders.

Mission

The mission of Faculty of Veterinary and Animal Science is teaching and research in the field of Animal Science for the management, conservation and utilization of resources towards the sustainable development of the Animal Sector in Bangladesh. The mission of the faculty of VAS is following-

i) Need based graduate production

ii) Quality education with up-to-date knowledge

iii) To become the leading provider of health service, product and quality service in Livestock health and marketing worldwide.

iv) Efficiently and effectively deliver quality professional

v) Assurance of national and international level of veterinary education

Program Objectives

Faculty OF VAS of HSTU has been conducting undergraduate program since 2002 as a degree offering faculty of other universities with the objectives:

- To provide profession-based education in Veterinary Science
- To produce graduates having advance up-to-date knowledge in Veterinary Science
- To provide knowledge regarding how to do research
- To enrich common sense of the graduates so that they can analyze and solve the field problems.
- Students will get knowledge about different quality control parameters and production procedure.
- Students will get adequate knowledge about marketing and merchandising of different sectors in animal health and production.
- Students will get involve in research work which will help them to acquire comprehensive knowledge about animal health and production and side by side it will help them to connect what latest technology offered around the world.
- Good academic results will give students the opportunity to get admission to higher studies at home and abroad with scholarships.
- Regular mill visits in every semester help students to build relationship with textile industries which help them get practical knowledge and employment. It is a comprehensive education combining theoretical knowledge with practical experience.

Program Intended Learning outcomes (PLO)

Actually there are no well defined learning outcomes stated in the curricula of both undergraduate and post-graduate programs of Faculty of Veterinary and Animal Science. However, the followings may be considered as hidden learning outcomes of the programs:

The graduates would be able to-

- Apply their acquired knowledge in different domain of Veterinary Science

- Recognize and solve the field problems in field of Veterinary Science
- Decide correctly by analyzing situation in the field.
- Communicate knowledge and technology among the farmers.
- Establish interpersonal relationship and work in a team.
- Serve the community.
- Knowledge about testing and quality control in different manufacturing processes will help them to get testing and quality related jobs in textile industries.
- Knowledge about marketing and merchandising in different sectors in livestock sectors
- Students will get opportunity to get job in diversified livestock sectors
- Students will get opportunity to get higher education abroad.

Curriculum Structure and related information

Nomenclature of Degree

The courses offered should lead to awarding the degree of Doctor of Veterinary Medicine.

System of Education

Semester wise

Eligibility for Admission

The candidates should have passed HSC/equivalent from Science Group. She/he should have GPA 6.5 combined from SSC/equivalent and HSC/equivalent without 4^{th} subject; and at least GPA 3.0 separately. She/he shall have Physics, Chemistry, Mathematics and Biology in both SSC/equivalent and HSC/equivalent examinations. These criteria can be changed by central admission committee by considering the situation.

Duration of Degree Program

Each of the degree is a five years Program divided into 10 academic semesters.

Academic calendar

The undergraduate program of Faculty of Veterinary and Animal Science is based on course credit system. The five year courses are divided into ten semesters. There are two semesters (I and II) in an academic year. The duration each term is 21weeks and distributed as following:

Duration of the term

Subject	**Minimum Duration**
Classes	14 Weeks
Recess for final semester examination	02 Weeks
Semester final Examination	03 Weeks
Publication of result	02 Weeks
Total	**21 Weeks**

Between two semesters there is a short period for grade improvement and/or **'F'** recovery.

Grading system and grading scale

The total performance of a student in a course is scaled in a grading scale as following:

Grading Scale

Numerical Grade	**Letter Grade**	**Grade Point**
80% and above	A +	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B +	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B -	2.75
50% to less than 55%	C +	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

Distribution of Marks

Each course, theoretical or practical, irrespective of one credit hour is evaluated over 50 marks. The performance of a student is evaluated by continuous assessment and final examination. Forty

percent (40%) of marks is allotted for continuous assessment (class participation, quizzes, mid semester). The remaining sixty percent (60%) marks are allotted for final examination.

Description	Marks (%)
Class participation/attendance	10
Quiz test	10
Mid semester	20
Final examination (Section A and B)	60 (30+30)
Total	100

Class attendance marks

Attendance (%)	Marks
100	10
90	9
80	8
70	7
65	6.5
60	6.0
less than 60	0

Medium of Instruction

The medium of instruction is English

Academic Credit

When a student enrolls in HSTU, he/she earn academic credits. In case of theoretical course, one lecture per week per semester (14 weeks) is equivalent to one credit i.e. for a 3-credit course; there are three lectures per week. In case practical course one practical class of two hours.

Types of Courses

The courses included in undergraduate curricula are Core/Compulsory courses; In each semester specific numbers of courses are offered as compulsory courses.

Department Wise Courses (Total Credit:)

Departments	Credit Hour

	(Theory +Practical=Total)
1. Dept. of Anatomy and Histology	14
2. Dept. of General Animal Science and Nutrition	17
3. Dept. Microbiology	21
4. Dept. Dairy and Poultry Science	18
5. Dept. Pathology and Parasitology	25
6. Dept. Physiology and Pharmacology	18
7. Dept. Genetics and Animal Breeding	06
8. Dept. Medicine, Surgery and Obstetrics	48
9. Dept. Biochemistry and Molecular Biology	06
10. Dept. of Social Science and Language	04
11. Dept. Statistics	03
12. Dept. Economics	03
14. Dept. Agricultural Extension	02
15. Internship	22
Total=	**185+22= 207**

Course Layout and Credit Hours for Degree of Veterinary Medicine (DVM)

Effective from academic session 2012-2013

Level-1, Semester-I			
Course Code	**Course Title**	**Credits (T+P)**	**Contact hours/Week**
ANH-101, 102	Gross Anatomy	3+1	3+2
ANH-103, 104	Histology	3+1	3+2
ASN-101, 102	General Animal Science (Theory)	2+1	2+2

BMB-105, 106	Biophysics and Chemistry of Biomolecules	2+1	2+2
SSL-129	English(Theory)	2+0	2+0
SSL-131	Rural Sociology (Theory)	2+0	2+0
	Total	**18**	**22**
Level-1, Semester-II			
Course Code	**Course Title**	**Credits (T+P)**	**Contact hours/Week**
ANH-105, 106	Avian Anatomy	1+1	1+2
ANH-107, 108	Embryology	1+1	1+2
MIC-101, 102	General Microbiology	2+1	2+2
ASN-103, 104	Livestock Management	2+1	2+2
ASN-105, 106	Fodder Production	1+1	1+2
DPS-101, 102	Introductory Poultry Science	2+1	2+2
BMB-107, 108	Metabolism of Biomolecules	2+1	2+2
	Total	**18**	**25**
Level-2, Semester-I			
Course Code	**Course Title**	**Credits (T+P)**	**Contact hours/Week**
MIC-201, 202	Biosafety and Hygiene	2+1	2+2
PPS-201, 202	General Pathology and Oncology	3+1	3+2
PPS-203, 204	General Parasitology & Malacology	2+1	2+2
PPH-201, 202	General Physiology	2+1	2+2
ASN-201, 202	Animal Nutrition	2+1	2+2
DPS-201, 202	Dairy Animal Production	2+1	2+2
STT-213, 214	Introduction to Biostatistics	2+1	2+2
	Total	22	29
Level-2, Semester-II			
Course Code	**Course Title**	**Credits (T+P)**	**Contact hours/Week**
MIC-203, 204	Bacteriology	3+1	3+2
PPS-205, 206	Systemic Pathology	2+1	2+2
PPS-207, 208	Nemathelminthes & Platyhelminthes	2+1	2+2
PPH-203, 204	Systemic Physiology	2+1	2+2
PPH-205, 206	General Pharmacology	2+1	2+2
ASN-203, 204	Poultry Nutrition (Theory)	1+1	1+2
DPS-203, 204	Dairy Science	2+1	2+2
DPS-205, 206	Poultry Production and Management	2+1	2+2
	Total	**24**	**32**

Level-3, Semester-I			
Course Code	**Course Title**	**Credits (T+P)**	**Contact hours/Week**
MIC-301, 302	Virology	3+1	3+2
PPS-301, 302	Pathology of Infectious Diseases	2+1	2+2
PPS-303, 304	Entomology	2+1	2+2
PPH-301, 302	Integral Physiology	1+1	1+2
ASN-301, 302	Meat Technology	1+1	1+2
DPS-301, 302	Dairy Microbiology	1+1	1+2
DPS-303, 304	Hatchery Operation and Management	1+1	1+2
GAB-301, 302	Genetics	2+1	2+2
	Total	**21**	**29**
Level-3, Semester-II			
Course Code	**Course Title**	**Credits (T+P)**	**Contact hours/Week**
ANH-302	Comparative and Neuro-Anatomy	0+1	0+2
MIC-303, 304	Immunology and Serology	2+1	2+2
PPS-305, 306	Avian Pathology	1+1	1+2
PPS-307, 308	Protozoology	2+1	2+2
PPH-303, 304	Systemic Pharmacology	2+1	2+2
PPH-305, 306	Toxicology	2+1	2+2
MSO-301, 302	General Medicine	2+1	2+2
ASN-303, 304	Animal Byproducts & Waste Management	1+1	1+2
DPS-305, 306	Dairy Products Technology	1+1	1+2
	Total	**22**	**31**
Level-4, Semester-I			
Course Code	**Course Title**	**Credits (T+P)**	**Contact hours/Week**
ANH-402	Surgical Anatomy (Practical)	0+1	0+2
PPH-402	Therapeutics and Pharmacy (Practical)	0+1	0+2
MSO-401, 402	Farm Animal Medicine	2+1	2+2
MSO-403, 404	Small Animal Medicine	2+1	2+2
MSO-405, 406	Avian Medicine	2+1	2+2
MSO-407, 408	General Surgery	2+1	2+2
MSO-409, 410	Anesthesiology	1+1	1+2
GAB-401, 402	Breeding	2+1	2+2
ECN-405	Livestock Economics	1+0	1+0
	Total	**20**	**28**
Level-4, Semester-II			

Course Code	Course Title	Credits	Contact hours/Week
MIC-401	Public Health & Ecosystem (Theory)	2+0	2+0
PPS-402	Clinical Pathology and Necropsy	0+1	0+2
MSO-411, 412	Zoo & Wild Animal Medicine (Theory)	1+1	1+2
MSO-413	Metabolic Diseases	1+0	1
MSO-415	Preventive Medicine	2+0	2
MSO-417, 418	Herd Health Management	1+1	1+2
MSO-419, 420	Gynaecology (Theory)	2+1	2+2
MSO-421, 422	Small Animal Surgery (Theory)	2+1	2+2
AEX-405, 406	Agricultural Extension (Theory)	1+1	1+2
ECN-409, 410	Agribusiness Administration (Theory)	1+1	1+2
	Total	**20**	**34**
Level-5, Semester-I			
Course Code	**Course Title**	**Credits**	**Contact hours/Week**
MIC-501, 502	Food Hygiene	1+1	1+2
MSO-501, 502	Farm Animal Surgery	2+1	2+2
MSO-503, 504	Radiology and Imaging	2+1	2+2
MSO-505	Jurisprudence and Ethics	1+0	1+0
MSO-508	Soundness & Certificate Writing	0+1	0+2
MSO-510	Clinics Medicine	0+1	0+2
MSO-511	Animal Behavior & Welfare	1+0	1+0
MSO-514	Clinics Surgery	0+1	0+2
MSO-516	Clinics Theriogenology	0+1	0+2
MSO-517	Obstetrics (Theory)	2+1	2+2
MSO-519, 520	Andrology & Artificial Insemination (	2+1	2+2
	Total	**20**	**38**

Internship Courses:

Level 5, Semester-II	
Course Title	**Credits**
Dairy and Goat Farm Practices	2
Feeds and Fodder Processing	1
A.I. and Fertility Practices	1
Livestock Products Technology	1
Poultry and Duck Farm Practices	1
Clinical Pathology	1
Vaccine Production Technology	1

Zoo Animal Health and Management Practices	1
Public Health and Slaughter House Practices	1
Seminar and Report writing	1
Clinical Medicine-I (Ruminant Medicine)	1
Clinical Medicine-II (Small Animal & Avian Medicine)	1
Clinical Pharmacy (Compounding & Dispensing)	1
Clinical Surgery-I (Ruminant Surgery)	1
Clinical Surgery-II (Small Animal & Avian Surgery)	1
Clinical Practices (Obstetrics & Surgery)	1
Clinical Parasitology	1
Rural Camp (Motivation, Extension, Treatment & Vaccination)	2
Clinical Seminar (Report Writing & Review of the Course)	2
Total	**22**

Total credit hour= 185+22=207

N.B. 1 credit hour=50 marks, 2 credit hours=100 marks and 3 credit hours=150 marks

T=Theory, P= practical

Teaching-Learning Strategy

Faculty members teach the subjects in such a way as the students get theoretical and practical knowledge as per course contents. The courses are conducted with lectures (chalk and talk, multimedia methods), review of the previous class, feedback, class room discussions, Power point presentation, Videos etc.

i. Class room instruction
ii. Lab exercise (Lab and field related) and preparation of Practical Note Book
iii. Assignment
iv. Field work/visit and reporting
v. Industry visit
vi. Extension tour
vii. Internship

Study Tour

As a part of academic curriculum, students of level 4 semesters 1 are required to perform study tour for enriching their practical knowledge. In addition students have to perform in the Animal farms, Clinics and Hospital Visit, different Livestock Survey, Visit to Research Organizations, Extension Organizations and Non- Govt. Organizations (NGO). They are also encouraged to go for sight-seeing, visit places of historic interest, and cultural heritage of our country.

Internship Programmed

For Veterinary education, in final semester (L5S2), all students need 6 months internship programmers in different places of Bangladesh and abroad. In this Program the students will get scope to work directly in different animal farms, veterinary hospital/clinics, research laboratories, dairy and goat farm, feed mills etc.

Assessment study

Assessment systems are duly communicated to students at the outset of the term/semester. Assessment procedures meet the objectives of the course. Both formative and summative assessment such as-

Quizzes
Short answer
Essay type
Demonstration
Reports
Assignment assessments
Presentations
Mid Semester examination
Final examination

The continuous assessment in terms of quizzes, mid semester examination, final examinations etc. are arranged according to the following table:

No. of credit of the course	No. quizzes required	No. Mid examination required	No. Final examination required
2	2	1	1
1	1	1	1

Department of Anatomy and Histology (ANH)

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
Discipline-Anatomy				
1.	ANH-101: Gross Anatomy (Theory)	3	1	1
2.	ANH-102: Gross Anatomy (Practical)	1	1	1
3.	ANH-105: Avian Anatomy (Theory)	1	1	I1
4.	ANH-106: Avian Anatomy (Practical)	1	1	I1
5.	ANH-302: Comparative and Neuro-Anatomy (Practical)	1	3	1I
6.	ANH-402: Surgical Anatomy (Practical)	1	4	1I
Total (Theory+ Practical) = (4+4) =08				
Discipline-Histology				
7.	ANH-103: Histology (Theory)	3	1	1
8.	ANH-104: Histology (Practical)	1	1	1
9.	ANH-107: Embryology (Theory)	1	1	1I
10.	ANH-108: Embryology (Practical)	1	1	1I
Total (Theory+ Practical) = (4+2) =06				

Total Credit Hour	
Theory	8
Practical	6
Total	**14**

Course Code: ANH-101 **Course Title: Gross Anatomy (Theory)**	**Credit Hour: 3.0**	**Level: 1**	**Semester: I**

Rationale: This course aims to understand the structure of different organs and their functions through various method of dissection.

Course Learning Outcomes: The major learning outcomes of this course are to-

- To define anatomical terminology and basic information on form and structure fundamental to considerations of function and physical diagnosis.
- To obtain knowledge on anatomical description of musculoskeletal, digestive, respiratory, urogenital, endocrine, nervous, cardiovascular and integumentarysystem.
- To learn about the different articulation of the body with their bone involvement.
- To apply the anatomical knowledge in surgical practice or operation.
- To establish association between structure and function of various body parts.

Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
Define anatomy and related terms, classification of anatomy and its application	**Introduction:** Definition and types of Anatomy, Importance and application of Anatomy, descriptive anatomical	Lecture Discussion Projector Display	Quiz Test, Term and Final exam Short Essay, Assignment
Enumerate the form and structure of different organs of animal body.	**OSTEOLOGY :** Classification of bones and skeleton, description of different segments of vertebral column, bones of fore and hind limbs	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Summarize the body joints with types	**SYNDESMOLOGY:** Definition and classification of joints Formation, composition, classification and movements of synovial joint, Different type of articulation in the body of animal	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment

Recognize the muscle, visceral organs of different system, their blood and nerve supply	**MYOLOGY:** Definition and classification of muscle tissue, Origin, insertion, blood and nerve supply of different muscles of the body.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
	SPLANCHNOLOGY (Digestive and Respiratory System): Different parts of the alimentary tract and accessory digestive organs, Organs of respiratory system with its function, Description of Peritoneum and pleura	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
	Urinary and Genital System: Different parts and location of Urinary and genital system (male and female) with the involvement of accessory organ/gland of different	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
	CARDIOVASCULAR SYSTEM: Definition and Terminology related to cardiovascular system, Blood circulation to the different system of the body and different type of circulatory system	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
	NERVOUS SYSTEM: Definition and classification of Nervous system and some terminology, different type of nervous system and plexus	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Narrate general anatomy of lymphatic organs.	**LYMPHATIC SYSTEM:** Lymph and lymphatic organs. Lymph vessels and lymph capillaries. Anatomical description of lymphoid organ (tonsils, lymph node, spleen, Thymus, Bursa, Peyer's patches)and other.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment

Explain anatomical location of sense organs of domestic mammals	**AESTHESIOLOGY (SENSE ORGANS AND COMMON INTEGUMENT):** Introduction of Aesthesiology and Anatomical location of sense organs with their function. Eye: The orbit, eyelids, conjunctiva, lacrimal apparatus, fascia and muscle of eyelid. Eyeball and its structure, layers of eyeball. Ear: external, middle and internal ear. Common Integument: skin and its glands, hair, hooves and nail. Organs of smell and organs of taste.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment

Books Recommended:

1. Sisson and Grossman's the Anatomy of the Domestic Animals. Volume 1 and 2. by Septimus Sisson (Author), James Daniels Grossman (Author), Robert Getty (Author)
2. Textbook of Veterinary Anatomy, K M Dyce; W O Sack; C J G Wensing

Course Code: ANH-102 **Course Title: Gross Anatomy (Practical)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: I**
Rationale: To achieve the knowledge of form and structure of animal body through practical demonstration.			
Course Learning Outcomes:			

Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
Understand the collection and preservation of animal organs	**INTRODUCTORY DISCUSSION:** Preparation of bones and settings of skeletons. Collection of samples of visceral organs, their preservation and various types of preservations.	Lecture, Discussion, Projector and Display Practical demonstration	Quiz Test, Midterm and Final exam

Course Code: ANH-103 **Course Title: Histology (Theory)**	**Credit Hour: 3.0**	**Level: 1**	**Semester: I**
Rationale: This course is designed to provide basic concepts of cell, tissues and their arrangement in different organ.			
Course Learning Outcomes: ➢ To study the microscopic form and structure of the tissues. ➢ To correlate the function of tissues at molecular and / or cellular level. ➢ To differentiate the histology of different organs among the species.			
Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
• Define the histology with its scope • Characterize and differentiate the basic tissues • Correlate the morphology of tissues with their physiological roles	**BASIC HISTOLOGY** **Introduction:** Definition, scope of Histology and its relation to other subjects. Basic concept about body cells. **Basic Tissue:** Definition and types of basic tissues (Epithelial tissue, Connective tissue, muscular tissue and Nervous tissue) Characteristics, location and function of tissues.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam
• Narrate the presence and arrangement pattern of basic tissues in different organs of body system • Explain the organ-specific functions related to their morphology	**Systemic Histology** **Digestive system:** General plan of digestive system. Histology of organs of gastrointestinal tract and accessory organs. **Circulatory system:** Composition and classification of blood and lymph. Histology of the organs of circulation and different lymphatic tissues and organs. **Respiratory system:**	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam

	Histology of Trachea, bronchi and lung. **Urinary system:** Histology of kidney, urinary bladder, ureter and urethra. **Endocrine System:** Histology of pituitary gland, thyroid gland, parathyroid gland, pineal gland and adrenal gland with its secretion. **Organ of Sense:** Histology of tongue, eye, ear, nose and skin.		

Course Code: ANH-104 **Course Title: Histology (Practical)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: I**
Rationale: This course is designed to provide practical knowledge on microscopic structures of organs.			
Course Learning Outcomes: ➢ To get the hand- in show skill to prepare the histological slides from various organs with diversified techniques. ➢ To understand the microscopic form and structure of the tissues. ➢ To differentiate microscopically the organs and tissues.			
Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
Identify types and parts of microscope	**Microscope:** Definition, types & different parts of microscope, care of microscope, handling of microscope.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam
Elucidate preparation of permanent slide	**Preparation of permanent slide:** Discussion about collection, preservation & dehydration of tissue, Clearing, infiltration & embedding of tissue, Sectioning of tissue,	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam

	Technique for H&E stain, Technique for some special stains		
Identify particular slides	**Histological slide show:** using microscope and projector.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam

Books Recommended

1. Textbook of Veterinary Histology by B.D. Dellmann. 1998, 5th edition, Lea and Fiebiger, Philadelaphia.
2. Fundamentals of the Histology of Domestic Animals by Trautmann, Alfred and FiebigerTosel. 1957, 13th edition Ithaca, Comstock Pub. Associates.
3. Bailey's Test Book of Histology by Copenharver W.M. and Bunge R.P. 1975, 16th edition, The Williams and Wilkins Com pany/Balti mare.
4. Basic Histology, by L. Carlos Junqueira, J. Carneiro, Robert, O. Kelly, 7th edition, Prentice-Hall International Inc.
5. Color Atlas of Veterinary Histology, by William J. Bacha, Jr. Linda, M. Linda, M. Wood, Lea and Febiger, Philadelphia.
6. Color Atlas of Human Histology, by Mariano, S.H. Di. Fiora, 4th edition, lea and Febiger, Philadelphia.
7. The histology of the fowl. Hodges, R.D., Academic Press, London.
8. Manual of Histologic and Special Staining Techniques. Gridley, M.F. McGraw-Hill Book Co., New York.
9. Animal Tissue Technique. Humason, G.L., W.H. Freeman and Co., London.

Course Code: ANH-105 **Course Title: Avian Anatomy (Theory)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**

Rationale: The students are expected to summarize the morphology of domestic birds in relation to their physiology.

Course Learning Outcomes:

- To comprehend the anatomical features of different system of aves.
- To compare the structural and functional properties among the avian species (duck, chicken, quail etc.)
- To apply the anatomical knowledge in therapeutics.

Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
Define avian anatomy and physiology	**Introduction:** Definition of avian anatomy and physiology with its scope	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam
Express the structure of different body systems of birds	**Osteology:** Studies of the bones of birds and their role in flight mechanism.	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam
	Arthology: Studies of the joints of the body of chicken. **Myology:** Studies of the muscles of different body parts.	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam
	Digestive system: Anatomy & function of the different organs for digestion of chicken	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam
	Respiratory system: Anatomy & function of different organs for respiration and air sac.	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam
	Cardiovascular system: Anatomy and function of cardiovascular system.	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam
	Urinary System: Structure and function of kidney and ureter.	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam
	Genetal system: Structure and function of male & female genital systems, mechanism of egg production.	Lecture Discussion Projector and Display	Quiz Test, Midterm and Final exam

Course Code: ANH-106 **Course Title: Avian Anatomy (Practical)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**
Rationale: To achieve the knowledge of form and structure of avian body through practical demonstration.			
Course Learning Outcomes:			
Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
Understand the collection and preservation of aves organs	Preparation of bones and settings of avian skeleton. Collection of samples of visceral organs, their preservation and various types of preservations.	Lecture, Discussion, Projector and Display Practical demonstration	Quiz Test, Midterm and Final exam
Books Recommended: 1. Sisson and Grossman's the Anatomy of the Domestic Animals. Volume 1 and 2. by Septimus Sisson (Author), James Daniels Grossman (Author), Robert Getty (Author) 2. Textbook of Veterinary Anatomy K M Dyce; W O Sack; C J G Wensing			

Course Code: ANH-107 **Course Title:** : **Embryology** (Theory)	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**
Rationale: This course is designed to provide basic concepts about the origin and development of an individual organism.			
Course Learning Outcomes: • To know the origin and development of germ cells. • To know about the reproductive cycle and their hormonal control. • To explain the mode of development from a zygote into an independent individual. • To understand the normal and abnormal development of embryo. • To know the teratological defects. • To apply the knowledge of embryology towards pathology, immunology and other applied subjects.			
Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
• Describe different terms of male and female reproductive system with general features • Describe male and female reproductive organs with labelling	**Introduction:** Some introductory terminology and general features of male and female reproductive system.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam
• Differentiate estrous and menstrual cycle	**Reproduction cycle:** Estrous and Menstrual cycle,	Lecture Discussion	Quiz Test, Mid Term and

• Describe anestrous	anestrous.	Projector and Display	Final exam
• Compare the histology of different ovarian follicles • Define gametogenesis • Describe fertilization • Discuss ovulation	**Embryogenesis-1:** Gametogenesis, semination, ovulation, fertilization.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam
• Diagram with development of fetus • Discuss fetal circulation • Explain cleavage and gastrulation	**Embryogenesis-1I:** Cleavage and gastrulation. Development of fetal membranes. Placentation and Fetal circulation.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam
• Acquire the concept of congenital and inherited abnormalities • Classify different types of developmental abnormalities • Know the factors related to developmental abnormalities	**Teratology:** Types of congenital and inherited abnormalities Abnormalities of maternal and fetal origin Control factors of embryonic development.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam

Course Code: ANH-108 **Course Title:** : **Embryology** (Practical)	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**
Rationale: This course is designed to provide practical knowledge on gradual development of embryo.			
Course Learning Outcomes: • To study the histology of reproductive organs. • To know the sequential morphological changes in different stages of embryo. • To differentiate the normal and abnormal structures of embryo.			
Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
Identify the reproductive system of different animals	Anatomical demonstration of organs of reproductive system of animals.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam
Know the histomorphology of reproductive organs	Histological slide show using microscope and projector.	Lecture Discussion Projector and Display	Quiz Test, Mid Term and Final exam
Explain the development stages of	Different stages development	Lecture	Quiz Test,

avian embryo	Organogenesis Teratology	Discussion Projector and Display	Mid Term and Final exam

Books Recommended

1. Essentials of Veterinary Histology and Embryology. R.K. Ghosh, Current books international, Kolkata.
2. LANGMAN'S Medical Embryology, T.W.Sadler, 12th edition, Lippincott, Williams and Wilkins.
3. The Early Embryology of the chick, Bradley M. Pattern, (1971). 5th edition, McGraw-Hill Book Company New York.
4. Foundations of Embryology, Bradley M. Pattern and Bruce M Carlson, (1774), 3rd edition, McGraw-Hill book Company New York.
5. Leslie Brainerd Arey. 1974. Developmental Anatomy. 7th edition Company, Philadelphia, London.
6. Bradley M. Patten. 1959. Embryology of the Pig. 3rd edition. McGraw-Hill Book Company, Now York.
7. Veterinary Embryology, E. S. Fitzpatrick, M. T. Ryan, P. J. Quinn, and T. A. McGeady, Blackwell publishing.

Course Code: ANH-302 **Course Title:** : **Embryology** (Practical)	**Credit Hour: 1.0**	**Level: 3**	**Semester: II**
Rationale: This course is aim to designed to gather comprehensive structural differences among the species to make the basis of classification.			
Course Learning Outcomes: • To study the anatomical distinguish among the various body parts of different species. • To establish the base of classification • To obtain knowledge on the cranial, spinal nerves and different plexus with their origin branches, distribution and function that is crucial needs during surgical operation / practice			
Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies

Gather the basic concept of the comparative and neuro-anatomy	**Introduction:** General idea about comparative anatomy and neuro-anatomy. The scope of comparative and neuro-anatomy and relationship with other biological science.	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,
Differentiate and classify the animal species on the basis of anatomical comparison	**Comparative study of axial and appendicular skeleton:** Comparative study of skull, ribs, sternum, forelimb and hind limb.	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,
Discriminate various organs of digestive system.	**Comparative study of various organs of digestive system:** Comparative study of alimentary tract, accessory organs (salivary gland, liver, gall bladder and pancreas) among different species such as horse, ox, goat, sheep, dog, cat and chicken.	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,
Comprise various organs of urinary system.	**Comparative study of various organs of urinary system:** Comparative study of urinary and respiratory organs of different species such as horse, ox, goat, sheep, dog, cat and chicken.	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,
Comprise various organs of genital and circulatory system.	**Comparative study of various organs of genetal system and circulatory system:** Comparative study and differences of testis, epididymis, vas deferens, urethra and penis of male genital system of horse, cattle,	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,

	sheep, goat, dog, cat and chicken. Comparative study of heart of horse, ox, goat, sheep, dog, and poultry.		
Generalize the structures of central nervous system.	**Neuro-Anatomy** **Central nervous system:** Removal of the brain from the skull Derivation of the principalparts of the brain and spinal cord and their covering.	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,
Identify the cranial, spinal nerves, and different plexus with their origin, branches, distribution and function.	**Peripheral nervous system:** Study of cranial nerves and their origin, branches, distribution and function. Study of spinal nerves and their origin, branches, distribution and function. Study of brachial plexusand lumbo-sacral plexuswith their origin and distribution.	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,
Investigate the origin, branches and distribution ofautonomicnervous system and various autonomic ganglia.	**Autonomic nervous system:** Study of origin, branches and distribution ofautonomicnervous system and various autonomic ganglia.	Lecture Discussion Projector Display Practical demonstration	Quiz Test, Term and Final exam,

Book References:

1. Sisson and Grossman's the Anatomy of the Domestic Animals, Vol. 1 and 2. by Robert Getty, 1975, W. B. Saunders Co. Philadelphia.
2. Bovine Anatomy, by W. M. Mcleod, 2nd ed. 1964, Burgers Publishing Co.
3. Anatomy of the Sheep, by Neil, D. S. May, 2nd ed. 1970, Brisbane, University of Queensland.
4. Anatomy of the Dog. by Miller, M. E. 1964, W. B. Saunders Co. Philadelphia.
5. Anatomy of Ox, ICAR Publication I"ed. New Delhi.

N. B.: A Practical note Book should be prepared on diagram (s) for each item on the basis of dissection of the species in the laboratory

Course Code: ANH-402 Course Title: : **Embryology** (Practical)	Credit Hour: 1.0	Level: 4	Semester: I
Rationale: This course is designed to provide practical knowledge on topographic anatomy to apply in surgical practice.			
Course Learning Outcomes: 1. To learn about the topographic location, underlying structures and other anatomical consideration related to surgery. 2. To visualize the course of great vessels, nerves in different body areas by external approach.			

Intended Learning Outcomes (ILOs) The students will be able to-	Course Content	Teaching / Learning Strategies	Assessment Strategies
Define different anatomical terms and name of body regions related to surgery.	**Introduction:** Definitions of Topographic Anatomy, Applied Anatomy, Surgical Anatomy, Vet. Surgical Anatomy, Surface anatomy Regional divisions of the animal body (head, neck, thorax, abdomen, pelvis, tail and appendages) Objectives of the course.	Lecture Discussion Projector and Display Practical demonstration	Quiz Test, Mid Term and Final exam
Implement the anatomical knowledge for successful abdominal surgery	**<u>Surgical Anatomy of Abdomen</u>** **Abdominal wall:** Anatomical description of the wall including the different regions- flank, paralumbar fossa, ventral abdominal region in small animal with special emphasis on muscular structures with blood and nerve supply. Structures involved in the operation of laparotomy-gastrotomy, celiotomy, enterotomy, enterectomy, various types of hernia. Topography of the abdominal viscera including peritoneum and peritoneal modifications and peritoneal pouches. Proper sites of segmental spinal nerve block, paravertebral anesthesia and high epidural anesthesia in various domestic animals.	Lecture Discussion Projector and Display Practical demonstration	Quiz Test, Mid Term and Final exam
Formulate the anatomical knowledge for successful surgery in pelvic region	**Surgical Anatomy of the pelvic cavity, hip:** Topography of the organs and associated structures of the pelvic, cavity and caudal part of the abdominal cavity through rectal palpation. Associated structures and possible sites with surgical importance to inguinal region, perineal region (ovariectomy, hysterectomy, castration,	Lecture Discussion Projector and Display Practical demonstration	Quiz Test, Mid Term and Final exam

	spaying, mammary gland and anal fistula). Possible sites of lodgments of urinary calculi in the Urinary tract and proper sites of needle puncture for evacuation of urine and also structures to be punctured. Epidural anesthesia, lumbosacral puncture for CSF, Paravertebral, Lumbar anesthesia, Perineal and Pudental nerve block. Intra-venous injection through milk or mammary vein.		
Apply the anatomical knowledge for successful surgery in perineal region	**Surgical Anatomy of the tail and perinal region:** Structures of tail with surgical importance during docking or, Structures to be incised during atresia ani, amputation. Muscles of vulva and anus. Anatomical consideration of the site of redial, ulnar and median nerve. **Intravenous Injection:** Identify site of intravenous injection through radial vein. **Nerve block:** Anatomical consideration of the site of cornual, ischiatic, tibial digital, high and low epidural and paravertebral nerve block.	Lecture Discussion Projector and Display Practical demonstration	Quiz Test, Mid Term and Final exam

Book References

1. Sisson and Grossman's the Anatomy of the Domestic Animals, Vol. 1 and 2. by Robert Getty, 1975, W. B. Saunders Co. Philadelphia.
2. Bovine Anatomy, by W. M. Mcleod, 2nd ed. 1964, Burgers Publishing Co.
3. Anatomy of the Sheep, by Neil, D. S. May, 2nd ed. 1970, Brisbane, University of Queensland.
4. Anatomy of the Dog. by Miller, M. E. 1964, W. B. Saunders Co. Philadelphia.
5. Anatomy of Ox, ICAR Publication I"ed. New Delhi.

N. B.: A Practical note Book should be prepared on diagram (s) for each item on the basis of dissection of the species in the laboratory.

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
Descipline-Animal Science				
1.	ASN 101: General Animal Science (Theory)	2	1	1
2.	ASN 102 : General Animal Science (Practical)	1	1	1
3.	ASN 103 : Livestock Management (Theory)	2	1	1I
4.	ASN 104 : Livestock Management (Practical)	1	1	1I
5.	ASN 301: Meat Technology (Theory)	1	3	1
6.	ASN 302: Meat Technology (Practical)	1	3	1
7.	ASN 303 : Animal Byproducts and Waste Management (Theory)	1	3	1I
8.	ASN 304 : Animal Byproducts and Waste Management (Practical)	1	3	1I
Total (Theory+ Practical) = (6+4) =10				
Descipline-Animal Nutrition				
9.	ASN 105 : Fodder Production (Theory)	1	1	II
10.	ASN 106 : Fodder Production (Practical)	1	1	II
11.	ASN 201 : Animal Nutrition (Theory)	2	2	1
12	ASN 202 : Animal Nutrition (Practical)	1	2	1
13.	ASN 203 : Poultry Nutrition (Theory)	1	2	II
14.	ASN 204 : Poultry Nutrition (Practical)	1	2	II
Total (Theory+ Practical) = (4+3) =07				

Total Credit Hour	
Theory	10
Practical	07
Total	17

Course Code: ASN 101 **Course Title: General Animal Science (Theory)**	**Credit Hour: 2.0**	**Level: 1**	**Semester: I**
Rationale: The course is designed to provide basic concepts of livestock production			
Course Learning Outcomes: ✓ discuss basic issues of animal science ✓ identify the breeds of livestock ✓ illustrate housing and feeding management of animal ✓ describe the contribution of livestock in the economy of Bangladesh			

Intended Learning Outcomes (ILOs)	Course Content	Teaching/ Learning Strategy	Assessment Strategy
✓ define the basic terms related to animal science ✓ describe the importance of livestock ✓ illustrate animal behavior and vices	**Introduction** ✓ introduction and scope of animal husbandry and animal science ✓ population of livestock in Bangladesh ✓ introduction to domesticated animal ecology, psychology, behavior and their vices ✓ importance of livestock and their impact on the economy of Bangladesh	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define the different technical terms for understanding animal science	Scientific and professional terms Horse, cattle, buffalo, sheep and goat	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ discuss the animal taxonomy ✓ classify the farm animal	**Taxonomy and classification of animals:** taxonomy of livestock ✓ zoological classification of livestock ✓ classification of livestock on the basis of digestive physiology and feeding habit	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ classify breeds of cattle ✓ identify the different breeds of	**Breeds of livestock :** common breeds of livestock, their importance, characteristics and adaptability with special emphasis on cattle and horse	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

cattle and horse ✓ differentiate the different breeds of cattle			
✓ state the importance of housing ✓ classify the livestock housing ✓ compute the space requirements for livestock	**Housing:** definition, objectives, advantages and disadvantages of housing ✓ site selection for housing ✓ classification of housing ✓ floor space requirements for different species of livestock	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ discuss the basic concepts of essential feed nutrients ✓ illustrate and classify livestock feed with functions	**Feedstuffs:** definition of common terms of livestock feeds and feedstuffs ✓ classification of feedstuffs ✓ essential feed nutrients and their functions	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ differentiate among various types of ration ✓ prepare the ration using various scientific methods	**Ration:** definition and classification of ration ✓ ideal characteristics of ration ✓ ration calculation by DM and Thumb rule method basis	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ describe the basic concept of urea ✓ compare the methods of different urea treated feeds ✓ discuss the side effects of urea and it's prevention	**Urea feeding:** definition and characteristics of urea, advantages of urea feeding ✓ factors affecting urea utilization ✓ methods of urea feeding, ✓ how urea utilized by ruminants ✓ symptoms and treatment of urea toxicity	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

Books recommended

1. M.E. Ensminger. 1990. Animal Science. 9th edn., Pearson, New York.
2. G.C. Banerjee. 2011. A Text Book of Animal Husbandry. 8th edn., Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3 D.N. Verma. 2005. A Text Book of Livestock Production Management in Tropic. Kalyani Publishers, New Delhi.
4. G.C. Banerjee. 1992. Poultry. Oxford & IBH Publishing CO. Pvt. Ltd., New Delhi.
5. M.C. Neshiem, R.E. Austic and I.E. Card. 1979. Poultry Production. 12th edn., Lea and Febiger, Philadelphia.
6. D.N. Verma. 1995. A Text Book of Animal Nutrition. 1st edn., Kalyani Publishers, New Delhi.

Course Code: ASN 102 **Course Title: General Animal Science (Practical)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: I**
Rationale: This course is oriented to provide students applied knowledge on animal production			
Course Learning Outcomes: ✓ discuss practical knowledge on animal management ✓ demonstrate applied livestock and poultry farming techniques ✓ illustrate feeding and housing management of livestock			

Intended Learning Outcomes (ILOs)	Course Content	Teaching/ Learning Strategy	Assessment Strategy
✓ describe the psychology of animal ✓ perform the operating of different animals ✓ demonstrate the approaching of farm animal	Handling and approaching of farm animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ list the body points of cattle ✓ draw and label the external body parts of cattle ✓ differentiate different species	Identification of different body parts of livestock	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ definition of restraining ✓ list the restraining tools ✓ demonstrate the procedure of restraining	Restraining of livestock	Lecture Discussion Demonstration	Quiz Test Term and Final exam Assignment
✓ illustrate the casting procedure ✓ demonstrate the casting methods	Casting of livestock	Lecture Discussion Demonstration	Quiz Test Term and Final exam Assignment

✓ write the objectives of live weight determination ✓ explain the methods of live weight determination	Live weight determination of animals	Lecture Discussion Demonstration	Quiz Test Term and Final exam Assignment
✓ define and classify animal's marking ✓ identify the animals on the basis of different marks	Marking and identification of animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ define the basic terms related to dentition and ageing ✓ draw and label the structure of teeth ✓ illustrate the of age of animal	Dentition and Ageing of livestock	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ define housing ✓ classify animal housing ✓ design animal house	Housing of animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ identify the various feed ingredients ✓ compute the ration of different animals	Study on feedstuffs	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ demonstrate the livestock farm	Visit to livestock farm	Demonstration	Quiz Test Term and Final exam Assignment

Books Recommended:

1. M.E. Ensminger. 1990. Animal Science. 9th edn., Pearson, New York.

2. G.C. Banerjee. 2011. A Text Book of Animal Husbandry. 8th edn., Oxford & IBH Publishing CO. Pvt. Ltd., New Delhi.

3. D.N. Verma. 2005. A Text Book of Livestock Production Management in Tropic. Kalyani Publishers, New Delhi.

4. G.C. Banerjee. 1992. Poultry. Oxford & IBH Publishing CO. Pvt. Ltd., New Delhi.

5. M.C. Neshiem, R.E. Austic and I.E. Card. 1979. Poultry Production. 12th edn., Lea and Febiger, Philadelphia.

6. D.N. Verma. 1995. A Text Book of Animal Nutrition. 1st edn., Kalyani Publishers, New Delhi.

Course Code: ASN 103 **Course Title: Livestock Management (Theory)**	**Credit Hour: 2.0**	**Level: 1**	**Semester: II**
Rationale: This course is oriented to provide students applied knowledge on animal management.			
Course Learning Outcomes: ✓ discuss livestock farm management ✓ identify the breeds of buffalo, sheep and goat ✓ assess the nutritional and housing management of farm animal			

Intended Learning Outcomes (ILOs)	Course Content	Teaching/ Learning Strategy	Assessment Strategy
✓ discuss basic issues of buffalo and draught animal ✓ describe the management of draught animal ✓ sketch a layout of small scale and commercial buffalo farm ✓ differentiate between judging and selection ✓ describe the common diseases of buffalo	**Buffalo and draught animal management** ✓ history, domestication and geographical distribution of buffaloes and other draught animal, importance of draught power in sustainable integrated farming system ✓ adaptation and the effect of environment on buffaloes and draught animal power output ✓ judging and selection of buffaloes and draught animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment

	✓ housing equipment, planning and evaluation of small scale and commercial buffalo farm ✓ common diseases of buffaloes and draught animal		
✓ discuss the basic issues of beef cattle ✓ justify the body condition scoring ✓ illustrate the management of beef cattle ✓ sketch a layout of small scale and commercial buffalo farm ✓ Predict the quality of beef ✓ describe the common diseases of beef cattle	**Beef cattle management** ✓ history, domestication and geographical distribution of beef cattle ✓ prospects and problems of beef cattle enterprise ✓ judging and selection of beef cattle ✓ production program of beef cattle, housing and equipment of beef cattle ✓ beef carcass composition and beef grading ✓ use of feed additives for beef cattle ✓ effect of environment on beef cattle production ✓ planning and evaluation of small scale and commercial beef farm ✓ common diseases of beef cattle	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ compare the behavior of sheep and goat ✓ classify the breeds of goat and sheep ✓ illustrate the nutritional management of sheep and goat ✓ outline the housing management of livestock ✓ describe the common diseases of sheep and goat	**Sheep and goat management** ✓ history, domestication and geographical distribution of sheep and goat ✓ importance of sheep and goat, their functional roles in poverty alleviation in Bangladesh ✓ classification and description of goat and sheep breed according to their uses ✓ housing of goat and sheep, management of goat and sheep for reproduction purpose, system of measuring efficiency of production, farming system of goat ✓ common diseases of sheep and goat	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment

Books Recommended

1. M.E. Ensminger. 1990. Animal Science. 9th edn., Pearson, New York.
2. G.C. Banerjee. 2011. A Text Book of Animal Husbandry. 8th edn., Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

3. D.N. Verma. 2005. A Text Book of Livestock Production Management in Tropic. Kalyani Publishers, New Delhi.
4. G.C. Banerjee. 1992. Poultry. Oxford & IBH Publishing CO. Pvt. Ltd., New Delhi.
5. M.C. Neshiem, R.E. Austic and I.E. Card. 1979. Poultry Production. 12th edn., Lea and Febiger, Philadelphia.
6. D.N. Verma. 1995. A Text Book of Animal Nutrition. 1st edn., Kalyani Publishers, New Delhi.

Course Code: ASN 104 **Course Title: Livestock Management (Practical)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**
Rationale: This course is oriented to provide students practical knowledge on animal farm management.			
Course Learning Outcomes: ✓ explain routine farm operation ✓ illustrate different tools of management ✓ demonstrate practical knowledge on farm layout			

Learning Outcomes	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ define judging and selection ✓ differentiate between judging and selection ✓ outline the body condition scoring of livestock	Judging and selection of livestock	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ define grooming ✓ list the grooming tools	Grooming and washing of animals	Lecture Discussion	Quiz Test Term and

✓ explain the methods of animal cleaning		Projector Display	Final exam Assignment
✓ state the objectives of bedding and clothing ✓ list the bedding materials of livestock ✓ illustrate the clothing techniques	Bedding and clothing of farm animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ state the importance of castration ✓ justify the suitable methods of castration ✓ compare the age of castration in different methods	Castration of animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ define dehorning and disbudding ✓ discuss the methods of dehorning and disbudding	Dehorning and disbudding of animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ describe the importance of dipping and docking ✓ explain the methods of dipping and docking	Dipping and docking of animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ define shearing and related terms ✓ distinguish between shearing and clipping ✓ illustrate the shearing and clipping process	Shearing and clipping of animals	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ list the importance of shoeing ✓ list different types of shoe ✓ describe shoeing techniques	Shoeing tools and shoeing of animal	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ define manager and management ✓ list the criteria of a good manager ✓ summarize management of farms	Management of livestock farm	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ demonstrate the livestock farm	Visit to livestock farm	Demonstration	Quiz Test Term and Final exam Assignment

Books Recommended:

1. Banerjee, G.C. 1999. A Text Book of Animal Husbandry. 8th edn. Oxford and IBH Publishing Co., New Delhi, India.
2. Ensminger, M.E 1969. Animal Science 6th edn. The Interstate Printers and publishers Inc., Danville, Illinois, US
3. McNitt, j.I. 1983. Livestock Husbandry Techniques. granada publishing Ltd. London.
4. Miller,W.C.and Robertson, E.D.S. 1959. Practical Animal Hustandry. 7th edn. Oliver and Boyd, Edinburgh, UK
5. Williamsong, G. and payne, W. J. A. 1978. An introduction to Animal Husbandry in the tropics, 3rd edn. Longman Group ltd., UK

Course Code: ASN 105 **Course Title: Fodder Production (Theory)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**
Rationale: This course is designed to provide knowledge on fodder production and preservation technology, pasture management and intercultural operations.			
Course Learning Outcomes: ✓ discuss fodder production and preservation technology ✓ explain pasture management and intercultural operations ✓ state the functions and deficiency symptoms of nutrients			

✓ describe the better management of poisonous plants			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ define the feedstuff, roughage and concentrate ✓ differentiate the roughage from concentrate ✓ classify the feedstuff ✓ describe the characteristics of roughage and concentrate	**Introduction to fodder production** ✓ feedstuff and it's classification ✓ definition of roughage and concentrate ✓ general characteristics of roughage and concentrate	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ state the importance of fodder production ✓ categorize the fodder production ✓ identify the suitable crops ✓ discuss the cultivation procedure of fodder crops	**Production technology of different fodder crops** ✓ classification and importance of fodder production ✓ fodder production guidelines ✓ suitability of different fodder crops in different parts of Bangladesh ✓ production technology of different fodder crops	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Assignment
✓ describe the plant and animal body composition ✓ compare between plants and animals ✓ list the determinants of forage composition	**Composition of plant and animal body** ✓ general composition of plant and animal body ✓ comparison between plants and animals ✓ factors that affect the chemical composition of the forage	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Assignment
✓ define pasture ✓ classify pasture ✓ state the importance of pasture ✓ evaluate the feasibility of pasturing ✓ illustrate knowledge on pasture management	**Pasture and pasture management** ✓ definition, classification and importance of pasture ✓ characteristics of a good pasture ✓ management of pastureland ✓ feasibility of pasturing in Bangladesh	Lecture Projector Display	Quiz Test, Term and Final exam, Assignment
✓ list the poisonous plants ✓ state the determinants of plant poisoning ✓ predict the symptoms of plant poisoning ✓ discus the treatment of plant poisoning	**Poisonous plants** ✓ some common poisonous plants ✓ predisposing factors of plant poisoning ✓ characteristic symptoms of plant poisoning ✓ preventing losses from poisonous plants ✓ treatments of plant poisoned animals	Lecture Projector Display	Quiz Test, Term and Final exam, Assignment
✓ describe the sources and forms of absorption of nutrients ✓ state the functions and deficiency symptoms of	**Fodder nutrition and growth** ✓ nutrient elements, their sources and forms of absorption ✓ functions and deficiency symptoms of nutrients	Lecture Projector Display	Quiz Test, Term and Final exam, Assignment

nutrients ✓ illustrate manure and fertilizer	✓ concept of manures and fertilizers		
✓ define and classify soil ✓ assess the interrelation between soil p^H and nutrient availability	**Soil management for better fodder production** ✓ definition and classification of soil ✓ soil component ✓ soil p^H ✓ relationship between soil p^H and nutrient availability ✓ problem soil and its correction	Lecture Projector Display	Quiz Test, Term and Final exam, Assignment
✓ discuss the inter-cultural operations for fodder production	**Tillage and intercultural operations for fodder production** ✓ Definition, objectives, advantages, disadvantages and methods of weeding, mulching, irrigation and drainage	Lecture Projector Display .	Quiz Test, Term and Final exam, Assignment
✓ define hay, silage and haylage ✓ describe about hay and silage making ✓ state the determinants of hay and silage making	**Conservation of fodder crops** ✓ definition, importance and methods of conservation ✓ preparation of silage and hay ✓ definition and advantages of silage and hay making ✓ methods of silage and hay making, ✓ crops suitable for hay making and silage making ✓ stage of harvesting of crops for hay making and silage making ✓ factors affecting the nutritive value of hay and silage ✓ nutrients losses during hay making and silage making ✓ types of silo pits ✓ characteristics of a good silo ✓ use of additives during ensiling ✓ chemical changes occur in the green mass ✓ haylage	Lecture Projector Display	Quiz Test, Term and Final exam, Assignment

Books recommended:

1. De, G. C. Fundamentals of Agronomy.1995. Oxford & IBH Publishing Co. New Delhi, India
2. Langer, R. H. M. 1973. Pasture and Pasture Plants. A. H. & A. W. Reed Ltd. Wellington, Sydney, London
3. Banerjee, G. C. Feeds and Principles of Animal Nutrition. Oxford & IBH Publishing Co. New Delhi, India
4. Ranjhan, S. K. Animal Nutrition and Feeding Practices. 1999. Vikas Publishing House Private Ltd. India
5. Reddy, D. V. Principles of Animal Nutrition and Feed Technology, 2003. Oxford & IBH Publishing Co. New Delhi, India

Course Code: ASN 106 **Course Title: Fodder Production (Practical)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**

Rationale: This course is designed to provide basic concepts on identification of agricultural implement, seed, roughage and concentrate. It also covers fodder production and preservation technology.

Course Learning Outcomes:

- ✓ identify various agricultural implement, seed, roughage and concentrate
- ✓ discuss fodder production and preservation technology
- ✓ illustrate manures and fertilizers required for fodder production

Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ list the implements required for fodder production ✓ identify the various agricultural implements	Identification of different agricultural implements needed for fodder Production	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Practical Note Book
✓ demonstrate the various seeds, roughage and concentrate feed ✓ illustrate the chemical composition of feedstuff	Identification of different seeds, roughage and concentrate feed	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Practical Note Book
✓ determine the feed and fodder requirements of dairy animals ✓ illustrate total land required for establishment of dairy farm	**Fodder production plan for a dairy farm** ✓ requirements of feed and fodder for lactating cow, dry cow, bullock, heifer and calf ✓ total land requirements	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Practical Note Book
✓ describe the methods of ensiling ✓ state the determinants of silage nutritive value	**Preparation of silage** ✓ methods of silage making ✓ chemical changes in green mass ✓ factors affecting the nutrient value of silage ✓ dry matter of the crop to be ensiled ✓ special method of silage making	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Practical Note Book
✓ list the crops suitable for hay making ✓ write the determinants of hay making ✓ discuss the methods of hay making	**Preparation of hay** ✓ crops suitable for hay making ✓ steps of crop harvesting ✓ importance of moisture in hay making ✓ methods of hay making ✓ factors affecting nutritional value of hay	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Practical Note Book

✓ define the various manures and compost ✓ state the composition of compost and manure ✓ discuss the compost making procedure	**Study on manures and fertilizers required for fodder production** ✓ definition of green manure, farmyard manure, home compost and vermicompost ✓ compost making ✓ nutrient composition of compost, green manure and farmyard manure	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Practical Note Book
✓ discuss the cultivation procedure of leguminous and non-leguminous fodder	Study on cultivation technique of seasonal fodder	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Practical Note Book

Books recommended:

1. De, G. C. Fundamentals of Agronomy.1995. Oxford & IBH Publishing Co. New Delhi, India
2. Langer, R. H. M. 1973. Pasture and Pasture Plants. A. H. & A. W. Reed Ltd. Wellington, Sydney, London
3. Banerjee, G. C. Feeds and Principles of Animal Nutrition. Oxford & IBH Publishing Co. New Delhi, India
4. Ranjhan, S. K. Animal Nutrition and Feeding Practices. 1999. Vikas Publishing House Private Ltd. India
5. Reddy, D. V. Principles of Animal Nutrition and Feed Technology, 2003. Oxford & IBH Publishing Co. New Delhi, India

Course Code: ASN 201 **Course Title: Animal Nutrition (Theory)**	**Credit Hour: 2.0**	**Level: 2**	**Semester: I**

Rationale: This course is designed to provide the basic concepts of nutrients, digestive physiology and ration formation of different animals.

Course Learning Outcomes:

- ✓ discuss the basic knowledge of animal nutrition
- ✓ illustrate the evaluation of feeds
- ✓ describe digestion, absorption and metabolism of nutrients
- ✓ apply knowledge of ration formulation

Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ define basic terms related to animal nutrition ✓ summaries the history of animal nutrition ✓ classify the nutrients ✓ interpret the soil-plant-animal relationship	**Introduction to feeding animals** ✓ definition of nutrients ✓ classification of nutrients ✓ field of nutrient ✓ history of gradual expansion of the field of nutrition ✓ soil-plant-animal relationship	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ classify the rumen microbes ✓ describe the fetal development ✓ discuss the rumen microbial ecology	**Physiology and microbiology of rumen** ✓ Fetal development ✓ establishment of rumen microbes ✓ types of microbial population ✓ rumen environment ✓ and nutrient requirements by rumen microbes	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ classify the digestion and digestive system ✓ explain the digestive physiology of different species	**Digestive organs, digestion, absorption and metabolism of nutrients** ✓ define and classify digestion ✓ organs of digestion ✓ digestive physiology of ruminants and non-ruminants ✓ digestion, absorption and metabolism of carbohydrate, proteins, fat and minerals	Lecture Projector Display	Quiz Test Term and Final exam Assignment Poster presentation
✓ classify the feed evaluation system ✓ state the different digestibility trial	**Evaluation of feeds** ✓ definition and importance of evaluation ✓ methods of evaluation	Lecture Projector Display	Quiz Test Term and Final exam Assignment

✓ sketch the partition of biological energy ✓ determine the protein quality	✓ digestibility trials ✓ partition of biological energy ✓ evaluation of protein quality		
✓ categorize different feeding standard ✓ development of feeding standard ✓ state the prospects of feeding standard	**Feeding standard** ✓ definition and types of feeding standard ✓ development of feeding standard (comparative type, digestible nutrient system production type value) ✓ prospects of developing feeding standard in Bangladesh	Lecture Projector Display	Quiz Test Term and Final exam Assignment
✓ define ration and balanced ration ✓ state the characteristics of ration ✓ compute ration for livestock	**Balanced ration and feeding of livestock** ✓ balanced ration and its characteristics ✓ computation of ration for cattle and buffaloes ✓ feeding of livestock during scarcity periods	Lecture Projector Display	Quiz Test Term and Final exam Assignment
✓ classify the different contaminants in livestock feed ✓ state the various sources of toxins and their effects	**Anti-nutritional factors in animal feedstuffs** ✓ list and classify the different contaminants in livestock feed ✓ sources of various toxins ✓ effect of anti-nutritional substances and mycotoxins in animals feeds ✓ fungal contamination in forage and concentrate	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ define vitamin and minerals ✓ distinguish the vitamin and minerals ✓ illustrate the functions, sources and deficiency symptoms of vitamin and mineral	**Physiology of Vitamin and Minerals** ✓ role of vitamin and mineral in animal feeding ✓ functions and deficiency symptoms of vitamins and minerals ✓ role of water in animal feeding	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ identify breeds of rabbit ✓ discuss housing management of rabbit ✓ apply knowledge on rabbit industry ✓ state the nutritional value of rabbit meat	**Rabbit rearing** ✓ breeds of rabbit ✓ housing ✓ commercial rabbit industry ✓ nutritional value of rabbit meat	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment

Books recommended:

1. Banerjee, G. C. Feeds and Principles of Animal Nutrition. Oxford and IBH Publishing Co. New Delhi, India.

2. Ranjhan, S. K. Animal Nutrition and Feeding Practices. 1999. Vikas Publishing House Private Ltd. India.
3. Reddy, D. V. Principles of Animal Nutrition and Feed Technology, 2003. Oxford & IBH Publishing Co. New Delhi, India.
4. Reddy, D. V. Applied Nutrition. 2003. Oxford & IBH Publishing Co. New Delhi, India
5. P, Mcdonald; R. A. Edwards; J. F. D. Greenhalgh and C. A. Morgan. Animal Nutrition. 1999. Replika Press Pvt. Ltd. Delhi 11040, India.

Course Code: ASN 202 **Course Title: Animal Nutrition (Practical)**	**Credit Hour: 1.0**	**Level: 2**	**Semester: I**
Rationale: This course is designed to provide knowledge on sampling, safety measures in laboratory and various procedures for determination of feed nutrients.			
Course Learning Outcomes: ✓ explain personal protective measures to be taken during working in the laboratory ✓ prepare various solutions for chemical analysis ✓ discuss sampling procedure and proximate analysis ✓ demonstrate the methods for determination of DM, CF, CP, EE and fiber			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ generalize the protection measures during working in the laboratory ✓ list of personnel protective measures	Safety measures/precautions for laboratory working	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ define sample ✓ state the sampling procedure ✓ determine the stage of sampling	Sampling principles and procedures	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ sketch the flow chart of proximate analysis ✓ discuss the procedure of proximate analysis ✓ state the merits and demerits of proximate analysis	Principles and procedures of proximate analysis of feedstuffs	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment

✓ illustrate the procedures of ash determination	Determination of ash	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ define dry matter ✓ describe the procedures of dry matter determination	Determination of DM	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ illustrate the procedures of crude fiber determination	Determination of CF	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ define crude protein ✓ state the formula of cp determination ✓ assess CP using kjeldahl method	Determination of CP	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ determine ether extract	Determination of EE	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment
✓ categorize fiber ✓ discuss the methods for fiber determination	**Van Soest method of feed analysis:** Classification of fiber, principles for fiber determination.	Lecture Projector Display Interactive discussion	Quiz Test Term and Final exam Assignment

Book recommended:

1. Banerjee, G. C. Feeds and Principles of Animal Nutrition. Oxford and IBH Publishing Co. New Delhi, India
2. Ranjhan, S. K. Animal Nutrition and Feeding Practices. 1999. Vikas Publishing House Private Ltd. India
3. Reddy, D. V. Principles of Animal Nutrition and Feed Technology, 2003. Oxford & IBH Publishing Co. New Delhi, India
4. Reddy, D. V. Applied Nutrition. 2003. Oxford & IBH Publishing Co. New Delhi, India
5. P, Mcdonald; R. A. Edwards; J. F. D. Greenhalgh and C. A. Morgan. Animal Nutrition. 1999. Replika Press Pvt. Ltd. Delhi 11040, India.

Course Code: ASN 203 **Course Title: Poultry Nutrition (Theory)**	**Credit Hour: 1.0**	**Level: 2**	**Semester: II**
Rationale:			
Course Learning Outcomes: articulate the knowledge and skills you want students to acquire by the end of the course			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
To know the history of avian species.	**Introductory:** Define poultry nutrition, objectives of poultry nutrition, History of poultry nutrition, biology of avian species and other non-ruminant species	Lecture Discussion Projector Display	Quiz Test (Term and Final exam, Short) Essay, Assignment
To understand the digestion, absorption and metabolism of nutrients in poultry	**Digestion, absorption and metabolism of nutrients:** Digestive anatomy of poultry, comparative anatomy of digestive tract of poultry and ruminant, difference between poultry ration and ruminant ration, digestion absorption and metabolism of nutrients in poultry.	Lecture Discussion Projector Display	Quiz Test (Term and Final exam, Short) Essay, Poster presentation
To know the feedstuffs and	**Feedstuffs and Feed or Ration**	Lecture	Quiz Test

feeds of poultry ration and apply for poultry.	**formulation:** Principles of poultry feeding, poultry feedstuffs, conventional and unconventional feedstuffs, prospects and limitations of using unconventional feedstuffs, Factors affecting the selection of feed ingredients, use of agro-industrial byproduct in ration, procurement and storage of feedstuffs, information needed during ration formulation, essential steps in ration formulation, feeding standard, inclusion level, ration formulation by computer/linear programming, quality control in feed manufacturing, differences between broiler and layer nutrition	Discussion Projector Display	(Term and Final exam, Short) Essay, Seminar
Knowing the effective knowledge for feed efficiency of poultry.	**Feed efficiency**: Feed efficiency, feed efficiency ratio, factors affecting feed efficiency, techniques of improving feed efficiency	Lecture Projector Display	Quiz Test, Term and Final exam, Short Essay.
Evaluation of feed additives used in poultry ration and their positive and negative effect on the poultry products	**Feed additives:** Def. of feed additives, why feed additives, classification of feed additives, causes of indiscriminate use of feed additives in Bangladesh poultry, consideration before selecting feed additives.	Lecture Projector Display	Quiz Test, Term and Final exam, Short Essay, Poster presentation
To learn the role of vitamins and minerals in poultry	**Vitamin and mineral:** Definition, functions, deficiency symptoms, source of vitamin and mineral, prevention and control	Lecture Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment.
Achieve the knowledge of functions of amino acids and fatty acids in poultry ration	**Amino acids and fatty acids:** Def. types of a. acids, factors affecting a. acids requirements, difference between plant and animal protein, effect of excess protein/a. acids, essential fatty acids	Lecture Projector Display	Quiz Test, Term and Final exam, Short Essay.
Knowing the nutrients requirements of duck and other poultry	**Nutrition of duck and other poultry**: Feeds and feeding of ducks and others	Lecture Projector Display	Quiz Test, Term and Final exam, Short Essay.
Understanding the nutrients interaction and some basic terms	**Nutrient interrelationships and some related topics:** Interactions among the nutrients, Calorie-protein ratio, fiber in poultry ration, unidentified growth factors, effect of diet on egg quality, def. and	Lecture Projector Display	Quiz Test, Term and Final exam, Short Essay. Assignment.

	function of vitamin-mineral-amino acids premix and composition		

Books recommended:

1. Banerjee, G. C. Feeds and Principles of Animal Nutrition. Oxford & IBH Publishing Co. New Delhi, India
2. Ranjhan, S. K. Animal Nutrition and Feeding Practices. 1999. Vikas Publishing House Private Ltd. India
3. Ranjhan, S. K. Animal Nutrition in the Tropics. 2001. Vikas Publishing House Private Ltd. India
4. Reddy, D. V. Applied Nutrition. 2003. Oxford & IBH Publishing Co. New Delhi, India
5. Banerjee, G. C. Poultry, Oxford & IBH Publishing Co. New Delhi, India
6. Bolton, W. and Blair, R. M. A. F. F. 1979. Poultry Nutrition, Her majesty's Stationary Office, 49, High Holborn, London WCIV6 HB
7. Scott, M. L. Nesheim, M. C. and Young, R. J. M. L. 1982. Nutrition of the Chicken. Scott and Associates, Ithaca, New york
8. Leeson, S. 1991. Commercial Poultry Nutrition. Watt Book Service 122, Weslay Ave, Mount Morris, USA

Course Code: ASN 204 **Course Title: Poultry Nutrition (Practical)**	**Credit Hour: 1.0**	**Level: 2**	**Semester: II**
Rationale:			
Course Learning Outcomes: articulate the knowledge and skills you want students to acquire by the end of the course			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
To know the different parts of digestive system	**Study on digestive system of poultry**: Digestive organs of poultry and their functions	Lecture Discussion Projector	Quiz Test, Mid Term and Final exam, Short Essay.

		Display, Demonstration.	
To gain the knowledge of feed ingredients for ration formulation	**Identification of feed ingredients:** Energy source, protein source, vitamin and minerals source	Lecture Discussion Projector Display, Demonstration.	Quiz Test, Term and Final exam, Short Essay.
To learn the Formulation of ration for poultry in different age	**Formulation of ration of various types of poultry:** Feeding of poultry, latest feeding standard of poultry, chemical composition and nutritive value of common poultry feed ingredients, calculation of ration formulation for broiler starter, broiler finisher, layer starter, layer grower and layer finisher, inclusion level of feed ingredients, essentials and importance of feed ingredients, ration formulation by using different methods.	Lecture Discussion Projector Display, Demonstration.	Quiz Test, Term and Final exam, Short Essay.
To enable the knowledge of feed mixing	**Study on preparation of mixed feed:** procedure of feed mixing	Lecture Discussion Projector Display, Demonstration.	Quiz Test, Term and Final exam, Short Essay.
knowing the feed and water requirement of poultry	**Feeding and watering practices for layer and broiler:** feeding management, watering management, cleaning of watered and feeder	Lecture Discussion Projector Display, Demonstration.	Quiz Test, Term and Final exam, Short Essay.
To gain the practical experience of feed market	**Report and visit of feed market:** Visit feed market, Loose feed, price of poultry product	Lecture Discussion Projector Display, Demonstration.	Quiz Test, Term and Final exam, Short Essay Assignment
Achieve the practical knowledge about poultry farm	**Field trip in commercial poultry farm and mills in Bangladesh**	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay.

Books recommended:

1. Banerjee, G. C. Feeds and Principles of Animal Nutrition. Oxford & IBH Publishing Co. New Delhi, India

2. Ranjhan, S. K. Animal Nutrition and Feeding Practices. 1999. Vikas Publishing House Private Ltd.
India
3. Ranjhan, S. K. Animal Nutrition in the Tropics. 2001. Vikas Publishing House Private Ltd. India
4. Reddy, D. V. Applied Nutrition. 2003. Oxford & IBH Publishing Co. New Delhi, India
5. Banerjee, G. C. Poultry, Oxford & IBH Publishing Co. New Delhi, India
6. Bolton, W. and Blair, R. M. A. F. F. 1979. Poultry Nutrition, Her majesty's Stationary Office, 49, High Holborn, London WCIV6 HB
7. Scott, M. L. Nesheim, M. C. and Young, R. J. M. L. 1982. Nutrition of the Chicken. Scott and Associates, Ithaca, New york
8. Leeson, S. 1991. Commercial Poultry Nutrition. Watt Book Service 122, Weslay Ave, Mount Morris, USA

Course Code: ASN 301 **Course Title: Meat Technology (Theory)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: I**
Rationale: This course is designed to provide basic concepts of meat, meat products and their processing technology.			
Course Learning Outcomes:			

- To know ante-mortem and post-mortem inspection.
- Obtaining knowledge on quality determination, quality control and quality assurance program.
- To illustrate the application of modern meat processing technology.
- To recommend the methods of preventing meat borne zoonotic and contagious diseases.

Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ To obtain basic concepts of meat technology. ✓ To predict the feasibility of meat industry in Bangladesh.	**Introduction to meat science and Technology:** Meat, Meat technology, Meat hygiene, Tasks of meat technology. Present Status of meat Industry in Bangladesh, Problems of meat industry in Bangladesh, Future prospect of slaughter house or meat industry in Bangladesh.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam
✓ To discuss the different technical terms for understanding meat technology.	Glossary on meat and meat technology.	Lecture Discussion	Quiz Test, Term and Final exam, Assignment
✓ Describe the structure of muscle. ✓ Comparison of nutritive value of meat of different species. ✓ Justify the effects of meat on human health. ✓ Detect the best quality meat for consumption.	**Composition and structure of muscle:** Average composition of meat, comparative composition of meat of different species, nutritive value/ food value of meat, factors affecting composition and nutritive value of meat, toxic compounds in meat. Myoglobin, muscle fibre bundle, myofibril, sarcoplasma.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Classify the methods of animal transportation. ✓ Assess the suitable methods of animal transportation. ✓ Categorize the housing system. ✓ Gathering knowledge about management of meat animals for quality meat production.	**Care and management of meat animals** Transportation of meat animals. Housing of meat animals. Resting, feeding, watering, and fasting/off-feeding, washing and cleaning of meat animals.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Distinguish the physical and chemical properties of meat from different species. ✓ Differentiate the	**Differentiation of meat of different animals:** Physical and chemical properties of veal, beef, mutton, chevon, pork, horse meat, dog meat.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment

carcass of various animals. ✓ Investigate the adulteration of meat and its prevention.	Carcass characteristics of cattle, horse, sheep, goat, pork and poultry. Carcass differentiation of horse from cattle and sheep from goat.		
✓ Describe the dressing percentage. ✓ Determine the dressing percentage. ✓ Measure the approximate quantity of meat produced from different species. ✓ Conclude the determinants of dressing percentage.	**Dressing of animals** Definition of dressing, dressing percentage, carcass and dressed carcass, desirable characteristics of carcass. Dressing percentage of different species of livestock. Factors affecting dressing percentage- breed, age, sex and fattening.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Understanding and subdividing the determinants of meat production.	Factors affecting the quality and quantity of meat- • Genetic factors. • Pre slaughter factors. • Post slaughter factors. • Nutritional factors. • Managemental factors.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Basic concept of grading. Categorization of meat on the basis of quality.	Grading of meat and meat products- Definition and advantages of grading, Grading of beef, mutton, chevon, chicken and pork.	Lecture Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Define packaging and related terms. ✓ Classify packaging materials. ✓ Discuss packaging techniques.	Packaging of meat and meat products- Definition and objectives of packaging, Criteria and classification of packaging materials, Packaging of meat and meat products.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ To assess the ways of meat spoilage and its prevention.	Spoilage- Spoilage under aerobic conditions, Spoilage under anaerobic conditions, Factors affecting spoilage of meat.	Lecture Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ To acquire knowledge about meat marketing channels.	Marketing of meat and meat products.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ List the meat borne zoonotic diseases. ✓ Planning for the control and prevention of meat borne zoonotic diseases.	**Meat borne diseases:** Definition, clinical findings, postmortem findings, prevention and control of Anthrax, Brucellosis, Botulism, Salmonellosis, Tuberculosis, Trichinellosis, Taeniasis etc.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment

Books Recommended:

1. Hui Y. H., 2001. Handbook of Meat and Meat Processing, Second Edition, CRC press, New York, USA.
2. Leo M.L. Nollet, Fidel Toldra, 2009. Handbook of Processed Meats and Poultry Analysis CRC press, New York, USA.
3. Singh V.P. and Neelam S., 2015, Principles of Meat Technology. New India Publishing Agency, New Delhi, India.
4. Rahman M.M., 2007. Meat hygiene and Technology. Zaman Printers, Bangladesh.
5. EIRI Board of Consultants and Engineers. Meat Processing and Meat Products Handbook. EIRI, New Delhi, India.

Course Code: ASN 302 **Course Title: Meat Technology (Practical)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: I**

Rationale: This course is designed to achieve practical knowledge on meat, meat products and meat industry.

Course Learning Outcomes:

- ❖ To evaluate the meat animal for quality products.
- ❖ To understand the comparative carcass characteristics of different species.
- ❖ To compare and selection of quality meat and meat products.
- ❖ To achieve practical knowledge on meat industry.

Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ Discuss the management of meat animal for slaughter. ✓ Determine the factors that affect meat quality during and after slaughtering.	Essential of slaughtering- • Pre slaughter essentials. • Essentials at the time of slaughter. • Post slaughter essentials.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Define ante and post mortem inspection. ✓ Illustrate the methods of inspection. ✓ To evaluate whether an animal is suitable for slaughtering or not.	Inspection of meat animal prior to slaughter- Ante-mortem inspection. Post-mortem inspection.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Discuss slaughtering methods. ✓ Explain the advantages and disadvantages of different techniques. ✓ To select which method of slaughtering is best.	Methods of animal slaughtering: Conventional methods and Ritualistic methods. Advantages and disadvantages of different techniques.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment

✓ Compare carcass characteristics of different species. ✓ Detect the adulteration of meat and its prevention.	Demonstration of carcass of meat animals.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Distinguish different meat by-products. ✓ Discuss the use of by-products.	Isolation of edible and in edible portions of carcass.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Compare and selection of quality meat from different area of body.	Demonstration of meat cuts for different species of animals.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Define preservation and related terms. ✓ Select the suitable method of meat preservation	Preservation of meat by- Asepsis, Application of heat, Use of low temperature, Preservation by drying, Use of preservatives, Curing, Smoking, Spices and Antibiotics	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Discuss different ingredient for meat recipes. ✓ Categorization of herbal ingredients. ✓ Formulation of meat recipes.	Preparing of meat and meat products Ingredients required for meat recipes, Classification of herbal ingredients as spices, Preparation of meat recipes.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ Develop a lay out of slaughterhouse.	Planning and design of small scale slaughter house.	Lecture Discussion Projector Display Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment
✓ To achieve practical knowledge on meat industry.	Visit to meat industry.	Demonstration	Quiz Test, Term and Final exam, Short Essay, Assignment

Books Recommended:

1. Hui Y. H., 2001. Handbook of Meat and Meat Processing, Second Edition, CRC press, New York, USA.
2. Leo M.L. Nollet, Fidel Toldra, 2009. Handbook of Processed Meats and Poultry Analysis CRC press, New York, USA.
3. Singh V.P. and Neelam S., 2015, Principles of Meat Technology. New India Publishing Agency, New Delhi, India.
4. Rahman M.M., 2007. Meat hygiene and Technology. Zaman Printers, Bangladesh.

5. EIRI Board of Consultants and Engineers. Meat Processing and Meat Products Handbook. EIRI, New Delhi, India.

Course Code: ASN 303 **Course Title: Animal Byproducts and Waste Management (Theory)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: II**
Rationale: This course is designed to provide basic concepts of animal byproducts and waste management.			
Course Learning Outcomes: ✓ describe the potentials of leather and wool industry in Bangladesh ✓ detect the health hazards associated with feeding of animal waste ✓ discuss the use of animal and slaughter house by products ✓ elucidate the better management of animal waste			

Intended Learning Outcomes (ILOs)	**Course Content**	**Teaching / Learning Strategy**	**Assessment Strategy**
✓ discuss the basic concepts of hides, skins, wool and waste ✓ describe the situation of hides, skins, wool and waste management in Bangladesh	**Introduction to hides, skins, wool and waste management** ✓ importance and present status of hides, skins, wool and waste management in Bangladesh ✓ problem, prospects and recommendation for production of hides, skins and wool in Bangladesh ✓ importance, prospects and potential of livestock waste management in Bangladesh	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define different technical terms related to hides, skins, wool and waste	**Glossary on hides, skins, wool and waste management**	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

✓ describe the structures, properties and use of hides and skins ✓ summarize the damage and defects of hides and skins ✓ classify hides and skins according to quality	**Composition and quality of hides and skin** ✓ composition, microscopic structure, functions of hides and skin, ✓ physical properties of hides, and skin ✓ damage and defects of hides and skins ✓ factors affecting the quality of hides and skins ✓ grading of hides and skins	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ describe the better preservation techniques of hides and skins ✓ illustrate the tanning procedure for leather production ✓ explain the marketing channels for hides and skins	**Management of leather** ✓ production, processing and preservation of hides and skin ✓ production and management of leather (tanning) ✓ methods and factors affecting the preservation of hides and skins ✓ marketing of hides and skins	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ discuss the general features of wool ✓ classify wool and hair fiber ✓ describe wool production ✓ detect the determinants of wool quality	**Hair fiber and wool production** ✓ physical properties, virtues, fleece characteristics of wool ✓ specialty hair fiber and their uses, classification and grading of wool ✓ manufacturing process and factors influencing the price of wool	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ discuss the nutritional value of animal waste ✓ list the composition of animal waste ✓ analyze the health hazards associated with feeding of animal waste	**Animal waste management** ✓ animal wastes, wastes from tanneries and slaughterhouses, and their composition ✓ farm animal wastes as livestock feed ✓ safety and regulation of feeding animal wastes	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ state the better management of animal waste ✓ write the feasibility of animal waste utilization	**Waste management technology** ✓ development of technologies for processing and treatment of animal wastes ✓ disposal of animal wastes, control of odors and environmental pollution ✓ economics of animal wastes management	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

Books Recommended

1. Wool Hand Book. 1963. Bergen W.V 3rd Enlarged Edn. Interests A division of John Willey and Sons, New York, London.
2. Sheep and Wool-Science. 1964 Newsmonger. M.E 3rd Edn /the Interstate Punters & Publishers in Danville Illinois U.S.A.
3. Flaying and Curing of Hides and Skins as a rural industry 1978 Aten A. Fade Innes, R. and Knee Food and Agriculture Organization of the United Nations, Rome Italy.
4. The Chemistry and Technology of Leather,Vol. -1, Preparation for Fannage,1965 O'Flaherty F, Ruddy. W.T. & Lollar, R.M. Reinhold Publishing Corporation, New York, Chapman & hall Ltd, London, U,K
5. Skin, Hide and Leather Defects, 1986, Tenuous, J.J. Ruddy, W.T. and O'Flaherty, F, Tanners Council Laboratory, university of Cincinnati, Cincinnati 21, Ohio, U.S.A
6. An Introduction to the Principles of Leather Manufacture. 1985 Indian Leather Technology Assertion Mercantile Buildings, Lalbazar, Calcutta 70001.

Course Code: ASN 304 **Course Title: Animal Byproducts and Waste Management (Practical)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: II**
Rationale: This course is designed to achieve practical knowledge on animal byproducts and waste management.			
Course Learning Outcomes: ✓ illustrate the production processes of hides and skins ✓ discuss the manufacturing of wool ✓ determine the preservation procedure of hides and skins ✓ plan of animal waste utilization using modern technology			

Intended Learning Outcomes (ILOs)	**Course Content**	**Teaching / Learning Strategy**	**Assessment Strategy**
✓ discuss the management of animal before slaughter	**Preparation of animal before slaughter for quality production of hides and skin**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ describe the role of complete bleeding for quality leather production ✓ select the suitable flaying technique	**Production of hides and skins-** ✓ slaughtering of animal ✓ complete bleeding ✓ flaying techniques ✓ washing of hides and skins	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment

✓ examine the inner structure of hides, skins and wools	**Microscopic studies of hides, skins and wool**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ discuss the manufacturing processes of wool	**Production of wool**	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define staple length ✓ determine the staple length	**Measurement of staple length of wool**	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ list the curing agent ✓ state the best methods for curing	**Curing of hides and skin**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ estimate the nutritional value of animal waste ✓ select the storage techniques of animal waste	**Collection, identification, chemical composition and storage of animal wastes**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ describe the use of animal by product and slaughter house by product	**Animal by product and slaughter house by products**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ select the composting procedure	**Study on composting**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ design of a biogas plant ✓ describe the procedure of biogas production	**Study on biogas plant**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ discuss the hygienic management of housing	**Cleaning and washing of animal house**	Lecture Discussion Projector	Quiz Test Term and Final exam

		Display Demonstration	Assignment
✓ demonstrate on slaughter house, hides and skin market and tanneries of Bangladesh	**Visit to slaughter house, hides and skin market and tanneries of Bangladesh**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment

Books Recommended

1. Wool Hand Book. 1963. Bergen W.V 3rd Enlarged Edn. Interests A division of John Willey and Sons, New York, London.
2. Sheep and Wool-Science. 1964 Newsmonger. M.E 3rd Edn /the Interstate Punters & Publishers in Danville Illinois U.S.A.
3. Flaying and Curing of Hides and Skins as a rural industry 1978 Aten A. Fade Innes, R. and Knee Food and Agriculture Organization of the United Nations, Rome Italy.
4. The Chemistry and Technology of Leather,Vol. -1, Preparation for Fannage,1965 O'Flaherty F, Ruddy. W.T. & Lollar, R.M. Reinhold Publishing Corporation, New York, Chapman & hall Ltd, London, U,K
5. Skin, Hide and Leather Defects, 1986, Tenuous, J.J. Ruddy, W.T. and O'Flaherty, F, Tanners Council Laboratory, university of Cincinnati, Cincinnati 21, Ohio, U.S.A
6. An Introduction to the Principles of Leather Manufacture. 1985 Indian Leather Technology Assertion Mercantile Buildings, Lalbazar, Calcutta 70001.

Department of Microbiology (MIC)

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
1.	MIC 101: General Microbiology (Theory)	2	1	I1
2.	MIC 102: General Microbiology (Practical)	1	1	I1
3.	MIC 201: Biosafety and Hygiene (Theory)	2	2	I
4.	MIC 202: Biosafety and Hygiene (Practical)	1	2	I
5.	MIC 203: Bacteriology (Theory)	3	2	II
6.	MIC 204: Bacteriology (Practical)	1	2	II
7.	MIC 301: Virology (Theory)	3	3	1
8.	MIC 302: Virology (Practical)	1	3	1
9.	MIC 303: Immunology and Serology (Theory)	2	3	II
10.	MIC 304: Immunology and Serology (Practical)	1	3	II
11.	MIC 401: Public Health & Ecosystem (Theory)	2	4	II
12.	MIC 501: Food Hygiene (Theory)	1	5	1
13.	MIC 502: Food Hygiene(Practical)	1	5	1
Total (Theory+ Practical) = (15+6) =21				

Total Credit Hour	
Theory	15
Practical	06
Total	21

Course Code: MIC 101 Course Title: General Microbiology (Theory)	Credit Hour: 2.0	Level: 1	Semester: II

Rationale: To provide fundamental knowledge about different types of microorganisms and their basic features.

Course Learning Outcomes:

- ✓ obtain knowledge about history, distribution, morphology and physiology of microorganisms
- ✓ attain knowledge on definition and general properties of six groups of microorganism
- ✓ acquire knowledge about bacterial genetics specially plasmid, gene transfer
- ✓ achieve knowledge about differentiation among different types of microorganisms, their reproduction nutrition , toxin and growth factors
- ✓ acquire knowledge about mechanism of infection and virulence

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ gain knowledge about brief history of microbiology ✓ explain the contributions to microbiology made by different microbiologist	history, development and concepts of microbiology with special emphasis on bacteria.	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ compare prokaryote cell from eukaryote cell ✓ describe the structures external and internal to the cell wall of bacteria ✓ differentiate between Gram (+ve) and Gram (-ve) bacteria ✓ acquire knowledge about composition and function of different bacteria. ✓ state the shape, size and their arrangement ✓ classify of bacteria on the basis of mentioned parameter	definition and general properties of bacteria differentiation of prokaryote from eukaryote	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ illustrate metabolism, reproduction and growth curve of bacteria ✓ assess the physical, chemical, biological properties and reproduction of fungi	metabolism of bacteria definition and their physical, chemical biological properties, reproduction, classification of fungi	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

✓ compare the phases of microbial growth ✓ describe relation between growth with generation time ✓ outline about nutritional, physicochemical requirements	cultivation, nutrition and growth of bacteria and fungi	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ perform about definition, differentiation of toxin, exotoxin and endotoxin ✓ list the name of fungal toxin and differentiation between fungal toxin and bacterial toxin ✓ execute the effect of different toxins in disease production	toxin and antitoxin: Exotoxin and endotoxin, toxin produced by bacteria, fungi and their effects on host tissues, Role of antitoxin against toxins	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ recall about various definition of infection, disease & virulence ✓ describe the factors of virulence in disease production ✓ justify relationship of microorganisms to a disease	mechanism of infection: microbial virulence, transformation of infectious agents, relationship of microorganisms to a disease, general defense mechanism of the body, Koch's postulate	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define disinfectants, disinfections and antiseptic ✓ explain the characteristics of an ideal disinfectant	disinfectants and their characteristics	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define genetics, genome, gene,genetic code, genetype and phenotype ✓ explain the DNA serves as genetic information ✓ assess the procedure of DNA replication ✓ define mutation, classify mutation ✓ perform about definition, ✓ differentiation of transformation, conjugation, transduction ✓ describe the function of plasmid and transposone	Bacterial genetics: Plasmid, gene transfer or transformation, conjugation, transduction.(F-factor and R-factor), mutation and their effects.	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

Books Recommended

1. Buxton, A and Frazer. 1977. Animal Microbiology. Vol. I. Blackwell Scientific Publication.
2. Marchant, I. A and Packer, R. A. 1967. Veterinary Bacteriology and Virology. 7th edn. The Iowa State University Press, Ames, Iowa, USA.
3. Kumar, H. D. 2000.Molecular Biology. 2nd edn. Vikas Publishing Houses Pvt. Ltd.

4. Dale J.E. 1998.Molecular Genetics of bacteria. 3rd edition. John Wiley and Sons Inc. 605. Third avenue, New York.
5. Freeman, BA. 1979.Burrows Textbook of Microbiology. 1st edition. W.B Saunders Company, Philadelphia, London.

Course Code: MIC 102 **Course Title: General Microbiology (Practical)**	**Credit Hour: 1.0**	**Level: 1**	**Semester: II**
Rationale: To provide fundamental knowledge about lab biosafety, safety rules, laboratory equipments, chemicals, stains & their uses to identify different microorganisms			
Course Learning Outcomes: ✓ attain knowledge on different lab safety equipments chemicals, stains, uses in microbiology lab ✓ improve about laboratory skills and techniques related to the isolation, staining and identification of microorganisms ✓ develop the ability to work both independently and with others in the laboratory			
Intended Learning Outcomes(ILOS)	Course Content	Teaching-Learning Strategy	Assessment Strategy
✓ identify the laboratory equipments ✓ state basic functions of equipments ✓ explain handling and safety measures for microbiological laboratory	demonstration of laboratory equipments, their basic functions, handling and safety measures	Practical work in the laboratory	Quiz Test Term and Final exam Assignment
✓ select the best methods to make laboratory equipment germ free	methods of sterilization and preparation of culture media	Practical work in the laboratory	Quiz Test Term and Final exam Assignment
✓ write the methods of sterilization and preparation of culture media	microscopic study of living organisms	Lecture Discussion	Quiz Test Term and Final exam Assignment
✓ differentiate Gram (+ve) and Gram (-ve) bacteria ✓ identify acid fast bacteria (mycobacterium) ✓ detect special structure of bacteria like flagella and capsules ✓ detect endospore and their functions ✓ discuss about the special stain of fungi	staining techniques of microorganisms	Practical work in the laboratory. Lecture Discussion	Quiz Test Term and Final exam Assignment

✓ distinguish between chemical define and complex media ✓ describe the procedure of sample collection, processing, preservation and transportation	cultivation, Isolation and identification of bacteria, collection of materials for bacteriological examination	Lecture Discussion Practical work in the laboratory.	Quiz Test Term and Final exam Assignment
✓ identify different parts of Microscopes and their functions	operation of Microscopes	Lecture Practical work in the laboratory.	Quiz Test Term and Final exam Assignment
✓ define disinfectants, disinfections and antiseptic ✓ describe the procedure of antibiotic sensitivity test	evaluation of disinfectants, antibiotic sensitivity testing demonstration of bacteria in specimens	Lecture Laboratory work Discussion	Quiz Test Term and Final exam Assignment

Books Recommended

1. Buxton, A and Frazer. 1977. Animal Microbiology. Vol. I. Blackwell Scientific Publication.
2. Mar chant, I. A and Packer, R. A. 1967. Veterinary Bacteriology and Virology. 7th edn. The Iowa State University Press, Ames, Iowa, USA.
3. Kumar, H. D. 2000.Molecular Biology. 2nd edn. Vikas Publishing Houses Pvt. Ltd.
4. Dale J.E. 1998.Molecular Genetics of bacteria. 3rd Edition. John Wiley and Sons Inc. 605. Third Avenue, New York.
5. Freeman, BA. 1979. Burrows Textbook of Microbiology. 1st edition. W.B Saunders Company, Philadelphia, London.

Course Code: MIC 201 **Course Title: Biosafety and Hygiene (Theory)**	**Credit Hour: 2.0**	**Level: 2**	**Semester: I**
Rationale: The course is designed to provide fundamental knowledge about hygiene, bio-safety related to animal, animal farm, personnel, environment in and outside of the farm.			
Course Learning Outcomes: ✓ gain different concept of hygiene and it's impact on animal health ✓ acquire the fundamental aspects of bio-security of a farm ✓ gain knowledge about bio-safety of human being working in the farm ✓ attain knowledge about different types of bio-security and bio-safety measures ✓ achieve knowledge on management of farm in terms of bio-security ✓ explore knowledge on impact of lack of hygienic practices in the farm			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ define health and hygiene ✓ write the importance of animal hygiene ✓ state the scope of hygiene for controlling disease	**Introduction** ✓ definition of health and hygiene ✓ importance of animal hygiene and its scope in health and production	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define soil borne disease ✓ list the factors affecting soil texture ✓ describe improvement of soil's sanitary condition ✓ discuss impurities of air ✓ find the effect of vitiated air on health ✓ justify that pure water is necessary for healthy living	**Influence of environment on health** **Soil:** texture, soil and disease, ✓ sanitary improvement ✓ sanitation of soil **Air and ventilation** ✓ hygienic importance ✓ types of ventilation ✓ health hazards due to radiation	Lecture Discussion Display	Quiz Test Term and Final exam Assignment

✓ examine water from different sources	**Water:** Source of water ✓ hygienic requirement of water ✓ water purification ✓ water examination		
✓ define sanitation, sewage and sewage disposal ✓ Summarize different types of sanitary measures ✓ Compare different methods of carcass disposal	**Sanitation** ✓ drainage and sewerage system ✓ disposal of wastes ✓ disposal of carcass	Lecture Projector Display Discussion	Quiz Test Term and Final exam Assignment
✓ define bio-safety and bio-secuirity ✓ explain bio-secuirity principles ✓ list the different levels of bio-secuirity ✓ describe the biosafety requirement of a laboratory	**Bio-security and Biosafety** ✓ bio-security and biosafety of livestock, laboratory animals and avian species	Lecture Discussion Display	Quiz Test Term and Final exam Assignment
✓ define basic terms related to better hygienic management ✓ draw a preventive scheme of biosecuirity for controlling disease in farm ✓ develop the hygienic management of farms ✓ illustrate the cleaning and disinfection of livestock and poultry houses	**Hygienic management** ✓ general principles and hygienic requirement in connection with the breeding, feeding and transit if animals ✓ hygienic measures for the prevention and control of infectious diseases ✓ isolation and quarantine ✓ disinfections, disinfestations, immunization ✓ hygienic management of hatchery, breeder, layer and broiler farms ✓ cleaning and disinfection of empty livestock and poultry houses before receiving the newly introduced livestock and poultry	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

Books Recommended

1. Thapylial, D. C. 1996. Fundamental of Animal Hygiene and Epidemiology. 1st edn. International Book Distributing Co.
2. Buxton, A and Frazer, G. 1977. Animal Microbiology, Vol.I.Blackwell Scientific Publication.
3. Marchant, I.A.and Packer, R.A. 1967. Veterinary Bacteriology and Virology 7 th edn. The Iowa State University Press, Ames, Iowa, USA.
4. Kumar H.D.2000. Molecular Biology 2nd edn. Vikas Publishing House, Pvt Ltd.
5. Dale, J.W.1998. Molecular Genetics of Bacteria. 3 rd edn. Jhon Wiley and Sons Inc.,Newyork.

6. Haq, A. and T. Ahmad. 2001. Poultry Hygiene and Disease Prevention Pak Book Empire Lahore, Pakistan.
7. The UFAW handbook on care and management of farm animals- edited by UFAW (1971). UFAW Churchill Livingstone Edinburge, U.K.
8. Rahman.M.M.et al., 2004.Practical Animal and Poultry Hygiene and Management. 1 st edn Published by Dept. of Microbiolgy and Hygiene. BAU, Mymensingh, Bangladesh.
9. Introductory Animal Hygiene and Management. By Prof. Muhammad Abdur Rahman and Prof. W.I.M. Afjal Hossain. 1st Edn. July· 1997. Published by Dept. of Microbiology and Hygiene.

Course Code: MIC 202 **Course Title: Biosafety and Hygiene (Practical)**	**Credit Hour: 2.0**	**Level: 2**	**Semester: I**
Rationale: This course is designed to determine the sign of good health, administration of medicine, application of bandages and sanitary condition using sterilization and disinfection.			
Course Learning Outcomes: ✓ know the signs of health and methods of recording temperature, pulse and respiration rate ✓ demonstrate the administration of medicine and application of bandages ✓ improve sanitary condition using sterilization and disinfection			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ define health from practical point of view ✓ determine normal signs of health of cow, sheep, goat, horse, dog and fowl	**Determination of health by external appearance**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ explain about temperature, pulse and respiration rate ✓ detect temperature, pulse and respiration of different animal	**Methods of recording temperature, pulse and respiration**	Lecture Discussion Demonstration	Quiz Test Term and Final exam Assignment

✓ define medicine ✓ explain different terms related to medicine administration ✓ identify different routes of injections ✓ describe about drenches	**Methods for the administration of medicines**	Lecture Projector Display	Quiz Test Term and Final exam Assignment
✓ define bandages ✓ classify and describe the bandages	**Methods for application of bandages of animals**	Lecture Projector Display	Quiz Test Term and Final exam Assignment
✓ define the term sterilization, disinfection and antiseptics	**Sanitary inspection of stable and surroundings.**	Lecture Projector Display	Quiz Test Term and Final exam Assignment
✓ describe the disinfection procedure	**Disinfections of byre and stable**	Lecture Projector Display	Quiz Test Term and Final exam Assignment
✓ explain different sterilization methods used in livestock and poultry farm	**Methods of sterilization of different instruments used in livestock and poultry farms**	Lecture Projector Display	Quiz Test Term and Final exam Assignment

Books Recommended

01. Thapylial, D. C. 1996. Fundamental of Animal Hygiene and Epidemiology. 1st edn. International Book Distributing Co.
02. Buxton, A and Frazer, G. 1977. Animal Microbiology, Vol.I.Blackwell Scientific Publication.
03. Marchant, I.A.and Packer, R.A. 1967. Veterinary Bacteriology and Virology 7 th edn. The Iowa State University Press, Ames, Iowa, USA.
04. Kumar H.D.2000. Molecular Biology 2nd edn. Vikas Publishing House, Pvt Ltd.
05. Dale, J.W.1998. Molecular Genetics of Bacteria. 3 rd edn. Jhon Wiley and Sons Inc.,Newyork.
06. Haq, A. and T. Ahmad. 2001. Poultry Hygiene and Disease Prevention Pak Book Empire Lahore, Pakistan.
07. The UFAW handbook on care and management of farm animals- edited by UFAW (1971). UFAW Churchill Livingstone Edinburge, U.K.
08. Rahman.M.M.et al., 2004.Practical Animal and Poultry Hygiene and Management. 1 st edn Published by Dept. of Microbiolgy and Hygiene. BAU, Mymensingh, Bangladesh.
09. Introductory Animal Hygiene and Management. By Prof. Muhammad Abdur Rahman and Prof. W.I.M. Afjal Hossain. 1st Edn. July, 1997. Published by Dept. of Microbiology and Hygiene

Course Code: MIC 203 Course Title: Bacteriology (Theory)	Credit Hour: 3.0	Level: 2	Semester: II
Rationale: This course is design to provide fundamental concept of bacteria and fungi causing human and animal diseases.			
Course Learning Outcomes: ✓ acquire knowledge about bacteria and fungi ✓ enrich knowledge on morphology, staining, cultural and biochemical properties with their transmission, pathogenecity , antigenic structure, toxins, resistance and immunity of bacterial species belonging to animals, birds and human ✓ achieve knowledge on morphology, staining, cultural and biochemical properties with their transmission, pathogenecity , antigenic structure, toxins, resistance and immunity of fungal species belonging to animals, birds and human			

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ describe the taxonomy and nomenclature of bacteria ✓ distinguish between bacteria and other microbes ✓ outline the bases for classification of bacteria ✓ explain about the genetic and systematic classification of bacteria	**Bacteriology** ✓ taxonomy and Nomenclature of bacteria ✓ bases for classification of bacteria ✓ compare between bacteria and other microbes ✓ systematic classification of bacteria ✓ DNA homology experiment ✓ ribosomal RNA homology experiment	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ discuss about the properties, transmission and pathogenicity of bacterial species belonging to animals, birds and human ✓ describe the cultivation and diagnosis of bacterial species belonging to animals, birds and human ✓ memorize the antigenic structure and toxins of bacterial species belonging to animals, birds and human ✓ assess the resistance and immunity of the pathogenic of bacterial species belonging to animals, birds and human ✓ discuss about acid fast organism	**Studies on the Gram positive, Gram negative (Aerobic and Anaerobic) and Acid fast bacteria;** ➢ **Gram positive (Aerobic and Anaerobic) bacterial species of animals, birds and human:** Staphylococcus, Streptococcus, Bacillus, Clostridium, Corynebacterium, Listeria, Erysipelothrix, Actinomyces, Dermatophilus ➢ **Gram negative (Aerobic and Anaerobic) bacterial species of animals, birds and human:** Escherichia, Salmonella, Campylobacter, Klebsiella, Alkaligenes, Pseudomonas, Enterobacter, Brucella, Pasteurella, Yarsinia, Bordetella, Actinobacillus, Haemophilus, Moraxella, Aeromonas, Sphaerophorus, Bacteroids, Treponema, Borrelia, Spirillum, Leptospira, Nocardia ➢ **Acid fast bacterial species of animals, birds and human:** Mycobacterium	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

✓ define mycology and fungi ✓ illustrate the properties of fungi ✓ outline the classification of fungi ✓ explain about the Reproduction of fungi	**Mycology:** ➢ Define mycology, fungi ➢ Properties ➢ Outline of a classification ➢ Reproduction	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ discuss about the properties, transmission and pathogenicity of bacterial species belonging to animals, birds and human ✓ describe the cultivation and diagnosis of bacterial species belonging to animals, birds and human ✓ memorize the antigenic structure and toxins of bacterial species belonging to animals, birds and human ✓ assess the resistance and immunity of the pathogenic of bacterial species belonging to animals, birds and human.	**Studies on the fungi belonging to the following groups of animals, birds and human:** ▪ Microsporum ▪ Trychophyton ▪ Epidermophyton ▪ Candida ▪ Cryptococcus ▪ Aspergillus ▪ Histoplasma ▪ Blastomyces ▪ Sporotrichum ▪ Coccidioides ▪ Rhinosporidium	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

Books Recommended:

1. Animal Microbiology. Vol. I. Buxton, A and Frazer. 1977. Blackwell Scientific Publication.
2. Veterinary Bacteriology and Virology. 7th edn. Marchant, I. A and Packer, R. A. 1967. The Iowa State University Press, Ames, Iowa, USA.
3. Molecular Biology. 2nd edn. Kumar, H. D. 2000. Vikas Publishing Houses Pvt. Ltd.
4. Molecular Genetics of bacteria. 3rd edition. Dale J.E. 1998. John Wiley and Sons Inc. 605. Third avenue, New York.
5. Burrows Textbook of Microbiology. 1st edition. Freeman, BA. 1979. W.B Saunders Company, Philadelphia, London.
6. Topley and Wilson's Bacteriology, Virology, and immunity. Vol. 1, 2 and 3. Smith, G.R Ed. 1984. Arnold Heinemann.
7. Microbiology. Davis, B.D. 1980. Harper and Row Publication.
8. Microbiology, An introduction. 8th edition.

Course Code: MIC 204 **Course Title: Bacteriology (Practical)**	**Credit Hour: 1.0**	**Level: 2**	**Semester: II**

Rationale: This course is design to provide practical knowledge on isolation, characterization and antibiogram study of bacteria and fungi causing human and animal diseases.

Course Learning Outcomes:

- ✓ know about the appropriate techniques of the selection, collection, preservation and shipment of specimens
- ✓ acquire knowledge on identification of bacteria and fungi by observing morphological, cultural and biochemical characteristics
- ✓ achieve knowledge on identification of the bacteria and fungi by using animal inoculation, serological tests, and molecular techniques: PCR, SDS-PAGE, Western blotting
- ✓ assess the sensitivity pattern of different antimicrobial and antifungal agents

Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
➢ discuss the procedure of selection, collection, preservation and shipment of samples for bacteriological and mycological investigation ➢ examine the bacteria and fungi by using morphological, cultural, biochemical and characteristics. ➢ evaluate the bacteria by animal inoculation, serological tests, and molecular techniques	collection, preservation and shipment of samples specimens for laboratory examination and identification observing morphological, cultural and biochemical properties isolation and identification of bacteria and fungi by; animal inoculation; Laboratory animal (Rabbit, mice). serological tests; RSPAT, AGPT, RBPAT, ELIZA, CFT, HI, FAT. molecular techniques: PCR, SDS-PAGE, Western blotting	Lecture Discussion Projector Display Lab. experiment	Quiz Test Term and Final exam Assignment

✓ assess the sensitivity pattern of different antimicrobial and antifungal agents	✓ To assess the sensitivity pattern of different antimicrobial and antifungal agents by using disk diffusion techniques	Lecture Discussion Projector Display Lab. experiment	Quiz Test Term and Final exam Assignment

Books Recommended:

1. Buxton, A and Frazer. 1977. Animal Microbiology. Vol. I. Blackwell Scientific Publication.
2. Marchant, I. A and Packer, R. A. 1967. Veterinary Bacteriology and Virology. 7th edn. The Iowa State University Press, Ames, Iowa, USA.
3. Kumar, H. D. 2000.Molecular Biology. 2nd edn. Vikas Publishing Houses Pvt. Ltd.

Course Code: MIC 301 **Course Title: Virology (Theory)**	**Credit Hour: 3.0**	**Level: 3**	**Semester: I**
Rationale: The course is very important for the veterinary undergraduate students to gather thorough knowledge about the viral diseases of animal			
Course learning outcomes: ✓ memorize the name of different viral diseases of animals ✓ acquire knowledge about fundamental concepts of virus, it's structures, history and nomenclature ✓ discuss the mechanisms of viral disease production ✓ predict the diagnose, control and prevention of viral diseases of animals ✓ distinguish among various diseases			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ define virology and viruses ✓ discuss physical, chemical and biological properties of viruses ✓ describe composition and function of viral structures	**General Virology** ✓ history of virology ✓ definition and general properties of viruses ✓ differentiation of virus from other microorganisms ✓ physical, chemical and biological properties of viruses ✓ composition and function of viral structures	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ classify viruses	**Nomenclature and classification of viruses**	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ describe viral genetics	**Viral genetics**	Lecture Discussion Projector	Quiz Test Term and Final exam

		Display	Assignment
✓ explain replication processes of viruses	**Replication of Viruses and their effects on host at cellular and multicellular level**	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ outline inactivation, preservation and purification of viruses	**Inactivation and preservation of viruses. Purification of viruses.**	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ evaluate the viral vaccine ✓ recommend the viral chemotherapy	**Viral vaccines and chemotherapy.**	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ discuss resistance and immunity ✓ define interferon and interference phenomenon ✓ classify interferon	resistance to viral infection and immunity, interference phenomenon and interferon	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ describe the epidemiology of viral infection ✓ define persistent infection and slow viruses	epidemiology of viral infection, transmission and reservoir of viruses, persistent infection and slow viruses	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ Define molecular Virology, DNA, RNA and PCR ✓ illustrate PCR technique and recombinant DNA technology ✓ explain SDS-PAGE and Western blotting	**Molecular Virology** definition and scope of molecular virology, viral DNA and RNA, PCR, RT-PCR, gel electrophoresis, recombinant DNA technology: cloning and gene expression, hybridization techniques, SDS-PAGE, Western blotting	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ Classify the viruses ✓ Narrate the transmission, pathogenicity and diagnosis of	**Systematic Virology** properties, transmission, pathogenicity, cultivation, diagnosis and immunity of different virus families: Paramyxoviridae, Orthomyxoviridae, Rhabdoviridae,	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

	different individual viruses ✓ summarize the immunity of different individual viruses	Coronaviridae, Retroviridae, Picornaviridae, Reoviridae, Togaviridae, Flaviviridae, Bunyaviridae, Birnaviridae, Circoviridae, Poxviridae, Parvoviridae, Papovaviridae, Adenoviridae, Herpesviridae, Iridoviridae of animals, birds and human		
✓ distinguish Mycoplasma, Rickettsia and Chlamydia ✓ discuss the diseases caused by Mycoplasma, Rickettsia and Chlamydia ✓ determine the immunity of Mycoplasma, Rickettsia and Chlamydia		Mycoplasma, Rickettsia and Chlamydia	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment

Books Recommended

1. Joklik, W.K. 1988. Principles of Animal Virology, Appletoncentury-crofts, New York
2. Kumar, H.D.2000. Molecular Biology, 2nd Edn. Vikas Publishing House, Pvt. Ltd.
3. Dale, J.E. 1998. Molecular Genetics of Bacteria, 3rd Edn. John Wiley and Sons Inc., New York
4. Buxton, A and Frazer G. 1977. Animal Microbiology, Blackwell Scientific Publication.
5. Bets, A.O and York C.J. 1967. Viral and Rickettsial Infection of Animals. New York Academic Press.

Course Code: MIC 302 **Course Title: Virology (Practical)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: I**
Rationale: The course is very important for the veterinary undergraduate students to know the techniques for isolation and identification of viruses from field samples.			
Course Learning Outcomes: ✓ demonstrate various virological techniques ✓ identify and isolate procedure of virus ✓ explain the diagnosis the viral diseases of animals ✓ distinguish similar diseases			
Intended Learning Outcomes (ILOs)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ discuss collection, transportation and cultivation of virological samples in indicator host system ✓ demonstrate the immunological and serological tests	**Virological Techniques** ✓ collection, transport, preservation and preparation of virological specimens for laboratory examination and identification of viruses ✓ filters and filtration techniques	Practical Demonstration	Quiz Test Term and Final exam Assignment

✓ show the molecular techniques	✓ purification of virus, analysis of viral proteins using SDS-PAGE, coomassie brilliant blue stain and Western blotting ✓ cultivation and titration of viruses in indicator host system (intact host system, embryonated eggs, tissue culture system) ✓ assay of infectivity of viruses: plaque assay. Media, reagents and other necessary biologics prepared and used in the laboratory ✓ identification of viruses through Haemagglutination test and other immunological and serological techniques ✓ identification of viruses by PCR, RT-PCR		
✓ describe the method of cultivation and identification of Mycoplasma ✓ Demonstrate method of cultivation and identification of Rickettsia ✓ discuss the method of cultivation and identification of Chlamydia	**Techniques for Prokaryotic Cells:** methods of cultivation and identification of Mycoplasma, Rickettsia and Chlamydia	Practical Demonstration	Quiz Test Term and Final exam Assignment

Books Recommended

1. Joklik, W.K. 1988. Principles of Animal Virology, Appletoncentury-crofts, New York
2. Cunningham, C.H. 1966. A Laboratory Guide in Virology, Brugress Publishing Company,
3. Kumar, H.D. 2000. Molecular Biology, 2nd Edn. Vikas Publishing House, Pvt. Ltd.
4. Dale, J.E. 1998. Molecular Genetics of Bacteria, 3rd Edn. John Wiley and Sons Inc., New York
5. Maniatis,T and Fritsch E.F. 2000. Molecular Cloning, Laboratory Manual. Clod, Spring Harbor Laboratory, USA.
6. Buxton, A and Frazer G. 1977. Animal Microbiology, Blackwell Scientific Publication.
7. Bets, A.O and York C.J. 1967. Viral and Rickettsial Infection of Animals. New York Academic Press.

Course Code: MIC 303 Course Title: Immunology and Serology (Theory)	Credit Hour: 2.0	Level: 3	Semester: II
Rationale: The study of immunology and serology can be conducted to solve a disease problem, for disease diagnosis and also for vaccine production. Also it can be contribute to the level of professional development of the researcher, veterinarian and doctor.			
Course Learning Outcomes: ✓ explain the different types of immunity with their role ✓ describe the characteristics of antigens and antibodies ✓ categorize immunoglobulin ✓ illustrate the pathways of complement activation along with their functions ✓ discuss about delayed hypersensitivity reaction and autoimmune diseases ✓ justify the role of immunologic reaction in disease diagnosis ✓ memorize immune disorders			

Intended Learning Outcomes (ILOS)	Course Content	Teaching/ Learning Strategy	Assessment Strategy
✓ define the term immunology ✓ describe the historical background of immunology	**Introduction to immunology and serology:** History and modern concepts of immunology and serology.	Lecture Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define and explain the types of immunity ✓ role of phagocytosis in immunity ✓ compare and contrast adaptive and innate immunity ✓ differentiate humoral from cellular immunity ✓ state the functions of cytokines ✓ define antigen, epitope, and hapten. ✓ explain antibody function, and describe the structural and chemical characteristics of antibodies ✓ define vaccine. ✓ explain how vaccine works ✓ differentiate the following, and provide an example of each: attenuated, inactivated, toxoid, subunit, and conjugated vaccines ✓ compare and contrast T-dependent and T-independent antigens ✓ describe clonal selection ✓ describe how a human can produce different antibodies ✓ role of B cell that encounters an antigen function as an antigen-presenting cell ✓ describe four outcomes of an antigen–antibody reaction ✓ differentiate T helper, T cytotoxic	**Immunity:** Resistance and their types Line of defenses Organs and cells associated with immunity. **Innate immunity :** physical or mechanical barrier, chemical factor, role of normal micro biota. phagocytosis, fever , inflammation **Antimicrobial substances:** complement system, antimicrobial peptides (AMPs)**,** interferon **Adaptive immunity** Antigen: Definition, composition, properties, types and functions. Antigen binding sites and their genetics Antibodies: Definition, composition, properties, formation and uses. Type of immunoglobulins, their properties and functions. Theory of antibody production.	Lecture Discussion Animated Display	Quiz Test Mid, Final examination Assignment

and T regulatory cells ✓ define apoptosis and antigen-presenting cell ✓ justify that the natural killer cell respond if the target cell does not have MHC class I molecules on its surface ✓ describe about immune tolerance	**Cytokines**: chemical Messengers of Immune Cells Response of B and T cell to antigen. Processing of antigen and their relationship with major histo-compatibility complex(MHC) molecules. **Uses of vaccine and adjuvant** **Monoclonal antibody and its production** **Types of Adaptive Immunity** Dual Nature of the Adaptive Immune System Humoral Immunity Response Process. Cellular Immunity Response Process . Extracellular Killing by the Immune System. Antibody-Dependent Cell-Mediated Cytotoxicity . Immunological Memory. Major outcome of Antigen-Antibody reactions Immune tolerance and factors responsible for immune tolerance.		
✓ list the disorders associated with immune system ✓ compare among different types of hypersensitivity ✓ discuss the different factors that influence the development of autoimmune disease ✓ discuss about graft rejection and immune deficiencies	**Disorders associated with the immune system** Hypersensitivity and classification of hypersensitivity, Process of different types of hypersensitivity Autoimmune diseases Immune deficiencies Graft rejections	Lecture Projector Display Industry/factory visit	Quiz Test Mid, Final examination Assignment

Books Recommended

1. Baker F.J. Introducion to Medical Laboratory Technology; 6thed, 1995.Butter worth.
2. Cheesbrough Monica. Medical Laboratory Manual for Tropical Countries; vol ll 2000.Cambridge Butter worth.Heinemann.Ltd.
3. P.Stities Daniel. Basic and Clinical Immunology; 8thed, 1994,USA 4.Fischbach Frances, Manual of Laboratory and Diagnostic tests; 4ed 1992,Lippincott.
4. Tizard, I. 1982. An Introduction to Veterinary immunology. 5th edition. W. B. Saunders co., Philadelphila,London, Toronto
5. Tortora, Funke, Case .Microbiology-An Introduction, 12th addition.
6. Turgeon L.M, Immunology and Serology in Laboratory Medicine,2nded, 1996,Mosby.
7. Sood Ramnik. Medical laboratory Technology methods and interpretation.4thed, New Delhi-India, Jaypee Brothers.

Course Code: MIC 304 **Course Title: Immunology and Serology (Practical)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: II**

Rationale: The study of immunology and serology can be conducted to solve a disease problem, for disease diagnosis and also for vaccine production. Also it can be contribute to the level of professional development of the researcher, veterinarian and doctor.

Course Learning Outcomes:

- ✓ identify the materials necessary for serological tests
- ✓ practice specimen collection preparation and preservation
- ✓ demonstrate serial dilution and determination of end point titer
- ✓ practice different serological tests for disease diagnosis
- ✓ detect and measure antibody

Intended Learning Outcomes (ILOS)	Course Content	Teaching/ Learning Strategy	Assessment Strategy
✓ explain how to prepare and preserve a specimen for serologic test	Collection, transportation and preservation of sample.	Laboratory work Lecture Discussion Animated Display	Practical examination Quiz Test Mid, Final examination Assignment Viva-voice
✓ discuss about serial dilution, endpoint and titer mean ✓ explain how precipitation reactions and immuno diffusion tests work ✓ differentiate direct from indirect agglutination tests ✓ differentiate agglutination from precipitation tests ✓ define hemagglutination ✓ explain how a neutralization test works ✓ differentiate precipitation from neutralization tests ✓ explain the basis for the complement-fixation test ✓ compare and contrast direct and indirect fluorescent antibody techniques ✓ explain how direct and indirect	Materials, reagents, biologics employed in serological tests Preparation and purification of antigen Agglutination Test Rapid serum plate agglutination Precipitation Test Agar gel precipitation Test Complement fixation Test Heamaglutination inhibition Test Serum neutralization Fluorescent tagged antibody reactions(Direct test) Fluorescent tagged antibody reactions (Indirect test) ENZYME LINKED IMMUNE SORBENT	Laboratory work Lecture Discussion Animated Display	Practical examination Quiz Test Mid, Final examination Assignment Viva-voice

ELISA tests work	ASSAY (direct test) ENZYME LINKED IMMUNE SORBENT ASSAY (indirect test)		

Books Recommended

1. Baker F.J. Introducion to Medical Laboratory Technology;6thed, 1995.Butter worth.
2. Cheesbrough Monica. Medical Laboratory Manual for Tropical Countries; vol II, 2000.Cambridge Butter worth.Heinemann.Ltd.
3. P.Stities Daniel. Basic and Clinical Immunology; 8thed, 1994,USA 4.Fischbach Frances, Manual of Laboratory and Diagnostic tests; 4ed 1992,Lippincott.
4. Tizard, I. 1982. An Introduction to Veterinary immunology. 5th edition. W. B. Saunders co., Philadelphila,London, Toronto
5. Tortora, Funke, Case .Microbiology-An Introduction, 12th addition.
6. Turgeon L.M, Immunology and Serology in Laboratory Medicine,2nd ed, 1996,Mosby.
7. Sood Ramnik. Medical laboratory Technology methods and interpretation.4thed, New Delhi-India, Jaypee Brothers.

Course Code: MIC 401 **Course Title: Public Health and Ecosystem (Theory)**	**Credit Hour: 2.0**	**Level: 4**	**Semester: II**
Rationale: This course is designed to provide basic concepts of public health and ecosystem.			
Course Learning Outcomes: The aim of this course is to provide advanced scientific knowledge and skills among the students in different fields of Public Health and Ecosystem for enhanced health, economic, institutional & social development of the society and apply such principles in future health work.			
Intended Learning Outcomes (ILOs)	**Course content**	**Teaching / Learning strategy**	**Assessment strategy**
✓ define veterinary public health ✓ justify the relationship between public health and medicine	Definition, scope and objectives of veterinary public health	Lecture Readings Discussion Multimedia Projector Display	Q/A, Quiz Essay, Assignment, Term paper
✓ determine the characteristics, image and basis of public health ✓	The common basis for veterinary and public health practices	Lecture Readings Discussion Multimedia Projector Display	Q/A, Quiz Essay, Assignment, Term paper
✓ differentiate the public health system from public health team ✓ justify the organogram of veterinary public health unit in Bangladesh ✓ Illustrate the general organization of public health system and the distribution of veterinarians	Public health team: Organization, administration and functions.	Lecture Readings Discussion Multimedia Projector Display	Q/A, Quiz Essay, Assignment, Term paper
✓ categorize zoonoses ✓ assess the determinants of spread of zoonotic disease ✓ determine the route and mode of zoonotic disease transmission	**Zoonoses:** its conception and classification Factors affecting the spread of zoonotic diseases Role of reservoir host and vectors in transmitting zoonotic	Lecture Readings Discussion Multimedia Projector Display	Q/A, Quiz Essay, Assignment, Term paper

	diseases. emergent zoonotic diseases Impact of zoonoses		
✓ list the bacterial pathogens having zoonotic importance ✓ illustrate important bacterial zoonotic diseases ✓ list the viral pathogens of zoonotic importance ✓ discuss important bacterial, viral and parasitic zoonotic diseases	Zoonotic diseases: (a) bacterial zoonoses. (b) viral zoonoses. (c) parasitic zoonoses Prevention, control and eradication of zoonotic diseases	Lecture Readings Discussion Multimedia Projector Display	Q/A, Quiz Essay, Assignment, Term paper
✓ identify the core functions of epidemiology ✓ categorize epidemiological study with examples ✓ illustrate the methods of epidemiological investigation ✓ predict the effect of acid rain and green house ✓ determine the determinants of balance health	**Epidemiology:** concepts, scope, objective and type of epidemiology, causes of multifactorial diseases: agents, host and environmental facts General methods of epidemiological investigation of zoonotic diseases Public health aspects of milk production, transportation and marketing Animal health, hygiene at dairy farm Hygienic control of dairy equipments, health control of dairy workers, hygienic handling of milk. micro organism important in foods of animal origin Effect of acid rain and green house on health of man and animal	Lecture Readings Discussion Multimedia Projector Display	Q/A, Quiz Essay, Assignment, Term paper
✓ define ‘ecology’ and food chain ✓ classify different types of food chain ✓ mention the different levels of ecological study ✓ discuss in brief the different components of ecosystem ✓ evaluate the relationship between ecosystem and food chain	**Ecosystem:** definition, components, organization and types of Ecosystem Processes of Ecosystem, Geography of Ecosystem Controls on Ecosystem function, Ecosystem services Ecosystem ecology,	Lecture Readings Discussion Multimedia Projector Display	Q/A, Quiz Essay, Assignment, Term paper

✓ predict the functions of ecosystem	Community ecology, Landscape ecology and System ecology		

Books Recommened

1. Veterinary Medicine and Human Health. Schwabe, C.W., 1965. Baltimore, William and Wilkins Company.
2. The zoonoses. 1st edition. Johan C. Bell, Stephen, R., Palmer and Jack, M. Payne (1988). Edward Arnold.
3. Diseases of animals transmissible to man. Thapaliyal, D.C. 1999. Internationals Book Distributing Company. Lowa StateUniversity Press/Ames.
4. Veterinary Epidemiology. 2nd edition. Martin, S.W., Meek, A.H. and Willeberg, P. 1987. Principles and methods.
5. Veterinary Epidemiology. 2nd edition. Thrushfeld, M. 1986. Blackwell Science.
6. Fundamentals of Animals Hygiene and Epidemiology. Thapaliyal, D.C. 1999.
7. Essentials of Epidemiology, 2nd Edition by Ann Aschengrau, ScD, and George R. Seage III, DSc. Copyright 2008, ISBN: 0-7637-4025-X.
8. Handbook of Zoonoses: Identification and Prevention by J. L. Colville and D. L. Berryhill. 2007 ISBN: 978-0-323-04478-3.
9. Human-Animal Medicine: Clinical Approaches to Zoonoses, Toxicants and Other Shared Health Risks by Rabinowitz and Conti. 2009 ISBN: 978-1416068372.

Course Code: MIC 501 **Course Title: Food Hygiene (Theory)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**
Rationale: The course is very important for the veterinary undergraduate students to gather knowledge on meat and milk hygiene.			
Course Learning Outcomes: ✓ acquire knowledge about concepts of food microbiology ✓ gain knowledge about the causes of spoilage of foods of animal origin ✓ understand the mechanisms of food spoilage ✓ diagnose the food-borne infection and food-borne intoxication ✓ develop knowledge on food sanitation and legislation ✓ develop microbiological quality of food			
Intended Learning Outcomes (ILOS)	Course Content	Teaching/ Learning Strategy	Assessment Strategy
✓ define food microbiology and food hygiene ✓ describe relation of microorganisms with food ✓ illustrate the scope & objectives of ante-mortem and postmortem examination ✓ assess the ante-mortem and postmortem examination of meat animals	History of microorganisms in food Role and significance of microorganisms in nature and foods Microorganisms important in foods of animal and avian origin General principles of food preservation and spoilage	Lecture Discussion Projector Display	Quiz Test Essay Assignment

✓ plan of an abattoir	Ante-mortem and postmortem examination; transportation of meat animals; slaughtering of animals and birds Pre-harvest and post harvest technology of foods at farm and manufacturing level. Principles for planning of an abattoir and situation in Bangladesh Inspection of carcasses, judgment of carcasses and examination reports Adulteration and misrepresentation of meat foods. Diseases transmitted through meat and meat products		
✓ investigate the contamination, preservation and spoilage of milk, fish and egg ✓ detect special organisms responsible for contamination and spoilage of canned foods	Contamination and spoilage of foods of animal origin Contamination and spoilage of milk and milk products, adulteration of milk Diseases transmitted through milk and their significance on health Bacteriological quality of milk and milk products Contamination and spoilage of fish and fish products, factors affecting kinds and rate of spoilage Preservation of fish and fish products Contamination and spoilage of eggs, preservation of eggs Contamination and spoilage of canned foods, preservation of canned foods Food borne infections and	Lecture Discussion Projector Display	Quiz Test Essay Assignment

	intoxications Investigation of food-borne diseases outbreaks Microbiology in food plant sanitation Food legislation, standards and code of practices		

Books Recommended

1. Frazier, W.C and Westhoff, W.C 1995. Food Microbiology. 4th Edn. Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
2. Thonton, H and Gracy, J. F. 1974. Textbook of Meat Hygiene. 6th Edn. Bailliere Tindall, London.
3. Tannar, F.W. 1952. Foodborne Infections and Intoxications, 2nd Edn. The Garrard Press
4. Hubbert, W.T. Hagstad H.V. Spangler, E. Hinton, M.H. and Hughes, K.L. 1996. Food safety and quality assurance. 2nd Edn. Iowa State University Press/Ames.
5. Cross,H.R. and Overby, A. 1988. Meat Scince, Milk Science and Technology. 3rd Edn. Elsevier Science, Oxford.
6. Rahman. M.M. 2003. Basic Food Hygienene. 1st Edn. Department of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh.

Course Code: MIC 502 **Course Title: Food Hygiene (Practical)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**
Rationale: The course is very important for the veterinary undergraduate students to know the techniques for food sample collection, determination of indicator and pathogenic bacteria and judgment of carcasses.			
Course Learning Outcomes: ✓ memorize the techniques for sample collection, determination of indicator and pathogenic bacteria ✓ know the viable count, probable number and direct microscopic count ✓ understand the F-value, D-values and Z-values ✓ acquire knowledge about how to determine the MNP index ✓ distinguish perfect and imperfect bleeding ✓ provide security for hygienic food production ✓ develop better management of slaughterhouse			
Intended Learning Outcomes (ILOS)	Course Content	Teaching / Learning Strategy	Assessment Strategy
✓ demonstrate sampling of foods	**Sampling and Testing of**	Practical	Quiz Test

✓ illustrate MPN and total viable counts ✓ detect indicator and pathogenic bacteria	**Foods:** Applied techniques in sampling of foods of animal origin and other related materials for bacteriological studies Sampling of solid, liquid and surface samples Preparation of dilutions, determination of MPN index and general viable counts Detection and enumeration of indicator bacteria Detection and enumeration of pathogenic and toxigenic organisms Determination of F-value, D-values and Z-values Microbiological examination of specific foods: i) meat and meat products ii) liquid milk, dry milk and other milk products iii) canned foods iv) frozen foods v) egg and egg products	demonstration	Practical test Assignment
✓ differentiate perfect bleeding from imperfect bleeding ✓ select proper inspection methods of carcass ✓ demonstrate field trips	**Slaughterhouse management** Determination of quality of foods in terms of safety and quality assurance (report writing) Differentiation between perfect and imperfect bleeding Inspection and judgment of carcasses Techniques for the differentiation of carcasses and meats of various food animals Field trips to milk and fish processing plants and slaughterhouse	Practical demonstration	Quiz Test Practical test Assignment

Books Recommended

1. Frazier, W.C and Westhoff, W.C 1995. Food Microbiology. 4th Edn. Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
2. Borgstrom, G. 1961. 1974. Fish as food. Vil 1. Newyork and London.
3. Tannar, F.W. 1952. Foodborne Infections and Intoxications, 2nd Edn. The Garrard Press

Department of Dairy and Poultry Science (DPS)

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
Discipline: Poultry Science				
1.	DPS-101: Introductory Poultry science (Theory)	2	1	I1
2.	DPS-102: Introductory Poultry science (Practical)	1	1	I1
3.	DPS-205: Poultry Production and Management (Theory)	2	2	I1
4.	DPS-206: Poultry Production and Management (Practical)	1	2	I1
5.	DPS-301: Hatchery operation and practices (Theory)	1	3	I
6.	DPS-302: Hatchery operation and practices (Practical)	1	3	I
Total (Theory+ Practical) = (05+03) =08				
Discipline: Dairy Science				
7.	DPS-201:: Dairy Animal Production (Theory)	2	2	1
8.	DPS-202: Dairy Animal Production (Practical)	1	2	1
9.	DPS-203: Fundamental Dairy Science (Theory)	2	2	I1
10.	DPS-204: Fundamental Dairy Science (Practical)	1	2	I1
11.	DPS-303: Dairy Microbiology (Theory)	1	3	I
12.	DPS-304: Dairy Microbiology (Practical)	1	3	I
13.	DPS-305: Dairy Product Technology (Theory)	1	3	II
14.	DPS-306: Dairy Product Technology (Practical)	1	3	II
Total (Theory+ Practical) = (06+04) =10				

Total Credit Hour	
Theory	11
Practical	7
Total	**18**

Course Code: DPS 101 **Course Title: Introductory Poultry science (Theory)**	**Credit Hour: 2.0**	**Level: 01**	**Semester: II**

Rationale: To provide basic knowledge about different dairy animal with productive management systems.

Course Learning Outcomes: The major learning outcomes of this course are to-

- ✓ provide scientific knowledge to the students about this subject.
- ✓ know the breed, variety and strain of different poultry species.
- ✓ acquire knowledge about poultry products and by-products.
- ✓ know the poultry farm and poultry house requirements.
- ✓ keep role in developing poultry related industry and contribute to national economy.

Intended Learning Outcomes(ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ define poultry and poultry science ✓ discuss origin and distribution of poultry species ✓ describe theory regarding origin of poultry species ✓ state Consequence of domestication of poultry ✓ illustrate importance of poultry and poultry products ✓ describe the problems and prospect of poultry farming in Bangladesh	**Introduction:** Introduction to poultry and poultry science. History, origin, distribution and domestication of different poultry species. Consequence of domestication of poultry. Behavior and habitats of poultry species. Importance of poultry and poultry products. Role of poultry and poultry industry in economy of Bangladesh	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ discuss the terms related to poultry ✓ classify class of chicken ✓ list the breeds and varieties of chicken ✓ write the zoological classification of chicken ✓ describe characteristics of different breed of chicken	**Terminology:** Terms related to poultry **Breeds and other sub-division of Chicken:** Chronological development of breeds, varieties and strains. Different Classes, breeds, varieties and strains of chicken and their characteristics	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ define digestive and	**Different body systems in**	Lecture	Quiz Test

reproductive system ✓ list the parts of digestive system of chicken with their functions ✓ list the organs of male and female reproductive system of chicken with their functions ✓ define and classify feather ✓ describe causes and remedy measures of different poultry vices	**relation to meat and egg production:** Digestive system, reproductive system. Feather and Feathering in poultry. Vices of poultry	Discussion Multimedia Projector Display Feed back	Term and final Exam. Class attendance
✓ define and classify egg ✓ state the chemical composition of egg ✓ describe food value and uses of egg ✓ discuss the formation of egg ✓ describe abnormalities of egg ✓ state the grading of egg	**Egg:** Definition of egg, types of egg, composition and food value of egg, uses of egg. Structure and formation of eggs. Abnormalities in eggs. Grading of eggs	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ define and classify poultry houses ✓ describe the requirements of an ideal poultry house ✓ illustrate the factors for selecting of poultry farm ✓ describe the poultry rearing system ✓ state the litter type and discuss the management of litter	**Housing:** principles of housing and different types of poultry houses. Site selection for poultry farm. Poultry rearing system. Types of poultry farming **Litter:** Litter types, materials, management of litter	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ define selection , culling poultry breeding and molting ✓ classify poultry breeding ✓ describe the system of poultry mating ✓ illustrate forced molting of poultry	**Selection and culling:** Selection, culling, breeding, mating and molting of poultry	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ classify breeds of duck ✓ describe duck rearing system in Bangladesh ✓ write advantages of duck cum fish farming ✓ list the breeds and varieties of quail, pigeon, goose and turkey	**Other poultry species:** Breeds and varieties of Duck, Quail, pigeon, goose and Turkey. Principles and practices of duck production. Problems and prospect of rearing of duck, quail, geese, pigeon and turkey rearing in Bangladesh	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance

✓ write the problems and prospect of poultry rearing in Bangladesh			

Course Code: DPS 102 **Course Title: Introductory Poultry science (Practical)**	**Credit Hour: 1.0**	**Level: 01**	**Semester: II**

Rationale: To provide basic knowledge about different dairy animal with productive management systems.

Course Learning Outcomes: The major learning outcomes of this course are to-

- ✓ gain different techniques and processes of poultry rearing.
- ✓ acquire knowledge of different species, breeds, variety and strains of poultry.
- ✓ know internal and external parts of poultry.
- ✓ acquire knowledge about various poultry products and by-products and equipments related to poultry.

Intended Learning Outcomes(ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ illustrate the practice of holding and handling	Holding and handling of poultry	Lecture Discussion Projector display Practical demonstration Industry/Factory visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ describe the external body parts of poultry	Identification of external body parts of poultry.	Lecture Discussion Projector display Practical demonstration Industry/Factory visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ discuss the different combs of chicken ✓ define and classify feather	Identification of different types of combs in chicken and Identification and	Lecture Discussion Projector display	Quiz Test Term and final Exam.

with draw and label	classification of feathers in chicken.	Practical demonstration Industry/Factory visit	Note Book Class attendance
✓ identify different poultry species	Identification of different poultry species.	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ define breed, class and variety of chicken ✓ describe characteristic of different breeds of chicken	Identification of breeds, varieties and class of chicken	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ draw and label of egg ✓ compare the eggs of different poultry species	Identification of eggs of different poultry species.	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ define different types of poultry houses ✓ describe different poultry housing system	Demonstration of poultry housing and poultry rearing systems	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ discuss the different equipments related to poultry rearing with functions	Identification of different equipments and appliances	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance

Books Recommended:

1. Poultry Science. & Practices 5th Edn. Winter, A. R & Funk, E. M. J. B. Lippincott Co., USA.1960.
2. Poultry Breeding and Genetics, R. D. Crawford. Elsever Publishers. Amasterdam, the Netherlands.1960.
3. Poultry Science. 4th edition. Colin G. Scanes, George Brant, M. E. Ensminger Deceased 2003.
4. Handbook of Poultry Science and Technology (Vol. 1 and 2). Isabel Guerrero- Legarreta, Alma Delia Alarcon- Rojo, Christine Alvarado and Amarinder S. Bawa..Wiley. 2010.
5. Egg Science and Technology. 4th edition. Wi;lliam J. Stadleman.

6. Storey's Guide to Raising Chickens. 3rd edition. Gail Damerow. Storey Publishing, LLC. 2010.

Course Code: DPS 201 **Course Title: Dairy Animal Production (Theory)**	**Credit Hour: 2.0**	**Level: 2**	**Semester: I**
Rationale: To provide basic knowledge about different dairy animal with productive management systems.			
Course Learning Outcomes: The major learning outcomes of this course are to- • articulate the knowledge and skills about different dairy breeds, their feeding, breeding, housing management and milk production • acquire knowledge about housing of dairy animal • obtain knowledge about the different farm records to manage dairy farm automatically • achieve knowledge about different dairy animal with details farming systems			
Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ describe the development of different dairy breeds throughout the globe ✓ briefly discuss theclimatic influence and adaptability on dairy animals.	**Introduction:** Origin, history and development of major dairy cattle breeds. Systems of dairy development in different countries. Climatic influence and adaptability of dairy animals.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions

✓ illustrate the care and management of calves, heifers, dry and dairy cows. ✓ elaborate the care and management before and after calving	**Care and management of dairy cattle:** Care and management of dam before and after calving. Care and management of new born calves, heifers, dry and lactating cows. Management of dairy cows	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions
✓ state the planning and prospects of dairy farm ✓ sketch the buildings and fodder plot for dairy farming ✓ discuss the commercial milk production systems with management ✓ discuss the rural dairy farming ✓ state the factors related to success of dairy farming	**Dairy Farm management:** Plan and prospectus of dairy farm. Buildings and plots of dairy farm. Commercial milk production and dairy farm management. Small scale backward dairy farm management. Factors affecting the success of dairy farm operation.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions
✓ define record with importance ✓ illustrate different type of dairy farms and their records	**Record Keeping:** Importance of record keeping. Types of record for successful dairy farm operation.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions
✓ sketch and illustrate cow's udder and biological procedure of milk yield ✓ discuss milking systems in relation automatic milking	**Udder physiology and milk synthesis:** Cow's udder structure and development, physiology and biosynthesis of milk, secretion and letdown. Milking procedures and use of milking machine.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions
✓ state the feeing system of calves, heifers and dairy cows ✓ write the feeding methods for dairy animal ✓ discuss the feed supplementation strategies for rural dairy farming	**Dairy cattle feeding:** Feeding and care of dairy calves and heifers, feeding of dairy cows. Methods of feeding of dairy animals. Supplementation strategies for milk production in smallholder dairy farming.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions
✓ discuss dairy buffalo breeds ✓ write the management of dairy buffalo production	**Dairy buffalo production:** Types and different breeds of dairy buffalo. Housing, feeding, breeding, and disease prevention of dairy buffalo breeds.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions

✓ describethe dairy goat breeds ✓ write the dairy goat production system	**Dairy goat production:** Different dairy goat breeds. Housing, feeding, breeding, and disease prevention of dairy goat breeds.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions

Books Recommended

1. Livestock Husbandry Techniques. McNitt, M. Granada Publishing Ltd, London. 1993,
2. A Text Book of Animal Husbandry. 8Th edition. Banerjee, G. C. Oxford and IBH Publishing Co, New Delhi, India. 1999.
3. An Introduction to Animal Husbandry in the Tropics. 3rdedn. Williamsong, G. and Payne, W. J. A. Longman Group Ltd, U.K. 1978.
4. Practical Animal Husbandry. 7thedn. Miller, W. C and Rovertson, E. D. S Oliver and Boyd, Edinburgh, U. K. 1959.
5. Dairy farm management. Oluinn, T. Van Nostrand Rethold Co., New Tork. 1980.

Course Code: DPS 202 **Course Title: Dairy Animal Production (Practical)**	**Credit Hour: 1.0**	**Level: 2**	**Semester: I**
Rationale: To provide basic knowledge about farm planning and management systems.			
Course Learning Outcomes: The major learning outcomes of this course are to- • acquire knowledge about modern dairy farm planning • achieve knowledge about modern dairy ration • obtain knowledge about modern dairy farm records practically			
Intended Learning Outcomes(ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ state the dairy farm plan and	Dairy farm plan and	Lecture	Quiz Test

prospects	prospectus for successful dairy operation.	Discussion Display by multimedia	Short questions Broad questions PNB
✓ sketch a layout of a modern dairy farm	Layout of a modern dairy farm.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions PNB
✓ compute the rations for calves, heifers and dairy cows	Computation of balanced rations for dairy cows, heifers and calves.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions PNB
✓ illustrate a routine work for a modern dairy farm	Routine works in a modern dairy farm.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions PNB
✓ perform the selection and judging of dairy cows	Selection and judging of dairy cows.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions PNB
✓ perform the cleaning and washing of utensils, equipments and dairy animals	Cleaning and washing of dairy cows, utensils and equipment.	Lecture Discussion Display by multimedia Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ define records with different types	Practice in the use of dairy records.	Lecture Discussion Display by multimedia	Quiz Test Short questions Broad questions PNB
✓ perform the detection of abnormal milk in different ways	Practice in the use of practical and rapid tests for abnormal milk and mastitis.	Lecture Discussion Display by multimedia Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ assess a modern dairy farm	Visit to modern dairy farms available in the country.	Factory or farm visit	Quiz Test Short questions Broad questions PNB

Books Recommended

1. Livestock Husbandry Techniques. McNitt, M. Granada Publishing Ltd, London. 1993,

2. A Text Book of Animal Husbandry. 8Th edition. Banerjee, G. C. Oxford and IBH Publishing Co, New Delhi, India. 1999.
3. An Introduction to Animal Husbandry in the Tropics. 3rdedn. Williamsong, G. and Payne, W. J. A. Longman Group Ltd, U.K. 1978.
4. Practical Animal Husbandry. 7thedn. Miller, W. C and Rovertson, E. D. S Oliver and Boyd, Edinburgh, U. K. 1959.
5. Dairy farm management. Oluinn, T. Van Nostrand Rethold Co., New Tork. 1980.

Course Code: DPS 203 **Course Title: Fundamental Dairy Science (Theory)**	**Credit Hour: 2.0**	**Level: 2**	**Semester: II**
Rationale: To provide basic knowledge about milk and milk products.			
Course Learning Outcomes: The major learning outcomes of this course are to- • acquire knowledge about milk and different milk products • achieve knowledge about milk processing and treatment process • obtain knowledge about farming co-operative society • develop basic knowledge about milk marketing channel			
Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ define dairy science, dairy animal and dairy cow ✓ differentiate between dairy cow and dairy animal ✓ describe the milk production and consumption scenario of Bangladesh ✓ describe the importance of dairy science ✓ list the top 10 milk producing and milk exporting countries	**Introduction:** Dairy science, Dairy animal and Dairy cow. Characteristics of dairy cow. Statistics related to dairying of Bangladesh and leading dairy countries. Importance of dairy science.	Lecture, Discussion, writing on white board and Display by multimedia	Quiz Test Short questions Broad questions
✓ definition of different terms related to dairy science	**Terminology:** Terms related to dairy science.	Lecture, Discussion, writing on white board, Display by multimedia	Quiz Test Short questions Broad questions
✓ describe the history of dairy	**Dairy farming:** Early history	Lecture,	Quiz Test

farming. ✓ narrate the importance of dairy farming. ✓ list the factors responsible for dairy farming.	of dairying. Importance of dairy farming. Factors responsible for the development of dairy industry.	Discussion, writing on white board, Display by multimedia	Short questions Broad questions
✓ define milk and colostrum. ✓ write the composition of milk and colostrum ✓ differentiate between milk and colostrum ✓ describe the physical properties of milk ✓ validate the amphoteric reaction of milk ✓ state the food value of milk ✓ list the factors influencing the quality and quantity of milk ✓ describe the Factors affecting the quality and quantity of milk ✓ describe the milk borne diseases with their prevention ✓ list the source of contamination and their prevention	**Milk and colostrum:** Definition of milk and colostrums and their composition. Importance of colostrum. Composition of milk of different species. Properties of milk. Food value of milk. Factors influencing the quality and quantity of milk. Sources of contamination of milk and their control. Milk borne diseases and their prevention.	Lecture, Discussion, writing on white board and Display by multimedia	Quiz Test Short questions Broad questions
✓ define pasteurization and sterilization and UHT sterilization ✓ describe the history of pasteurization of milk ✓ state the Working principles of vat and HTST pasteurization ✓ illustrate the flow diagram of UHT sterilizer ✓ list the advantages and disadvantages of pasteurization ✓ list the methods of pasteurization ✓ describe homogenization with its merits and demerits ✓ state the necessicity of homogenization	**Treatment of milk:** Pasteurization and sterilization, history of pasteurization and its methods. Working principles of Vat and HTST pasteurization. Working principles of UHT sterilization. Advantages and disadvantages of different methods of heat treatment in milk. Homogenization with its merits and demerits.	Lecture, Discussion, writing on white board and Display by multimedia , Industry/Factory visit	Quiz Test Short questions Broad questions
✓ illustrate the role of milk vita ✓ write the history of milk vita ✓ describe the functions of milk vita as a society	**Role of cooperative in dairy development:** History of milk vita establishment. Its objectives, activities. Some	Lecture, Discussion, writing on white	Quiz Test Short questions Broad

✓ list the plant of milk vita in our country	plant of milk vita in our country. The beneficiaries of milk vita.	board, Display by multimedia	questions
✓ describe the marketing system of milk in our country ✓ list the obstacles for proper marketing system of milk	**Marketing of milk:** Past and present marketing system of milk in our country.	Lecture, Discussion, writing on white board, Display by multimedia	Quiz Test Short questions Broad questions
✓ list the criteria of milk grading ✓ state the different grades of milk ✓ validate the best grade milk and also different classes of milk	**Grades and Classes of milk:** Grading of milk. Grade-A, B, C and Certified milk. Different classes of milk.	Lecture, Discussion, writing on white board, Display by multimedia	Quiz Test Short questions Broad questions

Books Recommended

1. Peterson W. E. Dairy Science; its principle and practice. Second Edn. J. B. Lippincoth Co. New York. 1958
2. Ecles C. H. Dairy Cattle and Milk Production. the Macmillan Co. New York, 1960.
3. Olson T.M. Elements of Dairying. the Macmillan co. New York.1965.
4. Judking and Keener. Milk production and processing. Jhon Willey & Sons New York, 1960
5. Banerjee G.C. A Text Book of Animal Husbandry. Oxford & IBH pub,New Delhi, 1987.
6. Jhon Webster. Understanding the Dairy Cow. 1st Edn. British Library, Cataloging in Publication Data. ISBN, 0-612-01889-5.
7. Jagadish Prasad. Animal Husbandry and Dairy Science. Kalyni Publishers, New Delhi, Ludiana, Kolkata, 1997.
8. Elmer H. Marth. Fundamentals of Dairy Science. Robert Jenness, Noble P, Wong and Mark Keeney. Springer, US. 1988.
9. C. H. Echles. Milk and Milk Products. W. Barnes Combs and Harold Macy. McGaraw-Hill book Company, Inc. New York and London. 1943.
10. T. Oluinn. Dairy Farm Management. Van Nostrand Rethold Co. New York. 1980.

Course Code: DPS 204 **Course Title: Fundamental Dairy Science (Practical)**	**Credit Hour: 1.0**	**Level: 2**	**Semester: II**

Rationale: To provide basic knowledge about milk and milk products with different testing system.

Course Learning Outcomes:

- achieve knowledge about milk processing and treatment process
- obtain knowledge about milk testing

Intended Learning Outcomes(ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ list the objectives of determination of total solids, ash and protein ✓ illustrate the procedure of determination of ash/protein/ ash ✓ calculate the ash/total solids/protein % in milk and make a comment on your observed result in the lab.	Determination milk compositions (Total solids, protein and ash)	Lecture Discussion Writing on board Practical demonstration, Display by multimedia	Quiz Test Short questions Broad questions Practical note book
✓ define sp. gr. of milk. B What are the objectives of determination of sp. gr. of milk ✓ describe the procedure of determination of sp. gr. of milk. ✓ calculate the sp. gr., LR and total solids% or fat% of milk . ✓ make a comment on your observed result in the lab for sp. gr., total solids/ fat% in milk. ✓ Assess the water, temperature and fat affect the sp. gr. of milk	Use of Lactometer	Lecture Discussion Writing on board Practical demonstration, Display by multimedia	Quiz Test Short questions Broad questions Practical note book
✓ List functions of sulfuric acid, amyl alcohol during fat% determination in milk? ✓ describe the principle of determination of fat in milk by Gerber Method/Babcock method.	Determination of fat in milk by Babcock Method Determination of fat in milk by Gerber Method	Lecture Discussion Writing on board Practical demonstration, Display by	Quiz Test Short questions Broad questions Practical note book

✓ describe the procedure of determination of milk fat by Gerber /Babcock method. ✓ evaluate the supplied milk samples after performing the fat test. ✓ Validate the necessity to determine the fat % of milk ✓ differentiate between Gerber and Babcock method of milk fat determination and validate which one is best		multimedia	
✓ examine the acidity of milk ✓ validatethe apparent/developed acidity in milk ✓ describe the procedure of determination of acidity in milk ✓ evaluate the supplied milk samples after performing the acidity test.	Determination of acidity in milk by formal titration method	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions Practical note book
✓ list objectives of Starch and cane sugar test ✓ describe the procedure of determination of starch and cane sugar in milk ✓ evaluate the supplied milk samples after performing the Starch and cane sugar test	Tests for different adulterants in milk (Starch and Cane sugar)	Lecture Discussion Writing on board Practical demonstration Industry/Factory visit	Quiz Test Short questions Broad questions Practical note book
✓ validate the COB test is necessary for dairy industry ✓ evaluate the supplied milk samples after performing the COB test	Study on Clot-On-Boiling (COB) test	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ state the importance of turbidity test in milk. ✓ describe the procedure of turbidity test ✓ perform turbidity test and judge the supplied milk samples	Study on Turbidity test in milk	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ define phosphatase ✓ state the role of phosphatase test in milk for dairy industry ✓ describe the procedure of	Study on Phosphatase test in milk	Lecture Discussion Writing on board	Quiz Test Short questions Broad

phosphatase test ✓ perform phosphatase test and judge the supplied milk samples		Practical demonstration	questions PNB

Books Recommended

1. Peterson W. E. Dairy Science; its principle and practice. Second Edn. J. B. Lippincoth Co. New York. 1958

2. Ecles C. H. Dairy Cattle and Milk Production. the Macmillan Co. New York, 1960.

3. Olson T.M. Elements of Dairying. the Macmillan co. New York.1965.

4. Judking and Keener. Milk production and processing. Jhon Willey & Sons New York, 1960.

5. Jhon Webster. Understanding the Dairy Cow. 1st Edn. British Library, Cataloging in Publication Data. ISBN, 0-612-01889-5.

6. Elmer H. Marth. Fundamentals of Dairy Science. Robert Jenness, Noble P, Wong and Mark Keeney. Springer, US. 1988

7. C. H. Echles. Milk and Milk Products. W. Barnes Combs and Harold Macy. McGaraw-Hill

book Company, Inc. New York and London. 1943.

Course Code: DPS 205 **Course Title: Poultry Production and Management (Theory)**	**Credit Hour: 2.0**	**Level: 2**	**Semester: II**
Rationale: This course is designed to provide general concept of poultry rearing and management.			
Course Learning Outcomes: The major learning outcomes of this course are to- ✓ know different strains of broiler and layer and their performances. ✓ acquire knowledge about different management practices of broiler and layer farm. ✓ keep role in developing poultry industry and contributing in our national economy.			

Intended learning outcomes (ILOs)	**Course content**	**Teaching/ Learning strategy**	**Assessment strategy**
✓ list the strains for commercial layer and broiler ✓ write the productive performances of commercial layer and broiler strains ✓ explain history and development of GPS and PS	**Introduction:** Strains for commercial layer and broiler and their productive performance. History and development of GPS and PS.	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ describe History and development of commercial layer ✓ explain problems and prospects of commercial layer production	**Layer production**: History and development of commercial layer. Problems and prospects of commercial layer production.	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ define brooding ✓ discuss the principle and practices of brooding and rearing ✓ write the principles and methods of	**Management**: brooding (Brooding, Principle and practices of brooding. Rearing:	Lecture Discussion Multimedia Projector	Quiz Test Term and final Exam. Class

poultry feeding ✓ describe nutritional requirements for broiler and layer ✓ illustrate watering, lighting and debeaking of laying bird ✓ discuss requirements of layer and broiler house ✓ distinguish between layer and non layer, good and poor layer	Rearing system), feeding (Principles and methods of poultry feeding. Nutrition requirement for broiler and layer), watering, lighting, debeaking, and other management practices. Housing: Requirements of layer and broiler house, construction of houses. Distinguishes between layer and non layer, good and poor layer	Display Feed back	attendance
✓ discuss collection, preservation and storage of eggs ✓ determine the factors affecting egg quality and their maintenance	**Egg**: Collection, preservation and storage of eggs. Factors effecting egg quality and their maintenance.	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ write the history and development of commercial broiler and broiler industry ✓ express the problems and prospects of broiler production ✓ discuss the management practices of broiler ✓ discuss the steps of broiler meat processing	**Broiler production**: History and development of commercial broiler and broiler industry. Problems and prospects of broiler production. Commercial broiler management: brooding, feeding, watering, lighting, other management practices and processing of broiler	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ define and classify bio-security ✓ discuss about disinfectant ✓ illustrate the prevention and control of diseases ✓ write the vaccination and medication schedule for broiler and layer	**Bio-security**: concept and measures, types, cleaning and disinfection of poultry houses and equipments. Prevention and control of diseases, vaccination and medication schedule for broiler and	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance

	layer.		

Course Code: DPS 206 **Course Title: Poultry Production and Management (practical)**	**Credit Hour: 1.0**	**Level: 02**	**Semester: II**
Rationale: This course is designed to provide general concept of poultry rearing and management.			
Course Learning Outcomes: The major learning outcomes of this course are to- ✓ gather knowledge about the preparation of poultry house. ✓ acquire knowledge about various operations of poultry farm. ✓ know layout of broiler and layer farm. ✓ gain knowledge about the poultry products and by-products and their processing.			

Intended learning outcomes (ILOs)	**Course content**	**Teaching/ Learning strategy**	**Assessment strategy**
✓ discuss the preparation of brooder house ✓ describe cleaning, disinfection and placement of litter in brooder house	Preparation of brooder house: cleaning, disinfection and placement of litter.	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ define brooding and sexing ✓ discuss the brooding house requirements ✓ identify sex of baby chicks	Brooding and sexing of chicks. .	Lecture Discussion Projector display Practical	Quiz Test Term and final Exam. Note Book

		demonstration Farm visit	Class attendance
✓ illustrate the egg collection, grading, packaging, storage and transportation	Care and handling of egg: Collection, grading, packaging, storage and transportation	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ plan the broiler and layer farm layout	Planning of layer and broiler farm	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ differentiate normal eggs from abnormal eggs	Structures and identification of normal and abnormal eggs	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ measure the internal and external egg quality	Measurements of egg quality traits: Shell quality and internal quality	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ write the steps in poultry processing	Processing poultry: steps in poultry processing	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ distinguish the grading of live and dressed broilers ✓ discuss the processing and cut-up parts of broilers	Grading of live and dressed broilers and processing and cut-up parts of broilers	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ identify different equipments, utensils and machineries used in broiler farming and mention their functions	Identification and uses of different equipment, utensils and machineries used in broiler farming	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance

✓ list the vaccination schedule for broiler and layer	Vaccination schedule for broiler and layer	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance

Books Recommended:

1. Poultry Science and Practices. 5th edn. Winter, A.R. and Funk, E. M. J. B. Lipponcott Co., USA. 1960.
2. Hatchery Operation and Management. Gohn Wiley and Sout. Funk, E. M. and Irwin, N, R. Inc. London Chapman and Hall Ltd. New York. 1999.
3. Poultry Breeding and Genetics, R. D. Crawford. Elsever Publishers. Amasterdam, the Netherlands. 1990.
4. Nutrient Requirements of Poultry. 9th revised edition. National Research Council Washington. D.C. U. S. A. 1994.

Course Code: DPS 301 **Course Title: Dairy Microbiology (Theory)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: I**
Rationale: To provide basic knowledge about different microbes related to milk and milk products.			
Course Learning Outcomes: • achieve knowledge about different microbes related to milk • obtain knowledge about microbes in dairy farm			

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ define microbiology, dairy microbiology, microorganisms ✓ classify the microorganisms ✓ state the biological properties of micro-organisms ✓ describe the importance of dairy	**Introduction:** **M**icrobiology. Dairy microbiology. Microorganisms. Classification of micro-organisms. Simple biological properties of micro-	Lecture, Discussion, writing on white board	Quiz Test Short questions Broad questions)

microbiology	organisms. Importance of dairy Microbiology.		
✓ explain the standard growth curve of microorganism ✓ describe the factors affecting the microbial growth	**Methods of controlling growth of micro-organisms:** Microbial growth, the concept of micro-environment, water relationship, nutrient requirements, p^H, oxidation reduction potential, oxygen relationship, temperature, antibiotics, germicidal properties of milk, quaternary ammonium compounds, salt fatty acids and miscellaneous agents.	Lecture, Discussion, writing on white board and display by multimedia	Quiz Test Short questions Broad questions
✓ illustrate the destruction of microorganisms by physical and chemical means	**Destruction of micro-organisms by physical and chemical agents:** Destruction by heat, destruction by radiation, destruction by chemicals, cleaning and sanitization, miscellaneous methods for removal of microorganisms.	Lecture, Discussion, writing on white board	Quiz Test Short questions Broad questions
✓ explain- how do different types of microbes act in a media	**Associative action among microorganisms:** Synergistic, metabiotic and antibiotic actions of microorganisms.	Lecture, Discussion, writing on white board	Quiz Test Short questions Broad questions
✓ explain the microbial defects in milk and milk products	**Physical reaction or microbial defects in milk and milk products:** Coagulation, Gassy defect, proteolytic reaction, lipolysis, ropiness, maltiness, bitterness, and color defect.	Lecture, Discussion, writing on white board	Quiz Test Short questions Broad questions)
✓ describe the bacteriological problem related to market milk ✓ illustrate properties of milk borne diseases	**Microbiology of Market milk and related products:** Bacteriological problems of market milk products, the spread of disease through milk.	Lecture, Discussion, writing on white board	Quiz Test Short questions Broad questions

✓ define starter culture/lactic culture. ✓ Classify the lactic culture ✓ validate that microbes produce lactic acid ✓ explain the citrate fermentation ✓ describe the procedure for culture production ✓ state the characteristics/properties and defects of culture	**Microbiology of lactic cultures:** Lactic acid production, citrate fermentation, carrying of culture and culture defects.	Lecture, Discussion, writing on white board	Quiz Test Short questions Broad questions)
✓ explain the contamination of milk from different source in a farm ✓ illustrate the role of milking utensils in milk sanitation	**Microbiology of milk on the producing farm:** Contamination from the cow, role of milking utensils in milk sanitation, bacteria from miscellaneous sources and cooling of milk.	Lecture, Discussion, writing on white board	Quiz Test Short questions Broad questions

Books Recommended

1. Dairy Microbiology. Edwin M. Foster, F. Eugene Nelson, Marvin L. Speck, Raymond N. Doetsch, Joseph C. Olson. Macmillan and Co. Ltd. London. 1958.
2. Food Microbiology. 4thedn. Frazier, W. C. and Westhoff, D. C. Tata McGraw-Hill Publishing Company Limited, New Delhi. 1995.
3. Food borne infections and intoxications. 2ndedn. Fred W. Tanner. The Garrard Press. 1952.
4. Applied Dairy Microbiology. 2nd edition. Elmer H. Marth, James Steele. Marcel Dekker Inc. New York. 2005
5. Laboratory Manual for Dairy Microbiology. E. M. Foster and W. C. Frazer, Burgess Publishing Company. 1951.
6. Standard Methods for the Examination of Dairy Products. R. T. Marshal-APHA. Broadway, New York. 1976.
7. Hand Book of Milk Microbiology. Srivastara. Daya Publishers, India. 2002.

Course Code: DPS 302 **Course Title: Dairy Microbiology (Practical)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: I**
Rationale: To provide basic knowledge about different microbes related to milk and milk products with testing.			
Course Learning Outcomes: • achieve knowledge about different microbes related to milk and testing			

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ measures the safeties for a dairy microbiology laboratory	Study on safety security measures in Dairy Microbiology laboratory	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ write the principle of methylene blue reduction test ✓ exercise the methylene blue reduction test and grade the milk sample	Study on Methylene Blue Reduction test	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ how does resazurin change the color in a milk sample ✓ perform the resazurin reduction test and grade the milk sample	Study on Resazurin Reduction test	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ calculate the microscopic factor for a specific focal diameter value ✓ write the objectives for DMCdescribe the procedure of DMC differentiate between DMC and SPC ✓ perform direct microscopic count with comments	Study on Direct Microscopic Count (DMC)	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ write the objectives for SPC describe the procedure of SPC ✓ perform standard microscopic count and write a comment on your observed result ✓ make a dilution ratio of 1:100000 using milk and dilution blank respectively	Study on Standard Plate Count (SPC)	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ state the importance of coliform count ✓ describe the procedure of coliform count ✓ state the coliform standard for milk and milk products	Study on Coliform Count	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB

✓ describe the procedure of yeast and mould count	Study on Yeast and Mold count	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ define starter culture ✓ classify starter culture ✓ state the properties and defects of starter culture ✓ describe the procedure of starter culture manufacturing	Study on Starter Culture	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB
✓ illustrate the procedure for bacteria isolation	Study on Isolation of Bacteria.	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions PNB

Books Recommended

1. Dairy Microbiology. Edwin M. Foster, F. Eugene Nelson, Marvin L. Speck, Raymond N. Doetsch, Joseph C. Olson. Macmillan and Co. Ltd. London. 1958.
2. Food Microbiology. 4thedn. Frazier, W. C. and Westhoff, D. C. Tata McGraw-Hill Publishing Company Limited, New Delhi. 1995.
3. Food borne infections and intoxications. 2ndedn. Fred W. Tanner. The Garrard Press. 1952.
4. Applied Dairy Microbiology. 2nd edition. Elmer H. Marth, James Steele. Marcel Dekker Inc. New York. 2005
5. Laboratory Manual for Dairy Microbiology. E. M. Foster and W. C. Frazer, Burgess Publishing Company. 1951.
6. Standard Methods for the Examination of Dairy Products. R. T. Marshal-APHA. Broadway, New York. 1976.
7. Hand Book of Milk Microbiology. Srivastara. Daya Publishers, India. 2002.

Course Code: DPS 303 **Course Title: Hatchery operation and practices (Theory)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: I**
Rationale: This course is designed to provide general concept of hatchery and hatchery management of poultry.			
Course Learning Outcomes: The major learning outcomes of this course are to- ✓ know hatchery building, hatchery equipments and incubators. ✓ acquire knowledge of various hatchery operations and management. ✓ develop hatchery industry and contribute to national economy.			
Intended Learning Outcomes(ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ define incubation ✓ classify incubation ✓ describe the methods of incubation ✓ write the incubation periods of different species of poultry ✓ describe the principles and practices of incubation ✓ discuss the embryonic development ✓ distinguish embryonic mortality from taking off hatch ✓ explain criteria for selection and culling of baby chicks	**Incubation:** Methods of incubation, Incubation periods of different species of poultry. Principles and practices of incubation, setting of eggs, requirements, embryonic development, embryonic mortality, taking off hatch. Selection and culling of baby chicks	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ state hatchery and its types ✓ illustrate factors affecting site selection for hatchery ✓ define and classify incubator ✓ assess selection of incubators ✓ evaluate sanitary measures of incubator	**Hatchery:** Types, site selection, Incubators: Types, selection and sanitation	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ define fertility and hatchability ✓ describe the factors affecting fertility and	**Fertility and hatchability:** definition, influencing factors of fertility and hatchability	Lecture Discussion Multimedia Projector	Quiz Test Term and final Exam. Class

hatchability		Display Feed back	attendance
✓ list the sources of hatching eggs ✓ discuss the selection criteria and care of hatching egg	**Hatching eggs:** Sources, selection and care of hatching eggs	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ determine the qualities of hatchery personnel ✓ identify sex of baby chicks ✓ discus the delivery methods of chick ✓ illustrate record keeping in hatchery	**Organization of works in hatchery:** Qualities of hatchery personnel, sexing baby chicks, chick delivery methods and record keeping in hatchery	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ list the hatchery born diseases ✓ describe the prevention and control of hatchery born diseases	**Egg and hatchery-borne diseases:** prevention and control	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance
✓ justify problems and prospect of hatchery business	**Economics in hatchery:** Problem and prospect of hatchery business	Lecture Discussion Multimedia Projector Display Feed back	Quiz Test Term and final Exam. Class attendance

Course Code: DPS 304 **Course Title: Hatchery operation and practices (Practical)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: I**

Rationale: This course is designed to provide general concept of hatchery and hatchery management of poultry.

Course Learning Outcomes: The major learning outcomes of this course are to-

- ✓ acquire knowledge about different hatchery operations and processing.
- ✓ gain concept about hatchery products and by-products.
- ✓ gather knowledge about incubator, fertile eggs and day old chicks and their proper management.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ explain factors affecting collection of hatching egg ✓ illustrate factors affecting of selection of hatching egg	Collection, Selection and care of hatching eggs	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ describe the natural incubation	Principles and practices of natural incubation	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ illustrate the sanitary measures of incubator and hatchery building	Sanitation of incubator and hatchery building	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ discuss the artificial incubation	Practical demonstration for artificial incubation of eggs	Lecture Discussion Projector display	Quiz Test Term and final Exam. Note Book

		Practical demonstration Farm visit	Class attendance
✓ state taking off hatch ✓ describe the sexing of chicken ✓ list the criteria of an ideal baby chick ✓ select the criteria for culling of baby chicks ✓ describe packaging , transportation and delivery of chicks	Taking off hatch. Sexing baby chicks. Counting, selection, culling, packaging, transportation and delivery of chicks	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ explain the process for collection and preservation of embryos	Collection and preservation of embryos for observation of development	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance
✓ detect causes of failure to hatch	Detection of causes of failure to hatch	Lecture Discussion Projector display Practical demonstration Farm visit	Quiz Test Term and final Exam. Note Book Class attendance

Books Recommended:

1. Hatchery Operation and Management. Funk, E. M. and Irwin, N, R. Gohn Wiley and Sout, Inc. London Chapman and Hall Ltd. New York. 1999.
2. Commercial Chicken Meat and Egg Production. Donald D. Bell and William D. Weaver. Springer. 2007.
3. Poultry Science. & Practices 5th Edn. Winter, A. R & Funk, E. M. J. B. Lippincott Co., USA. 1960.
4. Poultry Breeding and Genetics, R. D. Crawford. Elsever Publishers. Amasterdam, the Netherlands. 1990.
5. Poultry Science. 4th edition. Colin G. Scanes, George Brant, M. E. Ensminger Deceased 2003.
6. Handbook of Poultry Science and Technology (Vol. 1 and 2). Isabel Guerrero- Legarreta, Alma Delia Alarcon- Rojo, Christine Alvarado and Amarinder S. Bawa. Wiley. 2010.
7. Storey's Guide to Raising Chickens. 3rd edition. Gail Damerow. Storey Publishing, LLC. 2010.

Course Code: DPS 305 **Course Title: Dairy Product Technology (Theory)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: II**
Rationale: To provide basic knowledge about different milk and dairy products.			
Course Learning Outcomes: The major learning outcomes of this course are to- • achieve knowledge about different milk and dairy products • obtain knowledge about principle of different dairy products making.			

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ define cream with composition ✓ state the physical properties of cream and principle of cream separation ✓ illustrate the methods of cream separation with the justification of best one ✓ describe the factors affecting the richness of cream. ✓ Mention the condition when the cream separator works efficiently ✓ Classify the cream	**Cream:** Definition, composition, classification, Physical properties of cream. Cream separation-principles of cream separation, gravity and centrifugal methods of cream separation, Factors affecting the richness of cream, Factors affecting the efficiency of cream separator.	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions)
✓ Define butterwith composition ✓ enumerate the component of butter	**Butter:** Definition, composition of butter, types of butter, method of butter making, Factors affecting the	Lecture Discussion Writing on board	Quiz Test Short questions Broad

✓ describe the methods of butter making ✓ state the churn ability of cream ✓ what is overrun of butter ✓ explain the defects of butter with cause and remedies	churn ability of cream, overrun, defects in butter, their cause and prevention.	Practical demonstration Farm visit	questions
✓ define Ghee ✓ enumerate the component of ghee ✓ explain the methods of ghee making ✓ give explanation for the best method of ghee making ✓ list the defects of ghee with possible remedies	**Ghee making:** Definition, composition of ghee, ghee making from cream, method of ghee making, defects of ghee and their remedies.	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions)
✓ define cheese with composition ✓ classify cheese ✓ what are the scientific bases of cheese making ✓ illustrate the manufacturing of cheddar and Swiss cheese	**Cheese:** Definition, composition, classification, principles of cheese making, manufacture of Cheddar cheese and Swiss cheese	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions
✓ describe the manufacturing process of sweet dahi and sour dahi ✓ list the characteristics of good quality of dahi ✓ explain the nutritive value of dahi, defects and remedies	**Dhai:** Manufacture of dahi from whole milk and skim milk, Nutritive value and defects and remedies.	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions)
✓ define powder milk ✓ classify powder milk ✓ describe the methods of powder milk preparation ✓ differentiate between spray drying and drum drying ✓ explain the properties of powder milk	**Powder milk:** Definition, composition, types, methods of powder milk preparation and properties of powder milk.	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions
✓ define condensed milk ✓ classify condensed milk ✓ describe the methods of condensed milk preparation	**Condensed milk:** Definition, composition, types and manufacturing of condensed milk.	Lecture Discussion Writing on board Practical demonstration	Quiz Test Short questions Broad questions

		Farm visit	
✓ define ice-cream with composition ✓ classify different types of ice-cream with examples ✓ explain the steps of ice-crem making ✓ describe the different defects of ice-cream with their remedies	**Ice-cream:**Definition, composition, classification, food value, preparation procedure of ice-cream, overrun in ice-cream, defects in ice-cream and their remedies.	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions
✓ define Reconstituted, Recombined, Tonned, Filled and Vitaminized milk ✓ state the preparation procedure of different special milk	**Special milk** (Reconstituted, Recombined, Tonned, Filled, Vitaminized milk etc.)	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions

Books Recommended

1. Outlines of Dairy Technology by Sukumar De. 1st edtion. Oxford University Press. 2001.
2. The Sensory Evaluation of Dairy Products.2nd edition. Stephanie Clark, Michale Costello, MaryAnne Drake and Floyd Bodyfellt. AVI Van Reinhold Comp. Inc., Newyork. 2009.
3. Modern Dairy Products.3rd edition. Linclon M. Lampert. Chemical Publishing Co. Inc., US. 1998.
4. Dairy Technology in the Tropics and Subtropics. J. C. T. Van Den Berg. Pudoc Wageningen. 1988.
5. Ice Cream. 3rdeditionWendell S. Arbuckle. Director Books. 1977.
6. Milk and Milk Products. C. H. Echles, W. Barnes Combs and Harold Macy. McGaraw-Hill book Company, Inc., New York and London. 1943.
7. Advanced Dairy Science and Technology. Trevor Britz, Richard K. robinson. Weily-Blackwell. 2008.
8. Modern Dairy Technology: vol. 1 &2. Advances in Milk Processing. R. K. Robinson. Blackie Academic and Professional. 1996.

Course Code: DPS 305 **Course Title: Dairy Product Technology (Practical)**	**Credit Hour: 1.0**	**Level: 3**	**Semester: II**
Rationale: To provide basic knowledge about different milk and dairy products with manufacturing procedure.			
Course Learning Outcomes: The major learning outcomes of this course are to- • achieve knowledge about different milk and dairy products making.			

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
✓ identify different specimens with functions ✓ list the different parts of a creamseparator according to ascending or descending order	Identification of different parts of a cream separator	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions PNB
✓ assemble the different parts of a cream separator	Assembling of different parts of a cream separator	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions Practical note book
✓ perform the separation of cream with comments	Cream separation by a modern cream separator	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions PNB
✓ judge the cream sample after performing fat and acidity test	Testing of cream for fat and acidity	Lecture Discussion Writing on board Practical demonstration Farm visit	Quiz Test Short questions Broad questions PNB
✓ preparebutter and make a ratio between price in the laboratory and current market price.	Preparation of Butter	Lecture Discussion Writing on board Practical demonstration Industry visit	Quiz Test Short questions Broad questions PNB
✓ prepare ghee and make a ratio between price in the laboratory and current market price	Preparation of Ghee	Lecture Discussion Writing on board Practical	Quiz Test Short questions Broad questions

		demonstration Factory visit	Practical note book
✓ prepare cheese and make a ratio between price in the laboratory and current market price	Preparation of Cheese	Lecture Discussion Writing on board Practical demonstration Industry/Factory visit	Quiz Test Short questions Broad questions Practical note book
✓ prepare dahi/ cultured milk / mattha and make a ratio between price in the laboratory and current market price	Manufacturing of sweet and sour dahi, cultured milk, mattha	Lecture Discussion Writing on board Practical demonstration Factory visit	Quiz Test Short questions Broad questions Practical note book
✓ define channa with composition ✓ prepare Chhana, Rassogolla, Sandesh Malaikari and chamcham and make a ratio between price in the laboratory and current market price	Manufacturing of Chhana, Rassogolla, Sandesh Malaikariandchamcham	Lecture Discussion Writing on board Practical demonstration Factory visit	Quiz Test Short questions Broad questions Practical note book

Books Recommended

1. Outlines of Dairy Technology by Sukumar De. 1st edtion. Oxford University Press. 2001.
2. The Sensory Evaluation of Dairy Products.2nd edition. Stephanie Clark, Michale Costello, MaryAnne Drake and Floyd Bodyfellt. AVI Van Reinhold Comp. Inc., Newyork. 2009.
3. Modern Dairy Products.3rd edition. Linclon M. Lampert. Chemical Publishing Co. Inc., US. 1998.
4. Dairy Technology in the Tropics and Subtropics. J. C. T. Van Den Berg. Pudoc Wageningen. 1988.
5. Ice Cream. 3rd editionWendell S. Arbuckle. Director Books. 1977.
6. Milk and Milk Products. C. H. Echles, W. Barnes Combs and Harold Macy. McGaraw-Hill book Company, Inc., New York and London. 1943.
7. Advanced Dairy Science and Technology. Trevor Britz, Richard K. robinson. Weily-Blackwell. 2008.

8. Modern Dairy Technology: vol. 1 &2. Advances in Milk Processing. R. K. Robinson. Blackie Academic and Professional. 1996.

Department of Pathology and Parasitology (PPS)

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
Discipline: Pathology				
1.	PPS-201: General Pathology and Oncology (Theory)	3	2	1
2.	PPS-202: General Pathology and Oncology (Practical)	1	2	1
3.	PPS-205: Systemic Pathology (Theory)	2	2	II
4.	PPS-206: Systemic Pathology (Practical)	1	2	II
5.	PPS-301: Pathology of Infectious Diseases (Theory)	2	3	1
6.	PPS-302: Pathology of Infectious Diseases (Practical)	1	3	1
7.	PPS-305: Avian Pathology (Theory)	1	3	II
8.	PPS-306: Avian Pathology (Practical)	1	3	II
9.	PPS-402: Clinical Pathology and Necropsy (Practical)	1	4	II
Total (08+05)=13				
Discipline: Parasitology				
10.	PPS-203: General Parasitology and Malacology (Theory)	2	2	1
11.	PPS-204: General Parasitology and Malacology (Practical)	1	2	1
12.	PPS-207: Nemathelminthes and Platyhelminthes(Theory)	2	2	II
13.	PPS-208: Nemathelminthes and Platyhelminthes (Practical)	1	2	II
14.	PPS-303: Entomology(Theory)	2	3	1
15.	PPS-304: Entomology(Practical)	1	3	1
16.	PPS-307: Protozoology (Theory)	2	3	II
17.	PPS-308: Protozoology (Practical)	1	3	II
Total (08+04)=12				

Total Credit Hour	
Theory	16
Practical	9
Total	**25**

Course Code: PPS-201 **Course Title: General Pathology and Oncology (Theory)**	**Credit Hours: 3**	**Level:2**	**Semester:1**
Rationale: This course is designed to provide the basic idea about general pathologic conditions found in living body.			
Course learning outcomes: The major learning outcomes of this course are - • To know the importance and scope of pathology • Obtaining knowledge about etiological agents responsible for different pathological conditions in living individuals • Learn about the cellular and molecular changes in response to injurious agents and deprivations • Understanding the immunological responses of living body to specific allergens • To know about different neoplastic disorders and their developmental patterns			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ define pathology ➢ discuss branches of pathology ➢ describe the brief history of pathology ➢ recall glossary related to pathology	**Introduction:** History, definition, branches and scope of Pathology	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ terminology related to cell injury and cell death ➢ types of necrosis and gangrene ➢ characteristics of necrotic and gangrenous cells ➢ memorize post-mortem changes	**Cell injury, cell death and necrosis:** causes of cell injury and death, biochemical and ultrastructural changes in accidental cell death and apoptosis; Characteristics of necrotic cells and tissues; differentiation of necrosis and postmortem autolysis; types of necrosis; disposition of necrotic tissues; gangrene; infarct.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ define and explain fatty changes ➢ enlist different types of degeneration ➢ explain the causes, mechanism and pathology of accumulation	**Intracellular and extra cellular depositions; degenerations:** Fatty change, extra cellular accumulation of lipids, glycogen deposition	Lecture Interactive Discussion Audio visual Video clip	Quiz Test Short question Essay type Class

	of lipids, glycogen deposition and glycogen storage diseases; lysosomal storage diseases; extracellular deposition of proteins-amyloid, albumin and fibrin.	and glycogen storage diseases; lysosomal storage diseases; extracellular deposition of proteins-amyloid, albumin and fibrin.	Exercise	attendance
	➢ discuss different types, causes, occurrences and lesions of calcification ➢ express ossification and gout ➢ explain exogenous pigments and endogenous pigments ➢ discuss different types, causes, occurrences and lesions of jaundice, photosensitizational dermatitis	**Mineral deposits and pigments:** Pathologic calcifications and ossification, gout, exogenous pigments; endogenous pigments - melanosis; hemosiderosis; jaundice, photosensitizational dermatitis	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
	➢ enlist different types of disturbances of growth ➢ discuss causes, types, pathology of thrombosis, embolism, hyperemia and congestion, haemorrhage, oedema and shock	**Disturbances of circulation:** Definition, classification, oetiology, occurrences, pathogenesis, changes, significances and effects of thrombosis, embolism, hyperemia and congestion, haemorrhage, oedema and shock; Failure to clot	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
	➢ define and classify inflammation mention significances and effects of inflammation ➢ explain vascular and cellular events of inflammation ➢ describe characteristic features of inflammation ➢ discuss the process of healing	**Inflammation:** Definition, cardinal signs, classification, oetiology, occurrences, pathogenesis, changes, significances and effects and; vascular and cellular events in inflammation; chemical mediators of inflammations; cells of inflammation; types of inflammation; Healing, Fever	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
	➢ define immunity, immune reactor and immune pathology ➢ classify immunity ➢ discuss hypersensitivity, autoimmunity and immunodeficiency diseases	**Immunopathology:** Immune response, cells related to immunity, and immune effectors mechanisms; hypersensitivity; autoimmunity; immunodeficiency.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
	➢ define terminology related to	**Oncology**	Lecture	Quiz Test

oncology ➢ discuss causes, types, pathology of atrophy, hypertrophy, hyperplasia, metaplasia, hypoplasia, aplasia, dysplasia, anaplasia and neoplaisa ➢ describe important neoplasms.	Development Anomalies and Malformation, Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Hypoplasia, Aplasia, Dysplasia, Anaplasia, Neoplaisa; Brief Description of Important Neoplasms.	Interactive Discussion Audio visual Video clip Exercise	Short question Essay type Class attendance

Reference Books

1. Jones, T. C., Hunt, R. D. and King, N. W. 1997. Veterinary Pathology. 6th Williams and Wilkins, Philadelphia, USA.
2. Curran, R. C. 1981. Colour Atlas of Histopathology. 2nd edn. Harvey Miller Publishers, London, England.
3. Luna, L.G. 1967. Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. McGraw-Hill Book Company, New York.
4. Majno, G. and Joris, I. (1996). Cells, Tissues and Disease. Principles of General Pathology. Blackwell Scientific Publications, London
5. Roitt, I., Brostoff, J. and Male,D. (2001). Immunology, Moshby, london
6. Kumar. V., Cotron, R. S. and Robins, S. L. (1992). Basic Pathology. 5th Edition. W.B. Saunders Co., London.

Course Code: PPS-202 **Course Title: General Pathology and Oncology (Practical)**	**Credit Hours: 1**	**Level:2**	**Semester:1**

Rationale: This course is designed to provide basic idea for collection, preservation and processing of pathologic samples; to provide knowledge on gross and histopathology.

Course learning outcomes: The major learning outcomes of this course are -

- To know the different techniques for collection, preservation and processing of tissues / organs
- Learn about the process for preparation histopathological slides
- To evaluate the gross and cytopathology of abnormal tissues
- To acquire knowledge on the postmortem changes found in dead body for diagnostic purposes

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ represent different equipments and chemicals used in pathology lab. ➢ discuss the procedure for collection, Preservation, Fixation, processing and staining of	Methods of collection, Preservation, Fixation, processing and staining of pathological specimens	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB

pathological specimens			Viva voice
➢ identify macro and microscopic changes of pathologic specimens	Gross and microphotographs of pathologic specimens	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ differentiate post mortem change from ante mortem changes ➢ operate technique of post mortem examination ➢ sequential study of post mortem changes	Study of posmortem changes	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice

Reference Books

1. Jones, T. C., Hunt, R. D. and King, N. W. 1997. Veterinary Pathology. 6th Williams and Wilkins, Philadelphia, USA.
2. Curran, R. C. 1981. Colour Atlas of Histopathology. 2nd edn. Harvey Miller Publishers, London, England.
3. Luna, L.G. 1967. Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. McGraw-Hill Book Company, New York.
4. Majno, G. and Joris, I. (1996). Cells, Tissues and Disease. Principles of General Pathology. Blackwell Scientific Publications, London
5. Roitt, I., Brostoff, J. and Male,D. (2001). Immunology, Moshby, london
6. Kumar. V., Cotron, R. S. and Robins, S. L. (1992). Basic Pathology. 5th Edition. W.B. Saunders Co., London.

Course Code: PPS-203 **Course Title: General Parasitology and Malacology (Theory)**	**Credit Hours: 2**	**Level:2**	**Semester:1**

Rationale: This course is designed to provide basic concepts of Parasites, Hosts, relation and the effects of parasites on host body and different kinds of mollusks.

Course learning outcomes: The major learning outcomes of this course are -

- To know about the different kinds of parasites and their hosts
- Obtaining knowledge about the relationship between host and parasite
- Learn about the harmful effects of parasites

• To know the zoonotic importance of parasites • To acquire knowledge for controlling parasitic diseases • To know about the different mollusks and their importance in parasitology			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ define basic terminology ➢ describe brief history, origin and evolution of parasite ➢ discuss different types of host and parasitism ➢ classify host and parasite ➢ mention organ and host specificity	**Introduction to Parasitology**: Basic terminology, History, Origin and Evolution of Parasites, Types of parasitism, Host Parasite relationship. Injurious effects of parasites on their hosts, Systematic Classification of parasites, Host and organ specificity	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ define immunity and resistance ➢ classify different types of parasitic immunity and resistance ➢ describe mechanism of immunity development	Resistance and immunity of parasites	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ describe different zoogeographical area ➢ discuss factors affecting geographical distribution of parasites	Geographical distribution of parasites	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ define and classify zoonosis ➢ describe important parasitic zoonotic diseases	Parasitic zoonoses	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ discuss different method for controlling parasitic diseases	General consideration of control measures against parasites	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ define different terminology ➢ classify mollusk	**Malacology:** Identification of the snails,	Lecture Interactive	Quiz Test Short

➢ describe morphology, biology and habitat of different important snail ➢ mention veterinary and economic importance of snail ➢ discuss involvement of snail in the life cycle of parasite ➢ describe the effective methods of snail control	Examination of the snails for parasites, Important genera and species of snails involved in the life cycle of parasites; Control of Veterinary Important snails	Discussion Audio visual Video clip Exercise	question Essay type Class attendance

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peter, H.M. Gilles, H.M. Wolfe, Medical Publication, ELBS
2. Craig and Faust's Clinical Parasitology. Ernest Carrol Faust and Paul Farr Russell Kimpton, London
3. Diagnosing Helminthiasis. Through Coprological Examination. D. Theinpont, F. Rochette, O. Vanparijs, Janssen Research Foundation, Burse Belgium
4. Ecological Relations of the Larval Trematodes of Fresh Water Snails. W.W. Cort
5. General Parasitology. Cheng, T. C. New Delhi, India, Academic Press Inc. USA
6. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
7. Introduction to Helminth Parasites of Animals and Birds. M.H. Rahman, M.M.H. Mondal and S.Ahmed. Bangladesh
8. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
9. Medical and Economic Malacology. E.A. Malek and T.C. Cheng, Academic Press, New York and London
10. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
11. Parasitology in Focus- Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
12. Text Book of Parasitology .D.L. Belding. Appleton Century-Crofts, NewYork
13. Text Book of Veterinary Clinical Parasitology. E.J.L. Soulsby. Blackwell Scientific Co. Ltd. Oxford
14. Veterinary Helminthology. Dun, A. William-Heinemann Medical Book Ltd. UK.
15. Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings. Blackwell Science, U.K.

Course Code: PPS-204 **Course Title: General Parasitology and Malacology (Practical)**	**Credit Hours: 1**	**Level:2**	**Semester:1**

Rationale: This course is designed to provide basic idea about different chemicals and equipments used in Parasitology Lab. and different diagnostic techniques for identifying parasites and mollusks.

Course learning outcomes: The major learning outcomes of this course are -

- To know the different kinds of reagents and equipments

- Obtaining knowledge on the parasitological samples
- Learn about the different techniques for identifying eggs and parasites
- To identify different mollusks in field and Lab. Conditions.

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ represent different equipments and chemicals used in parasitology lab. ➢ discuss the procedure for preparation of different solutions used in parasitology lab.	Preparation of solutions used for parasitological examinations	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB Viva voice
➢ describe different lab. procedure for diagnosis of parasitic infections	Laboratory procedure for the diagnosis of parasitic infections	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ discuss different methods for collection, preservation and transportation of parasitic materials	Methods for collection, preservation and transportation of parasitic materials	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ describe the procedure for collection snail from field ➢ discuss different technique for examination and identification of snail	Identification of snails	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peter, H.M. Gilles, H.M. Wolfe, Medical Publication, ELBS
2. Craig and Faust's Clinical Parasitology. Ernest Carrol Faust and Paul Farr Russell Kimpton, London

3. Diagnosing Helminthiasis. Through Coprological Examination. D. Theinpont, F. Rochette, O. Vanparijs, Janssen Research Foundation, Burse Belgium
4. Ecological Relations of the Larval Trematodes of Fresh Water Snails. W.W. Cort
5. General Parasitology. Cheng, T. C. New Delhi, India, Academic Press Inc. USA
6. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
7. Introduction to Helminth Parasites of Animals and Birds. M.H. Rahman, M.M.H. Mondal and S.Ahmed. Bangladesh
8. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
9. Medical and Economic Malacology. E.A. Malek and T.C. Cheng, Academic Press, New York and London
10. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
11. Parasitology in Focus- Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
12. Text Book of Parasitology .D.L. Belding. Appleton Century-Crofts, NewYork
13. Text Book of Veterinary Clinical Parasitology. E.J.L. Soulsby. Blackwell Scientific Co. Ltd. Oxford
14. Veterinary Helminthology. Dun, A. William-Heinemann Medical Book Ltd. UK.
15. Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings. Blackwell Science, U.K.

Course Code: PPS-205 **Course Title: Systemic Pathology (Theory)**	**Credit Hours: 2**	**Level:2**	**Semester: II**

Rationale: This course is designed to provide knowledge about the different systemic disorders caused by infectious and non-infectious agent in animal body.

Course learning outcomes: The major learning outcomes of this course are -

- To know the different systemic disorders caused by infectious and non-infectious agent
- Learn about the etiology, pathogenesis, pathology and clinical manifestations of different systemic disorders
- To know the different methods for diagnosis of systemic disorders

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ explain pathogenesis and pathology of digestive system ➢ investigate the diseases of digestive system ➢ enlist neoplasm of digestive	**Digestive system:** Pathological conditions of the buccal cavity, salivary glands, oesophagus, tympanites, bloat, ruminal	Lecture Interactive Discussion Audio visual	Quiz Test Short question Essay type Class

system	acidosis, traumatic reticulitis/peritonitis, gastritis, gastric ulcers, enteritis, intestinal obstruction, impaction of caecum, colitis, proctitis, peritonitis, hepatitis, cirrhosis, cholecystitis, cholelithiasis, pancreatitis and neoplasms	Video clip Exercise	attendance
➢ memorize pathological condition of respiratory tract ➢ summarize pathogenesis and pathology of respiratory system ➢ state neoplasms of respiratory system	**Respiratory system:** Pathological conditions of the upper respiratory tracts, pneumonia, pneumonitis, special types of pneumonia, bronchial asthma, pleuritis, atelectasis, broncheictasis, emphysema and neoplasms	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ enlist developmental anomalies ➢ express pathological condition of cardiovascular and lymphatic system ➢ describe pathogenesis and pathology of different condition found in cardiovascular and lymphatic system ➢ state neoplasms of cardiovascular and lymphatic system	**Cardiovascular system:** Developmental anomalies, cardiac failure, myocarditis, cardiomyopathy, pericarditis, endocarditis, arteritis, phlebitis, arteriosclerosis and neoplasms **Hemopoietic and Lymphatic systems:**Pathological conditions of bone marrow, lymphnodes, spleen and thymus, anaemia and neoplasms	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ state muscular dystrophy, hypoplasia, hyperplasia, atrophy, hypertyrophy, degeneration and necrosis, ossification of muscles and steatosis ➢ explain nutritional myopathy (white muscle disease), steatitis, equine rhabdomyolysis (azoturia), arthritis and neoplasms ➢ enlist neoplasm of musculoskeletal system	**Musculoskeletal system:** Muscular dystrophy, hypoplasia, hyperplasia, atrophy, hypertyrophy, degeneration and necrosis, ossification of muscles, steatosis, nutritional myopathy (white muscle disease), steatitis, equine rhabdomyolysis (azoturia), arthritis and neoplasms	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ recall congenital anomalies ➢ define and describe different pathological condition found in urogenital system	**Urogenital system:** Congenital anomalies of male and female urogenital organs, glomerulonephritis, interstitial	Lecture Interactive Discussion Audio	Quiz Test Short question Essay type

➢ mention neoplasm of urogenital system	nephritis, pyelonephritis, nephrosclerosis, cystitis, urolithiasis, neoplasms.Cystic ovary, oophoritis, salpingitis, metritis, abortion, vaginitis, vulvitis, mastitis, schirrous cord, gut tie, posthitis, balanitis, balanoposthitis, neoplasms	visual Video clip Exercise	Class attendance
➢ recall pathological condition of different endocrine gland ➢ explain goiter, hypoparathyroidism, hyperparathyroidism and diabetes ➢ list neoplasm of endocrine system	**Endocrine system:** Pathological conditions of different endocrine glands, cushing syndrome, goiter, hypoparathyroidism, hyperparathyroidism, diabetes mellitus, diabetes insipidus and neoplasms	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ explain pathological conditions of brain, spinal cords and peripheral nerves ➢ define and explain encephalitis, encephalomalacia, myelitis, meningitis, epilepsy and spongiform encephalopathydetect pathology of nervous system ➢ enlist neoplasm of nervous system	**Nervous system:** Pathological conditions of brain, spinal cords and peripheral nerves, encephalitis, encephalomalacia, myelitis, meningitis, epilepsy, spongiform encephalopathy, and neoplasms	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ memorize pathological conditions of eye, ear, skin and appendages ➢ define and describe conjunctivitis, blepharitis, keratitis, cataract, gluocoma, otitis and otorrhoea ➢ discuss disorders of epidermis, dermis and subcutis ➢ detect pathology of special senses, skin and appendages ➢ enlist neoplasm of special senses, skin and appendages	**Organs of Special Senses:** Pathological conditions of eye and ear, conjunctivitis, blepharitis, keratitis, cataract, gluocoma, otitis, otorrhoea and neoplasms **Skin and appendages:** Disorders of epidermis, dermis and subcutis, dermatitis, autoimmune skin diseases and neoplasms	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

Reference Books

1. Jones, T. C. Hunt, R. D. and King, N. W. 1997. Veterinary Pathology. 6th edn. Williams and Wilkins. Philadelphia, USA.
2. Jubb, K. V. F., Kennedy, P. C. and Palmer, N. 1993. Pathology of Domestic ANimals. Vol. 1, 2 & 3. 4th edn. Academic Press Inc. New York, USA.
3. Luna, L.G. 1967. Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. McGraw-Hill Book Company, New York.

4. Moulton, J.E. 1990. Tumors in Domestic Animals. 3rd edition. University of California Press, Berkeley, California, USA.

Course Code: PPS-206 **Course Title: Systemic Pathology (Practical)**	**Credit Hours: 1**	**Level:2**	**Semester: II**

Rationale: This course is designed to provide knowledge about the different diagnostic techniques for the detection of systemic disorders.

Course learning outcomes: The major learning outcomes of this course are -

- To acquire knowledge for investigation of various systemic disorders
- To know the different techniques for examination of pathological specimens
- Learn about the preparation of histopathological slides from collected samples

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ explain different techniques for preservation, processing and staining of pathological specimen	Techniques of preservation of pathological specimen: Processing of tissurs; Preparation and staining of microslides.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB Viva voice
➢ differentiate live and diseased part under microscope ➢ identify histopathological changes in different body system	Gross and histopathological studies of diseases, disease conditions of different systems using laboratory specimens, histopathological slides, illustration and transparencies.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice

Reference Books

1. Jones, T. C. Hunt, R. D. and King, N. W. 1997. Veterinary Pathology. 6th edn. Williams and Wilkins. Philadelphia, USA.
2. Jubb, K. V. F., Kennedy, P. C. and Palmer, N. 1993. Pathology of Domestic ANimals. Vol. 1, 2 & 3. 4th edn. Academic Press Inc. New York, USA.
3. Luna, L.G. 1967. Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. McGraw-Hill Book Company, New York.
4. Moulton, J.E. 1990. Tumors in Domestic Animals. 3rd edition. University of California Press, Berkeley, California, USA.

<table>
<tr><td colspan="2">Course Code: PPS-207
Course Title: Nemathelminthes and Platyhelminthes (Theory)</td><td>Credit Hours: 2</td><td>Level:2</td><td>Semester: II</td></tr>
<tr><td colspan="5">Rationale: This course is designed to provide the basic idea about nematodes, trematodes and cestodes in relation to their life history and pathogenic effects on host body.</td></tr>
<tr><td colspan="5">Course learning outcomes: The major learning outcomes of this course are -
• To know the different kinds of helminths and their life histry
• Obtaining knowledge on the relationship between helminth and their host
• Learn about the harmful effects of helminths
• To know the helminthes having public health importance
• To acquire knowledge for controlling helminthic diseases</td></tr>
<tr><td>Intended Learning Outcomes (ILOs)
The students will be able to-</td><td>Course Contents</td><td>Teaching-Learning Strategies</td><td colspan="2">Assessment Strategies</td></tr>
<tr><td>➢ discuss general morphology, life cycle, pathology and pathogenesis, diagnosis, control/biocontrol of different helminths</td><td>Nemathelminthes:
of the following:</td><td>Lecture
Interactive Discussion
Audio visual
Video clip
Exercise</td><td colspan="2">Quiz Test
Short question
Essay type
Class attendance</td></tr>
<tr><td>➢ state the morphology and life biology of different genera of nematode
➢ describe pathogenic feature of different genera of nematode
➢ discuss control strategies of different genera of nematode</td><td>Different genera of nematode: Ascaris, Parascaris, Toxascaris, Toxocara, Oxyuris, Enterobius, Heterakis, Asaridia, Subulura, Strongyloides, Chabertia, Oesophagostomum, Stephanurus, Ancylostoma, Stephanurus, Ancylostoma, Necator, Uncinaria, Bunoatomum, Trichostrongylus, Ostertagia, Cooperia,Haemonchus,Dictyocaulus, Metastrongylus,Protostrongylus, Angiostrongylus, Habronema, Thelazia, Spirocerca, Parafilaria, Setaria, Gongylonema, Tetremeres, Gnathostoma, Dirofilaria, Wuchereria, Loa,</td><td>Lecture
Interactive Discussion
Audio visual
Video clip
Exercise</td><td colspan="2">Quiz Test
Short question
Essay type
Class attendance</td></tr>
</table>

	Dipetalonema, Onchocerca, Dracunculus, Trichuris, Capillaria, Trichinella, Dioctophyma and other veterinary important genera		
➢ discuss general morphology, life cycle, pathology and pathogenesis, diagnosis, control/biocontrol of different trematode	**Trematode:** General characteristics, general life cycle, classification of trematodes, Morphology, life cycle, pathology and pathogenesis, diagnosis, control/biocontrol of the species of the following:	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ state the morphology and life biology of different genera of trematode ➢ describe pathogenic feature of different genera of trematode ➢ discuss control strategies of different genera of trematode	**Different genera of trematode:** Fasciola, Fasciolopsis, Fascioloides, Dicrocoelium, Prosthogonimus,Eurytrema, Paramphistomum, Gastrothylax, Gigontocotyle, Cotylophoron, Gastrodiscus, Homalogaster, Metagonimus, Paragonimus, Echinostoma, Catatropis, Schistosoma, Nanophyetus, Ornithobilharzia, Opisthorchis, Clonorchis and other veterinary important genera	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ discuss general morphology, life cycle, pathology and pathogenesis, diagnosis, control/biocontrol of different cestode	**Cestode:** General characteristics, general life cycle, classification of cestodes, Morphology, life cycle, pathology and pathogenesis, diagnosis, control/biocontrol of the species of the following:	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ state the morphology and life biology of different genera of cestode ➢ describe pathogenic feature of different genera of cestode ➢ discuss control strategies of different genera of cestode	**Different genera of cestode:** Taenia, Echinococcus, Moniezia, Anoplocephala, Paranoplocephala, Davainea, Raillietina, Cotugnia, Stilesia, Thysanosoma, Avitellina, Amoebotaenia, Choanotaenia, Metroliasthes, Dipylidium, Hymenolepis, Diphyllobothrium, Mesocestoides, Spirometra and other veterinary important genera	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peter, H.M. Gilles, H.M. Wolfe, Medical Publication, ELBS
2. Craig and Faust's Clinical Parasitology. Ernest Carrol Faust and Paul Farr Russell Kimpton, London
3. Diagnosing Helminthiasis. Through Coprological Examination. D. Theinpont, F. Rochette, O. Vanparijs, Janssen Research Foundation, Burse Belgium
4. Ecological Relations of the Larval Trematodes of Fresh Water Snails. W.W. Cort
5. General Parasitology. Cheng, T. C. New Delhi, India, Academic Press Inc. USA
6. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
7. Introduction to Helminth Parasites of Animals and Birds. M.H. Rahman, M.M.H. Mondal and S.Ahmed. Bangladesh
8. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
9. Medical and Economic Malacology. E.A. Malek and T.C. Cheng, Academic Press, New York and London
10. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
11. Parasitology in Focus- Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
12. Text Book of Parasitology .D.L. Belding. Appleton Century-Crofts, NewYork
13. Text Book of Veterinary Clinical Parasitology. E.J.L. Soulsby. Blackwell Scientific Co. Ltd. Oxford
14. Veterinary Helminthology. Dun, A. William-Heinemann Medical Book Ltd. UK.
15. Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings. Blackwell Science, U.K.

Course Code: PPS-208 **Course Title: Nemathelminthes and Platyhelminthes (Practical)**	**Credit Hours: 1**	**Level:2**	**Semester: II**
Rationale: This course is designed to provide the basic knowledge for identifying different nematodes, trematodes and cestodes of animal and man.			
Course learning outcomes: The major learning outcomes of this course are - • To know the different techniques for identifying the eggs, larvae and intact parasites • Learn about the slide preparation of helminths • To acquire knowledge for estimating the level of helminthic infections			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ explain different Laboratory procedure for the diagnosis of nematode infections ➢ identify important members of nematodes	Laboratory procedure for the diagnosis of nematode infections Identification of important members of nematodes	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB Viva voice
➢ describe the technique for demonstration of helminths at slaughter house	Practical demonstration of helminths at slaughter house	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ mention the procedure for preparation of permanent slides for cestodes and trematodes ➢ Identify important members of the class Trematoda and Cestoda	Preparation of permanent slides for cestodes and trematodes Identification of important members of the class Trematoda and Cestoda	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ describe qualitative and quantitative methods of estimating parasitic infection	Qualitative and quantitative methods of estimating parasitic infection	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration

			performance Class attendance PNB Viva voice

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peter, H.M. Gilles, H.M. Wolfe, Medical Publication, ELBS
2. Craig and Faust's Clinical Parasitology. Ernest Carrol Faust and Paul Farr Russell Kimpton, London
3. Diagnosing Helminthiasis. Through Coprological Examination. D. Theinpont, F. Rochette, O. Vanparijs, Janssen Research Foundation, Burse Belgium
4. Ecological Relations of the Larval Trematodes of Fresh Water Snails. W.W. Cort
5. General Parasitology. Cheng, T. C. New Delhi, India, Academic Press Inc. USA
6. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
7. Introduction to Helminth Parasites of Animals and Birds. M.H. Rahman, M.M.H. Mondal and S.Ahmed. Bangladesh
8. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
9. Medical and Economic Malacology. E.A. Malek and T.C. Cheng, Academic Press, New York and London
10. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
11. Parasitology in Focus- Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
12. Text Book of Parasitology .D.L. Belding. Appleton Century-Crofts, NewYork
13. Text Book of Veterinary Clinical Parasitology. E.J.L. Soulsby. Blackwell Scientific Co. Ltd. Oxford
14. Veterinary Helminthology. Dun, A. William-Heinemann Medical Book Ltd. UK.
    Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings. Blackwell Science, U.K.

Course Code: PPS-301 **Course Title: Pathology of Infectious Diseases (Theory)**	**Credit Hours: 2**	**Level:3**	**Semester:1**
Rationale: This course is designed to provide the basic knowledge about the different infectious diseases.			
Course learning outcomes: The major learning outcomes of this course are -			

• To know the present situation of Infectious diseases • Obtaining knowledge about the causal agents, pathogenesis, pathology, clinical signs and diagnosisof different Infectious diseases			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ discuss etiology, epidemiology, pathogenesis and pathology of bacterial diseases ➢ predict differential diagnosis among bacterial diseases	Pathology and Pathogenesis of the following diseases: **Bacterial Diseases:** Anthrax, black quarter, pasteurellosis, clostridial infections, strangles, granders, colibacilosis, brucellosis, campylobacteriosis, tuberculosis, paratuberculosis, actinomycosis, actinobacillosis, shigellosis, listerosis, leptospirosis, dermatophilosis, leprosies.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ explain etiology, epidemiology, pathogenesis and pathology of viral diseases ➢ diagnosis among viral diseases	**Viral Diseases:** Rinderpest, hog cholera, peste des petits ruminants, foot and mouth disease, bovine viral diarrhoea-mucosal disease complex, ephemeral fever, infectious bovine rhinotracheitis, rabies, pseudorabies, infectious canine, hepatitis, canine distemper, pox, papillomatosis, prion borne diseases.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ describe etiology, epidemiology, pathogenesis and pathology of parasitic diseases ➢ assemble differential diagnosis among parasitic diseases	**Parasitic Disease:** Fascioliasis, stomach worm infection, hookworm infection, stephanofilariasis, ascariasis and other nematodiasis, coccidiosis, toxoplasmosis, babesiosis, trypanosomiasis, trichomoniasis, hydatidosis and other tapeworm	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

	infections, mite infections.		
➢ express etiology, epidemiology, pathogenesis and pathology of fungal diseases ➢ draw differential diagnosis among fungal diseases	**Fungal Diseases:** Rhinosporidiosis, coccidiodomycosis, cryptococcosis, ringworm, aspergellosis, candidiasis, histoplsmosis, blastomycosis.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ represent etiology, epidemiology, pathogenesis and pathology of mycoplasma diseases ➢ sketch differential diagnosis among mycoplasma diseases	**Diseased Caused by Mycoplsma:** Bovine pleuropnemonia, contagious caprine pleuropnemonia, infectious bovine keratoconjunctivitis, enzootic pneumonia of calves, bovine mycoplsmal arthritis, swine mycoplasmal arthritis and polyserositis.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ describe etiology, epidemiology, pathogenesis and pathology of rickettsial diseases ➢ assemble differential diagnosis among rickettsial diseases	**Diseass caused by Rickettsia:** Q-fever, salmon disease of dogs and foxes, Heartwater of cattle, sheep and goats, anaplasmosis, haemobartonellosis, eperythrozoonosis.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ discuss etiology, epidemiology, pathogenesis and pathology of chlamydial diseases ➢ predict differential diagnosis among chlamidial diseases	**Diseases caused by Chlamydia:** Psittacosis, sporadic bovine encephalomyelitis, enzootic abortion of ewes, chalamydial abortion in cattle, chalamydial pneumoniad in cattle and sheep. Gross and histopathologacal studies of different infectious and non-infectious diseases using laboratory specimens, histopathologacal slides, illustrations and transparencies.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

Reference Books

1. Jones, T. C., Hunt, R. D. and King, N. W. 1997. Veterinary Pathology. 6th edn. Williams ad Wilkins, Philadelphia, USA.
2. Jubb, K. V. F. Kennedy P. C. and Plamer, N. 1993. Pathology of Domestic Animals. Vol. 1, 2 & 3, 4th edn. Academic Press. Inc. New York. USA.

3. Radostitis, O. M., Gay, C. C., Blood, D. C. and Hinchcliff, K. W. 1998. Veterinary Medicine. A TExt Book of Diseases of Cattle, Sheep, Pigs, Goats and Horses. 9th edn. W. B. Saunders Co. Ltd. London. UK.

Course Code: PPS-302 **Course Title: Pathology of Infectious Diseases (Practical)**	**Credit Hours: 1**	**Level:3**	**Semester:1**

Rationale: This course is designed to provide knowledge about the different diagnostic techniques for detecting the pathogenic changes of Infectious diseases.

Course learning outcomes: The major learning outcomes of this course are -

- To acquire knowledge for investigating the various changes on necropsy
- To know the different techniques for examination of pathologic specimens
- Learn about the preparation of histopathological slides from preserved samples

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ demonstrate necropsy procedure and sample collection from dead animal ➢ illustrate post mortem changes	Post mortem examination of dead animals.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB Viva voice
➢ identify macro and microscopic changes of pathologic specimens of important diseases	Demonstration and studies of histopathological slides and film strips on important diseases and disease conditions of Livestock.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice

Reference Books

1. Jones, T. C., Hunt, R. D. and King, N. W. 1997. Veterinary Pathology. 6th edn. Williams ad Wilkins, Philadelphia, USA.

2. Jubb, K. V. F. Kennedy P. C. and Plamer, N. 1993. Pathology of Domestic Animals. Vol. 1, 2 & 3, 4th edn. Academic Press. Inc. New York. USA.
3. Radostitis, O. M., Gay, C. C., Blood, D. C. and Hinchcliff, K. W. 1998. Veterinary Medicine. A TExt Book of Diseases of Cattle, Sheep, Pigs, Goats and Horses. 9th edn. W. B. Saunders Co. Ltd. London. UK.

Course Code: PPS-303 **Course Title: Entomology (Theory)**	**Credit Hours: 2**	**Level:3**	**Semester:1**
Rationale: This course is designed to provide the knowledge of Arthropod (especially Insects and arachnids) which have veterinary importance in relation to their effects on host body.			
Course learning outcomes: The major learning outcomes of this course are - • To know the different kinds of Arthropods (especially Insects and arachnids) • Obtaining knowledge about the relationship between host and parasite • Learn about the harmful effects of Arthropods • To know the public health importance of Arthropods • To acquire knowledge about the different kinds of vectors and vector borne diseases • Understanding the method for preventing and controlling of arthropod borne diseases			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ define basic terminology ➢ describe body systems of arthropods ➢ discuss morphology, life cycle, pathology, pathogenesis and transmission of insects and arachnids ➢ mention biological control of arthropods	**Introduction to Entomology**, Arthropods and their economic significance, Classification of Arthropoda, Respiratory, digestive, nervous and reproductive systems of arthropods, Morphology, life cycle, pathology and pathogenesis, Pathogens	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

	transmitted by insects and arachnids Biological control of arthropods vector role and control of arthropods		
➢ discuss morphology, life cycle, pathology, pathogenesis and transmission of Phthiraptera, Hemiptera and Siphonaptera ➢ state control strategies of Phthiraptera, Hemiptera and Siphonaptera	**Phthiraptera:**Haematopinidae, Linognathidae, Pulicidae and others **Hemiptera:** Cimicidae, Reduvidae **Siphonaptera:** Pulicidae and others	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ describe morphology, life cycle, pathology and pathogenesis and Pathogens, transmission of Diptera ➢ explain control strategies of Diptera	**Diptera:** Culicidae, Ceratopogonidae, Simulidae, Psychodidae, Tabanidae, Gastrophilidae, Glossinidae, Muscidae, Calliphoridae, Oesteridae, Hypodermatidae, Cuterebridae, Hippoboscidae and others	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ describe morphology, life cycle, pathology, pathogenesis and transmission of ticks and mites ➢ state control measures of ticks and mites	**Acarina:** Ixodidae, Argasidae, Demodicidae, Sarcoptidae, Psoroptidae, Dermanyssidae, Cheylotidae and others	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peters, H.M. Gilles, H.M. Wolfe, Medical Publications, ELBS
2. A Guide to Medical Entomology. Service, M.W.A. MacMillan, London
3. An Illustrated Laboratory Manual of Parasitology. R.M. Cable. Burgess Publishing Co., Minneapolis, Minnesota
4. Entomology in Human and Animal Health. R.F. Harwood and M.T. James. Mac Millan Publishing Co., Inc., New York
5. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
6. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
7. Livestock Entomology. R.E. Williams, R.D. Hall, A.B. Broce, P.J. Scholl, John Wiley and Sons, Chichester, New York, Brisbane, Toronto, Singapore
8. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
9. Medical and Veterinary Entomology. D.S. Kettle, Croom Helm, Beckenham
10. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
11. Parasitology in Focus. Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
12. Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W.

Jennings. Blackwell Science, U.K.

Course Code: PPS-304 **Course Title: Entomology (Practical)**	**Credit Hours: 1**	**Level:3**	**Semester: I**
Rationale: This course is designed to provide knowledge about the detection of different veterinary important arthropods in field and Lab. Conditions.			
Course learning outcomes: The major learning outcomes of this course are - • To attain knowledge for collection and preservation of different veterinary important arthropods • Learn about the identification of arthropods by preparing slides • Obtaining knowledge about the practical demonstration of arthropods in field condition			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ explain methods for collection, fixation and preservation of arthropods ➢ describe methods for preparation of permanent mounts of insects and arachnids	Methods for collection, fixation and preservation of arthropods Methods for preparation of permanent mounts of insects and arachnids	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB Viva voice
➢ mention examination procedures of skin scrapings for mange ➢ demonstrate wing venation of insects	Examination of skin scrapings for mange Demonstration of wing venation of insects	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance Practical note book Viva voice
➢ identify causal agent of different arthropod borne diseases in livestock and poultry	Field visit at livestock and poultry farm for collection and identification of ectoparasites	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance Practical note book Viva voice
➢ demonstrate important members of different arthropods in Lab.	Identification of the important members of the order Phthiraptera, Hemiptera, Siphonaptera, Diptera and Acarina	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class

			attendance Practical note book Viva voice

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peter, H.M. Gilles, H.M. Wolfe, Medical Publication, ELBS
2. Craig and Faust's Clinical Parasitology. Ernest Carrol Faust and Paul Farr Russell Kimpton, London
3. Diagnosing Helminthiasis. Through Coprological Examination. D. Theinpont, F. Rochette, O. Vanparijs, Janssen Research Foundation, Burse Belgium
4. Ecological Relations of the Larval Trematodes of Fresh Water Snails. W.W. Cort
5. General Parasitology. Cheng, T. C. New Delhi, India, Academic Press Inc. USA
6. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
7. Introduction to Helminth Parasites of Animals and Birds. M.H. Rahman, M.M.H. Mondal and S.Ahmed. Bangladesh
8. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
9. Medical and Economic Malacology. E.A. Malek and T.C. Cheng, Academic Press, New York and London
10. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
11. Parasitology in Focus- Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
12. Text Book of Parasitology .D.L. Belding. Appleton Century-Crofts, NewYork
13. Text Book of Veterinary Clinical Parasitology. E.J.L. Soulsby. Blackwell Scientific Co. Ltd. Oxford
14. Veterinary Helminthology. Dun, A. William-Heinemann Medical Book Ltd. UK.
15. Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings. Blackwell Science, U.K.

Course Code: PPS-305 **Course Title: Avian Pathology (Theory)**	**Credit Hours: 1**	**Level:3**	**Semester:1I**

Rationale: This course is designed to provide the idea about the different infectious and non-infectious diseases of poultry.

Course learning outcomes: The major learning outcomes of this course are -

- To know the present situation of poultry diseases in our country
- Obtaining knowledge about the causes, pathogenesis, pathology, clinical signs and diagnosis of different avian diseases

• Understanding the method for maintaining biosecurity in poultry farms			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ briefly describe the present situation of poultry diseases in Bangladesh.	**Introduction:**	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ discuss etiology, epidemiology, pathogenesis and pathology of bacterial diseases ➢ predict differential diagnosis among bacterial diseases	**Bacterial Diseases:** Salmonellosis, colibaciollosis, pasturellsis, infectious coryza, tuberculosis, strptocoocosis, staphylocoocosis.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ describe etiology, epidemiology, pathogenesis and pathology of virall diseases ➢ sketch differential diagnosis among viral diseases	**Viral Diseases:** Infectious bursal disease, Newcastle disease, Marek's disease, avian leucosis, fowl pox, infectious bronchitis, infectious laryngotracheitis, avian influenza, chicken infectious anaemia, egg drop syndrome, duck plague, duck viral hepatitis, viral arthritis.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ explain etiology, epidemiology, pathogenesis and pathology of parasitic diseases ➢ draw differential diagnosis among parasitic diseases	**Parasitic Diseases:** Ascardiasis and other nematodiasis, tapeworm infection, coccidiosis, infestation by ectoparasites.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ express etiology, epidemiology, pathogenesis and pathology of fungal diseases ➢ diagnose among fungal diseases	**Fungal Diseases:** Aspergillosis, thrush, canadidiasis.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ report etiology, epidemiology, pathogenesis and pathology of Mycoplasmal and chlamydal Diseases ➢ assemble differential diagnosis among Mycoplasmal and chlamydal Diseases	**Mycoplasmal and chlamydal Diseases:** Avian mycoplsmosis avian mycoplamosis, avian chlamydiosis.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

➢ represent etiology, epidemiology, pathogenesis and pathology of Non-infectious Diseases ➢ sketch diagnosis among Non-infectious Diseases	**Non-infectious Diseases:** Deficiencies of fat soluble and water soluble vitamins, deficiencies of calcium, phosphorus, copper, zinc, deficiencies of amino acids and protein, calories ad water; common vices, mycotoxicosis and other poisonings. Gout, multicausal respiratory disease, hydro pericardium hepatitis, syndrome, ascites and right ventricular hypertrophy, enteric disease complex, spiking mortality syndrome.	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

Reference Books

1. Calnek, B. W. Barnes, H. J. Beard, C. W. McDougald, L. R. and Saif, Y. M. 1997. Diseases of Poultry. 10th edn. Iowa State University Press, Armes, Iowa, USA.
2. Charlton, B. R. 2000. Avian Diseas Manual. 5th edn. American Association of Avian Pathologists, Pennsylvania, USA.
3. Chauhan, H. B. S. and Roy S. 1996. Poultry Diseases. Daignosis and Treatment. New Age Internationa (Pvt) Ltd. Publishers, New Delhi, India.
4. Riddell, C. 1987. Avian Histopathology. The American American Association of Avian Pathologists, Pennsylvania, USA.

Course Code: PPS-306 **Course Title: Avian Pathology (Practical)**	**Credit Hours: 1**	**Level:3**	**Semester:1I**

Rationale: This course is designed to provide knowledge about the different diagnostic measures of poultry diseases in Field and Lab. condition.

Course learning outcomes: The major learning outcomes of this course are -

- To acquire knowledge for investigation of poultry disease on-farm and Lab. condition
- To know the different techniques for post-mortem examination of dead birds
- Learn about the preparation of histopathological slides from collected samples
- Obtaining knowledge about the different techniques for demonstration & interpretation of diseases

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ demonstrate necropsy procedure and sample collection from avian species ➢ draw differential diagnosis of avian species	Investigation of poultry diseases; on-farm investigation, post mortem examination and interpretation, and laboratory investigation.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB Viva voice
➢ identify histopathological changes induced by different diseases in avian species	Study of various poultry diseases using laboratory specimens, histopathological slides, illustration and transparencies	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice

Reference Books

1. Calnek, B. W. Barnes, H. J. Beard, C. W. McDougald, L. R. and Saif, Y. M. 1997. Diseases of Poultry. 10th edn. Iowa State University Press, Armes, Iowa, USA.
2. Charlton, B. R. 2000. Avian Diseas Manual. 5th edn. American Association of Avian Pathologists, Pennsylvania, USA.
3. Chauhan, H. B. S. and Roy S. 1996. Poultry Diseases. Daignosis and Treatment. New Age Internationa (Pvt) Ltd. Publishers, New Delhi, India.
4. Riddell, C. 1987. Avian Histopathology. The American American Association of Avian Pathologists, Pennsylvania, USA.

Course Code: PPS-307 **Course Title: Protozoology (Theory)**	**Credit Hours: 2**	**Level:3**	**Semester:1I**

Rationale: This course is designed to provide the idea of different protozoa and protozoan diseases which have veterinary importance.

Course learning outcomes: The major learning outcomes of this course are -

- To know the different kinds of veterinary and medical important protozoa
- Obtaining knowledge about the relationship between protozoa and their hosts
- Learn about the harmful effects of protozoa on their host body
- To know the zoonotically important protozoa
- Understanding the methods for preventing and controlling the protozoan diseases

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ define basic terminology ➢ describe brief history of protozoa ➢ classify protozoa ➢ discuss general morphology and biology of protozoa ➢ mention control of important protozoa	History of Protozoology, Anatomy of Protozoa, Nutrition, locomotion, reproduction and excretion of Protozoa, Classification of Protozoa, Morphology, life cycle, diagnosis, pathogenesis and control of important protozoa	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ describe morphology, life cycle, pathology, pathogenesis, transmission and control of Trypanosoma and Leishmania	Trypanosoma Leishmania	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ explain morphology, life cycle, pathology, pathogenesis, transmission and control Tritichomonas, Histomonas, Giardia, Entamoeba, Eimeria, Isospora, Toxoplasma, Sarcocystis, Cryptospordia and Balantidium	Tritichomonas, Histomonas, Giardia, Entamoeba, Eimeria, Isospora, Toxoplasma, Sarcocystis, Cryptospordia, Balantidium	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance
➢ discuss morphology, life cycle, pathology, pathogenesis, transmission and control of Plasmodium Haemoproteus, Leucocytozoon, Hepatozoan, Babesia, Theileria, , Anaplasma, Ehrlichia, Eperythrozoan, Hemobartonella and others	Plasmodium Haemoproteus, Leucocytozoon, Hepatozoan, Babesia, Theileria, , Anaplasma, Ehrlichia, Eperythrozoan, Hemobartonella and others	Lecture Interactive Discussion Audio visual Video clip Exercise	Quiz Test Short question Essay type Class attendance

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peters, H.M. Gilles, H.M. Wolfe, Medical Publications, ELBS
2. Comparative Protozoology (Ecology, Physiology, Life history). O.R. Anderson, Arcata Graphics, Halliday, West Hanover, Massachusetts, USA
3. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and

Tindal, England.
4. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
5. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
6. Parasitology in Focus- Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
7. Text Book of Veterinary Clinical Parasitology. E.J.L. Soulsby, Blackwell Scientific Co., Oxford
8. The Biology of Coccidia. P.L. Long. Baltimore University Park Press
9. Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings. Blackwell Science, U.K.
10. Veterinary Protozoology. N.D. Levine. Iowa State Press, Ames, IO

Course Code: PPS-308 **Course Title: Protozoology (Practical)**	**Credit Hours: 1**	**Level:3**	**Semester:1I**
Rationale: This course is designed to provide knowledge on detection of different veterinary and medical important protozoa in field and Lab. Conditions.			
Course learning outcomes: The major learning outcomes of this course are - • To acquire knowledge regarding sample collection and preservation • Learn about the preparation of protozoan slide from collected sample • To know the different techniques for identifying important protozoa • Obtaining knowledge about the morphology of protozoa using related techniques			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ discuss fecal examination procedure for diagnosis of protozoa	Qualitative and quantitative fecal examination for protozoa	Demonstration Group discussion Practical test Exercise	Quiz Test Short question performance Class attendance PNB Viva voice
➢ perform blood examination for detection of protozoa	Blood examination for protozoa	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ identify Trichomonas from crop and genital samples	Examination of crop and genital discharges for	Demonstration Group	Quiz Test Short question

	Trichomonas	discussion Practical test Exercise	Demonstration performance Class attendance PNB Viva voice
➢ describe the method for microscopic measurement of Protozoa ➢ identify important members of Protozoa	Microscopic measurement of Protozoa Identification of important members of Protozoa	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice

Reference Books

1. A Colour Atlas of Tropical Medicine and Parasitology. W. Peters, H.M. Gilles, H.M. Wolfe, Medical Publications, ELBS
2. Comparative Protozoology (Ecology, Physiology, Life history). O.R. Anderson, Arcata Graphics, Halliday, West Hanover, Massachusetts, USA
3. Helminths, Arthropods and Protozoa of Domesticated Animals. E.J.L. Soulsby. Bailiere and Tindal, England.
4. Manual of Veterinary Parasitology Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Her Majesty's Stationary Office, London
5. Parasitology for Veterinarians. J.R. Georgi and M.E. Georgi. W.B. Saunders and Co., Philadelphia, PA
6. Parasitology in Focus- Facts and Trends. H Melhorn, Springer-Verlag, Berlin, Germany
7. Text Book of Veterinary Clinical Parasitology. E.J.L. Soulsby, Blackwell Scientific Co., Oxford
8. The Biology of Coccidia. P.L. Long. Baltimore University Park Press
9. Veterinary Parasitology. G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings. Blackwell Science, U.K.
10. Veterinary Protozoology. N.D. Levine. Iowa State Press, Ames, IO

Course Code: PPS-402 **Course Title: Clinical Pathology and Necropsy (Practical)**	**Credit Hours: 1**	**Level:4**	**Semester:1 I**

Rationale: This course is designed to provide certain Lab. test and necropsy for diagnosis of diseases.

Course learning outcomes: The major learning outcomes of this course are -

- To acquire knowledge on clinical investigation of diseases by performing certain Lab. test
- Necropsy examinations for the diagnosis of diseases

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
➢ define clinical pathology ➢ explain scope of clinical pathology ➢ make a plane for setting up a	**Introduction:** Definition and scope of clinical pathology and necropsy,	Demonstration Group discussion Practical test	Quiz Test Short question performance Class

clinical pathology laboratory ➢ prepare glassware, instruments and solutions used in clinical pathology	setting up a clinical pathology laboratory, cleaning and maintenance of glassware and instruments used in clinical pathology, Preparation of various buffers, stains and reagents.	Exercise	attendance PNB Viva voice
➢ perform collection and examination procedure of blood and sera ➢ draw interpretations based on test results	**Clinical haematology:** Methods of collection of blood, serum and plasma. Routine hematological test-total erythrocyte count, total leukocyte count, hemoglobin estimation, erythrocyte sedimentation rate, packed cell volume tests for coagulation disorders; interpretation of hematological findings in animals and birds.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ perform biochemical tests of different samples ➢ analyse test results for interpretation	**Clinical biochemistry:** Tests for heart, muscles, liver, kidney, pancreas and bone function with their interpretations. Clinical tests for urine and their interpretations.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ perform pathological tests for diagnosis of parasitic, bacterial and fungal infection ➢ evaluate test results for interpretation	**Clinical diagnosis of parasitic diseases:** Qualitative and quantitative examination of faecal samples. Examination of skin scrapings **Clinical laboratory diagnosis of bacterial and fungal infections:** methods of sample collection, culture, common staining and antibiotic sensitivity tests.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice
➢ perform immunological test for different samples ➢ analyse test results for interpretation	**Techniques of Immunodiagnosis:** ELISA, agar gel precipitation test, haemagglutination and haemagglutination inhibition	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance

	tests. Collection and examination of biopsy materials and clinical cytology. Methods of writing clinical report.		PNB Viva voice
➢ Demonstrate necropsy and sample collection during necropsy of different animals ➢ differentiate necrosis from post mortem autolysis ➢ operate technique of post mortem examination ➢ illustrate post mortem changes	**Necropsy:** Techniques of postmortem examination of animals and poultry: interpretations of post-mortem findings, Selection, collection, preservation and shipment of pathological specimens to the diagnostic laboratories for diagnosis of specific disease or disease conditions. Methods of disposal of carcasses. Methods of recording of necropsy findings and writing report.	Demonstration Group discussion Practical test Exercise	Quiz Test Short question Demonstration performance Class attendance PNB Viva voice

Reference Books

1. Benjanmin, M.M. 1978. Outline of Veterinary Clinical Pathology. 3rd edn. The lowa State University Press, Iowa, USA.
2. Coles, E.H. 1980. Veterinary Clinical Pathology. 3rd edn. W.B. Saunders Company.
3. Manual of Veterinary Investigation. Laboratory Techniques. Vol. 1 and 2. MAFF/ADAS, Reference Book 389 and 390. HMSO, London. 1984.

Department of Physiology and Pharmacology (PPH)

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
Discipline: Physiology				
1.	PPH-201 General Physiology (Theory)	2	2	1
2.	PPH-202 General Physiology (Practical)	1	2	1
3.	PPH– 203 Systemic Physiology (Theory)	2	2	11
4.	PPH –204 Systemic Physiology (Practical)	1	2	11
5.	PPH- 301 Integral Physiology (Theory)	1	3	I
6.	PPH -302 Integral Physiology (Practical)	1	3	I
Total (05+03)=08				
Discipline: Pharmacology				
7.	PPH -205 General Pharmacology (Theory)	2	2	II
8.	PPH -206 General Pharmacology (Practical)	1	2	II
9.	PPH – 303 Systemic Pharmacology (Theory)	2	3	11
10.	PPH -304 Systemic Pharmacology (Practical)	1	3	11
11.	PPH -305Toxicology (Theory)	2	3	11
12.	PPH -306 Toxicology(Practical)	1	3	11
13.	PPH -402 Therapeutics and Pharmacy (Practical)	1	4	I
Total (06+04)=10				

Total Credit Hour	
Theory	**11**
Practical	**7**
Total	**18**

Course Code: PPH-201 **Course Title: General Physiology (Theory)**	**Credit Hours: 2**	**Level: 02**	**Semester:I**
Rationale: This course is designed to provide basic concept of physiology and phenomena of animals & birds.			
Course learning outcomes: The major learning outcomes of this course are to- ❖ address the basic knowledge about physiology and physiological process. ❖ acquire knowledge about fundamental physiological phenomena of cell ❖ gather knowledge about physiology of blood and body fluids of domestic mammals			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
• define physiology, cell, organ, organization, life, diffusion, osmosis, active transport, passive transport, filtration, bulk flow, action potential, excitation, rhythmicity • classify the physiology, cell, transport through the cell membrane • describe organization, physical structure and functional system of the cell • explain the physiological phenomena of cells in domestic mammals and birds • understand the basic concept of membrane potentials, action potentials, excitation and rhythmicity of cell	**Introduction:** Definition, classification, importance of physiology, organization of the cell, physical structure and functional system of the cell, physiological phenomenon, transport through the cell membrane-active and passive process, membrane potentials, action potentials, excitation and rhythmicity Phenomena with life processes and aging.Organization, composition and automaticity of the animal Phy. biochemistry includes solution, sol, gel, emulsion, colloid, crystalloid, surface tension, osmosis, diffusion filtration, dialysis	Lecture Discussion (with questions & Answers) Visual presentation Brain storming Feed back and monitoring	Quiz test (TF, FB and MCQ), mid term (short) and final E Exam, (Broad) Assignment Presentation
• define blood, plasma, serum, hemoglobin, hematopoiesis,	**Blood:** Different terminology related with	Lecture Discussion	Quiz test (TF, FB

hemolysis, physiological hemolysis, anemia, polycythemia, haemaglutination leukocytosis, blood cancer • discuss the properties, functions and constituents of blood • describe process of hematopoiesis, nutrient essential for hematopoiesis, fate of blood cells and physiological changes of blood cells • understand different blood groups, blood coagulation factors and process in mammals • distinguish different blood groups and plasma & serum • explain the clinical parameters of blood	blood,definition, functions, properties, cellular and chemical constituents of blood, hemoglobin, hematopoiesis, fate of blood cells, blood volume, physiological changes of blood cells, blood coagulation, haemaglutination, blood groups and immune-genetics, plasma and serum, clinical parameters of blood of domestic mammals & birds	(with questions & Answers) Visual presentation Brain storming Feed back and monitoring	and MCQ), mid term (short) and final E Exam, (Broad) Assignment Presentation
• define tissue fluid, lymph, synovial fluid and CSF • describe the sources and location of different body fluid • distinguish different body fluids • discuss the formation and importance of different body fluids • define different terms related with homeostasis in domestic mammals	**Body fluid:** Classification of body fluids, tissue fluid, lymph, synovial fluid and cerebrospinal fluid, their formation and functions& regulation	Lecture Discussion (with questions & Answers) Visual presentation Brain storming Feed back and monitoring	Quiz test (TF, FB and MCQ), mid term (short) and final E Exam, (Broad) Assignment Presentation
• define different terms related • with homeostasis in domestic mammals • explain importance of acid-	**Acid-base Balance/ Homeostasis:** Definitions, functions, acidosis, alkalosis, blood p^h, buffer	Lecture Discussion (with questions &	Quiz test (TF, FB and MCQ), mid

base balance in domestic mammals • clarify and distinguish acidosis and alkalosis • describe different buffer systems and systems involve in acid-base balance • discuss role of lungs and kidneys in homeostasis	systems, systems involved in acid-base balance, role of lungs and kidneys in acid base balance	Answers) Visual presentation Brain storming Feed back and	term (short) and final E Exam, (Broad) Assignment Presentation

Books Recommended:

1. Langley,L.L , Review of physiology , Mcgraw-Hill Book Company,USA , 3rd edn.
2. Lamberg,S.L .and Rothstein,R. Hematoloy and urinalysis. AVI Publishing Company , Companay, USA
3. Melvin J. Swenson. Duke, s Physiology of Domestic Animals. Cornel University press, USA. 9th edn.
4. Arther C. Guyton and John E. Hall. Toxt Book of Medical physiology. W.B. Saunders Company, USA, 9 th edn .

Course Code: PPH-202 **Course Title: General Physiology (Practical)**	**Credit Hours: 1**	**Level: 02**	**Semester:I**

Rationale: This course is designed to provide the principle concept along with practical knowledge about blood collection from different mammals& birds and their hematological analysis.

Course Learning Outcomes: The major learning outcomes of this course are to-

- ✓ To provide fundamental concept about blood collection from different mammals & birds and their hematological analysis
- ✓ To gather knowledge on preparation of chemicals and reagents for hematological analysis
- ✓ To acquire knowledge about fundamental knowledge of different hematological test

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Contents**	**Teaching-Learning Strategies**	**Assessment Strategies**
• discuss the laboratory	General laboratory	Lecture	Quiz

safety • apply safety materials during emergency	safety measure	Interactive discussion Visual presentation Demonstration Hands on practice Group exercise PNB	Short question Demonstration performance Identification PNB Viva voce Class attendance
• Prepare and uses of chemicals and reagents for hematological studies	Preparation of reagents for hematological studies	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB Viva voce Class attendance
✓ describe the technique of blood collection from different animals & birds ✓ collect blood from different domestic mammals& birds	Collection of blood from different domestic mammals and birds.	Lecture Interactive discussion Visual presentation Demonstration Hands on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB Viva voce Class attendance
✓ explain the principle and procedure of estimation of Hb ✓ estimate the amount of Hb in blood	Hemolysis and estimation of hemoglobin	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB Viva voce Class attendance
✓ explain the principle and procedure of ESR and PCV of blood. ✓ calculate the ESR and PCV of blood.	Determination of erythrocyte sedimentation rate (ESR) and packed cell volume (PCV)	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB
✓ explain the principle and procedure of total count of RBC, total count of WBC and differential leukocyte count (DLC) ✓ calculate total count of RBC and	Total count of RBC and WBC, differential leukocyte count Effects of	Lecture Interactive discussion Visual presentation Demonstration	Lecture Interactive discussion Visual presentation Demonstration

total count of WBC	temperature and drugs in heart	Hand on practice Group exercise PNB	Hand on practice Group exercise PNB

Books Recommended:

1. Clarke,M.L.Harvey,D.G.and Humphreys, D.J. Veterinary Toxicology,ELBS, Bailliere Tindall, 2nd edn.
2. Doull,J.Klassen, C.D.And AMDUR, O. Cassarett and Doull,s Toxicology.MaCmillan publishing Co.Inc.New York,6th edn.
3. Lorgue,G.Lechenet, J.and Riviere,A,Clinical Veterinary Toxicology, Blackwel Science Inc....Cambridege,USA, 1st English edn.
4. Loomis, T.A.and Hayes .A. w. Loomis's Essentials of toxicology, Academic Press 4th edn.

Course Code: PPH-203 **Course Title**: **Systemic Physiology (Theory)**	**Credit Hour: 02**	**Level:2**	**Semester:I I**
Rationale: This course is designed to provide fundamental knowledge about normal/physiological activities of different systems of the animal body..			

Course Learning Outcomes: The major learning outcomes of this course are to-

- ✓ acquire knowledge about physiological phenomena of digestive, respiratory, urinary and muscular, Nervous, endocrine and reproductive system in domestic mammals & birds.
- ✓ comparing the normal and abnormal function of different system using physiological knowledge

Intended Learning Outcomes (ILOS) **The students will be able to-**	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
✓ clarify the factors affecting digestion ✓ describe composition, function and regulation of digestive juices ✓ explain digestion in simple and compound stomach mammals ✓ illustrate the movement of gastrointestinal tract, feces and defecation ✓ discuss the process of digestion in birds	**Digestive system:** Digestion of feed stuffs, factors of digestion, prehension, mastication, composition, function and regulation of digestive juices, digestion in simple and coumpound stomach of mammals, movement of gastrointestinal tract, feces and defecation, digestion in birds.	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Quiz test TF, FB and MCQ), Mid term (short) and Final exam Assignment Presentation
✓ define different terms related with respiration ✓ discuss types and mechanism of respiration ✓calculate volumes of air respirated ✓ explain exchange and transport of respiratory gases ✓ illustrate regulation of respiration and pulmonary compliance ✓ clarify respiration in birds	**Respiratory system:** Definition, types, mechanisms of respiration, exchange and transport of respiratory gases, volumes of air respired, regulation of respiration, pulmonary compliance, and respiration in birds.	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Quiz test TF, FB and MCQ), Mid term (short) and Final exam Assignment Presentation
✓ define different terms related with micturition ✓ describe functions of kidney ✓ make clear idea about formation of urine ✓ discuss urine volume regulation ✓ explain the process of micturition and renal clearance	**Urinary system:** Functions of kidney, urine formation urine volume regulation, micturition, renal clearance	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Quiz test TF, FB and MCQ), Mid term (short) and Final exam Assignment Presentation
✓ define different terms related with muscle physiology	**Muscular system:** Properties and functions of muscles,	Lecture discussion	Quiz test TF, FB and

✓ discuss properties and function of muscles ✓ clarify isotonic and isometric contraction of muscle ✓ describe changes in the muscle during contraction ✓ explain rigormortis in domestic mammals and birds	isotonic and isometric contraction, changes in the muscle during contraction rigormortis	(with question & answers) visual presentation Brain storming Feed back and monitoring	MCQ), Mid term (short) and Final exam Assignment Presentation
✓ discuss the functions of ovary, corpus Luteum, ✓ narrate reproductive cycle of domestic mammals ✓ explain the physiology lactation & milk let down mechanism in domestic mammals ✓ discuss the function of male reproduction	**Reproductive system:** function of male reproductive tract and sex glands; functions of female reproductive tract & corpus luteum, reproductive cycle, lactation, milk let down Mechanism	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Quiz test TF, FB and MCQ), Mid term (short) and Final exam Assignment Presentation
✓ define endocrine physiology, endocrine Hormone, gland receptor, ✓ describe the general and specific function of hormone ✓ discuss the biosynthesis and mode of act ion of hormone, ✓ Transportation of hormone ✓ explain the relation of endocrine system	**Endocrine system:** define endocrine physiology, Hormone, glands,receptor General and specific function of Hormone, biosynthesis of hormone, different glands, Mode of action, inter relation with other system, hormone related to reproduction	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Quiz test TF, FB and MCQ), Mid term (short) and Final exam Assignment Presentation
✓ define neuron, nerve , stimuli,receptor, synapse, impulse ✓ narrate classification of nervous system Synapse,receptor ✓ explain the mechanism of nerve function define action potential, polarization,depo larization ✓ define autonomic nervous system, function of autonomic and central nervous system ✓ clarify sympathetic and parasympathetic innervations at different region	**Nervous system :** definition neuron, nerve, stimuli, receptor, synapse, impulse, classification, mechanism of nerve, basic function of central and peripheral nervous system. Autonomic nerve, action potential, reflex,	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Quiz test TF, FB and MCQ), Mid term (short) and Final exam Assignment Presentation

Books Recommended:

1. Langley,L.L , Review of physiology , Mcgraw-Hill Book Company,USA , 3rd edn.
2. Lamberg,S.L .and Rothstein,R. Hematoloy and urinalysis. AVI Publishing Company ,

Companay, USA
3. Melvin J. Swenson. Duke, s Physiology of Domestic Animals. Cornel University press, USA. 9th edn.
4. Arther C. Guyton and John E. Hall. Toxt Book of Medical physiology. W.B. Saunders Company, USA, 9 th edn .

Course Code: PPH-204 **Course Title**: **Systemic Physiology (Practical)**	**Credit Hour: 01**	**Level:2**	**Semester:I I**
Rationale: This course is designed to provide fundamental concept about urinalysis in domestic mammals.			
Course Learning Outcomes: The major learning outcomes of this course are to- ✓ acquire knowledge about urine analysis ✓ application of knowledge of urine analysis for diagnosis of physiological condition in the body			

Intended Learning Outcomes (ILOS) **The students will be able to-**	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
✓ know the way of collection Preservation of urine of different animal	Urine collection, Preservation and inspection	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB Viva voce Class attendance
✓ discuss the composition of Urine ✓ explain causes of difference among the urine of domestic mammals	General chemistry of urine	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB Viva voce Class attendance
✓ perform physical examination of urine ✓ explain causes of different color, odor, volume and transparency in urine ✓ discuss importance of physical examination of urine	Physical examination of urine e.g. volume, color, odor, transparency	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB Viva voce Class attendance
✓ describe principle and procedure of determination of specific gravity of urine ✓ determine the specific gravity of sample urine ✓ explain clinical importance of specific gravity of urine	Determination of specific gravity of urine	Lecture Interactive discussion Visual presentation Demonstration Hand on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB Viva voce Class attendance
✓ perform chemical examination of urine ✓ discuss importance of chemical examination of urine ✓ describe principle and procedure of estimation of abnormal constituents (glucose,	Test for abnormal constituents of urine e.g. glucose, albumin, acetone, calcium, bile, calcium, phosphate, ammonia	Lecture Interactive discussion Visual presentation Demonstration Hand on	Quiz Short question Demonstration performance Identification PNB Viva voce Class

albumin, acetone, calcium, bile pigment, bile		practice Group exercise PNB	attendance

Books Recommended:

1. Langley,L.L , Review of physiology , Mcgraw-Hill Book Company,USA , 3 th ed.
2. Lamberg,S.L .and Rothstein,R. Hematoloy and urinalysis. AVI Publishing Company, Companay, USA.
3. Melvin J. Swenson. Duke, s Physiology of Domestic Animals. Cornel University press, USA. 9 th edn.
4. Arther C. Guyton and John E. Hall. Toxt Book of Medical physiology. W.B. Saunders Company, USA, 9 th edn.

Course code: PPH 205 **Course Title: General Pharmacology (Theory)**	**Credit Hour:02**	**Level:2**	**Semester-II**
Rationale: This course is designed to provide knowledge of different types of drug, sources of drug,			

pharmacokinetics, pharmacodynamics, dosage form of drugs and their pharmacological dose with uses.

Course Learning Outcomes: The major learning outcomes of this course are to-

- Acquire knowledge of pharmacology such as pharmacokinetics & pharmacodynamics.
- Select different types of drugs and their uses.
- Develop student ability to understand knowledge of sources, action, use, and doses of drugs.
- Evaluate the adverse effect of drugs and their incompatibility.
- Enrich knowledge on drug resistance, indication, contraindication, residual effect, & drug precaution

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Content**	**Teaching-learning Strategies**	**Assessment Strategies**
• Define and classify of Pharmacology • Summarize the background of Pharmacology • Illustrate the development of Pharmacology • Explain terminology related to Pharmacology • State the Scope of Pharmacology	**Introduction:** Definition and historical background and development of Pharmacology. Terminology, classification, Branches and scope of Pharmacology.	Lecture Interactive Discussion, Visual Presentation, Brainstorming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Discuss the sources of drug • Classify sources of drugs • Represent Characteristics of drugs • Apply the sources of drugs for development of new one..	**Source of drugs**: definition, Sources,Classification, Characteristics of drugs.	Lecture Interactive Discussion, Visual presentation Brainstorming Feedback	Quiz, Short question,Essay type question, Class Attendance
• Define &Classify the process of pharmacokinetics • Explain the absorption process of drug • Justify absorption rate in different form of drugs • Choose & list the route of distribution of drugs • List the barrier of drug distribution & illustrate the drug distribution process • Write the factor responsible for drug distribution • Describe the biotransformation process of drug • Enlist the enzyme responsible for biotransformation. • Explain the process with	**Pharmacokinetics**:absoption, distribution, biotransformation & excretion of drugs	Lecture Interactive Discussion, Brainstorming Feedback	Quiz, Short question, Essay type question, Class Attendance

diagramically with example • Enlist excretion route & discuss the route for excretion of each drugs.			
• Assess the adverse effects of drug • Justify the factors altering drug response • Choose the drug for minimum adverse effect • Select the pregnancy safe drugs& identify the drug with their selective adverse effect. • Define& Classify incompatibility • Evaluate the incompatibility of each drugs. • Design a Schedule to reduce drug incompatibility	**Pharmacodynamics &others**: adverse effects of drugs, factors Altering drug response, drug incompatibility, multiple drug therapy.	Lecture Interactive Discussion Brain storming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Define and classify drug receptor • State the receptor for drug action • Identify the receptor for each group of drugs • Select /Determine drug receptor theory & explain drug activities	**Receptor**: Classification, Drug-receptor theory, Principle of drug activity .	Lecture, Interactive Discussion, Visual presentation Brainstorming Feedback	Quiz, Short question,Essay type question, Class Attendance
• Define &Classify drug administration method. • Describe advantage and disadvantage of drug administration methods • Justify the route of drug administration in condition of patient/disease condition. • Calculate weight of drug & describe the drug activity	**Drug administration**: Dosage forms and methods of drug administration, advantage & disadvantage of different form of drugs,	Lecture, Interactive Discussion, Visual presentation, Brain storming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Define & classify prescription • Illustrate the steps of prescription • Write a prescription using all steps of prescription • Define & classify Metrology • Enlist the different weight measurement chart • Estimate dose according to their body weight • Use of different weight measurement unit	**Prescription:** prescription writing and Metrology, definition, classification, steps of prescription writting	Lecture, Interactive Discussion, Visual presentation, Brain storming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Define & explain some	**Antibiotic-**Definition,	Lecture,	Quiz, Short

terminology& enlist all groups of antibiotics. • Differentiate antibiotic and antimicrobial & justify the use of antibiotic. • Familiar with wide list of various antibiotics • Generate the history, properties, chemistry and classification of those agents • Discuss the pharmacokinetic properties, dose, action, therapeutic uses, adverse effects, contra-indications and drug withdrawal period • Evaluate the principle of antibiotic therapy & assess of sensitivity and resistance of antibiotics • Judge the toxic effect of different antibiotics. • Illustrate the cause of resistance of antibiotic • Assess the safe antibiotic drug for pregnant animal& recommend the antibiotic drug for specific diseases	classification, ideal features of antibiotics, sensitivity and resistance of antibiotics	Interactive Discussion, Visual presentation Brain storming Feedback	question, Essay type question, Class Attendance
• Explain chemistry, Illustrate history of all antibiotic drugs discover • Describe Pharmacokinetics and Pharmacodynamics • Classify all antibiotic drugs separately • List all market available antibiotic drugs • Calculate the Dose rate and dosage form of all antibiotic drugs • Mention/Indicate the use of antibiotic drugs separately. • Prepare a chart for the disease where specific antibiotics are used • Estimate the dose of market available penicillin, Cephalosporin, Tetracycline,	**Penicillin, B-lactams, Cephalosporin, Tetracycline, Chloramphenicol, Aminoglycosides, Macrolides, Fluroquinalones:** Mode of action, Pharmacokinetics and Pharmacodynamics, dose, indications and contraindications, precautions, residues in food animals, bacterial resistance, toxicity of antibiotics-Penicillin, B-lactams,Cephalosporin, Tetracycline, Chloramphenicol, Aminoglycosides, Macrolides, Fluroquinalones.	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance

Chloramphenicol, Aminoglycosides, Macrolides, Fluroquinalones drug. • Illustrate the indication and contraindication of penicillin, Cephalosporin, Tetracycline, Chloramphenicol, Aminoglycosides, Macrolides, Fluroquinalones drugs.			
• Explain chemistry, Illustrate history of Sulphonamide drug discover • Classify sulphonamide& describe Pharmacokinetics and Pharmacodynamics& withdrawal period. • Familiar with general properties, antimicrobial spectrum of sulphonamides • List all market available Sulphonamide antibiotic drugs • Calculate the Dose rate and dosage form of Sulphonamide in different animals. • Mention/Indicate the use& precautions of Sulphonamide drug • Illustrate the indication and contraindication of Sulphonamide drug. • Evaluate the toxicity and incompatibility of sulphonamide drugs.	**Sulphonamide-** Mode of action, Pharmacokinetics and Pharmacodynamics, dose, indications and contraindications, precautions, residues in food animals, bacterial resistance, toxicity of antibiotics-Sulphonamide	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
• Explain chemistry, Illustrate history of Sulphonamide drug discover • Classify sulphonamide& describe Pharmacokinetics and Pharmacodynamics& withdrawal period. • Familiar with general properties, antimicrobial spectrum of sulphonamides • List all market available Sulphonamide antibiotic drugs	**Antifungal Drugs-** Mode of action, Pharmacokinetics, pharmacodynamics, dose, indications, contraindications, toxicity of antifungal drugs	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance

• Calculate the Dose rate and dosage form of Sulphonamide in different animals. • Mention/Indicate the use& precautions of Sulphonamide drug • Illustrate the indication and contraindication of Sulphonamide drug. • Evaluate the toxicity and incompatibility of sulphonamide drugs.			
• Explain chemistry, Illustrate history of antiparasite drug discover • Classify & describe Pharmacokinetics and Pharmacodynamics • List all market available Antiparasite drugs& calculate the Dose and dosage form of Antiparasite drug • Estimate the dose of market available Antiparasite drug in different animals. • Illustrate the indication and contraindication of Antiparasitedrug	**Antiparasitic Drug** Mode of action, Pharmacokinetics, pharmacodynamics, dose, indications, contraindications, toxicity of antiparasite drugs	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
• Explain chemistry, Illustrate history of Antifungal drug discover • Classify & describe Pharmacokinetics and Pharmacodynamics • List all market available Antifungal drugs& calculate the Dose and dosage form of Antifungal drug • Estimate the dose of market available Antifungal drug in different animals. • Illustrate the indication and contraindication of Antifungal drug	**Antiviral drug** Classification of antiviral drug Mode of action, Pharmacokinetics, pharmacodynamics, dose, indications, contraindications, toxicity of antviral drugs	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
Reference Books: • Amanda Helen Rock.2007. Veterinary Pharmacology: A Practical Guide for the Veterinary Nurse.			

ISBN13 9780750688628. Publisher Elsevier Health Sciences.UK.
- Janet Romich.2010. Fundamentals of Pharmacology for Veterinary Technicians.2ndedition, ISBN13 9781435426009 Publisher Cengage Learning, Inc UK.
- Jim E. Riviere, and Mark G. Papich. Veterinary Pharmacology and Therapeutics. 1st edition, ISBN 13: 9780813820613. Iowa State University Press.USA.
- Mark G. Papich.2015. Saunders Handbook of Veterinary Drugs: Small and Large Animal. 4th Revised edition, ISBN13 9780323244855. Publisher Elsevier - Health Sciences Division.USA.
- N.H. Booth & L.E. McDonald .2009. Jones Veterinary Pharmacology and Therapeutics.3rd edition, Kalayani Publishers, Ludhiana, India.
- Walter H. Hsu.2013. Handbook of Veterinary Pharmacology. 2nd edition. Publisher Iowa State University HYPERLINK "https://www.bookdepository.com/publishers/Iowa-State-University-Press"Press,USA.

Course code: PPH 206 **Course Title: General Pharmacology (Practical)**	**Credit Hour:01**	**Level:2**	**Semester-II**

Rationale: This course is designed to provide practical knowledge of different laboratory instrument and th different type of chemical drugs preparation, identify the knowledge of prescription writing.

Course Learning Outcomes: The major learning outcomes of this course are to-
- Acquire knowledge of laboratory instruments and appliances, their specific uses in pharmacological fields.
- Select appropriate routes of drug administration with their advantage and disadvantage
- Prepare weight and package of different form of solid, semi -solid and liquid sample.
- Enrich knowledge to identify medicinal plants and prepare ointment, solution and powder form for different diseases.

Intended Learning Outcomes (ILOs)	**Course Content**	**Teaching – Learning Strategies**	**Assessment Strategies**
• Identify and justify the use of various instruments	Identification and usage of various instruments used in Pharmacology	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification PNB Viva voce
• Evaluate drug dose • Recommended the drug form • Differentiate the drug dose according to their body weight	Drug dosage forms	Lecture, Interactive Discussion, Visual	Quiz, Short question, Essay type question, class

		presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	attendance Demonstration performance Identification PNB Viva voce
• Define& classify weight measurement • Enlist different weight measurement chart • Estimate the drug dose according to their body weight • Use of different weight measurement unit.	Measurement of drugs	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification PNB Viva voce
• Define& classify packaging • Isolate the packaging material for different form of drugs • Evaluate Characterstis of packaging • Compare advantage and Disadvantage of packaging materials • Use of packaging materials	Packaging of drugs	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Define & classify prescription • Explain the steps of prescription • Prepare a prescription using all steps of prescription • Calculate drug dose and explain all steps and apply the knowledge of prescription in different disease of different animals • Enlist some common diseases and prepare prescription	Prescription writing	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae • Prepare the ointment • Implement the ointment • Illustrate the mode of action	Preparation of ointment- Whitfield's ointment	Lecture, Interactive Discussion, Visual	Quiz, Short question, Essay type question, class

• Use of ointment		presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae • Prepare the ointment • Implement the ointment • Illustrate the mode of action • Use of ointment	Preparation of ointment - Sulpher ointment	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae& prepare the normal saline • Implement the normal saline& illustrate the mode of action • Use of normal saline	Preparations of Pharmacological solution- Normal saline solution	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae&prepare the solution • Implement the solution& illustrate the mode of action • Use of solution	Preparations of 0.01% Potassium Permanganate solution	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae& prepare the solution • Implement the solution& illustrate the mode of action	Preparations of Tincture iodine (mitis), Tincture iodine (fortis)	Lecture, Interactive Discussion, Visual	Quiz, Short question, Essay type question, class

• Use of solution		presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae& prepare the solution • Implement the solution& illustrate the mode of action • Use of solution	Preparations of Lugols iodine solution,	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae& prepare the dusting powder • Implement the dusting powder & illustrate the mode of action • Use of dusting powder	Preparation of Dusting Powder	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae& prepare the dusting powder • Implement the dusting powder& illustrate the mode of action • Use of dusting powder	Boric acid solution	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae& prepare the solution • Implement the solution& illustrate the mode of action	Calcium borogluconate solution	Lecture, Interactive Discussion, Visual	Quiz, Short question, Essay type question, class

• Use of solution		presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	attendance Demonstration performance Identification Practical note book Viva voce
• Represent the formulae& prepare the solution • Implement the solution& illustrate the mode of action of solution • Use of solution	Castor oil preparation	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, class attendance Demonstration performance Identification Practical note book Viva voce

Course Code: PPH-301 **Course Title**: **Integral Physiology (Theory)**	**Credit Hour: 01**	**Level:03**	**Semester: I**
Rationale: This course is designed to provide the basic concept about physiological function of sense organ, cardiovascular system and temperature regulation in the animal body.			
Course Learning Outcomes: The major learning outcomes of this course are - ✓ To provide fundamental concept about normal activity and process of sense organ ✓ To gather knowledge on blood circulation and normal activity of heart ✓ To acquire knowledge about temperature regulation of animal body			
Intended Learning Outcomes (ILOS) **The students will be able to-**	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
✓ describe about physiological phenomena of different sense organs	**Physiology of sense:** sense of audition, vision,	Lecture discussion	Quiz test TF, FB and

in domestic mammals ✓ explain different sensory pathway with their significance and abnormalities	smell, taste, integumentation, mechanism of sense action, component and the function of sense organ.	(with question & answers) visual presentation Brain storming Feed back and monitoring	MCQ), Mid term (short) and Final exam Assignment Presentation
✓ discuss the heartbeat, regulation of heartbeat, action potential cardiac cycle and heart sounds ✓ explain different waves of ECG and their significance ✓ narrate basic concepts about different cardiovascular diseases	**Cardiovascular physiology**: origin and conduction heartbeat, regulation of heartbeat, action potential and cardiac cycle, electrocardiogram, heart sounds, heart block, regulation of heart beat &blood pressure, vasomotor mechanism	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring
✓ describe different definitions related with temperature and temperature regulation ✓ narrate sources of heat, normal temperature and common site of temperature recording in different mammals and birds ✓ discuss the thermoregulation physiology of domestic	**Temperature regulation & environmental physiology:** Definitions, source of heat, body temperature, common site of temperature recording, physiological variations of temperature, warm and coldblooded animals, normal temperatures of different	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring	Lecture discussion (with question & answers) visual presentation Brain storming Feed back and monitoring

Books Recommended:

1. Langley,L.L , Review of physiology , Mcgraw-Hill Book Company,USA , 3 th ed.
2. Lamberg,S.L .and Rothstein,R. Hematoloy and urinalysis. AVI Publishing Company, Companay, USA.
3. Melvin J. Swenson. Duke, s Physiology of Domestic Animals. Cornel University press, USA. 9 th edn.
4. Arther C. Guyton and John E. Hall. Toxt Book of Medical physiology. W.B. Saunders Company, USA, 9 th edn.

Course Code: PPH-302 **Course Title**: **Integral Physiology (Practical)**	**Credit Hour: 01**	**Level:03**	**Semester: I**
Rationale: This course is designed to provide practical knowledge on sense organ, heart, Echocardiography (ECG)			
Course Learning Outcomes: The major learning outcomes of this course are - ✓ To provide knowledge on how to examine the function of sense organ\ ✓ To gather practical knowledge on measuring blood pressure, pulse and heart rate ✓ To acquire practical knowledge about echocardiography (ECG)			
Intended Learning Outcomes (ILOS) **The students will be able to-**	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
✓ describe the way to examine the normal function of sensory organ with detection of abnormality ✓ explain different sensory pathway with their significance and abnormalities	determination of sensory function of ear, eye, nose, tongue, identification of abnormalities.	Lecture Interactive discussion Visual presentation Demonstration Hands on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB, Viva voce Class attendance
✓ determine the heartbeat, pulse rate heart sound, blood pressure ✓ demonstrate different place for pulse detection ✓ explain the steps for measuring blood pressure	determination of heart beat, heart sound, pulse rate and blood pressure, demonstration of the place for collecting heart sound	Lecture Interactive discussion Visual presentation Demonstration	Quiz Short question Demonstration performance Identification PNB,

		Hands on practice Group exercise PNB	Viva voce Class attendance
✓ prepare and uses of chemicals and reagents for ECG studies ✓ explain the principle and procedure of ECG methods, setting up of equipment & recording in different of heart ✓ discussion about ECG graph to identify heart condition	Equipment for ECG, setting up and practical demonstration, recording ECG in graph, explanation and understanding the graph, explanation of heart condition using ECG	Lecture Interactive discussion Visual presentation Demonstration Hands on practice Group exercise PNB	Quiz Short question Demonstration performance Identification PNB, Viva voce Class attendance

Books Recommended:

1. Langley,L.L , Review of physiology , Mcgraw-Hill Book Company,USA , 3rd edn.
2. Lamberg,S.L .and Rothstein,R. Hematoloy and urinalysis. AVI Publishing Company , Companay, USA
3. Melvin J. Swenson. Duke, s Physiology of Domestic Animals. Cornel University press, USA. 9th edn.
4. Arther C. Guyton and John E. Hall. Toxt Book of Medical physiology. W.B. Saunders Company, USA, 9 th edn .

Course code: PPH 303 **Course Title: Systemic Pharmacology (Theory)**	**Credit Hour:02**	**Level: 03**	**Semester-I I**
Rationale: This course is designed to provide knowledge about different type of drugs acting on different system of body.			
Course Learning Outcomes: The major learning outcomes of this course are to- • Gain knowledge on physiochemical properties of drug, methods of drug administration and			

prescription writing of different disease in different system. • Acquire knowledge mode of action, indication, contraindication, pharmacological effect of drugs in different system of animal body. • Learn knowledge about different drugs with source, action, dose and uses.			
Intended Learning Outcomes (ILOs) **The students will be able to-**	**Course Content**	**Teaching-learning Strategies**	**Assessment Strategies**
• Define and classify of Systemic Pharmacology. • Explain history and scope of Systemic pharmacology. • Illustrate the basic terminology of Systemic pharmacology	**Introduction:** Definition, Scope and importance of systemic pharmacology. Pharmacological basis of different system of the body.	Lecture Interactive Discussion, Visual Presentation, Brainstorming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Enlist drugs and their definition used in digestive system diseases • Compare and calculate the dose rate of each group of drug • Classify drugs use in digestive system • Discuss about pharmacokinetics & pharmacodynamics of digestive drugs.	**Drugs acting on digestive system:** Sialics and Antisialics, Demulcents ,Stomachics, Emetics and Antiemetic's ,Carminative and Antizymotics, Astringents, Antidiarrheal, Antacids, laxatives, Purgativesetc	Lecture Interactive Discussion, Visual presentation Brain storming Feedback	Quiz, Short question,Essay type question, Class Attendance
• Types of drug used in respiratory system • Discuss the pharmacokinetics and pharmacodynamics of drugs • Select & use of drug in different respiratory diseases. • Enumerate trade, generic name and dose of drug	**Drugs acting on Respiratory system:** Expectorants, Mucolytic, Antitussive, Antihistamines and bronchodilators etc.	Lecture Interactive Discussion, Brain storming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Identify the disease in urinary system with their specific drug. • Explain Pharmacokinetic and pharmacodynamics of drugs. • Enlist the drugs with its trade name, generic name, dose rate available in market. • Identify pregnancy safe drug which is used in urinary system disease.	**Drugs acting on urinary system:** Diuretics and Antidiuretics Urinary acidifiers and Alkalizes, drugs which alter the excretion of organic molecules, Urinary antiseptics and sedatives.	Lecture Interactive Discussion Brain storming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Explain pharmacokinetic and	**Drugs acting on cardio**	Lecture,	Quiz, Short

pharmacodynamics of each group of drugs. • Compare and evaluate trade name and generic name with dose rate in different animals • Select pregnancy safe drugs.. • Assemble the drugs acting on cardio- vascular system and their uses.	**–vascular system:** Heart tonic, Heart stimulants and heart depressant, Antianemic agents, Hemostatic, Coagulants and Anticoagulants.	Interactive Discussion, Visual presentation Brain storming Feedback,	question,Essaytype question, Class Attendance
• Design a chart for different diseases with selected drugs • Define ,classify and state the drugs acting on nervous system • Name of drug with its trade name, generic name, form and dose rate available in market • Identify pregnancy safe drugs.	**Drugs acting on Nervous system:** Sympatholytic and Parasympatholytics drugs, Ganglionic blocking drugs. Stimulants; Sympathomimetic and Parasympathomimetic drugs.	Lecture, Interactive Discussion, Visual presentation, Brain storming Feedback	Quiz, Short question, Essay type question, Class Attendance
• Express endocrine gland with release component and function • Describe all drugs and calculate dose in different animals act on endocrine gland • Define ,classify and state the drug acting on endocrine system • Identify pregnancy safe drug which is used in endocrine system disease animals.	**Endocrine Pharmacology**: Classification of drugs affecting the endocrine system (Hormones and related drugs) with their pharmacology effects, Interpretation of mechanism of actions, of endocrine hormones	Lecture, Interactive Discussion, Visual presentation, Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
• Define and classify of autacoids , anti-inflammatory and antihistaminic drugs. • Recognise steroid drug in veterinary field practices • Identify pregnancy safe autacoids , anti-inflammatory and antihistaminic drugs.	**Autacoids and Related Drugs**: Plasma kinins, Angiotensin, Histamine,5-Hydroxytryptamine and their antagonists. Pharmacology of the NSAIDS and anti-inflammatory drugs.	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
• Define,Classify and illustrate Ophthalmic and Dermatological drugs • Outline of specific drugs acting on specific disease	**Dermatologic, ophthalmic and Aural Pharmacology**: Drugs acting on affecting skin, mucous membranes, ears, and eyes.	Lecture, Interactive Discussion, Visual presentation Brain	Quiz, Short question, Essay type question, Class Attendance

		storming Feedback,	
• Define, classify and Vaccine. • Differentiate live vaccine and killed vaccine • Design vaccination schedule in broiler, layer, large and small animal in commercial farm • Distinguish & judge sensitivity, resistance& toxic effects of vaccine • Name the market available vaccine in Bangladesh • Illustrate the cause of vaccination failure & precautions.	**Prophylactic Pharmacology** : vaccine and antisera	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
• Define, Classify and use of anesthetics • Enlist anesthetics with their, trade name, generic name and dose rate in different animals. • Explaine indication contraindication and side effects anaesthetics • Diagrams of procedure of anesthesia in different animals • Differentiate stage and hazards of anesthesia with remedy.	**Anesthesiology**- Introduction, characteristics, classification, local anesthetic drug, General anaesthetic drug, General depressant Sedative, Hypnotics or Soporifics, Narcotics , Analgesics or Anodynes, Tranquillizers , Anaesthetics, Anesthetic procedure of different animals, stage of anesthesia, Hazard of anesthesia and remedy,	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
• Enlist all vitamins and minerals with their deficiency disease • Recommend drug for specific disease • Compare pharmacology all market available vitamin and minerals • Calculate dose rate and route of drugs used in differentanimals.	**Nutritional Pharmacology:** Vitamins and minerals	Lecture, Interactive Discussion, Visual presentation Brain storming Feedback,	Quiz, Short question, Essay type question, Class Attendance
Referencesbooks: • Alfred Goodman Gilman, Louis S. Goodman and Alfred Gilman .2010.The Pharmacological Basis of Therapeutics. 3rd edition. Macmillan Publishing Co. Inc. New York. • Donald C. Plumb .Plumb's Veterinary Handbook: Pocket. 8th edition, John & Sons inc, New York, USA.			

- Fiona Cunningham, Jonathan Elliott, Peter Lees. 2010.Comparative and Veterinary Pharmacology. 1st edition, Springer.
- G.C. Brander, D.M. Pugh, R.J. Bywater& W.L. Jenkins. 2009. Veterinary Applied Pharmacology and Therapeutics. 4th edition, ELBS with BailliereTindall, U.K
- N.H. Booth & L.E. McDonald .2009.Jones Veterinary Pharmacology and Therapeutics. 3rd edition. Kalayani Publishers, Ludhiana, India.

Course code: PPH 304 **Course Title: Systemic Pharmacology (Practical)**	**Credit Hour:01**	**Level: 03**	**Semester-I I**
Rationale: This course is designed to provide knowledge of mixture preparation and demonstration of drugs acting on different system			
Course Learning Outcomes: The major learning outcomes of this course are- • Select different type of drugs in different system • Develop student ability to understand knowledge of disease, name of drug in different system & doses of drug. • Formulate, calculate and clinical use of prepare mixture for different diseases.			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Content**	**Teaching-learning**	**Assessment Strategies**

		Strategies	
• Formulate ,Prepare & Demonstrate of mixture • Explain use of mixture and each of ingredient • Estimate dose rate and route and interval of prepared drugs • Illustrate the mode of action of prepared drugs	Compounding and dispensing of mixture acting on Digestive system; Carminative, Stomachic, Antizymotic, Antiemetic, Antacid, etc.	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, PNB, Viva voce
• Formulate and prepare mixture preparation • Estimate dose rate ,route and interval of prepared drugs • Illustrate the mode of action, uses of prepared drugs	Compounding and dispensing of mixture acting on cardio – vascular system antianaemic/haematinic etc.	Lecture, Interactive Discussion, Visual presentation Brain storming Demonstration , Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, Practical note book, Viva voce
• Formulate and prepare mixture preparation • Calculate dose rate ,route and interval of prepared drugs • Describe the mode of action, uses of prepared drugs	Compounding and dispensing of febrifuge mixture	Lecture, Interactive Discussion, Visual presentation Brain storming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, Practical note book, Viva voce
• Formulate and prepare mixture preparation • Estimate dose rate ,route and interval of prepared drugs • Explain the mode of action, uses of prepared drugs Illustrate the mode of action of prepared drugs	Compounding and dispensing of mixture acting on respiratory system; Expectorant, etc.	Lecture, Interactive Discussion, Visual presentation Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, PNB ,Viva voce
• Prepare mixture with formulate the ingredients • Estimate dose rate ,route and interval of prepared drugs • Evaluate the mode of action, uses	Compounding and dispensing of mixture acting on Urinary system; Diuretics, Normal saline,	Lecture, Interactive Discussion, Visual presentation,	Quiz, Short question, Essay type question, Class attendance,

of prepared drugs Illustrate the mode of action of prepared drugs	Urinary Antiseptics, etc.	Hand on practice, Group exercise, PNB	Demonstration, Performance Identification, PNB, Viva voce
• Formulate and prepare solution • Estimate dose rate ,route and interval of prepared solution • Illustrate the mode of action & uses of prepared drug solutions	Compounding and dispensing of mixture acting on Skin; Na-Salicylate, Ointment, liniments, $KMnO_4$	Lecture, Interactive Discussion, Visual presentation Demonstration Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, PNB, Viva voce
• Formulate and prepare ointment preparation • Estimate dose rate ,route and interval of prepared ointment drugs • Explain the mode of action, uses of prepared ointments	Compounding and dispensing of mixture acting on eyes-Antibiotic ointment, Antifungal cream, Anti-inflammatory cream.	Lecture, Interactive Discussion, Visual presentation, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, PNB, Viva voce
• Formulate and prepare mixture preparation • Estimate dose rate ,route and interval of prepared drugs • Evaluate the mode of action, uses of prepared drugs	Compounding and dispensing of mixture acting on ear etc.	Lecture, Interactive Discussion, Visual presentation , Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, PNB, Viva voce
• Show all market available mixture preparation and drugs of different system • Select the appropriate drug in different system of all diseases • Dose calculation of drug from market available form	Interpretation and presentation of mixture drugs available related to different to groups in the market.	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming Demonstration, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration, Performance Identification, PNB, Viva voce

• Achieve the latest research findings and information in the area of Systemic Pharmacology	**Latest research findings-** Information about latest research innovations in field of Pharmacology	Review of journals and articles	Assignment evaluation

References Books:

- Boyce Wanamaker Kathy Massey.2015. Applied pharmacology for veterinary technicians, 5e (PB). 9780323186629. Elsevier Health science division. USA.
- Dawn Merton Boothe. 2012. Small Animal Clinical Pharmacology and therapeutics, 2e (PB). 9780721605555. Australian veterinary journal. Australia.
- Jill E. Maddison Stephen W. page David B. church .2008. Small animal Clinical Pharmacology. 2rd Revised edition .Elsevier Health science division.USA.
- Jim E. Riviere, Mark G. Papich .2009. Veterinary Pharmacology and Therapeutics. 9th Revised edition. Iowa state university press.USA.
- Michael E. Peterson Patricia A. Talcott .2006. Small animal Clinical Pharmacology. 2nd Revised edition. Elsevier Health science division. USA.

Course code: PPH-305 Course Title: Toxicology (Theory)	**Credit Hour:02**	**Level: 03**	**Semester-II**

Rationale: This course is designed to provide knowledge of different types ofpoison, toxic substances, toxic plants, insecticides, metals and nonmetal poisons, poisonous animals, mycotoxins, rodenticide, and feed additive etc.

Course Learning Outcomes: The major learning outcomes of this course are to-

- Enriched basic knowledge of toxicology , sources of toxic substances,and toxic principles,
- Differentiate toxin and poison, metal and non- metal poison, bacterial and fungal poison.
- Select specific type of antidotes and their use in veterinary practices
- Develop student ability to understand knowledgeof source, action, use, toxic doses of poison

,lethal dose rate, factors, specific clinical signs, specific post mortem lesion, confirmatory diagnosis and specific antidotes of poson and toxin • Gather knowledge on Insecticiderodenticides, additives and toxic effects in animals.			
Intended Learning Outcomes (ILOs) The students will be able to-	**Course Content**	**Teaching-learning Strategies**	**Assessment Strategies**
Introductory Toxicology: • Define and classify of Toxicology • Illustrate history and development of Toxicology • Differentiate& Classify toxin and poisons. • List toxic substances according to dose rate. • Enumerate factors alter the action of poisons • Describe the role of a toxicologist in veterinary field • Illustrate all part of toxic kinetic and toxicodynamics	**Introductory Toxicology** Definition and brances of toxicology, Terminology related of toxicology; toxin, toxicity, toxicants, hazards and lethal dose 50, etc. Definition of poison, Source of poisoning. Common causes of poisoning, mode of action of poison, factors altering the action of poisons. Classification of toxicants, general diagnosis and treatment of poison, absorption, distribution metabolism and excretion of poison.	Lecture Interactive Discussion PowerPoint presentation	Quiz, Short question, Essay type question, Class attendance , Assignment
Diagnosis and treatment: • Recognize correctly the toxicological cases by the proper techniques • Relate the clinical signs with the nature and mechanism of different • Analyze poisoning and take immediate treatment of the diagnosed case	**Diagnosis and treatment of poisoning:** Mechanisms of poison, General diagnosis; collection and sending materials for toxicological analysis, antidote for poisoning.	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance
• Represent general diagnostic procedure of poisons • Illustrate general and specific treatment of poisons • Justify the knowledge of toxicological analysis		Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance
Metal poisoning: • Differentiate metal poisoning on the basis of pharmacokinetics and	**Metal poisoning:** Toxicokinetics, toxicodynamic, diagnosis and	Lecture Interactive Discussion	Quiz, Short question, Essay type

pharmacodynamics • Estimate the toxic dose rate according to animal body weight. • List the clinical signs of metal poisons & choose the specific postmortem lesion for specific metal poisoning for diagnosis • Compare metal substance on the basis of differential diagnosis • Identify the specific diagnostic test for specific metal substances diagnosis • Describe treatment of metal substances • Select the specific treatment and calculate dose rate, route, interval of antidote according to animal body weight	antidote of Arsenic, Lead, Mercury, Selenium, Molybdenum, Copper, Iron, Zinc, Thallium poisoning.	Power point Presentation Feed back Brainstorming	question, Class attendance
Nonmetal poisoning: • Differentiate Non-metal poisoning on the basis of mode of action and clinical signs. • Differentiate source of related Non-metal substances which is responsible for poisoning • Mention the toxic and lethal dose of Non-metal substances • Estimate the toxic dose rate& lethal dose according to animal body weight. • Explain absoption, distribution, biotransformation and excretion process of Non- metal substances • Justify toxic forms of Non-metal poisons responsible for toxicity in animal bodies. • Choose the selective mode of action which specifically responsible selective Non-metal poisons • Compare Non-metal substance on the basis of clinical sign, differential diagnosis.	**Nonmetal poisoning**(Toxicokinetics, toxicodynamic, diagnosis and antidote of Nitrate and Nitrate, cyanide, Ammonia, Urea,Sodium Chloride, Ammonia compounds, Iodine, Fluoride ,Phosphorous, Acids and Alkalis poisoning).	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance

• Choose the specific postmortem lesion for specific Non-metals for diagnosis • Identify the specific diagnostic test for specific Non-metal substances diagnosis • Describe treatment of Non-metal substances • Select the specific treatment and calculate dose rate, route and intervals according to animal body weight			
Mycotoxin • Enlist different sources of fungi associated with their metabolites and various bacteria that cause toxicity • Achieve knowledge regarding altering factors of toxicity, toxicokinetics, mechanism of action, clinical signs, diagnosis and treatment/ management of mycotoxins and bacterial toxin	**Fungal toxins and Bacterial** toxins (Toxicokinetics, toxicodynamic, diagnosis and antidote for poisoning arising from Mycotoxins and Bacterial toxins)	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance
Plant Poisoning: • Familiar with a broad list of poisonous plants associated with their toxic constituents • Discuss about toxicokinetics, mechanism of producing toxic effect, clinical signs, diagnosis and treatment poisons etc.	**Plant Poisoning** (Phytotoxicology): Toxicokinetics, toxicodynamic, diagnosis and antidote for poisoning arising from cyanogenetic and teratogenic plants, plants producing lathyrism,plant producing oxalate poisoning, plant producing photosensitizations Datura, oleander, Cator bean , Abrus, Nux vomica, strychnine ,Ergot, Ipomoea etc.	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance
Poisonous Animals: • Define Venom, Apotoxin, and Other toxins. • Introduce with wide range of poisonous animals, insects, fish	**Poisonous Animals** (Toxicokinetics, toxicodynamic, diagnosis and antidote for poisoning arising from snakes, honey bees ,wasps and ants)	Lecture Interactive Discussion Power point Presentation Feed back	Quiz, Short question, Essay type question, Class attendance

associated with their metabolites that causes toxicity • Explain factors of toxicity, toxicokinetics, mechanism of action, clinical signs, diagnosis and treatment/ management of that sorts of toxicity. • Visual identification of all toxic animals according to importance aspect of Veterinary practices in Bangladesh. • Describe and select specific clinical signs, post mortem lesions after biting of poisonous animals • Identify& describe Diagnostic test for specific animal poisonings • Compare differential diagnosis with toxic plants and other Metal, Non-metal and animal poisons etc. • Justify specific antidotal treatment and symptomatic treatment and Management as well as • Calculate the dose rate, route, interval of dose according to animal body weights.		Brainstorming	
Toxicology of Agro chemicals: • Define Pesticides& classify Pesticides, Insecticide, Rodenticide, Herbicides, Fungicides, fumigants • Differentiate organophosphate and Organocarbamate • Assess toxic dose, Clinical signs Toxicokinetics, toxicodynamic of all type of insecticides, Rodenticides. • Visual identification of all toxic Substances according to importance aspect of Veterinary practices in Bangladesh. • Enlist all important fungicides and fumigants • Compare Specific and symptomatic clinical signs, post mortem lesion	**Toxicology of Agro chemicals** (Pesticides poisoning): toxicokinetics, toxicodynamic, diagnosis and antidote for poisoning arising from Insecticides, Herbicides, fungicide, fumigants, rodenticides.	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance

all important pesticide • Identify Diagnostic test& compare differential diagnosis for specific pesticide poisoning and Management as well as • Justify specific & symptomatic antidotal treatment & calculate the dose rate, route, interval of dose according to animal body weights in different animals.			
• Point out sources and factors affecting toxicity involved with radiation • Describe mechanism of action, diagnosis, treatment and management of radiation cases	**Radiation Hazards and Toxicity** (toxicokinetics ,toxicodynamic, diagnosis and antidote for poisoning arising from radiations)	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance
• Focus on some therapeutic agents having toxicological effects. • Criticize diagnosis based on clinical signs and post mortem findings, treatment and management	**Drug Toxicity** (toxicology of therapeutic agents, their diagnosis, clinical sign, postmortem findings, treatment &management)	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance
• Define and classify feed additives • Describe the toxicokinetic properties, factors, mechanism of action, clinical sign, diagnosis and treatment • Familiar with different household poisoning those create toxicity	**Feed additives toxicity and household poisoning-** (definition, Classification, toxicokinetic & toxicodynamic properties, different household products & feed additives, clinical sign diagnosis, treatment of feed additive and household poisoning)	Lecture Interactive Discussion Power point Presentation Feed back Brainstorming	Quiz, Short question, Essay type question, Class attendance

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1. B.K. Roy. 2009. Veterinary Pharmacology and Toxicology, 2nd edition, India.
2. Ernest Hodgson .2010. A Textbook of Modern Toxicology, 4thedn, USA.
3. H.S. Sandhu and R.S.Barar. 2003. Text book of Veterinary Toxicology, 2ndedn. India.
4. HS Sandu. 1999. Laboratory Manual on Veterinary Pharmacology and Toxicology, 1st edition. India.
5. Joseph D. Roder .2001.The Practical Veterinarian-Veterinary Toxicology, 1stedn, USA.
6. Michael J. Derelanko and Carol Auletta .2014.Handbook of Toxicology, 3rdedn.USA.
7. Satish K. Garg .2013.Veterinary Toxicology, 3rdedn. India.

Course code: PPH 306 Course Title: Toxicology (Practical)	Credit Hour: 01	Level: 03	Semester-II
Rationale: This course is designed to provide practical knowledge of different type Poison, Toxic Substances, Mechanism of action of poison, Toxic plants and confirmatory diagnosis of different metal, non-metals, plant poisoning chelating agents (chemical antagonisms) and rodenticide which is used in veterinary practices in toxicological fields.			
Course Learning Outcomes: The major learning outcomes of this course are to- • Identify and Characterize common poisonous important plants available in Bangladesh. • Illustrate general diagnosis, sample collection procedure, name of collected sample, amount of sample. • Select specific chemical antagonism, use and diagnostic test of chelating agents in veterinary toxicological practices & demonstrate diagnostic procedure of poisons.			

• Develop student ability to understand knowledge to select diagnostic test for metal, Nonmetals, toxic components of plants, mycotoxin, agrochemical substances & animal poisons.			
Intended Learning Outcomes (ILOs)	**Course Content**	**Teaching – Learning Strategies**	**Assessment Strategies**
• Define Toxin and poisons • Evaluate the history of development of Toxicology, poison, toxins • Discuss brief overview of all topics of toxicology	Introduction: Definition of toxin & poison, history of toxicology, brief overview	Lecture, Interactive Discussion, Visual presentation ,Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce
• Define plant poisoning. • Identify and characterize common poisonous plants • Prepare a chart of common important toxic plants, Scientific name, Bengali name, toxic parts, toxic principle and toxic effects • History of identify poisonous chemical substances in plants	Identification and characterization of common poisonous plants available	Lecture, Interactive Discussion, Visual presentation , Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration Performance Identification, PNB, Viva voce
• Classify diagnostic procedure • Briefly describe all diagnostic procedure	General diagnostic procedure for different poisoning cases	Lecture, Interactive Discussion, Visual presentation ,Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration Performance Identification, PNB, Viva voce
• Enlist collected sample from animal bodies and amount of diagnostic samples • Role of sealing and transportation	Collection ,preservation and specimens for toxicological analysis	Lecture, Interactive Discussion, Visual	Quiz, Short question, Essay type

of sample • Explain preservatives and ice cooling		presentation ,Feedback, Hand on practice, Group exercise, PNB	question, Class attendance, Demonstration Performance Identification, PNB, Viva voce
• Principle of Diphenyl amine test & list the instruments and chemicals for nitrate tests • Explain test procedure • Practically done the experiment • Discuss the observation of result in a groups • Present the justification of result	Diagnosis of Nitrite/Nitrite poisoning by Diphenyl amine test	Lecture, Interactive Discussion, Visual presentation ,Feedback, Hand on practice, Group exercise, Practical note book preparation	Quiz, Short question, Essay type question, Class attendance, Demonstration Performance Identification, Practical note book, Viva voce
• Principle of Reinsch test &List the instruments and chemicals for nitrate tests • Explain test procedure • Practically done the experiment • Discuss the observation of result in a groups • Present the justification of result	Diagnosis of Arsenic and Mercury poisoning by Reinsch test	Lecture, Interactive Discussion, Visual presentation Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration Performance Identification, PNB, Viva voce
• Principle of Semi-quantitive test Arsenic & list the instruments and chemicals for Arsenic tests • Collect and prepare the Arsenic containing sample & explain test procedure • Practically done the experiment by collecting sample. • Discuss the observation of result in a groups • Present the justification of result	Semi-quantitative method of Arsenic determination by Arsenic	Lecture, Interactive Discussion, Visual presentation , Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration Performance Identification, PNB, Viva voce

• Principle of Picrate paper test. • List the instruments and chemicals for Cyanide tests • Collect and prepare the Cyanide containing sample. • Explain test procedure& practically done the experiment • Discuss the observation of result in a groups • Present the justification of result	Diagnosis of Cyanide poisoning by sodium picrate paper method	Lecture, Interactive Discussion, Visual presentation ,Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration Performance Identification, PNB, Viva voce
• Principle of lead test& list the instruments and chemicals for Lead tests • Collect and prepare the Lead containing sample & explain test procedure • Practically done the experiment • Discuss the observation of result in a groups • Present the justification of result	Determination of lead poisoning in supplied sample	Lecture, Interactive Discussion, Visual presentation Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, Demonstration Performance Identification, PNB, Viva voce

Reference books:

1. Konrieplumlee. 2004. Clinical veterinary Toxicology.1st edition ISBN10.0323054552 ISBN13.9780323054553. Elsevier Health science division.USA.

2. Michael Peterson. 2013. Small Animal Toxicology 3e (PB). 9781455707171. Elsevier Health science division.USA.

3. Ramesh Chandra Gupta. 2018. Veterinary Toxicology: Basic &Clinical Principles, 3e(HB). 9780123859266. Elsevier Health science division.USA.

4. Robert.H. Poppenga. 2013. Small Animal Toxicology Essentials (PB). 9780813815381. John Wiley and Sons, Inc. USA.

5. Roger W. Gfeller, Shawn p.Messonnien. Hand book of small Animal Toxicology and poisonings. 2nd4th revised edition. Elsevier Health science division.USA.

Course code: PPH 402 **Course Title: Therapeutics and Pharmacy (Practical)**	**Credit Hour:01**	**Level:4**	**Semester-I**

Rationale: This course is designed to provide knowledge of different drugs, new drug development, instruments and some quality assurance tests used in pharmaceutical industries.

Course Learning outcomes: The major learning outcomes of this course are to-

- Acquire basic knowledge about therapeutics & pharmacy.
- Gain knowledge of different pharmaceutical preparation with difficulties arises during their preparation.
- Acquire knowledge about compounding and dispensing of drugs.
- Identify different type of instruments, quality assurance test in pharmaceutical industries & develop student ability to understand knowledge of new drug development.
- Develop knowledge of specific drugs for appropriate diseases

Intended Learning Outcomes (ILOs)	**Course Content**	**Teaching – Learning Strategies**	**Assessment Strategies**
• Define & classify Therapeutics and pharmacy • Explain history of drug developments.	Introduction on Therapeutics and pharmacy	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce
• Recommended the specific instruments for specific uses. • Present the picture of instruments by multimedia projectors.	Different types instruments and appliances used in quality assurance of drugs in pharmaceutical industries	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce
• Describe quality assurance test • Identify specific instruments for quality test • Present the video of test in multimedia projector	Study on different tests for Quality assurance of drug	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Enlist sources of drugs • Isolate, identify & collect of drugs • Describe each stage of collection. • Video presentation of collecting.	Collection of drugs	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Isolate the packaging material for	Packaging of drugs	Lecture, Interactive	Quiz, Short

different form of drug • Compare advantage and Disadvantage of packaging materials. • Video presentation of packaging		Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	question, Essay type question, Class attendance, PNB, Viva voce
• Identify the preservation material for different form of drug • Compare advantage and Disadvantage of preservation • Video presentation of preservation	Preservation of drugs	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Define, classify and characterize tablet • Explain the procedure & difficulties of tablet preparation • Select the test for quality assurance of tablets • Present the video of tablet preparation in multimedia projector.	Preparation of tablet	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Define & Classify Capsule. • Evaluate the characteristic & environmental hazards of Capsule • Describe the procedure of Capsule preparations. • Present the video of capsule preparation in multimedia projector	Preparation of capsule	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Define & enlist type of solution • Explain the method of solution preparation • Enumerate characteristic & quality test of solution.	Preparation of solution	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce
• Define &Classify suspension. • Evaluate the characteristic & environmental hazards of suspension. • Describe the procedure of suspension preparations.	Preparation of suspension	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.

• Present the video of suspension preparation in multimedia projector			
• Define, classify and characterize emulsion • Explain the procedure & difficulties of emulsion preparation • Select the test for quality assurance of emulsion • Present the video of emulsion preparation in multimedia projector.	Preparation of emulsion	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Define & enlist type of paste • Explain the method of paste preparation • Enumerate characteristic & quality test of paste.	Preparation of paste	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce
• Define & enlist type of ointment • Explain the method of ointment preparation • Enumerate characteristic & quality test of ointment	Preparation of ointment	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce
• Enlist the name & source of medicinal plants. • Describe the collection & isolation procedure. • Also enlist their active ingredients and uses. • Present the video of medicinal plants.	Medicinal plants	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Represent rule and regulation of pharmacy • Propose law for drug regulations	Rule and regulation of pharmacy and drug regulation laws in Bangladesh.	Lecture, Interactive Discussion, Visual presentation Feedback Brainstorming	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.
• Represent the process/steps of size deductions • Describe size reduction procedure • Implement the nanotechnology for	Size reductions by nanotechnology	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on	Quiz, Short question, Essay type question, Class

size reduction of drugs • Present the video of size reduction procedure in multimedia projector		practice, Group exercise, PNB	attendance, PNB, Viva voce.
• Identify the drug • Introduce the trade name by visual inspection. • Implement the drug in specific diseases • Illustrate the mode of action • Calculate the dose rate of drugs	Techniques used for the assessment of antibiotics, anthelmintics, anti-inflammatory drugs , antiseptics and other common drugs .	Lecture, Interactive Discussion, Visual presentation, Feedback, Hand on practice, Group exercise, PNB	Quiz, Short question, Essay type question, Class attendance, PNB, Viva voce.

Reference books:

1. Jim E. Riviere (Editor), Mark G. Papich. 2018. Veterinary Pharmacology and Therapeutics 10th Edition,(USA) ISBN-13: 978-1118855829 ISBN-10: 1118855825.WILEY Blackwell.USA.
2. Mark G. papich. 2015. Saunders Handbook of veterinary Drugs small and large Animal. 4threvisedEdition. ElsevierHealth science division.USA.
3. Robert L. Bill.2016. Clinical Pharmacology and Therapeutics for Veterinary Technicians, 4e. 4th Edition. ISBN-13: 978-0323086790 ISBN-10: 0323086799. Elsevier health division.USA.
4. Valerie J. Wiebe. Jul 20, 2015 .Drug Therapy for Infectious Diseases of the Dog and Cat. 1st Edition.ISBN-13: 978-1118557341 ISBN-10: 1118557344. WILEY Blackwell.USA.
5. Walter H. Hsu.2013.Handbook of Veterinary Pharmacology 1st Edition.(USA)ISBN-13: 978-0813828374 ISBN-10: 0813828376. WILEY Blackwell.USA.

Department of Genetics and Breeding (GAB)

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
1.	GAB-301 Animal Genetics (Theory)	2	3	1
2.	GAB-302Animal Genetics(Practical)	1	3	1

3.	GAB-401 Animal Breeding (Theory)	2	4	1
4.	GAB-401 Animal Breeding(Practical)	1	4	1
Total (4+2)=6				

Total Credit Hour	
Theory	**4**
Practical	**2**
Total	**6**

Course Code: GAB 301 **Course Title: Animal Genetics (Theory)**	**Credit Hour: 2.0**	**Level: 3**	**Semester: I**
Rationale: Providing of in depth idea about basic Genetics to advanced genetic engineering technologies			
Course Learning Outcomes: ✓ illustrate the advanced tools of genetic engineering, as well as molecular and cellular biology ✓ assess genetic merits, which reflects on productivity and reproducibility			

Intended Learning Outcomes (ILOs)	Course Content	Teaching-Learning Strategy	Assessment Strategy
✓ define basic terms related to genetics ✓ assemble historical background of genetics ✓ classify gene action	**Introduction to Genetics** ✓ genetic terminology ✓ concept, branches and application of genetics in livestock and human welfare ✓ different types of gene action	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define basic terms of Mendelian genetics ✓ justify contribution of Gregor Johann Mendel in genetics ✓ decribe Mendel's laws and their modification	**Mendelian Genetics** ✓ basic terminology ✓ Gregor Johann Mendel and his contribution in genetics ✓ Mendel's laws ✓ modification of Mendelian ratios	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ categorize multiple alleles ✓ investigate the coat color inheritance in animals ✓ determination of blood group and blood protein polymorphism	**Multiple Alleles** ✓ definition and concept of multiple alleles ✓ coat color inheritance in animals ✓ blood groups and blood protein polymorphism in animals	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ define gene mapping, linkage and crossing over ✓ classify linkage and crossing over ✓ describe various traits related to sex ✓ discuss etiological basis of crossing over	**Linkage, Crossing Over, Gene Mapping and Genetics of Sex** ✓ linkage and its significance ✓ kinds of linkage and crossing over ✓ cytological basis of crossing over ✓ interference and coincidence ✓ gene mapping ✓ sex determination and sex inheritance ✓ sex linked; sex influenced and sex limited traits in farm animals	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ illustrate significance and basic concepts of aberration ✓ categorize chromosomal aberration	**Chromosomal Aberration** ✓ definition and concept of aberration ✓ classification and significance of chromosomal aberration ✓ chromosomal aberration and hermaphrodism	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment

✓ define mutation ✓ illustrate mutation ✓ classify mutation ✓ explain experimental proof of mutation	**Mutation** ✓ definition and concept, occurrence, causes, classification, significance of mutation ✓ forward and reverse mutation and experimental proof of mutation	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ design the structure of chromosome, gene, DNA and RNA ✓ describe the DNA replication ✓ differentiate DNA from RNA ✓ explain protein biosynthesis	**Chemical Basis of Heredity** ✓ basic concept and structure of Chromosome, gene, RNA and DNA ✓ DNA replication ✓ DNA as genetic materials ✓ protein biosynthesis	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment
✓ illustrate genetic engineering ✓ define gene cloning, gene probe and recombinant DNA ✓ discuss the procedure of producing transgenic animals and knock-out mouse	**Genetic Engineering** ✓ concept and definition, application, advantages and disadvantages of genetic engineering ✓ gene cloning, gene probe and recombinant DNA ✓ DNA sequencing ✓ Transgenic animals ✓ Knock-out mouse	Lecture Interactive Discussion Projector Display	Quiz Test Term and Final exam Assignment

Books Recommended:

1. Genetics (6th edition), P.S. Verma and D.P. Agarwal. S. Chand and Co. Ltd., New Delhi. 1985.
2. Genetics (18th edition0, E.J. Gardner, M.J. Simmonds and D.P. Snustard. John Wiley and Sons, New York. 1991.
3. Veterinary Genetics, F.W. Nicholas, Clarendon Press, Oxford. 1987.
4. Genetics, M.W. Strickberger, McMillan, New York. 1968.
5. Principles of Genetics, 8th edition, E.J. Gardner, M.J. Simmonds and D.P. Snustard. John Wiley and Sons, New York.
6. Molecular Biology, H.D. Kumar, Vikas Publishing House. PTV Ltd. India. 1991.
7. Principles of Gene Manipulation, R.W. Old and S.B. Primrose. Blackwell Science Publisher, London.
8. Biotechnology- Fundamentals and application. S.S. Purohit, S.K. Mathur. Agrosbios, Jodhpuir, India. 2000.

Course Code: GAB 302 Course Title: Animal Genetics (Practical)	Credit Hour: 1.0	Level: 3	Semester: I
Rationale: To give an idea about basic genetics, related mathematical problems and their solutions, basic cell biology using appropriate genetic material and gametogenesis.			
Course Learning Outcomes: ✓ illustrate basic concepts of genetics			

✓ discuss related mathematical problems and their solutions ✓ evaluate basic cell biology using appropriate genetic material ✓ diagramatic representation of gametogenesis			
Intended Learning Outcomes (ILOs)	Course Content	Teaching-Learning Strategy	Assessment Strategy
✓ select appropriate materials to study genetics	**Materials of genetics study**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ differentiate animal cell from plant cell ✓ diagram the animal cell ✓ discuss the structures of animal cell	**Study on Animal cell**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ define mitosis ✓ justify mitotic procedure in onion roots	**Mitosis using onion roots**	Lecture Discussion Demonstration	Quiz Test Term and Final exam Assignment
✓ distinguish mitosis from meiosis ✓ diagram the phases of mitosis	**Cell Division-Mitosis**	Lecture Discussion Demonstration	Quiz Test Term and Final exam Assignment
✓ prove the role of meiosis in reproduction ✓ sketch the phases of mitosis	**Cell Division-Meiosis**	Lecture Discussion Demonstration	Quiz Test Term and Final exam Assignment
✓ compare between oogenesis and spermatogenesis ✓ illustrate the steps of gametogenesis	**Gametogenesis**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ state the basic concepts of culture media ✓ elucidate the culture media preparation for drosophila	**Preparation of culture media of drosophila**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ illustrate the morphological structure of drosophila	**Morphology of drosophila**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ demonstrate solution to some	**Mathematical problems**	Lecture	Quiz Test

mathematical problems related to Mendelian genetics	**related to Mendelian genetics**	Discussion Projector Display Demonstration	Term and Final exam Assignment

Books Recommended:

1. Genetics (6th edition), P.S. Verma and D.P. Agarwal. S. Chand and Co. Ltd., New Delhi. 1985.
2. Genetics (18th edition0, E.J. Gardner, M.J. Simmonds and D.P. Snustard. John Wiley and Sons, New York. 1991.
3. Veterinary Genetics, F.W. Nicholas, Clarendon Press, Oxford. 1987.
4. Genetics, M.W. Strickberger, McMillan, New York. 1968.
5. Principles of Genetics, 8th edition, E.J. Gardner, M.J. Simmonds and D.P. Snustard. John Wiley and Sons, New York.
6. Molecular Biology, H.D. Kumar, Vikas Publishing House. PTV Ltd. India. 1991.
7. Principles of Gene Manipulation, R.W. Old and S.B. Primrose. Blackwell Science Publisher, London.
8. Biotechnology- Fundamentals and application. S.S. Purohit, S.K. Mathur. Agrosbios, Jodhpuir, India. 2000.

Course Code: GAB 401 **Course Title: Animal Breeding (Theory)**	**Credit Hour: 2.0**	**Level: 4**	**Semester: I**
Rationale: Design and implementation of appropriate breeding tools to improve animal productivity and genetic merits.			
Course Learning Outcomes:			

✓ justify the ways of improving animal productivity that is essential to encounter the growing demand of animal protein ✓ illustrate improved breeding approaches that can trigger genetic merit ✓ assemble knowledge of adaptive breeding tools that are necessary to reserve animal genetic resources			
Intended Learning Outcomes (ILOs)	Course Content	Teaching-Learning Strategy	Assessment Strategy
✓ define basic terms of animal breeding ✓ illustrate the background and application of animal breeding	**Introduction of Animal Breeding** ✓ concept of Animal Breeding, its development and application ✓ breed, strain, line and type ✓ breed association	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ discuss the Hardy-Weinberg law ✓ determine the determinants of genetic properties and gene frequency	**Genetic constitution of population** ✓ gene and genotype frequencies ✓ Hardy-Weinberg law ✓ factors changing genetic properties and gene frequency	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ categorize economically important traits ✓ detect the relationship between genotype and environment	**Phenotypic variation** ✓ traits of economic importance ✓ values and means discrete and continuous variation ✓ components of phenotypic and genetic variation ✓ genotype-environment interaction ✓ average effect of genes	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ estimate heritability and repeatability ✓ explain the terms- heritability, repeatability and genetic correlation	**Population parameters** ✓ heritability, repeatability and genetic correlation ✓ methods of estimation and their uses	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ predict the breeding value using	**Breeding value**	Lecture	Quiz Test Term and

BLUP and MPPA ✓ estimate breeding value	✓ concept, estimation and uses of breeding value ✓ best linear unbiased prediction (BLUP) ✓ most probable producing ability (MPPA) and transmitting ability	Discussion Projector Display Demonstration	Final exam Assignment
✓ differentiate natural and artificial selection ✓ predict selection response ✓ discuss the selection methods ✓ implication of selection to livestock	**Selection and response to selection** ✓ Natural and artificial selection ✓ selection objectives and criteria ✓ aids to selection ✓ progeny testing and sib testing ✓ methods of selection for more than one traits ✓ selection program for livestock improvement ✓ prediction and estimation of selection response ✓ implication of selection to livestock ✓ selection limit	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ illustrate semen collection and processing technology ✓ evaluate the semen quality ✓ plan the layout of an AI centre ✓ select the best methods for pregnancy diagnosis	**Semen Collection and Artificial Insemination (AI)** ✓ collection of semen from various breeding male ✓ quantitative and qualitative evaluation of semen for AI ✓ various diluents and extension of semen ✓ preservation of semen for short and long term ✓ artificial insemination of farm animals ✓ pregnancy diagnosis in farm animal ✓ management of breeding animals ✓ routine activities in AI centre	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment

	✓ visiting of AI stations ✓ equipment required for AI ✓ planning of an AI centre		
✓ state the definition and procedure of super ovulation and embryo transfer ✓ predict the limitations	**Super ovulation and Embryo Transfer** ✓ super ovulation procedure ✓ purpose and procedure of embryo transfer ✓ limitations of super ovulation and embryo transfer	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ predict the history of In Vito Fertilization ✓ illustrate In Vito Fertilization	**In Vitro Fertilization (IVF)** ✓ history of IVF ✓ application and process of IVF	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ predict the history of cloning ✓ classify cloning ✓ assess the cloning process	**Cloning** ✓ history ✓ application and process of different types of cloning	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment

Books Recommended

1. Introduction to Quantitative Genetics (4th edition D. S. Falconer and Trudy F. C.Mackay. Addison Wesley Longman Limited, England. 1996.
2. Veterinary Genetics, F.W. Nicholas, Clarendon Press, Oxford. 1987.
3. Genetics, M.W. Strickberger, McMillan, New York. 1968.
4. Principles of Genetics, 8th edition, E.J. Gardner, M.J. Simmonds and D.P. Snustard. John Wiley and Sons, New York.
5. Molecular Biology, H.D. Kumar, Vikas Publishing House. PTV Ltd. India. 1991.
6. Principles of Gene Manipulation, R.W. Old and S.B. Primrose. Blackwell Science Publisher, London.
7. Biotechnology- Fundamentals and application. S.S. Purohit, S.K. Mathur. Agrosbios, Jodhpuir, India. 2000.

Course Code: GAB 402 **Course Title: Animal Breeding (Practical)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: I**
Rationale: Providing idea about breeding tools, related mathematical problems and their solutions			
Course Learning Outcomes: ✓ detect and reserve indigenous breeding resources			

✓ determine various breeding tools ✓ analyze different mathematical problems and their solutions			
Intended Learning Outcomes (ILOs)	Course Content	Teaching-Learning Strategy	Assessment Strategy
✓ detect the chromosome number of various animal species ✓ evaluate genetic resources of livestock	**Identification of Indigenous Livestock Genetic Resource of Bangladesh**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ categorize economically important traits ✓ demonstrate solution to mathematical problems	**Study on different types of traits**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ illustrate the definition and formula of different biometrical terms ✓ analyze mathematical problems	**Study on biometry essential for animal breeding**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ determine ANOVA ✓ analyze mathematical problems using ANOVA	**Study on Analysis of Variance (ANOVA)**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ select the best methods of heritability determination ✓ estimate heritability of animals and birds	**Study on the estimation of heritability**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ verify the methods of repeatability determination ✓ estimate repeatability of animals and birds	**Study on the estimation of repeatability**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment
✓ solve various mathematical problems ✓ determine breeding value of livestock	**Study on the estimation of breeding value**	Lecture Discussion Projector Display Demonstration	Quiz Test Term and Final exam Assignment

Books Recommended

1. Introduction to Quantitative Genetics (4th edition D. S. Falconer and Trudy F. C.Mackay. Addison Wesley Longman Limited, England. 1996.
2. Veterinary Genetics, F.W. Nicholas, Clarendon Press, Oxford. 1987.
3. Genetics, M.W. Strickberger, McMillan, New York. 1968.

4. Principles of Genetics, 8th edition, E.J. Gardner, M.J. Simmonds and D.P. Snustard. John Wiley and Sons, New York.
5. Molecular Biology, H.D. Kumar, Vikas Publishing House. PTV Ltd. India. 1991.
6. Principles of Gene Manipulation, R.W. Old and S.B. Primrose. Blackwell Science Publisher, London.
7. Biotechnology- Fundamentals and application. S.S. Purohit, S.K. Mathur. Agrosbios, Jodhpuir, India. 2000.

Department Medicine, Surgery and Obstetrics (MSO)

Course Layout

Sl. No.	Course Code and Title	Cr. Hr.	Level	Semester
Discipline: Medicine				
1.	MSO-301: General Medicine (Theory)	2	3	I1
2.	MSO-302: General Medicine (Practical)	1	3	I1
3.	MSO-401: Farm Animal Medicine (Theory)	2	4	1
4.	MSO-402: Farm Animal Medicine (Practical)	1	4	1
5.	MSO-403: Small Animal Medicine (Theory)	2	4	1
6.	MSO-404: Small Animal Medicine (Practical)	1	4	1
7.	MSO-405: Avian Medicine (Theory)	2	4	1
8.	MSO-406: Avian Medicine (Practical)	1	4	1
9.	MSO-411: Zoo and Wild Animal Medicine (Theory)	1	4	I1
10.	MSO-412: Zoo and Wild Animal Medicine (Practical)	1	4	I1
11.	MSO-413: Metabolic Disease (Theory)	1	4	I1
12.	MSO-415: Preventive Medicine (Theory)	2	4	I1
13.	MSO-417: Herd Health Management (Theory)	1	4	II
14..	MSO-418: Herd Health Management (Practical)	1	4	II
15.	MSO-505: Jurisprudence and Ethics (Theory)	1	5	I
16.	MSO-510: Clinics Medicine (Practical)	1	5	I
17.	MSO-511: Animal Behavior and Welfare (Theory)	1	5	I
Total (15+07)=22				
Discipline: Surgery				
18.	MSO-407: General Surgery (Theory)	2	4	1
19.	MSO-408: General Surgery (Practical)	1	4	1
20.	MSO-409: Anesthesiology (Theory)	1	4	1
21.	MSO-410: Anesthesiology (Practical)	1	4	1
22.	MSO-421: Small Animal Surgery (Theory)	2	4	II
23.	MSO-422: Small Animal Surgery (Practical)	1	4	II
24.	MSO-501: Farm Animal Surgery (Theory)	2	5	I
25.	MSO-502: Farm Animal Surgery (Practical)	1	5	I
26.	MSO-503: Radiology and Imaging (Theory)	2	5	I
27.	MSO-504: Radiology and Imaging (Practical)	1	5	I
28.	MSO-508: Soundness and Certificate Writing (Practical)	1	5	I
31.	MSO-514: Clinics Surgery (Practical)	1	5	I
Total (09+07)=16				
Discipline: Theriogenology				
32.	MSO-419: Gynecology (Theory)	2	4	II
33.	MSO-420: Gynecology (Practical)	1	4	II
34.	MSO-516: Clinics Theriogenology (Practical)	1	5	I
35.	MSO-517: Obstetrics (Theory)	2	5	I
36.	MSO-518: Obstetrics (Practical)	1	5	I

37.	MSO-519: Andrology and Artificial Insemination (Theory)	2	5	I
38.	MSO-520: Andrology and Artificial Insemination (Practical)	1	5	I
Total (06+04)=48				

Total Credit Hour	
Theory	30
Practical	18
Total	**48**

Course Code: MSO 301 **Course Title: General Medicine (Theory)**	**Credit Hour: 2.0**	**Level: 3**	**Semester: II**

Rationale: This course is designed to provide basic concepts of medicine, general systemic states of animals, diseases and their methods of management.

Course Learning Outcomes:

- ✓ Study on the medicine, classification and terminology related with medicine and diagnosis
- ✓ Study on the general systemic states of the body, their treatment and control.
- ✓ Principles of manifestations of dysfunction of diseases of different organs and systems of the body.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Discuss general terminologies related with the medicine.	History and definition of veterinary medicine Branches of medicine and veterinary medicine Terminology related with veterinary medicine Classification of disease and factors affecting the diseases	Lecture, Discussion and Projector display.	Quiz test, Term and Final exam
Outline the knowledge on general systemic state of body	Hypothermia, hyperthermia, toxemia, septicemia, dehydration, acidosis, alkalosis, stress, sudden death, demeanor, pica.	Lecture, Discussion and Projector display.	Quiz test, Term and Final exam
To enable the principle manifestations of dysfunction, diagnosis and treatment of diseases of different organ and system			
Illustrate principle manifestations, diagnosis and treatment of alimentary tract dysfunction	**Diseases of oral cavity** • Stomatitis • Gingivitis • Glositis **Disease of oesophagus and pharynx** • esophageal obstruction	Lecture, Discussion and Projector display.	Quiz test, Term and Final examination

	(choke) • Oesophagitis • pharyngitis, • pharyngeal obstruction • Pharyngeal paralysis **Diseases of the stomach** • Indigestion • Traumatic reticuloperitonitis • Abomasal displacement • Abomasal impaction **Diseases of intestine** • Enteritis • Intestinal obstruction • Gut-tie • Equine colic **Diseases of the liver** • Hepatitis • Jaundice		
State the Principle manifestations, diagnosis and treatment of respiratory tract dysfunctions	**Diseases of upper respiratory tract** • Rhinitis • Epistaxis and hemoptysis • Laryngitis, tracheitis and bronchitis	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
	Diseases of the lungs • Pulmonary emphysema • Pneumonia and pneumonitis • Aspiration pneumonia • Hydrothorax, Haemothorax and Pneumothorax • Plurisy or Pleuritis	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Investigate the principle manifestation, diagnosis and treatment of urinary tract diseases	• Principle of diagnosis of urinary tract dysfunction • Principle of treatment of urinary tract diseases	Lecture, Discussion, Projector display and Feed Back.	Quiz test, Term and Final exam
	Diseases of the kidney • glomerulonephritis • pyelonephritis	Lecture, Discussion, Projector	Quiz test, Term and Final exam

	• renal ischemia • Nephrosis	display and Feed Back	
	Diseases of the urinary bladder and urinary tract • Cystitis • Urolithiasis • Rapture of bladder	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Explain the principle manifestations, diagnosis and treatment of cardiovascular diseases	• Epicarditis and pericarditis • General discussion on haemorrhage, shock, oedema, anaemia	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Judge diseases of the integumentary system	• Principle manifestations of the diseases of skin • Principle of diagnosis of diseases of skin • Principle of treatment of diseases of skin • Classification of skin diseases • Terminologies related with skin diseases • Dermatitis • Photosensitization • Urticaria • Diseases of sub-cutis/ hypodermis	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Interpret diseases of the musculoskeletal system	• Principle manifestations, diagnosis and treatment of diseases of muscles and their attachments, the bones and joints • Arthritis and synovitis • Congenital defects of musculoskeletal system	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Discuss the principle manifestations, diagnosis and treatment of diseases of nervous system	• General discussion on Encephalomalacia, encephalitis, meningitis	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam

Books Recommended

1. Aiello, S.E. and Mays, A. (1988). The Merck Veterinary Mamud. Merck & Co., Inc, USA.
2. Anderson, N.V. (1992). Veterinary Gastroenterology. Lea & Febiger, London.
3. Andrews, A.H., Blowey, R.W., Boyd, H. and Eddy, R.G. (2004). Bovine Medicine: Disease and Husbandry of Cattle. 2nd edn. Blackwell Science.
4. Byaher and Natamen, M.C. (1985). Veterinary Fluid Therapy. Blackwell Science.
5. Howard, L.J. (1993). Current Vet. Therapy: Food Animal Practice. W.B. Saunders Co. Philadelphia.
6. Mathews, J. (1999). Diseases of the Goat. Blackwell Science.
7. Radostitis, O.M., Gay, C.C., Blood, D.C. and Hincheliff, K.W. (2000), Veterinary Medicine: A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses, 9th edn. W.B. Saunders Co. Phildelphia.
8. Smith, B.P. (1996). Large Animal Internal Medicine. 2nd edn. C.V. Mosby Co., St. Louis, Philadelphia.
9. Samad, M. A. (2008). Animal Husbandary and Veterinary Science. Volume 1, LEP publication.

Course Code: MSO 302 Course Title: General Medicine (Practical)	Credit Hour: 2.0	Level: 3	Semester: II

Rationale: This course is designed to provide practical demonstration of veterinary clinics, diagnosis of diseases and dysfunctions and treatment.

Course Learning Outcomes:

- Practical introduction to requirements of veterinary clinic and hospital
- Practical demonstration on the methods of history taking, case recording and clinical examination of animal
- Studies on the methods of sample collection, dispatching and tests used for the laboratory diagnosis of different diseases
- Recording of clinical cases with post-treatment evaluation and interpretation

.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Discuss the general concept of veterinary medicine regarding veterinary clinics	• Requirements for veterinary clinics and methods of management • Study on the instruments used by the clinician for the diagnosis and treatment of diseases	Lecture, Discussion, practical demonstration assignment	Quiz test, Term and Final exam
Outline the knowledge on the clinical case record	• Methods of recoding of data • Method of case history taking (anamnesis) • Management of sick animals.	Lecture, Discussion, practical demonstration assignment	Quiz test, Term and Final exam
Design the procedures of the clinical examination of patient	• Restraining of animal • Examination of the environment • Examination of patient • General examination • Close examination • Physical examination • Special examination • Examination of body regions and system • Examination of identified system.	Lecture, Discussion, practical demonstration assignment	Quiz test, Term and Final exam
Formulate the knowledge on the body	• Normal condition	Lecture,	Quiz test,

condition of the animal	• poor condition • thin condition • emaciation • fat condition	Discussion, practical demonstration assignment	Term and Final exam
Demonstrate the knowledge on different clinical parameters	• study on the examination of respiratory rate • study on the examination of pulse rate • study on the examination of heart rate and sound • study on the examination of body • temperature • study on the collection of blood for laboratory examinations • study on the collection of faeces • study on the collection of urine	Lecture, Discussion, practical demonstration assignment	Quiz test, Term and Final exam

Books Recommended:

1. Aiello, S.E. and Mays, A. (1988). *The Merck Veterinary Mamud.* Merck & Co., Inc, USA.
2. Anderson, N.V. (1992). *Veterinary Gastroenterology*. Lea & Febiger, London.
3. Andrews, A.H., Blowey, R.W., Boyd, H. and Eddy, R.G. (2004). *Bovine Medicine: Disease and Husbandry of Cattle*. 2nd edn. Blackwell Science.
4. Byaher and Natamen, M.C. (1985). *Veterinary Fluid Therapy*. Blackwell Science.
5. Howard, L.J. (1993). *Current Vet. Therapy: Food Animal Practice*. W.B. Saunders Co. Philadelphia.
6. Mathews, J. (1999). *Diseases of the Goat*. Blackwell Science.
7. Radostitis, O.M., Gay, C.C., Blood, D.C. and Hincheliff, K.W. (2000), *Veterinary Medicine: A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses*, 9th edn. W.B. Saunders Co. Phildelphia.
8. Smith, B.P. (1996). *Large Animal Internal Medicine*. 2nd edn. C.V. Mosby Co., St. Louis, Philadelphia.
9. Samad, M. A. (2008). Animal Husbandary and Veterinary Science. Volume 1, LEP publication.

Course Code: MSO 401 **Course Title: Farm Animal Medicine (Theory)**	**Credit Hour: 2.0**	**Level: 4**	**Semester: I**

Rationale: This course is designed to provide basic concepts of diseases of farm animals and their management.

Course Learning Outcomes:

- Introduction of farm animal medicine and role of veterinarian in animal farms and industry.
- To know the infectious and noninfectious diseases of farm animals.
- To know the etiology, epidemiology, clinical signs, diagnosis, treatment, control and prevention method of different infectious diseases of farm animals.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Illustrates the general concept of farm animal medicine	Introduction of farm animal medicine and role of veterinarian in animal farms and industry.	Lecture, Discussion, Projector display and Feed back	Quiz test, Term and Final exam
Specific diseases of farm animals (Etiology, epidemiology, clinical signs, diagnosis, treatment, prevention and control)			
Assess the knowledge on viral diseases of farm animals	Papillomatosis, Infectious bovine rhinotracheitis, Bovine ephemeral fever, Foot and mouth disease, Rinderpest, Bovine viral diarrhea, Bovine malignant catarrh, Rabies, Pseudrabies, PPR, Blue tongue, Scrapie, Pox	Lecture, Discussion, Projector display and Feed back	Quiz test, Term and Final exam
Investigate bacterial diseases of farm animals	Contagious bovine pyelonephritis, Caseous lymphadenitis, Bovine Bacillary haemoglobinuria, Infectious necrotic hepatitis, Haemorrhagic septicaemia, Infectious bovine keratoconjunctivitis, Paratuberculosis, Actinobacillosis, Actinomycosis,	Lecture, Discussion and Projector display, Assignments	Quiz test, Term and Final exam

	Leptospirosis, Dermatophilosis, Foot rot, Strangles, Glanders.		
Categorize parasitic diseases of farm animals	Fascioliasis, Aparamphistomiasis, Schistosomiasis, Ascriasis, Strongyloidosis, Tapeworm disease, Lungworm disease, Hookworm disease, Eyeworm disease, Trichinellosis, Skin-worm disease, Babesiosis, Theileriosis, Trypanosomiasis, Cocidiosis, Bovine tritrichomoniasis, Toxoplasmosis, Cryptosporidiosis, Sarcocystosis, Balantidiasis, Ectoparasitic skin disease	Lecture, Discussion and Projector display, Assignments.	Quiz test, Term and Final exam
Classify fungal disease of farm animals	Dermatomycosis, Rhinosporidiosis, Candidiasis, Mucormycosis, Coccidioidomycosis, Degnala diseases.	Lecture, Discussion and Projector display and Feed back	Quiz test, Term and Final examination
Generalize mycoplasmal and rickettsial disease of farm animal	Contagious bovine pleuropneumonia, Mycoplasmal arthritis, contagious agalactia Anaplasmosis, tick borne fever, Q fever, and contagious ophthalmia.	Lecture, Discussion, Projector display and Fed back.	Quiz test, Term and Final exam
Prioritize on diseases caused by poisons	Hydrocyanic acid, Nitrate and nitrite, Chlorinated hydrocarbons, Organ phosphorus and carbonates, Urea, Lead, Arsenic, and Snake bite.	Lecture, Discussion and Projector display.	Quiz test, Term and Final exam
Evaluate the diseases caused by physical agents	Physical dermatitis, Lightning stroke and electrocution, Burns and	Lecture, Discussion and Projector	Quiz test, Term and Final exam

	Scalds, Yoke gall, Brisket disease	display.	

Books Recommended

1. Aiello, S.E. and Mays, A. (1998). The Merck Veterinary Manual, Merck and Co, Inc. USA.
2. Howard, L. J. (1993). Current Veterinary Therapy Food Animal practice, W.B. Saunders Co., Philadelphia.
3. Matthews, J. (1999). Diseases of the Goat. Blackwell Science, London.
4. Radostitis, O.M.; Gay, C.C. Blood., D.C.; and Hincheliff, K.W. (2000). Veterinary Medicine. W.B. Sounders Co., Philadelphia.
5. Samad, M.A. Animal Husbandry and Veterinary Science, Vol-1& Vol-2, LEP Publication, Mymensingh, Bangladesh
6. Samad, M.A. (2007) Veterinary Practitioners Guide. LEP Pub. No 7, BAU, Mymensingh.
7. Smith, B.P. (1996). Large Animal Internal medicine 2nd Mosby, St Louis.

Course Code: MSO 401 **Course Title: Farm Animal Medicine (Practical)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: I**

Rationale: This course is designed to provide basic concepts of diseases of farm animals and their management. .

Course Learning Outcomes:

- Clinical examination of farm animals for the diagnosis of infectious diseases
- Treatment and management of diseases in farm animals

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Draw introduction on farm animal medicine	Introduction to farm animals and their diseases	Lecture Discussion, Demonstration Projector Display and Feedback	Quiz test, Term and Final examination
Recommend the clinical examination and method of clinical case record	Clinical Examination of sick farm animals, diagnosis of the diseases and their treatment.	Lecture Discussion, Demonstration Projector Display and Feedback	Quiz test, Term and Final exam
Formulate the collection and dispatching method of sample	Method of Collection and dispatch of specimens to the laboratory for examination and confirmation of diagnosis.	Lecture Discussion, Demonstration Projector Display and Feedback	Quiz test, Term and Final exam
Evaluate the practical exposure on disease incidence and their management.	Visit of different cattle, buffalo, sheep and goat farms for practical exposure on disease incidence and their management.	Assignments	Assignments and oral presentation

Books Recommended

1. Aiello, S.E. and Mays, A. (1998). The Merck Veterinary Manual, Merck and Co, Inc. USA.
2. Howard, L. J. (1993). Current Veterinary Therapy Food Animal practice, W.B. Saunders Co., Philadelphia.
3. Matthews, J. (1999). Diseases of the Goat. Blackwell Science, London.

4. Radostitis, O.M.; Gay, C.C. Blood., D.C.; and Hincheliff, K.W. (2000). Veterinary Medicine. W.B. Sounders Co., Philadelphia.
5. Samad, M.A. Animal Husbandry and Veterinary Science, Vol-1& Vol-2, LEP Publication, Mymensingh, Bangladesh
6. Samad, M.A. (2007) Veterinary Practitioners Guide. LEP Pub. No 7, BAU, Mymensingh.
7. Smith, B.P. (1996). Large Animal Internal medicine 2nd Mosby, St Louis.

Course Code: MSO 403 **Course Title: Small Animal Medicine (Theory)**	**Credit Hour: 2.0**	**Level: 4**	**Semester: I**

Rationale: This course is designed to provide basic concepts of diseases of small animal and its control and prevention.

Course Learning Outcomes:

- Clinical examination of small animals for the diagnosis of diseases
- Treatment and management of diseases in small animals

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Define Small Animal Medicine	Definition, scopes of Small Animal Medicine. Principles of diagnosis and treatment of disease of different systems of dog and cat.	Lecture, Interactive Discussion, Projector	Quiz Test, Term and Final exam, Short Essay, Assignment

Describe general diseases of small animal in respect of their etiology, clinical findings, diagnosis, treatment, prevention and control measures.	**General Systemic State:** vomiting, diarrhoea, anorexia and constipation. **Gastro-intestinal disorders-** Ptyalism, Melena and haematochezia. **Urinary disorder-** acute and chronic renal failure. **Respiratory disorder-** Coughing, epistaxis, aspiratiom pneumonia. **Cardiovascular and Hematological disorder-** Haemolysis and anaemia. **Opthalmologic disorders-** Blepharitis, glucoma. **Dermatologic disorder:** Skin fold pyoderma, pyotraumatic dermatitis, Superficial pyoderma, Impetigo, deep pyoderma.	Lecture, Interactive Discussion, Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Explain microbial diseases of small animal.	**Microbial diseases:** **Bacterial diseases:** Brucellosis, Tuberculosis, plague, Tyzzer's disease, Leptospirosis, Tetanus, Dermatophilosis, Salmonellosis, Lyme disease, Cat scratch disease. **Viral Diseases:** Rabies, Canine distemper, Kennel cough, canine infectious hepatitis, Canine parvovirus infections, Canine Rota virus infection, , Feline immunodeficiency virus (FIV) **Fungal diseases:** Dermatophytosis,	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment

	Histoplasmosis, Aspergillosis, Cryptoccosis		
Evaluate the parasitic diseases of small animal.	**Protozoal diseases:** Toxoplasmosis, Babesiosis, Trypanosomiasis, Leishmaniasis. **Helminthic diseases**: Hookworm disease, Ascariasis, Tapeworm infestation, Whipworm infection, Heartworm disease. **External parasitic infestation**: Flea and mange mites.	Lecture, Interactive Discussion, Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment

Book Recommended:

1. Ettinger, S. J. and Feldman, E. C. 1995. Textbook of Veterinary Internal Medicine, Diseases of the dog and cat 4th edn. W. B. Saunders Co., Philadelphia.
2. McCurrin, D. M. and Poffenharger, E. M. 1991. Small Animal physical Diagnosis and Clinical Procedures. 1st edn. W. B. Saunders. C o., USA.
3. Samad, M.A. 2000. Veterinary Practitioner's Guide. 1st Pub., LEP, Bangladesh Agricultural University, Mymensingh.
4. Samad, M. A. 2000. Veterinary Practitioner's Guide. 1st Pub., LEP, Bangladesh Agricultural University. Mymensingh.
5. Sherding, R. G. 1989. The cat (diseases and clinical management). 1st Pub. Churchill Livingstone Inc.
6. Susan, E. A. 1998. The Merck Veterinary Manual. 8th edn. Merck and Co., Inc., USA.

Course Code: MSO 404 Course Title: Small Animal Medicine (Practical)	Credit Hour: 1.0	Level: 4	Semester: I

Rationale: This course is oriented to provide students applied knowledge on small animal medicine. This purpose is to apply the practical knowledge on disease diagnosis and its treatment, prevention, control and advice.

Course Learning Outcomes:

- Obtaining practical knowledge on small animal disease.
- Acquiring practical knowledge on how to make prescription for different disease.
- Giving practical knowledge on animal restraining and different diagnostic procedure clinically.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
State about small animal clinic and small animal practitioners.	Requirements of small clinic and responsibilities of the small animal practitioners.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Determine the methods of restraining	Methods of restraining of dogs and cats.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam.
Design the procedure of clinical diseases diagnosis in small animal.	Methods of clinical diagnosis of diseases of dog and cat- History taking, distant inspection and physical techniques, clinical examination of different body regions and different systems and organs of small animals.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Formulate the procedure of imaging techniques.	Diagnostic imaging techniques and its application in the diagnosis of small animal diseases.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Estimate laboratory diagnosis of diseases in small animal.	Methods of laboratory diagnosis- Collection,	Lecture Discussion	Quiz Test, Term and

	physical examination, preservation and shipment of stool, urine, blood, skin scrapings, smears, swabs and edematous fluid.	Projector Display and Feedback	Final exam, Short Essay, Assignment
Implement the drug administration	Demonstration and dispensing of drugs and their doses, route of administration, duration of treatment and adverse drug reactions in dog and cat.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Write how to prescribe the diseases.	Recording of clinical cases of dog and cat and their prescription writing, post-treatment evaluation and interpretation.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Apply knowledge practically from field.	Field trips to the Central Veterinary Hospital, Dhaka and other private small animal clinic for practical classes.	Demonstration and Discussion	Oral Presentation, Assignment

Book Recommended:

1. Ettinger, S. J. and Feldman, E. C. 1995. Textbook of Veterinary Internal Medicine, Diseases of the dog and cat 4th edn. W. B. Saunders Co., Philadelphia.
2. McCurrin, D. M. and Poffenharger, E. M. 1991. Small Animal physical Diagnosis and Clinical Procedures. 1st edn. W. B. Saunders. Co., USA.
3. Samad, M.A. 2000. Veterinary Practitioner's Guide. 1st Pub., LEP, Bangladesh Agricultural University, Mymensingh.
4. Samad, M. A. 2000. Veterinary Practitioner's Guide. 1st Pub., LEP, Bangladesh Agricultural University. Mymensingh.
5. Sherding, R. G. 1989. The cat (diseases and clinical management). 1st Pub. Churchill Livingstone Inc.
6. Susan, E. A. 1998. The Merck Veterinary Manual. 8th edn. Merck and Co., Inc., USA.

Course Code: MSO 405 Course Title: Avian Medicine (Theory)	Credit Hour: 2.0	Level: 4	Semester: I

Rationale: This course is designed to provide basic concepts of diseases of avian species, their economic effect, control and prevention of diseases in poultry species and role of veterinarians in poultry industries.

Course Learning Outcomes:

- ✓ Introduction to poultry with economic effects of disease and role of Veterinarian in poultry industry
- ✓ Principle of disease prevention and control
- ✓ Studies on the common bacterial, viral, metabolic, protozoal and fungal diseases of parent stock, layer and broiler, duck and geese, pigeons and quail
- ✓ Study on the avian diseases of public health significance

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Discuss about the justification of avian medicine and the economic effects of diseases.	○ Introduction to poultry with economic effects of disease and role of Veterinarian in poultry industry.	Lecture, Discussion and Projector display and Feedback	Quiz test, Term and Final exam
Explain the principles of disease control	○ Source of infection and transmission of avipathogens ○ Biosecurity in poultry farm, ○ General discussion on house and housing, equipments, environment, management of hatchery and hatching eggs, flocks and handling of disease outbreaks, ○ Use of disinfection and vaccination in disease control.	Lecture, Discussion and Projector display and Feedback	Quiz test, Term and Final exam
Estimate the dysfunction with manifestations, diagnosis and treatment of the diseases of different body systems	Systemic diseases and disorders of birds with special emphasis to ○ crop impaction, ○ enteritis, ○ stunt chick disease, ○ round heart disease, ○ bumble foot,	Lecture, Discussion and Projector display and Feedback	Quiz test, Term and Final exam

	○ endocarditis, ○ nephrosis ○ gout, ○ egg bound, internal layer and abnormal eggs		
Evaluate The etiology, epidemiology, principle dysfunction with manifestations, diagnosis, treatment and control of viral diseases in aspect of Bangladesh	○ Avian pox, ○ Ranikhet disease, ○ Infectious bronchitis and Infectious laryngotracheitis, ○ Marek's Disease and Lymphoid leucosis, ○ Egg drop syndrome 76 ○ Infectious bursal disease, Hydropericardium hepatitis syndrome. Duck plague, ○ Duck virus hepatitis ○ Chicken Infectious anaemia.	Lecture, Discussion, Projector display and assignment and Feedback	Quiz test, Term and Final exam
Illustrates the etiology, epidemiology, principle dysfunction with manifestations, diagnosis, treatment and control of bacterial diseases in aspect of Bangladesh	○ avian streptococcosis and staphylococcosis ○ avian salmonellosis and avian colibacillosis, ○ avian cholera and infectious coryza ○ avian clostridiosis and botulism ○ necrotic enteritis and ulcerative enteritis, ○ avian mycoplasmosis and infectious synovitis, ○ gangrenous dermatitis, ○ avian tuberculosis and avian listeriosis ○ anatipestifer infection and pseudomonas infection, ○ haemophilous catarrh, ○ avian chlamydiasis	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Investigate the important parasitic diseases of poultry with their effect on poultry and economy	○ Important Nematode, cestode and trematode infections with their treatment and control in domestic species of poultry ○ Effect and therapeutic measurement of avian coccidiosis,	Lecture, Discussion, Projector display and Feed Back.	Quiz test, Term and Final exam

	○ Histomoniasis, Trichomoniasis, Leucocytozoonosis and Avian malaria, ○ Haemoproteus infections, ○ Important external parasitic infestations and method of treatment in avian species.		
Detect the metabolic and nutritional deficiency diseases of poultry and their managements	○ Ascites and oedema, ○ heat stress or fatty liver hemorrhagic syndrom ○ Protein, Carbohydrate, Fat Vitamin (A, D, E, B1, B2 and vit K) and Mineral (specially calcium and phosphorus) deficiency diseases. ○ Gout and Rickets	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Categorize the fugal and fungal oriented diseases of poultry, different types of poisonings and intoxications in poultry	○ aspergillosis, ○ candidiasis and favus ○ Mycotoxicosis ○ Commonly occurred different types of chemical, insecticidal and herbicidal poisoning in poultry	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Identify miscellaneous diseases commonly occurred in poultry and hatchery.	○ ammonia and poultry welfare, ○ cannibalism, ○ egg eating. ○ hatchery and egg borne diseases.	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam
Assess the avian diseases of public health significance.	○ Zoonotically important diseases of poultry species, route of infection, method of transmission and important clinical signs in human. ○ Prevention methods and precautions of zoonosis from avian species	Lecture, Discussion, Projector display and Feed Back	Quiz test, Term and Final exam

Books Recommended

1. Calnek, B.W. (1997). *Diseases of Poultry*. 10th edn., Iowa State University Press, Ames, Iowa, USA.
2. Hoefer, H.L. (1997). *Practical Avian Medicine*. Veterinary Learning System, USA.
3. Jordan. F.T.W and Pattison, M. (2000). *Poultry Diseases*. 5th edn., Bailliere Tindall, London.

4. Rosskepf, W.J. and Woerpel, R. (1996). *Diseases of Cage and Aviary Birds*. Woerpel, Williams and Wilkins, USA.
5. Samad, M. A. (2005). *Poultry Science and Medicine*. 1st edn., LEP publication. BAU campus.
6. Singh, H. and Moore, E.N. (1993). *Livestock and Poultry Production*. 2nd edn. Prentice-Hall of India Private Ltd., New Delhi.
7. Samad, M. A. (2008). Poultry Production. LEP publication.

Course Code: MSO 406 **Course Title: Avian Medicine (Practical)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: I**
Rationale: This course is designed to provide practical knowledge on the diagnosis, treatment and control of diseases of avian species.			
Course Learning Outcomes: • Practical introduction to poultry disease, risk factors of diseases and their methods of management • Principle of disease prevention and control by following biosecurity and vaccination • Studies on the methods of restraining of poultry for drug administration, blood and other specimen collection			
Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Categorized the risk factors of avian diseases and their management	• Practical introduction of poultry farms and farm equipments and flock management. • Risk factors of diseases and their methods of management.	Lecture, Discussion and Assignments, Demonstration Projector display.	Quiz test, Term and Final exam
Analyze the practical knowledge on	• Methods of restraining	Lecture,	Quiz test,

restraining of different species of birds	and handling of different species of poultry for collection of blood and other specimens and • Methods of administration of drugs and vaccines in individual bird.	Discussion, Demonstration and Projector display.	Term and Final exam
Construct the method of diagnosis of diseases emphasizing epidemiology, clinical signs and postmortem	• Methods of diagnosis of diseases of birds in the clinic and flocks in the poultry farms.	Lecture, Discussion Demonstration and Projector display.	Quiz test, Term and Final examination
Demonstrate and dispense the poultry drugs	• Methods of Demonstration and dispensing of poultry drugs and their uses, doses, route of administration, duration of treatment and adverse drug reactions on health and production.	Lecture, Discussion, demonstration and Projector display.	Quiz test, Term and Final examination
Judge the available vaccines and methods of vaccination in aspect of Bangladesh	• Practical demonstration of available poultry vaccines and their uses, doses rout of administration, advantages and disadvantages, duration of immunity and vaccination failure under field and farm condition.	Lecture, Discussion and Projector display, assignment	Quiz test, Term and Final exam
Develop the prescription writing and clinical case record	• Recording of clinical cases and/or outbreaks of diseases in poultry flocks with their prescription writing, post treatment evaluation and interpretation.	Lecture, Discussion and Projector display.	Quiz test, Term and Final exam
Assemble the knowledge on field condition of different poultry farms	• Field trips to some public and private poultry farms and	Visit on different poultry farm, Assignment	Oral presentation, Assignments

	backyard poultry rearing unit for practical classes.		

Books Recommended

1. Calnek, B.W. (1997). *Diseases of Poultry*. 10th edn., Iowa State University Press, Ames, Iowa, USA.
2. Hoefer, H.L. (1997). *Practical Avian Medicine*. Veterinary Learning System, USA.
3. Jordan. F.T.W and Pattison, M. (2000). *Poultry Diseases*. 5th edn., Bailliere Tindall, London.
4. Rosskepf, W.J. and Woerpel, R. (1996). *Diseases of Cage and Aviary Birds*. Woerpel, Williams and Wilkins, USA.
5. Samad, M. A. (2005). *Poultry Science and Medicine*. 1st edn., LEP publication. BAU campus.
6. Singh, H. and Moore, E.N. (1993). *Livestock and Poultry Production*. 2nd edn. Prentice-Hall of India Private Ltd., New Delhi.
7. Samad, M. A. (2008). Poultry Production. LEP publication.

Course Code: MSO 407 Course Title General Surgery (Theory)	Credit Hour: 2.0	Level: 4	Semester: I

Rationale: This course is oriented to provide students applied knowledge on General Surgery. The purpose is to apply knowledge on diagnosis and surgical correction of various affection of farm animal.

Course Learning Outcomes:

- Acquiring knowledge on how to make surgical intervention for different surgical affections.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Describe the general knowledge of Surgery	Introduction, definition of common surgical terms and methods of therapy.	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Illustrate the principles of surgery	Preoperative consideration of animals, inflammation, suppuration and abscess formation, affections of uropygial gland in bird. Contusions, fibrosis and sclerosis, wounds, classification, characterization and treatment of wounds, healing of wounds, complications of wound healing, ulceration, necrosis, gangrene, sinus, fistula, cysts, tumors, hematoma, lymphangitis, edema, emphysema, physical lesions, affections of joints, fractures and repair of bones, complication of fractures, yoke gall, hemorrhage and homeostasis, burns and scalds, frost bite, shock and its management, cryosurgery, paracentasis, asepsis and antisepsis.		
Analyze Surgical affections of tissues	Etiology, classification, symptoms, diagnosis, prognosis	Lecture Discussion	Q/A Quiz Test

	and treatment of skin and subcutaneous connective tissues, arteries, veins, lymphatics, nerves.	Projector Display	(TF, FB, Short) Midterm exam. Essay Assignment
Investigate Surgical affections causing lameness	Definition, classification, etiology, clinical signs, diagnosis, prognosis and treatment of different affection causing lameness	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Predict on fluid therapy	Indications, different types of fluid used, assessment of fluid deficit, administration of fluids, electrolyte of blood and blood plasma.	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment

Books Recommended:

1. O'Connor, J.J. 1980. Dollar's Veterinary Surgery. 1st edn. CBS Publisher and Distributors, New Delhi.
2. Adams, O. R. 1974. Lameness in Horses. 3rd edn.
3. Paul R. Greenbush. 1972. Lameness in Cattle.
4. Slatter. D. H. 1985. Textbook of Small Animal Surgery. Vol I and II W. B. Saunders Company, Philadelphia.
5. Micheal Bynaher, Clarke and Waterman. 1985. Veterinary Fluid Therapy. Black well scientific publication, London.
6. Ruminant Surgery, 1996. Tyagi, R. P. S. and Singh, J. 1st edn, CBS Publisher and Distributors, Delhi.

Course Code: MSO 408 **Course Title: General Surgery (Practical)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: I**
Rationale: This course is oriented to provide student's practical knowledge on Farm Animal Surgery. The purpose is to apply knowledge on diagnosis and surgical of correction various affection of farm animal.			
Course Learning Outcomes: ➢ Acquiring knowledge on how to make surgical intervention for different surgical affections.			
Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Investigate common surgical cases in VTH	Clinical practice of surgical cases at Veterinary Teaching hospital (VTH)		
Applied knowledge of general considerations for surgery	Proficiency in operative surgery, clinical examination of the patient, surgical anatomy, preparation of patient, restraint of animals, identification and sterilization of instruments, dressing, bandaging, sutures and suture materials, different types of knots, operative technique, hemostasis, practice of fluid therapy and blood transfusions.	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Evaluate common surgical condition.	Passing of stomach tube, probing and catheter in domestic animals, nerve blocking, and parenteral injection of drugs, sera and vaccines, diagnosis of lameness, common minor operations in domestic animals, and parenthesis abdominis in bovine.		

Books Recommended:

1. O'Connor, J.J. 1980. Dollar's Veterinary Surgery. 1st edn. CBS Publisher and Distributors, New Delhi.
2. Adams, O. R. 1974. Lameness in Horses. 3rd edn.
3. Paul R. Greenbush. 1972. Lameness in Cattle.
4. Slatter. D. H. 1985. Textbook of Small Animal Surgery. Vol I and II W. B. Saunders Company, Philadelphia.
5. Micheal Bynaher, Clarke and Waterman. 1985. Veterinary Fluid Therapy. Black well Scientific publication, London.

References:

1. Course curricula of Department of Veterinary Husbandry, Rajshahi University.
2. Course curricula of Faculty of Veterinary and Animal Science, Chittagong Veterinary and Animal Science University, Chittagong.
3. Course curricula of Dinajpur Government Veterinary College.

Course Code: MSO 409 **Course Title: Anesthesiology (Theory)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: I**
Rationale: This course is oriented to provide students applied knowledge on anesthesiology. The purpose is to apply knowledge on diagnosis and surgical correction of various affection of farm animal.			
Course Learning Outcomes: ➢ Acquiring knowledge on how to make surgical intervention for different surgical affections.			

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Define general concept on anesthesiology	Definition of common terms, general consideration for anaesthesia, Classification of anaesthesia and anaesthetics, mode of action of anaesthetics, stages of anaeasthesia.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Assignment
Detect Principles of sedation and premeditation	Indication, agents used and their doses in different species.		
Select muscle relaxants	Drugs used and their doses in various species.		
Apply general anaesthesia in animals	Agents of general anaesthesia, conditions and procedures for general anaesthesia in different animals		
Compare Local and regional analgesia	Topical analgesia, field block, paravertebral, epidural, cornual, auriculopalpebral, supra-orbital, mandibular, infra-orbital, planter, perineal, pudic nerve block,		

Course Code: MSO 410 Course Title: Anesthesiology (Practical)	Credit Hour: 1.0	Level: 4	Semester: I

Rationale: This course is oriented to provide student's practical knowledge on anesthesiology. The purpose is to apply knowledge on diagnosis and surgical correction of various affections of animals.

Course Learning Outcomes:

- Acquiring applied knowledge on how to perform anaesthesia for surgical intervention of different surgical affections.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Develop knowledge on Pre-anesthetic examination	Preanaesthetic examination and preparations of the animal. Orientation with different anaesthetics and devices used for administration of anaesthetics.	Lecture Discussion Practical demonctration	Quiz Test, Term and Final exam, Short essay, Assignment
Discuss about general considerations for anaesthesia	Demonstration of local, regional and general anesthesia in various species.	Lecture Discussion Practical demonstration	Quiz Test, Term and Final exam, Short essay, Assignment
Measure to mitigate anesthetic hazards	Various anaesthetic hazards and their management		

Book Recommended:

1. Veterinary Anaesthesia, 1991. Hall. L. W. and Clark, K. W. 9thedn. Bailliere Tindall, London.
2. Drugs in Anaesthetic Practice. 1984. Vickers, M.D., Schnieden, H. and Wood-Smith, F.G., Butterworths, London.
3. General Anesthesia. 1989. Nunn J. F., an Brown B. R.. 5th edn, Butterworths, London.
4. The practice of Small Animal Anaesthesia. 1984. Sawyer, W. B. Saunders Company, London.
5. Wright's Veterinary Anaesthesia and Analgesia. 1978. Hall, L. W., ELBS and Bailliere Tindall, London.
6. Text book of Veterinary Anesthesia. 1971, Soma L. R., The Williams &wilkins Company, Balt.
7.

Course Code: MSO 411 **Course Title: Zoo and Wild Animal Medicine (Theory)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: II**
Rationale: This course is designed to provide basic concepts of diseases of zoo and wild animal. Prevention, control of diseases in zoo and wild animal and role of veterinarians in disease management.			
Course Learning Outcomes: • Clinical examination of zoo and wild animals for the diagnosis of diseases • Treatment and management of diseases in zoo and wild animals .			

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Categorize zoo and wild animal	Definition of zoo animal, wild life, zoological medicine, scopes and importance of zoo animal medicine.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Justify the wild life conservation and biodiversity	Definition and importance of wild life conservation, Major threats to wild life, wild life of Bangladesh, habitat and requirements of wildlife and biodiversity.	Lecture Discussion Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Assess the conservation status.	Conservation status and list of some mammals of Bangladesh.	Lecture Projector Display Discussion and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Describe zoo	Definition, purposes of zoo, Classification of zoo and laboratory Animals, Zoochosis: Abnormal and Stereotypic behavior in Captive Animals, Different sections of zoo. Requirements of healthy zoo.	Lecture Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Illustrate feeding, reproduction and medication of zoo animal	Principles of Zoo mammal nutrition, Reproductive behavior of captive animals, Medication of some zoo animals	Lecture Projector Display and Feedback	Quiz Test, Term and Final exam, Short Essay, Assignment
Distinguish different order of zoological medicine	Reptilia, carnivora, Lagomorpha, primates,	Lecture Projector	Quiz Test, Term and Final

	Mersupials, Chiroptera Artiodactyls.	Display and Feedback	exam, Short Essay, Assignment

Book Recommended:

- Zoo and Wild Animal Medicine 1986 M.L.Fowler, 2nd Edn.W.B.Saunders Company Philadelphia
- Cage Bird Medicine - C. V. Steiner and R.B. Davis, Iowa State University press/Ames, Iowa
- Companion Bird Medicine 1987 L.W. Burr, Iowa State University press/Ames.
- Clinical Laboratory Animal Medicine 1988, DRI lohnes, lowa State University press, Ames, Iowa.
- Wildlife Conservation Trust. Training Manual. International Training Centre (ITC). New Jersey. UK. 2001.
- Gain, P. 1998. Bangladesh Environment, Facing the 21st Century. Society for Environment and Human Development (SEHD) Dhaka, Bangladesh.
- IUCN Bangladesh. Red list of Threatened Animals of Bangladesh. IUCN-The World Conservation Union. 2000.
- IUCN Bangladesh. The Bangladesh Sundarbans: A Photo real sojourn. IUCN Bangladesh Country Office. Dhaka, Bangladesh. 2001.

Course Code: MSO 412 **Course Title: Zoo and Wild Animal Medicine (Practical)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: II**

Rationale: This course is oriented to provide students applied knowledge on zoo and wild medicine. This purpose is to apply the practical knowledge on disease diagnosis and its treatment, prevention, control and advice.

Course Learning Outcomes:

- Obtaining practical knowledge on zoo and wild animal disease.
- Acquiring practical knowledge on how to make prescription for different disease.
- Giving practical knowledge on animal restraining and different diagnostic procedure clinically.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Represent zoo, laboratory animals and birds	Identification of different species of zoo animals, birds and laboratory animals.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Formulate restraining of zoo and wild animals	Restraining and handling of zoo and wild animals, birds and laboratory animals.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Design animal handling, feeding and management of zoo animals	Introduction to zoo education: Visitors survey, Animal talk, Workshop, Training etc. Visiting of students to Dhaka zoo for demonstration of feeding, reproduction, record keeping, disease control and management of zoo administration	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Draw the procedure of prescription writing	Recording of clinical cases of zoo animals and their prescription writing, post-treatment evaluation and interpretation.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Demonstrate practical knowledge from field.	Visiting of madhupurforest, Gazipur forest, Sundarban forest and to demonstrate natural habitats of wild animals and birds.	Demonstration and Discussion	Oral Presentation, Assignment

	Planning and management of small zoo and laboratory units.		

Book Recommended:

1. Zoo and Wild Animal Medicine 1986 M.L.Fowler, 2nd Edn.W.B.Saunders Company Philadelphia
2. Cage Bird Medicine - C. V. Steiner and R.B. Davis, Iowa State University press/Ames, Iowa
3. Companion Bird Medicine 1987 L.W. Burr, Iowa State University press/Ames.
4. Clinical Laboratory Animal Medicine 1988, DRI lohnes, lowa State University press, Ames, Iowa.
5. Wildlife Conservation Trust. Training Manual. International Training Centre (ITC). New Jersey. UK. 2001.
6. Gain, P. 1998. Bangladesh Environment, Facing the 21st Century. Society for Environment and Human Development (SEHD) Dhaka, Bangladesh.
7. IUCN Bangladesh. Red list of Threatened Animals of Bangladesh. IUCN-The World Conservation Union. 2000.
8. IUCN Bangladesh. The Bangladesh Sundarbans: A Photo real sojourn. IUCN Bangladesh Country Office. Dhaka, Bangladesh. 2001.

Course Code: MSO 413 **Course Title: Metabolic Diseases (Theory)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: II**

Rationale: This course is designed to provide basic knowledge on the metabolic and nutritional deficiency diseases of cattle, buffalo, sheep, goat, horse and pig and their effect on production.

Course Learning Outcomes:

- To know the importance of metabolic and nutritional deficiency diseases on livestock and poultry.
- To earn knowledge on the diseases associated with disturbances of metabolism in animals and birds
- To know the effect of metabolic diseases on health and production of animals.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Justify importance of metabolic	Importance of metabolic and nutritional deficiency diseases in livestock and poultry.	Lecture, Discussion and Feed Back	Quiz test, Term and Final exam
Discuss on diseases associated with disturbances, of metabolism in animals and birds and their effect on health and production	• Ketosis, • Diabeties, • Pregnancy toxaemia, • Azoturia,	Lecture, Discussion and Feed Back	Quiz test, Term and Final exam

	• Neonatal hypoglycemia, • Milk fever, • Downer'scow syndrome. • Transit recombency of ruminants, • Lactation tetany and hypomagnesemic tetany of calves • Post parturient hemogloninuria, • Ricket, osteomalacia and gout		
Interpret diseases associated with nutritional deficiencies in animals and birds.	• Deficiency of energy and proteins • Deficiency of mineral coblt copper iron iodine molybdenum sodium chloride management zine manganese potassium sclenium and vitamin E. calcium phosphorus. • Deficiency of vitamins A. D. K. and B complex vitamins.	Lecture, Discussion and Projector display.	Quiz test, Term and Final examination
Assess the diseases caused by chemical agents in animals and birds	Lead, arsenic, selemium, phosphorus, mercury, fluorine, molybdenum, copper sodium chloride, zine, sulfur, cadmium, hydrocyanic acid, nitrate and nitric, oxalate, strychnine, anthelmintics, insecticides, organophosphates and carbamates, chlorpyrifos, rotenone, urea, rodenticides, feed additives, mycotoxicosis, venom, blister, beetles, tick paralysis.	Lecture, Discussion and Feed Back	Quiz test, Term and Final examination
Estimate effect of diseases caused by hypersensitivity reactions	• Autoimmune hemolytic anemia, • purpurae hemorrhagica, • laminitis, • Allergic dermatitis. • Milk allergy, • Bovine atopic rhinitis.	Lecture, Discussion and Feed Back	Quiz test, Term and Final exam
Verify common diseases caused by inheritance of undesirable characters	• Chromosomal anomalies, • Metabolic defects, • Inherited diseases of the different system and organs	Lecture, Discussion and Feed Back	Quiz test, Term and Final exam

Books Recommended:

1. Veterinary Medicine 2007, O.M. Radostits, D.CBlood and C.C.Gay, ELBS, Bailliere Tindal London.
2. Diseases of Livestocks 1996, T.G/ Hungerford, McGraw-Hill Book Company, U.K.
3. The Merck Veterinary Manual 1998-S.E Aiello and A.Mays, Merck and Co., Inc. White House Station, N.J., USA.
4. Veterinary Gastroenterology 1992 by N.V. Anderson, Lea and Febiger, London.
5. The Practice of Veterinary Medicine, 1985. D.H.Uddal, Pub. The Author, Ithaca, Newyork.
6. Current Veterinary Therapy 3 Food Animal Practice 1986, J.L.Howard, W.B. Saunders Company, Philadelphia.

Course Code: MSO 415 Course Title: Preventive Medicine (Theory)	Credit Hour: 2.0	Level: 4	Semester: II

Rationale: This course is designed to provide basic knowledge on prevention of diseases of cattle, buffalo, sheep, goat, horse, pig and poultry.

Course Learning Outcomes:

- To know the importance of prevention of diseases on livestock and poultry.
- To know the effect of diseases prevention on health and production of animals.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Represent preventive medicine	Definition, Scopes and importance of preventive medicine	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Assignment
Categorize disease, transmission of disease	Classification of disease, Horizontal transmission, Vertical transmission.	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Assignment
Justify the importance of epidemiology in the prevention of disease	Definition and types of epidemiology. Scopes and objectives of epidemiology	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay, Assignment
Differentiate control, Eradication and Elimination	Principles of disease control, Types of prevention, Disease Management, Strategies of disease Management, Stages of eradication campaign, Elimination, Quarantine, Isolation.	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay, Assignment
Evaluate Surveillance and Notification for disease management.	The advantages of a sound reporting system, Integrated Disease Management, Nutritional Aids to Disease Management, Management of exotic disease, Special disease management, Managing anthrax on farm.	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay, Assignment
Formulate methods for control of Zoonosis.	Steps for effectively dealing with zoonotic and food borne disease.	Lecture Discussion	Quiz Test, Term and

		Projector Display and Feed Back	Final exam, Short Essay, Assignment
Discuss about Vaccine and vaccination.	General Instruction for Vaccination, Vaccination failure, Vaccine available for livestock and poultry.	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay, Assignment
Compare disease control	Biological control of diseases, Genetic control of diseases, Control of arthropods on animals,	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay, Assignment
Validate the disinfectant, fumigation	Types of disinfectant, antiseptics, sanitizer, sterilization, germicide, fumigation.	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay, Assignment
Design method of Prevention, control & eradication of economically important diseases	Anthrax, FMD, Tetanus, Haemorrahagic Septicemia (HS), Foot rot, Ephemeral fever, Humpsore.	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay
Explain biosecurity in poultry farm	Definition, The salient features/ areas of concern, Bio-security measures in tropical countries, Stress factor and their influence, Season Vs Managemental requirements.	Lecture Discussion Projector Display and Feed Back	Quiz Test, Term and Final exam, Short Essay

Book Recommended:

1. Veterinary Medicine 2007, O.M. Radostits, D.CBlood and C.C.Gay, ELBS, Bailliere Tindal London.
2. Diseases of Livestocks 1996, T.G/ Hungerford, McGraw-Hill Book Company, U.K.
3. The Merck Veterinary Manual 1998-S.E Aiello and A.Mays, Merck and Co., Inc. White House Station, N.J., USA.
4. Veterinary Gastroenterology 1992 by N.V. Anderson, Lea and Febiger, London.
5. The Practice of Veterinary Medicine, 1985. D.H.Uddal, Pub. The Author, Ithaca, Newyork.
6. Current Veterinary Therapy 3 Food Animal Practice 1986, J.L.Howard, W.B. Saunders Company, Philadelphia

Course Code: MSO 417 **Course Title: Herd Health Management (Theory)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: II**
Rationale: This course is designed to provide basic concept of management of herd and their diseases.			
Course Learning Outcomes: • Development of herd health programme. • To understand the how to manage calf, beef cattle, sheep and swine in their herds.			

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Justify the importance of herd health	Definition, objectives, factors affecting the development of herd health programme, requirements and components and benefit of herd health programme.	Lecture Discussion Projector Display and Feed back	Quiz Test, Term and Final exam, Short Essay, Assignment
Justify management of animal housing, feeding, breeding and culling in aspect of diseases control in herd	Body condition and nutrition, housing, culling practices, maintenance of reproductive efficiency, infectious diseases control, prevention and control strategies, monitoring the frequencies of diseases and other health problems.	Lecture Discussion Projector Display and Feed back	Quiz Test, Term and Final exam, Short Essay, Assignment
Formulate health and production managemental plan in different species of animals	Health management of calves, planned animal health and production in beef cattle breeding herd. Health and production management in beef feedlots, sheep and swine herds	Lecture Discussion Projector Display and Feed back	Quiz Test, Term and Final exam, Short Essay, Assignment

Course Code: MSO 419 Course Title: Gynaecology (Theory)	Credit Hour: 2.0	Level: 4	Semester: II

Rationale: This course is oriented to provide students applied knowledge on Veterinary Gynaecology. The purpose is to apply knowledge on management of female reproduction, breeding and infertility of animals.

Course Learning Outcomes:

- To learn about advances in ovarian, uterine and endocrine functions and effect of nutrition, season and immunological factors on female fertility.
- Acquiring knowledge on how to understand hormonal regulation of female reproduction and therapeutic management of infertility.
- To provide quality teaching for production of well-trained Veterinary Graduates in the field of Animal Reproduction.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Define Gynaecological terms	✓ Definition and common terminology	Lecture, Discussion, Projector Display	Quiz Test, Term and Final exam, Assignment
Generalize knowledge on Female reproduction and endocrinology	✓ Female reproductive systems, reproductive hormones, puberty and sexual maturity, phases of estrus cycle role of hypothalamic-pituitary-gonadal axis in attainment of puberty and sexual maturity, onset of postpartum ovarian activity, Endocrine regulation of estrous cycle. Female for breeding soundness, methods of oestrus detection and intervention on estrus cycle. ✓ Folliculogenesis, oogenesis and ovulation and associated endocrine pattern, manipulation of follicular waves, synchronization of		

	estrus and ovulation and induction of ovarian activity.		
Generalize knowledge on Female reproduction and endocrinology	✓ Gamete transport, fertilization, implantation and maternal recognition of pregnancy. ✓ Embryonic and fetal development, Types and functions of placenta in different species, placentation, fetal circulation and gestation, position of fetus in the uterus, age characteristics of fetus. ✓ Pregnancy diagnosis: clinical, ultrasonographic, endocrinological and other diagnostic laboratory tests. Pseudo-pregnancy and its treatment. Management of pregnant animals.	Lecture, Discussion, Projector Display	Quiz Test, Term and Final exam, Assignment
Categorize the factors affecting reproduction	✓ Seasonality, nutrition, stress, environment, management, suckling and diseases		
Assess and classify female infertility	✓ Introduction to infertility, classification, economic impact. Anatomical, congenital and hereditary causes of infertility and acquired defects. ✓ Nutritional causes of		

	infertility. Importance of body condition score. ✓ Managemental and environmental causes of infertility. ✓ Infectious causes of female infertility, specific and non-specific infections.		
Assess and classify female infertility	✓ Ovarian dysfunction: anoestrus, cystic ovarian degeneration, anovulation, delayed ovulation and luteal insufficiency. ✓ Repeat breeding: its causes, diagnosis and treatment. ✓ Early embryonic death (EED): causes, diagnosis and therapeutic management. ✓ Abortion: infectious and non-infectious causes, diagnosis and prevention of abortion. ✓ Interactions in Immunological mechanisms and infertility.	Lecture, Discussion, Projector Display	Quiz Test, Term and Final exam, Assignment

Book Recommended:

1. Current Therapy in Large Animals Theriogenology, 1997, by R. S. Y. Youngquist, W. B. Saunders Company, Philadelphia.
2. Marshall's Physiology of Reproduction, 1990, 4th edn., by G.E. Lamming, Vol-2, (Reproduction in the male) Churchill Livingstone, London Melbourne and Yew York.
3. Physiology of Reproduction and Artificial Insemination in Cattle, 1978, 2nd edn., W.B. Salisbury, N.I. Vandemark and J.R. Lidge, freeman and Company, Sanfransisco, USA.

4. Reproduction in Domestic Animals, 1991, 4th edn., By P.T. cupps, Academic Press, Inc. California, London.
5. Reproductive in Farm Animals, 2000. By F.S.E. hafex, Lea and Febizer, USA.
6. Reproductive clinical Problems in the Dog, 1988, 2nd edn, D.E. Jones and O. Joshua, Wright, London.
7. Reproductive Pathology of Domestic Mammals, 1990, 1st edn, by Kenneth McEnteem, Academic Press, Inc. San Diego, New York.
8. Veterinary Obstetrics and Genital diseases (Theriogenology) 1998, By S.J. Roberts, 3rd edn, by G.B. Saunders Company, US.
9. Veterinary Reproduction and Obstetrics (Theriogenology) 1998, by G.H. Arthur, D.E. Noakes and II. Pearson 3rd edn, Bailliere Tindal, London, Sydney, Tokyo.

Course Code: MSO 420 **Course Title: Gynaecology (Practical)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: II**

Rationale: This course is oriented to provide student's practical knowledge on Veterinary Gynaecology. The purpose is to apply knowledge on diagnosis, management and treatment of various female reproductive diseases and disorders of animal.

Course Learning Outcomes:

- To impart knowledge in diagnosis and treatment of gynaecological diseases and infertility in female animals.
- To expose student to different clinical approaches of gynaecological cases.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Apply experimental Gyneacology	▪ Study of Female Genitalia in Slaughter House Specimens ▪ Comparative Anatomy of reproductive Tracts ▪ Detection of Oestrus by Vaginal Cytology ▪ Gynaecological Examination of Vagina ▪ Technique of Intra-uterine Therapy ▪ Collection of Genital Discharge ▪ Examination of Cervico Vaginal Mucus Sample ▪ Practical introduction of	Lecture, Discussion, Practical demonstration	Quiz Test, Term and Final exam, Oral, clinical and practical examination, Assignment, presentation

	Hormonal Drugs Acting on the Reproductive System		
Investigate Problem based competence in veterinary clinics	Clinical examination of female genitalia. Biometry of female genital organs. Rectal and vaginal examination to diagnose cyclic phases of estrous cycle. Fern pattern of cervical mucus and exfoliated vaginal cytology.		
Investigate Problem based competence in veterinary clinics	Pregnancy diagnosis in large and small animals by various methods. Estimation of age of the fetus. Use of ultrasound / RIA / ELISA in Gyneacology. Synchronization of estrus and ovulation in farm animals. Record keeping, herd fertility assessment and management, diagnosis and treatment of infertility in female animals, use of uterine swabs for bacterial and fungal culture, histo-pathological evaluation of uterine biopsy, hormone assay. Use of ultrasonography in diagnosis of infertility. Immuno diagnostic techniques.	Lecture, Discussion, Practical demonstration	Quiz Test, Term and Final exam, Oral, clinical and practical examination, Assignment, Presentation

Book Recommended:

1. Current therapy in large Animal Theriogenology, 1997, by R.S.Y. Youngquist, W.B. Saunders Companry, Philadelphia.
2. Marshall's Physiology of Reproduction, 1990, 4th edn., by G.E. Lamming, Vol-2, (Reproduction in the Mlae) Churchill Livingstone, London Melboruyrne and New York.
3. Physiology of Reproduction nad Artifical Insemination in Cattle, 1978, 2nd edn., W.B. Salisbury, N.I. Vandemark and J.R. Ledge, Freeman and Company, Sanfransisco, USA.
4. Reproduction in Domestic Animals, 1991, 4th edn,, By P.T. Cupps, Academic Press, Inc. California London.
5. Reproduction in Farm Animals, 2000. By F.S.E. Hafex, Lea and Febizer, USA.
6. Reproductive Clinical Problems in the Dog, 1988, 2nd D. E. Jones and J. O. Joshua, Wright, London.
7. Reproductive Pathology of Domestic Mammals, 1990, 1st edn, by Kenneth McEntemm, Academic Press, Inc. San Diego, New York.
8. Veterinary Obstetrics and Genital Diseases (Theriogenolgy) 1986, b S.J. Roberts, 3rd edn, by G.B. Saunders Company, US.
9. Veterinary Reproduction and Obstetrics (Theeriogenolgy) 1998, by G.H. Arthur, D.E. Noakes and II. Pearson 3rd edn, Bailliere Tindal, London, Tokuyo.

Course Code: MSO 421 **Course Title: Small Animal Surgery (Theory)**	**Credit Hour: 2.0**	**Level: 4**	**Semester: II**

Rationale: This course is oriented to provide students applied knowledge on Small animal Surgery. The purpose is to apply knowledge on diagnosis and surgical correction of various affection of small animal.

Course Learning Outcomes:

- Obtaining knowledge on Small animal Surgery
- Acquiring knowledge on how to make prescription for different surgical affections.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Introduction	Definition and common terminology	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Discriminate knowledge on Ophthalmic and aural surgery	Examination of the eye and ear and their surgical affections		
Discuss dental surgery	Parrot mouth, pig mouth, sharp mouth, dental tarter, dental carries, pyorrhea, dental fistula, dentigerous cysts, extraction of teeth, dental abscess, epulis.		
Assess information about gastrointestinal surgery	Salivary mucocele, sialoliths, chocking, gastro-oesophageal reflux, haematemesis, foreignbody. oesophageal stricture, Gastric dilation-torsion syndrome, delayed gastric emptying, traumatic gastritis, intussusceptions, strangulation, mega colon, intestinal anastomosis, anal sac disease. cholelithiasis, peritonitis. various hernias etc.		
Generalize concept on Urogenital surgery:	Pyelonephritis, hydronephrosis, obstruction of urethra, feline urologic syndrome, urolithiasis, Prevention of canine and feline uroliths. retention of urine, urinary fistula, surgical affections of the penis and prepuce, persistent frenulum, hypospadiasis, cryptorchidism, fracture of the ospenis. castration, scrotal abrasion, canine venereal granuloma. hyperplasia of the		

	prostate gland, spaying, neoplasm and other diseases.		

Book Recommended:

1. O'Connor. J.J. 1980. Dollar's Veterinary Surgery. 4th edn, CBS Publisher and Distributors, New Delhi.
2. Slatter, D.H. 1985. Text Book of Small Animal Surgery. Vol-I and II. W./ B., Saunders Company, Philadelphia.
3. MichealBynaher. Clarke and Waterman. 1985. Veterinary Fluid Therapy. Hlackwell Scientific Publication, London.
4. Venugopalan. A. 1993. Essentials of Veterinary Surgery. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
5. Gelatt, K.N. 1991. Veterinary Ophthalmology. 2nd edn. Lea and Febiger, Philadelphia, London.
6. Alexander, J.W. 1985. Leonard's Orthopedic Surgery of the Dog and Cat. W. B/ Saunders Company, Philadelphia, London.

Course Code: MSO 422 **Course Title: Small Animal Surgery (Practical)**	**Credit Hour: 1.0**	**Level: 4**	**Semester: II**
Rationale: This course is oriented to provide students applied knowledge on Small animal Surgery. The purpose is to apply knowledge on diagnosis and surgical correction of various affection of small animal.			
Course Learning Outcomes: ✓ Acquiring knowledge on how to make surgical intervention for different surgical affections in small animals.			
Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Define terminology regarding to small animal surgery	Definition and common terminology	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short essay, Assignment
Investigate common surgical cases in VTH	Clinical practice of surgical cases at Veterinary Teaching Hospital (VTH).		
Planning applied knowledge of Anaesthesia	Anaesthesia and analgesia related to specific operations		

Assess Knowledge of Surgery of small Animals	Anaesthesia and analgesia related to specific operation, Amputation of tail, digit, dewclaw, ventriculocordectomy (debarking), tracheotomy, oesophagotomy, antireflux surgery, gastrotomy, enterotomy, enterectomy, intestinal anastomoses, typhlectomy, colopexy. spleenectomy, cholecystectomy, entropion and ectropion operation, enucleatoin of eyeball, abscess, urethrotomy, castration, vasectomy, cystotomy. amputation of penis, nephrectomy. aural rejection.		

Book Recommended:

1. O'Connor, J.J. 1980. Dollar's Veterinary Surgery. 4th edn, CBS Publisher and Distributors, New Delhi.
2. Slatter, D.H. 1985. Text Book of Small Animal Surgery. Vol-I and II. W.I B., Saunders Company, Philadelphia.
3. MichealBynaher. Clarke and Waterman. 1985. Veterinary Fluid Therapy. Hlackwell Scientific Publication, London.
4. Venugopalan, A. 1993, Essentials of Veterinary Surgery. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
5. Gelatt, K.N. 1991. Veterinary Ophthalmology. 2'' edn. Lea and Febiger, Philadelphia, London.
6. Alexander, J.W. 1985. Leonard's Orthopedic Surgery of the Dog and Cat. W. B! Saunders Company, Philadelphia, London.

Course Code: MSO 501 **Course Title: Farm animal Surgery (Theory)**	**Credit Hour: 2.0**	**Level: 5**	**Semester: I**

Rationale: This course is oriented to provide students applied knowledge on Farm animal Surgery. The purpose is to apply knowledge on diagnosis and surgical correction of various affections of farm animals.

Course Learning Outcomes:

- Obtaining practical knowledge on farm animal Surgery
- Acquiring knowledge on how to make prescription for different surgical affections.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Introduction	**Definition and common terms**		
Generalize concept of Ophthalmic surgery	Examination of eye, ectropion, entropion, ocular foreign keratitis, keratocele, keratoconjunctivitis, corneal opacity, Periodic Ophthalmia, uveitis, cataract, glaucoma, hydropthalmia, panophthalmia, parasite in the eye, dermoid cyst, enucleation of eyeball	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short essay, Assignment
Assemble Respiratory affections	Epistaxis, foreign bodies and parasites in the nostrils, retropharyngeal abscess, roaring.		
Discriminate knowledge on Gastrointestinal surgery	Ranula, chocking, esophageal stricture and diverticulum, surgical approaches to the abdomen, foreign bodies in the stomach, bloat, impaction, crop impaction inbirds, traumatic reticuloperitonitis, abomasal displacement and torsion, intestinal obstruction, intussusceptions, volvulus, rectal prolapse, atresia coli, atresia recti, atresia ani, other surgical diseases of abdomen and various hernias.		
Discuss about Urogenital surgery	Pyelonephritis, hydronephrosis, obstruction of urethra, urolithiasis, various types of calculi, rupture of the		

	bladder and urethra, retention of urine, urinary fistula, surgical affections of the penis and prepuce. phymosis, paraphirnosis and posthitis. caponization and other diseases.		
Illustrate udder and teat surgery	Supranumerary teats, imperforate teats, fissure of teats, obstruction in the teat, duct, fistula, papilloma, abscess and diseases.		
Categorize miscellaneous affections	Hydrocephalus, empyema of sinus, sinusitis, disbudding and dehorning, actinomycosis, cleft palate. contracted tendon. sinus affections. neoplasm and their modern therapy.Fistula withers, poll evil, humpsore, yoke gall, fracture of the horn.		

Book Recommended:

1. O'conner, J. J. 1980. Dollars Veterinary Surgery. 4th edition CBS Publisher and Distributors, New Delhi.
2. Oeheme, D. W. 1988. Textbook of Large Animal Surgery. 2 edition. Williams & Wilkins, Baltimore, USA.
3. Slatter, D. H. 1985. Textbook of Small Animal Surgery. Vol- 1 &2 . W.B. Saunders Company, Philadelphia.
4. Paul and Jennings. 1984. The Practice of Large Animal Surgery. W. B. Saunders Company, Philadelphia, London.

Course Code: MSO 502 **Course Title: Farm animal Surgery (Practical)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**

Rationale: This course is oriented to provide student's practical knowledge on Farm Animal Surgery. The purpose is to apply knowledge on diagnosis and surgical correction of various affection of farm animal.

Course Learning Outcomes:

- Acquiring knowledge on how to make surgical intervention for different surgical affections in farm animals.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Investigate common surgical cases in VTH	Clinical practice of surgical cases at Veterinary Teaching Hospital		
Applied knowledge of Anaesthesia	Anaesthesia and analgesia related to specific operations	Lecture Discussion Practical demonctration	Quiz Test, Term and Final exam, Short Essay, Assignment
Support correction of common surgical condition	Amputation of tail, digit, limb, trephining of sinus, tracheotomy, oesophagotomy, entropion and ectropion operation, enucleation of eyeball, abscess, castration and caponization, urethrotomy, oesophagotomy, ligation of Stenson's ducts, opening of guttural pouch, roaring operation, penile deviation, vasectomy, cystotomy, amputation of penis, Caslick's operation, episiotomy, gastrotomy, rumenotomy, enterotomy, enterectomy, intestinal anastomoses, splenectomy, nephrectomy.		

Book Recommended:

1. O'conner, J. J. 1980. Dollars Veterinary Surgery. 4th edition. CBS Publisher and Distributors, New Delhi.
2. Oeheme, D. W. 1988. Textbook of Large Animal Surgery. 2nd edition. Williams & Wilkins, Baltimore, USA.

3. Slatter, D. H. 1985. Textbook of Small Animal Surgery. Vol- 1 & 2. W. B. Saunders Company, Philadelphia.
4. Paul and Jennings. 1984. The Practice of Large Animal Surgery. W. B. Saunders Company, Philadelphia, London.

Course Code: MSO 503 **Course Title: Radiology and Imaging (Theory)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**
Rationale: To acquire proper knowledge on various aspects of Radiology and Imaging techniques.			
Course Learning Outcomes: ➢ To know about radiology and imaging technique. ➢ To understand different types of imaging technique. ➢ To be familiar with how performed radiography. ➢ To learn how to use radiography for diagnosis and treatment of diseases. ➢ To know how to assess their level of learning. ➢ To achieve knowledge on principles of action of MRI, CT Scan, PET scan, angiography.			
Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Generalize knowledge of Radiology and Imaging	➢ Definition and common terms	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Describe Radiation	➢ Radioactivity, Radiation and its classification ➢ X-ray and Properties of X-ray ➢ Quality of radiograph ➢ Scattered radiation ➢ Production of X-ray ➢ Radiation hazards and safety		
Assemble X-Ray machine	➢ X-ray machine ➢ X-ray accessories ➢ Faction of different important X-ray machine parts. ➢ Exposure factors		
Analyze Radiography	➢ Taking of radiograph ➢ Exposure factors ➢ Positioning of animals		
Classify Contrast media	Contrast media and classification Mode of action of contrast media.		

	Contrast media for different body systems		
Plan Processing of X-ray film	X-ray dark room Processing of X-ray films Radiographic artifacts Interpretation of radiograph Radiation hazards and safety		
Investigate Imaging technique	a) Diagnostic radiography and fluoroscopy b) Principles of endoscopy and ultrasound techniques d) MRI, CT scan, Tomography, Angiography		
Illustrate Nuclear Medicine	Scope of nuclear medicine. Radio diagnosis and radiotherapy in veterinary practices. PET scan Isotope scan		

Book Recommended:

1. Doughlas, SW and Williamson. H.D. 1980. Principles of Veterinary Radiography. 3rd end. Bailliere Tindall. London.
2. Gillette, E.L. Thrall, D.E and lebel, J.L. 1977. Carlson's Veterinary Radiology. 3rd end. Lea and Febiger, Philadelphia.
3. Oeheme, D. W. 1988. Textbook of Large Animal Surgery. 2nd edition. Williams and Wilkins, Baltimore, USA.
4. Slattr, D.H. 1985. Textbook of Small Animal Surgery. Vol-1 and 2 W.B. Sunders Company, Philadelphia.
5. Paul and Jennings. 1984. The practice of Large Animal Surgery. W. B. Saunders Company Philadelphia. London.

Course Code: MSO 504 **Course Title: Radiology and Imaging (Practical)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**
Rationale: To acquire proper knowledge on various aspects of Radiology and Imaging techniques.			
Course Learning Outcomes: ✓ To know about radiology and imaging technique.			

- ✓ To understand different types of imaging technique.
- ✓ To be familiar with how performed radiography.
- ✓ To learn how to use radiography for diagnosis and treatment of diseases.
- ✓ To know how to assess their level of learning.
- ✓ To achieve knowledge on principles of action of MRI, CT Scan, PET scan, angiography.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Discuss with Radiographic equipment's and accessories	➢ X-ray machine ➢ X-ray accessories ➢ Function of different importantX-ray machine parts.	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Plan of taking radiograph	Preparation of animals for taking radiograph Estimation of machine factors and patient factors Uses of different contrast media for taking radiograph Taking radiograph	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Outline the processing of X-ray film	X-ray dark room	Processing of X-ray films	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Evaluate the radiograph	Interpretation of radiographic sign		Assignment

Book Recommended:

1. Doughlas, SW and Williamson. H.D. 1980. Principles of Veterinary Radiography. 3rd end. Bailliere Tindall. London.
2. Gillette, E.L. Thrall, D.E and lebel, J.L. 1977. Carlson's Veterinary Radiology. 3rd end. Lea and Febiger, Philadelphia.
3. Oeheme, D. W. 1988. Textbook of Large Animal Surgery. 2nd edition. Williams and Wilkins, Baltimore, USA.
4. Slattr, D.H. 1985. Textbook of Small Animal Surgery. Vol-1 and 2 W.B. Sunders Company, Philadelphia.
5. Paul and Jennings. 1984. The practice of Large Animal Surgery. W. B. Saunders Company Philadelphia. London.

Course Code: MSO 505 Course Title: Jurisprudence and Ethics (Theory)	Credit Hour: 1.0	Level: 5	Semester: I

Rationale: This course is designed to provide basic knowledge on the ethics, law and legal system related with the veterinary profession.

Course Learning Outcomes:

- Study on the Legislation against animal diseases
- To acquire knowledge on Veterinary and law (The legal system)
- To know the common frauds in selling of livestock and livestock products
- To know the ethics of a registered veterinarian

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Generalize knowledge on jurisprudence and forensic medicine	• Introduction of veterinary forensic medicine and jurisprudence • Aims, scopes, uses and branches of forensic medicine. • Difference between forensic medicine and jurisprudence.	Lecture, Discussion, Project Display and Feed Back	Quiz test, Term and Final exam
Illustrate laws and regulations related to veterinary profession (The legal system)	• Criminal law, civil law and combined criminal and civil law. • Courts of law and their power, • Hints for giving evidence and witness	Lecture, Discussion, Project Display and Feed Back	Quiz test, Term and Final exam
Conclude Legislation against animal diseases	• The Glanders and Farcy Act, 1899; • The Dourine Act, 1910; • The livestock importation Act, 1998' • Prevention for cruelty to Animals Act, 1890; • The Poisoning Act, 1919; • The Dangerous Drug Act, 1930.	Lecture, Discussion, Project Display and Feed Back.	Quiz test, Term and Final examination
To earn knowledge on common offences against animals and birds	• Mischief, cruelty and bestiality and examination of dead animals in criminal cases. • Methods of mischievous killing of animals: Poisoning, slaughtering, violence,	Lecture, Discussion, Project Display and Feed Back	Quiz test, Term and Final examination

	starvation, strangulation and drawing.		
Validate the accidental deaths of animals	• Lightning stroke and electrocution. • Post-mortem examination of veterolegal cases. • Submission of Specimens in Suspected cases of poisoning.	Lecture, Discussion, Project Display and Feed Back	Quiz test, Term and Final exam
Discriminates common frauds in selling of livestock and livestock products	• Common frauds in the sale of livestock • Common frauds in selling of milk and milk products and different tests methods for the determination of frauds. • Falsification of meat and method of identification of meat of different animals	Lecture, Discussion, Project Display and Feed Back	Quiz test, Term and Final exam
Justify Vetero-legal wounds	• Classification and description of veterolegal wounds. • Differences among the incised, lacerated and punctured wounds. • Difference between ante-mortem and post-mortem wounds. • Determination of age of injury. • Vetero-legal importance of wound healing.	Lecture, Discussion, Project Display and Feed Back	Quiz test, Term and Final exam
Categorize constitute of different medical offices and organizations related with veterinary profession and their activities	• Veterinary ethics • professional infamous conduct, processional malpractices, liability and insurance • Bangladesh Veterinary Council (BVC) and their responsibilities, • Method of registration as a veterinarian. • Oath of a veterinarian	Lecture, Discussion, Project Display and Feed Back	Quiz test, Term and Final exam

Books Recommended

1. Coles, E.H. 1980. Veterinary clinical Pathology. 3rd edn. W.B. Saunders Co., Philadelphia.
2. Minnet, F.C. 1949. Outline of Veterinary Science. Govt. of Pakistan.
3. Selim, R. 1996. The Essential of forensic medicine and Toxicology. Essence publications, Dhaka.
4. Sharma, S.N. 1981. Veterinary jurisprudence. 3rd edn. Oxford and IBH Publishing Co., India

Course Code: MSO 508 **Course Title: Soundness and certificate writing (Practical)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**
Rationale: To acquire proper knowledge on health management and judgments of animal.			
Course Learning Outcomes: ➢ Writing certificate of soundness of animals. ➢ Differentiate between sound and unsound animals.			

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Categorize common terms used for soundness of animals	Terminology	Lecture Discussion Projector Display	Q/A Quiz Test (TF, FB, Short) Midterm exam. Essay Assignment
Develop Certificate writing procedure	Certificate writing for identification, soundness, health certificate, injury/wound certificate, specimen certificate.		
Judge horse by various colour and marking	Identifying different colour of horse. Identifying different marking of horse.		
Measure basic data for animal	Estimate of live weight, physiological data, age, dental formula of animals		
Report on soundness of animals	Standardized soundness examination of horse, cattle, buffalo, goats, sheep, camels, dog, cats.		

Books Recommended:

1. Adams, O.R. (1974): Lameness in Horse. 3rd ed., Lea &Febiger Philadelphia.
2. Banerjee, G.C. (2004): A text book of animal husbandry, 8then. Oxford & IBH publishing co. pvt. Ltd. New Delhi.
3. Greenough, R.P. and Weaver A.D. (1997). Lameness in cattle. 3rd ed. W.B. Saunders Co London.

References:

1. Course curricula of Department of Veterinary and Animal Husbandry, Rajshahi University
2. Course curricula of Faculty of Veterinary and Animal Science, Chittagong Veterinary and Animal Science University. Chittagong.
3. Course curricula of Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh
4. Course curricula of Dinajpur Government Veterinary College.

Course Code: MSO 510 Course Title: Clinics Medicine (Practical)	Credit Hour: 1.0	Level: 5	Semester: I

Rationale: This course is oriented to provide students applied knowledge on clinical medicine.

Course Learning Outcomes:

- Obtaining practical knowledge on different disease animal in clinics.
- Acquiring practical knowledge on how to make prescription for different disease.
- Giving practical knowledge on animal restraining and different diagnostic procedure clinically.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Describe clinics and its importance	Infrastructure of clinics, instruments and appliances of clinics, methods of clinical case record, methods of management of clinics.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay
Recommend animal handling and examination	Restraining, Distant inspection, Physical examination, Special physical examination techniques.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay
Justify clinical examinations	Microscopic examination of fecal, blood samples, skin scrapping, urine sample	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Clinical case Record
Demonstrate drug administration and dose calculation	Demonstration and dispensing of drugs and their doses, route of administration, duration of treatment and adverse drug reactions in dog and cat.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
To know how to prescribe the diseases.	Recording of clinical cases of different species of animal commonly encountered in Veterinary Teaching Hospital and their prescription writing, post-treatment evaluation and interpretation.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam, Short Essay, Assignment
Explain cases practically from field	Ambulatory medical services at various farms and field stations,	Practical demonstrati	Oral Presentation,

	clinical practices of infectious and noninfectious cases at various government and private veterinary hospitals, clinics and zoo	on by students	assignment

Book Recommended:

1. Ettinger, S. J. and Feldman, E. C. 1995. Textbook of Veterinary Internal Medicine, Diseases of the dog and cat 4th edn. W. B. Saunders Co., Philadelphia.
2. Samad, M.A. 2000. Veterinary Practitioner's Guide. 1st Pub., LEP, Bangladesh Agricultural University, Mymensingh.
3. Sherding, R. G. 1989. The cat (diseases and clinical management). 1st Pub. Churchill Livingstone Inc.
4. Susan, E. A. 1998. The Merck Veterinary Manual. 8th edn. Merck and Co., Inc., USA.
5. Byaher and Natamen, M.C. (1985). *Veterinary Fluid Therapy*. Blackwell Science.
6. Howard, L.J. (1993). *Current Vet. Therapy: Food Animal Practice*. W.B. Saunders Co.
7. Philadelphia.
8. Mathews, J. (1999). *Diseases of the Goat*. Blackwell Science.
9. Radostitis, O.M., Gay, C.C., Blood, D.C. and Hincheliff, K.W. (2000), *Veterinary Medicine: Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses*, 9th edn. W.B. Saunders Co. Phildelphia.

Course Code: MSO 511 **Course Title: Animal Behaviour and Welfare (Theory)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**
Rationale: This course is designed to provide basic concepts of animal behaviours and their welfare.			
Course Learning Outcomes: • To know behaviours of different animals • Obtaining knowledge on their feeding, reproductive behaviours • To learn about animal welfare.			
Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Justify animal behaviour study	Why study animal behaviours? Approaches to study animal behaviours, Some basic principles of animal behaviour. Behavioural variability, Interaction of heredity and environment.	Lecture Discussion Projector Display	Quiz Test, Term and Final exam
Support genetic influence on behaviour	Genetic influence on qualitative and quantitative nature of the response	Lecture Projector Display, Discussion and Feed Back	Quiz Test, Term and Final exam
Estimate the early experience and behavioral development	Phenotypic plasticity, Imprinting behaviour of animal	Lecture Projector Display, Discussion and Feed Back	Quiz Test, Term and Final exam
Discuss about mating system and reproduction	Monogamy, polygamy, sexual dimorphism. Mating system used in captive animals, Courtship (pre-mating) behaviour, Mating behaviour, Sensory influence on male sexual behaviour, Behavioral manifestation of ovulation and sexual receptivity, Female mate preference.	Lecture Projector Display, Discussion and Feed Back	Quiz Test, Term and Final exam
Assess the Maternal behaviours	Behaviours prior to birth and hatching, Behaviours associated with birth and hatching.	Lecture, Discussion Projector Display and feed Back	Quiz Test, Term and Final exam
Illustrate communication of	Visual communication, auditory	Lecture,	Quiz Test,

animals	communication, Olfactory communication, chemical signals.	Discussion Projector Display and feed Back	Term and Final exam
Assemble Agonistic and atypical behaviours	Definition and expression of Agonistic behaviours, causes of atypical behaviours and stereotyped behaviours	Lecture, Discussion Projector Display and feed Back	Quiz Test, Term and Final exam
Discriminate the animal handling and movement	Use of dog and other animals in handling and movement of livestock	Lecture Projector Display, Discussion and Feed Back	Quiz Test, Term and Final exam
Explain Animal Welfare	Definition, purpose of animal welfare, Different animal welfare organization	Lecture Projector Display, Discussion and Feed Back	Quiz Test, Term and Final exam

Book Recommended:

1. The welfare of cats. Rochlitz, I. 2005. Springer for science, Netharlands.
2. Farm Animal Welfare. Sainsbury, D. 1986. Collins, London UK.
3. Radostitis, O.M.; Gay, C.C. Blood., D.C.; and Hincheliff, K.W. (2000). Veterinary Medicine. W.B. Sounders Co., Philadelphia.
4. Beef Quality Assurance (2009). Feed yard Assessment. Available athttp://www.bqa.org/resources/assessments
5. Cooke RF, Arthington JD, Austin BR, and Yelich JV (2009). Effects of acclimation to handling on performance, reproductive, and physiological responses of Brahmancrossbred heifers. JAnim Sci 87:3403-3412
6. Grandin T Deesing MJ (1998). Genetics and behavior during handling, restraint, and herding. Genetics and the behavior of domestic animals 1998:113- 44.

Course Code: MSO 514 **Course Title: Clinics Surgery (Practical)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**

Rationale: This course is oriented to provide students applied knowledge on Clinics Surgery. The purpose is to apply knowledge on diagnosis and surgical correction of various affections of various animas.

Course Learning Outcomes:

- Acquiring knowledge on how to make surgical intervention for different surgical affections.

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Investigate common surgical cases in VTH	Clinical practice of surgical cases at Veterinary Teaching Hospital (VTH). Admission of surgical cases in clinics, Preoperative preparation of patient Preparation of operation theater for surgery.	Lecture Discussion Practical demonstration	Quiz Test, Term and Final exam, Short essay, Assignment
Apply knowledge of Anaesthesia	Anaesthesia and analgesia related to specific operations		
Predict Knowledge of Surgery in various animals at clinics	Clinical diagnosis and treatment of surgical disease and disorders in animals and birds at the veterinary clinic, ambulatory surgical services at various farms and field stations, clinical practices of surgical cases at various government and private veterinary hospitals, clinics and zoo. Emergency surgical cases of different animals, Postoperative care of animal after surgery in clinics		

Book Recommended:

1. O'Connor, J.J. 1980. Dollar's Veterinary Surgery. 4th edn, CBS Publisher and Distributors, New Delhi.
2. Slatter, D.H. 1985. Text Book of Small Animal Surgery. Vol-I and II. W./ B., Saunders Company, Philadelphia.
3. MichealBynaher, Clarke and Waterman. 1985. Veterinary Fluid Therapy. Hlackwell Scientific Publication, London.
4. Venugopalan, A. 1993, Essentials of Veterinary Surgery. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
5. Gelatt, K.N. 1991. Veterinary Ophthalmology. 2nd edn. Lea and Febiger, Philadelphia, London.

Course Code: MSO 516 **Course Title: Clinics Theriogenology (Practical)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**

Rationale: This course is oriented to provide student's practical knowledge on clinical reproductive disorders and their management in animal.

Course Learning Outcomes:

- To expose student to obtain complete case based history taking from patient, caretaker or outside records
- Hands-on training on diagnosis and treatment of reproductive disorders in animals
- To expose student to perform focused & accurate clinical examination
- To expose student to establish diagnosis & to formulate a management plan

Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Analyze Problem based competence in veterinary clinics	▪ Management of different problems during pregnancy ▪ Management of obstetric patients with mal position and mal presentation ▪ Management of gynaecological cases ▪ Clinical examination of animals affected with reproductive disorders, use of diagnostic techniques for diagnosis, maintenance of case records, presentation on selected/ assigned cases	Lecture, Discussion, Practical demonstration	Quiz Test, Term and Final exam, Oral, clinical and practical examination Assignment, Presentation
Apply the knowledge of Gynaecology, Obstetrics and Andrology in Veterinary Clinics	Use of ultrasonography in ovarian Function (follicular image pattern, follicular dynamics) and in early pregnancy diagnosis and infertility. Utility of uterine culture, uterine cytology and uterine biopsy (histopathological examination) in infertility investigation. Diagnosis of ovarian and uterine dysfunction. ELISA/RIA of hormones and interpretation of results. Use of Assisted reproductive technology (ART) to enhance reproductive efficiency in farm animals.		

Books Recommended:

1. Veterinary Reproduction and Obstetrics (Theriogenology) 1998, by G.H. Arthur, D.E. Noakes and II. Pearson 3rd edn, Bailliere Tindal, London, Sydney, Tokyo.
2. Veterinary Obstetrics and Genital diseases (Theriogenology) 1998, By S.J. Roberts, 3rd edn, by G.B. Saunders Company, US.
3. Current Therapy in Large Animals Theriogenology, 1997, by R. S. Y. Youngquist, W. B. Saunders Company, Philadelphia.
4. Canine and Feline theriogenology,2001,by S.D. Johnston,M.V. Root Kustritz and P.N.S. Olson, W. B. Saunders company, Philadelphia.
5. Reproductive clinical problems in dog, 1988, 2nd edn, D.E. Jones and J.O. Joshua, Wright, London.

Course Code: MSO 517 **Course Title: Obstetrics (Theory)**	**Credit Hour: 2.0**	**Level: 5**	**Semester: I**
Rationale: To acquire proper knowledge on Veterinary Obstetrics.			
Course Learning Outcomes: ➢ To impart knowledge on physiology and pathology of pregnancy, parturition and postpartum period and their management in animals.			
Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Define Obstetrical terms	✓ Definition and common terminology	Lecture, Discussion, Projector Display	Quiz Test, Midterm Exam, Assignment
Discriminate the knowledge about Pregnancy, Parturition and post partum period in animal	✓ Gestation: prenatal development, hormonal control and duration, shotr and prolonged gestation, twins and multiple birth, teratology; Parturition: signs approaching parturition, stages of parturition, mechanism of initiation of		

	parturition, hormonal profiles associated with parturition, expulsion of placenta. ✓ Principles of handling of dystocia, obstetrical procedures: mutations, fetotomy, caesarean section. Obstetrical anesthesia and analgesia, epidural anesthesia. ✓ Fetal and maternal dystocia: causes, diagnosis and management. ✓ Uterine torsion: causes, diagnosis and its correction.		
Discriminate the knowledge about Pregnancy, Parturition and post partum period in animal	✓ Diseases and accidents during gestation and around parturition. Dropsy of fetal membranes and fetus Fetal mummification, maceration. Pyometra and mucometra. Premature birth. Uterine torsion and prolapse, Cervico-vaginal prolapse. ✓ Etiology, diagnosis and treatment of ante-partum and post-partum uterine infections. ✓ Induction of parturition	Lecture, Discussion, Projector Display	Quiz Test, Midterm Exam, Assignment

	and elective termination of pregnancy. ✓ Involution of uterus following normal and abnormal parturition. ✓ Care of dam and the newborn.		
Determine Obstetrical problems in small ruminants	✓ Abortion, Dystocia ✓ Metabolic: pregnancy toxemia ✓ and milk fever ✓ Mastitis, Ring womb ✓ Vaginal and uterine prolapse		
Investigate Obstetrical problems in small animals	✓ Dystocia, Eclampsia ✓ Retained placenta ✓ Metritis, Mastitis ✓ Vaginal and uterine prolapse		

Book Recommended:

1. Veterinary Obstetrics and Genital diseases (Theriogenology) 1998, By S.J. Roberts, 3rd edn, by G.B. Saunders Company, US.
2. Veterinary Reproduction and Obstetrics (Theriogenology) 1998, by G.H. Arthur, D.E. Noakes and II. Pearson 3rd edn, Bailliere Tindal, London, Sydney, Tokyo.
3. Current Therapy in Large Animals Theriogenology, 1997, by R. S. Y. Youngquist, W. B. Saunders Company, Philadelphia.
4. Marshall's Physiology of Reproduction, 1990, 4th edn., by G.E. Lamming, Vol-2, (Reproduction in the male) Churchill Livingstone, London Melbourne and Yew York.
5. Physiology of Reproduction and Artificial Insemination in Cattle, 1978, 2nd edn., W.B. Salisbury, N.I. Vandemark and J.R. Lidge, freeman and Company, Sanfransisco, USA.
6. Reproduction in Domestic Animals, 1991, 4th edn., By P.T. cupps, Academic Press, Inc. California, London.
7. Reproductive in Farm Animals, 2000. By F.S.E. hafex, Lea and Febizer, USA.
8. Reproductive Pathology of Domestic Mammals, 1990, 1st edn, by Kenneth McEnteem, Academic Press, Inc. San Diego, New York.

Course Code: MSO 518 Course Title: Obstetrics (Practical)	Credit Hour: 1.0	Level: 5	Semester: I

Rationale: To acquire proper knowledge on practical approach of Veterinary Obstetrics.

Course Learning Outcomes:

- To learn the diagnosis and management of dystocia, accidents of gestation and peri-parturient disorders in animals.
- To expose students to experimental techniques related to subject.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Investigate Problem based competence in veterinary clinics	Diagnosis and correction of abnormal fetal presentation, position and posture, Epidural anesthesia, ovariohysterectomy and caesarean operation. Fetotomy exercises. Distortion of uterus. Management of prolapse. Handling of clinical cases of dystocia.	Lecture, Discussion, Projector Display	Quiz Test, Term and Final Exam, Oral, clinical and practical examination, Assignment, presentation
Demonstrate Experimental Obstetrics	▪ Pregnancy Diagnosis in Cows ▪ Biological and Chemical Methods of Pregnancy Diagnosis ▪ Care of the Postpartum Dam ▪ Care of New Born ▪ Pelvimetry of Domestic Animals ▪ Caudal Epidural Anaesthesia ▪ Obstetrical Instruments ▪ An Approach to a Case of Dystocia ▪ Evidence of Fetal Life ▪ Techniques of Caesarean Section in Farm Animals		

Book Recommended:

1. Veterinary Obstetrics and Genital diseases (Theriogenology) 1998, By S.J. Roberts, 3rd edn, by G.B. Saunders Company, US.
2. Veterinary Reproduction and Obstetrics (Theriogenology) 1998, by G.H. Arthur, D.E. Noakes and II. Pearson 3rd edn, Bailliere Tindal, London, Sydney, Tokyo.
3. Current Therapy in Large Animals Theriogenology, 1997, by R. S. Y. Youngquist, W. B. Saunders company, Philadelphia.
4. Marshall's Physiology of Reproduction, 1990, 4th edn., by G.E. Lamming, Vol-2, (Reproduction in the male) Churchill Livingstone, London Melbourne and Yew York.
5. Physiology of Reproduction and Artificial Insemination in Cattle, 1978, 2nd edn., W.B. Salisbury, N.I. Vandemark and J.R. Lidge, freeman and Company, Sanfransisco, USA.

6. Reproduction in Domestic Animals, 1991, 4th edn., By P.T. cupps, Academic Press, Inc. California, London.
7. Reproductive in Farm Animals, 2000. By F.S.E. hafex, Lea and Febizer, USA.
8. Reproductive clinical Problems in the Dog, 1988, 2nd edn, D.E. Jones and O. Joshua, Wright, London.
9. Reproductive Pathology of Domestic Mammals, 1990, 1st edn, by Kenneth McEnteem, Academic Press, Inc. San Diego, New York.

Course Code: MSO 519 Course Title: Andrology and Artificial Insemination (Theory)	Credit Hour: 2.0	Level: 5	Semester: I

Rationale: This course is designed to provide knowledge on veterinary Andrology, seminology and Artificial Insemination (AI) in animals.

Course Learning Outcomes:

- To impart knowledge about male reproduction and treatment of male infertility in domestic animals.
- To impart knowledge on collection, evaluation and preservation of semen and artificial insemination (AI) in domestic animals.
- To obtain knowledge on semen borne and AI-related diseases, their control and prevention techniques.
- To obtain knowledge on reproductive biotechnology to maximize reproduction and control reproductive diseases.
- To provide quality teaching for production of well-trained Veterinary Graduates in the field of Animal Reproduction.

Intended Learning Outcomes (ILOS)	Course Contents	Teaching / Learning Strategy	Assessment Strategy
Define Andrology terms	• Definition and common terminology	Lecture, Discussion, Projector Display	Quiz Test, Term and Final exam, Assignment
Generalize the knowledge of Andrology and male fertility	• Structure and function of reproductive organs of male • Sexual behavior and examination of bulls for breeding soundness • Spermatogenesis, (formation, migration, maturation and ejaculation of semen), fine structure of spermatozoa, semen and its composition • Diseases transmitted through semen • Factors affecting semen quality, semen culture, tests for assessment of sperm motility, sperm survival and fertilizing capacity of spermatozoa		
	• Causes of infertility: hereditary, congenital, infectious, nutritional and hormonal. Pathological and functional disturbances of epididymis, vas deferens and accessory sex glands	Lecture, Discussion, Projector Display	Quiz Test, Term and Final exam, Assignment

	• Testicular hypoplasia and degeneration: causes and affect on semen and fertility • Coital injuries and vices of male animals		
Categorize methods of semen preservation and apply Artificial Insemination (AI) technique	• History of artificial insemination • Methods of semen collection • Semen evaluation: macroscopic, microscopic, biochemical and microbiological tests, Computer assisted semen analysis (CASA) • Semen preservation. Extenders for preservation of semen at different temperatures. Semen additives for enhancement of motility and fertilizing capacity of spermatozoa • Cryopreservation of semen. Effects of cryopreservation on spermatozoa, semen quality and fertility • Thawing protocols of frozen semen. Factors affecting post-thaw semen quality • Ideal protocol for AI in different species of animals. Factors affecting success of AI.		
Investigate Faulty Artificial Insemination (AI)	• Infertility and uterine infections due to faulty AI in different animals	Lecture, Discussion, Projector Display	Quiz Test, Term and Final exam, Assignment
Assess the diseases of male animal	• Male infertility, Congenital or acquired abnormalities of male reproductive organs • Sexually transmitted diseases • Correction procedures • Control and prevention techniques of reproductive diseases.	Lecture, Discussion, Projector Display	Quiz Test, Term and Final exam, Assignment,
Distinguish semen borne and AI-related diseases	• Veterinary management of semen borne diseases • Control and prevention procedures of AI-related diseases.		
Develop Record keeping system	• Recording and clinical analysis of reproductive and Artificial		

	Insemination (AI) parameters.		
Describe stud male management	• Health management technique for Stud males • Evaluation technique of zoonotic diseases • Sexually transmitted diseases, semen borne diseases, Prevention of semen contamination • Certified semen service.		
Prepare Teaser male	• Procedure of teaser male preparation, Heat detection procedures.		
Discriminate knowledge on Reproductive Biotechnology	• Embryo transfer technology: selection of donors and recipients • Synchronization, super-ovulation, surgical and non-surgical collection of embryos and evaluation of embryos • Cryopreservation of embryos, transfer of embryos to donors • Cloning		

Book Recommended:

1. Current Therapy in Large Animal Theriogenology, 1997, by R.S. Youngquist, W.B Saunders Company, Philadelphia.
2. Marshall's Physiology of Reproduction, 1990, 4th edn., edited by G.E. Lamming, Vol-2, (Reproduction in the male), Churchill Livingstone, London, Melbourne and Yew York.
3. Veterinary Reproduction and obstetrics (Theriogenology) 1998, by G.H. Arthur, D. E. Noakes and H. Pearson, 3rd edn, Bailliere Tindal, London, Syndey, Tokyo.
4. Veterinary Obstetrics and Genital Diseases (Therigenogy) 1986, by S. J. Roberts, 3rd edn., W. B. Saunders Company, US.
5. Physiology of Reproduction and Artifical Inseminatoin in Cattle, 1978, 2nd edn, by G.B. Salisbury, N.I. Vandemark and J. R. Lidge, Freeman and Company, Sanfransisco, USA.
6. Reproduction in Farm Animals, 2000. By F.S.E. Hafez, Lea and Febizer, USA.
7. Reproductive in Domestic Animals, 1991, 4th edn., By P.T. cupps, Academic Press, Inc. California, London,
8. Reproductive Clinical Problems in the Dog, 1988, 2nd edn, D. E. Jones and J.O. Joshua, Wright, London.

9. Reproductive Pathology of Domestic Mammals, 1990, 1st edn, by Kenneth McEnteem, Academic Press, Inc, San Diego, New York.

Course Code: MSO 520 **Course Title: Andrology and Artificial Insemination (Practical)**	**Credit Hour: 1.0**	**Level: 5**	**Semester: I**
Rationale: This course is oriented to provide student's practical knowledge on veterinary Andrology, seminology and Artificial Insemination (AI). The purpose is to apply knowledge on diagnosis, management treatment and correction of various male reproductive diseases, conditions and disorders of animals.			
Course Learning Outcomes: • To expose students in different clinical approaches of andrological cases and treatment of male infertility in animals. • To learn advances in collection, processing and preservation of semen and Artificial Insemination (AI) techniques to obtain high fertility. • To learn advances in recent developments in biotechnology in reproduction for the production of desired elite animals.			
Intended Learning Outcomes (ILOS)	**Course Contents**	**Teaching / Learning Strategy**	**Assessment Strategy**
Evaluate Clinical male reproductive problems	• General and rectal examination for biometrics of male genitalia and accessory sex glands • Breeding soundness evaluation of male animals • Semen evaluation for sperm abnormalities, fertility and determination of other biochemical constituents of seminal plasma • Computer assisted semen analysis (CASA) • Microbiological load of semen. Examination, diagnosis and treatment of infertile male animals.	Lecture, Discussion, Practical demonstration	Quiz Test, Term and Final exam, Oral, Clinical and Practical examination, Assignment, Presentation

Demonstrate Clinical Practice on semen handling and AI technique	• Collection and evaluation of Semen • Preparation of extenders. Preservation of semen: room temperature, refrigeration and cryopreservation. Handling and evaluation of processed semen • Practice of AI techniques in animals	Lecture, Discussion, Practical demonstration	Quiz Test, Term and Final exam, Oral, Clinical and Practical examination, Assignment, presentation
Interpret Problem based competence in veterinary clinics	• Operative techniques for the corrections of injuries and affections of male reproductive system at veterinary clinics • Technique of teaser male preparation		

Book Recommended:

1. Current Therapy in Large Animal Theriogenology, 1997, by R.S. Youngquist, W.B Saunders Company, Philadelphia.
2. Marshall's Physiology of Reproduction, 1990, 4th edn., edited by G.E. Lamming, Vol-2, (Reproduction in the male), Churchill Livingstone, London, Melbourne and Yew York.
3. Veterinary Reproduction and obstetrics (Theriogenology) 1998, by G.H. Arthur, D. E. Noakes and H. Pearson, 3rd edn, Bailliere Tindal, London, Syndey, Tokyo.
4. Veterinary Obstetrics and Genital Diseases (Therigenogy) 1986, by S. J. Roberts, 3rd edn., W. B. Saunders Company, US.
5. Physiology of Reproduction and Artifical Inseminatoin in Cattle, 1978, 2nd edn, by G.B. Salisbury, N.I. Vandemark and J. R. Lidge, Freeman and Company, Sanfransisco, USA.
6. Reproduction in Farm Animals, 2000. By F.S.E. Hafez, Lea and Febizer, USA.
7. Reproductive in Domestic Animals, 1991, 4th edn., By P.T. cupps, Academic Press, Inc. California, London,
8. Reproductive Clinical Problems in the Dog, 1988, 2nd edn, D. E. Jones and J.O. Joshua, Wright, London.
9. Reproductive Pathology of Domestic Mammals, 1990, 1st edn, by Kenneth McEnteem, Academic Press, Inc, San Diego, New York.