Secondary Level School Curriculum
(Technical and Vocational Stream)

(Grade 9-10)

Animal Science

2078

Government of Nepal
Ministry of Education
Curriculum Development Centre
Sanothimi, Bhaktapur

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Preface

Secondary Level Education in Nepal aims to produce skillful healthy citizens familiar with national customs, culture, social heritage and democratic values who can actively take part in the economic development of the country. So, the main aim of this level is to produce skilled manpower who can make special contribution to the country's all-round development, and at the same time, to produce conscious citizens with essential knowledge and skills to be ready for university education. The process of developing and revising school level curricula in Nepal is being continued in line with this objective.

In this connection, in order to bring relevant changes in secondary level curricula as per the recommendations of School Sector Development Plan (SSDP), some subjects, i. e. Plant Science, Animal Science, Computer Engineering, Electrical Engineering and Civil Engineering have been introduced under Technical and Vocational stream. According to this provision, the curricula of these subjects have been prepared, and they are being implemented. Considering the situation that the curricula of these subjects are not easily available at present, they have been published for the wider circulation. This curriculum, revised in 2078 B. S., is one of them.

Revising school level curricula is a continuous process and the role of teachers, parents and scholars is vital in making it more effective in future. Therefore, the Curriculum Development Centre always anticipates constructive suggestions from all the persons concerned.

Curriculum Development Centre
Sanothimi, Bhaktapur

Content

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Curriculum Structure

Class 9-10

क्र.सं.	कक्षा ९			कक्षा १०		
	विषय	पाठ्यघण्टा Credit	वर्षिक कार्यघण्टा	विषय	पाठ्यघण्टा Credit	वर्षिक कार्यघण्टा
१	नेपाली	४	१२८	नेपाली	४	१२८
२	अङ्ग्रेजी	३	९६	अङ्ग्रेजी	३	९६
३	गणित	३	९६	गणित	३	९६
४	विज्ञान	३	९६	विज्ञान	३	९६
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Veterinary Extension and Computer Science

Grade: 9 **Credit hrs: 4** **Working hrs: 128**

1. Introduction

Livestock extension and computer science subject is of fundamental concern in veterinary science. It has become a subject of primary discussion and application in veterinary field. This curriculum presumes that the students joining grade 9 Animal Science stream come with diverse aspirations and some may continue to higher level studies in specific areas of Veterinary Extension and Computer Science. The curriculum is designed to provide students with general understanding of the fundamental livestock extension laws and principles that governs the livestock phenomena in the world. It focuses to develop Animal Science knowledge, skill competences and attitudes required at secondary level (grade 9) irrespective of what they do beyond this level, as envisioned by national goals. Understanding of livestock extension and computer science concepts and their application, in day to day context as well as the process of obtaining new knowledge through holistic approach of learning in the spirit of national qualification framework is emphasized in the curriculum.

This curriculum comprises of fundamental conceptual principles and practices, introduction to livestock extension, communication and innovation, extension education systems and cooperatives, extension program planning, monitoring and evaluation, concept of sociology, social mobilization and community development, group formation and group dynamics, introduction to computer, computer system, operating system and application of software. It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum has been offered as per the structure of National Curriculum Framework 2076. It provides a comprehensive outline of level-wise competencies, grade-wise leaning outcomes and scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematic.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Acquire general knowledge and skills of livestock extension in Nepali context.
2. Describe the types of communication and introduce extension education systems.
3. Elaborate the different aspects of extension program planning, its monitoring and its evaluation.
4. Analyze the concept of sociology, social mobilization and its application in community development.
5. Gain knowledge about farmer's group formation and its utility in livestock extension system.
6. Apply knowledge about role of cooperatives in livestock commodities.
7. Develop a sense of information technology culture and an appreciation of the range and power of computer applications.
8. Familiarize with different parts of a computer and application of software.

3. Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
Livestock extension		
1	Introduction to livestock extension	1.1 Introduce principles of extension, its meaning, definition, components, scope, basic principles, elements and concepts of extension. 1.2 Introduce historical perspectives of livestock extension development in Nepal. 1.3 Simplify organizational structures of livestock extension systems in Nepal. 1.4 Introduce current status of livestock extension services in Nepal.
2	Communication and innovation, extension education systems	2.1 Describe types of communication, communication models and process. 2.2 Introduce organizational communication. 2.3 Describe diffusion of innovation, adaptation process and adopter categories. 2.4 Introduce extension education systems and audiovisual aids**.**

3	ension gram nning, nitoring evaluation	3.1 Describe concept and importance of program planning. 3.2 Discuss program monitoring, evaluation and follow ups. 3.3 Discuss program planning process and decentralization of program. 3.4 Describe need of evaluation of program planning.
4	Concept of sociology, social mobilization and community development	1.1 Explain the concept of sociology and rural sociology and their importance in development process. 1.2 Introduce concept and history of social mobilization in Nepal. 1.3 Discuss objective of social mobilization in extension. 1.4 Explain concept and importance of development (Sustainable, rural and community development). 1.5 Describe major issues and problems of rural and community development program in Nepal.
5	Group formation and group dynamics	5.1 Groups 5.1.1 Introduce concept, principle and types of groups. 5.1.2 Explain procedures of group formation and its role in extension. 5.1.3 Discuss dynamics of group leader in group management. 5.1.4 Discuss about group meeting for problem solving and decision making. 5.1.5 Discuss types of farmers groups and its role in livestock extension. 5.1.6 Explain group as a conflict management
6.	Cooperative	6.1 Introduce cooperatives 6.2 Discuss impact of local cooperatives in livestock commodities

Computer Science		
7	Introduction to Computer	7.1 Introduce concepts of computer and its history. 7.2 Discuss the computer system and its characteristics. 7.3 Discuss the capabilities and limitation of computer. 7.4 Explain the types of computer. 7.5 Explain different generations of computer. 7.6 Discuss types of Personal computers and their characteristics.
8	General concept of computer	8.1Introduce concept of computer organization. 8.2 Discuss the basic components of computer. 8.3 Familiarize with hardware parts of computer. 8.4Explain different types of memories and storage device 8.5 Explain different input devices of a computer. 8.6 Describe the characteristics of a monitor. 8.7. Discuss computer Software and its importance 8.8. Explain types of Software-System Software, Application software.
9	Application of software	9.1 Conceptualize Word Processing, types and uses, Word Processor's Interface Enter and Edit Text Formatting, Text-Characters, Paragraphs and Documents, Work with Special features of Word Processing – Language tools, Tables, WordArt and Charts Add Graphics. 9.2 Conceptualize Spreadsheet and Use Spreadsheet, Types of Spreadsheet Spreadsheet's Interface Enter Data in a Worksheet – Labels, Values, Dates and Formulas Edit and Format a Worksheet – Relative and Absolute Cell References, Formatting Values, Labels and Cells Add Charts Data Filter and sort data Work with Special features of spreadsheet – General Functions and Formulas.

		9.3. Present Program Basics, Present Program's Interface, Create a Presentation Format Slides, Special Features of Presentation Programs – Transition, Animation and Custom Animation Work with Tables, Graphics, Word ART, Graphs, Organization Charts and Multimedia Integrate Multiple Data Sources in a Presentation Present Slide Shows.

4. Scope and Sequence of Contents

Unit	Scope	Content	Hrs.
I.	**Livestock extension**		
1.	Introduction to livestock extension	1.1 Principles of extension: genesis, meaning , definition, components, scope, basic principles, elements and concepts of extension 1.2 Historical perspectives of livestock extension development in Nepal 1.3 Simplified organizational structures of livestock extension systems in Nepal 1.4 Current status of livestock extension services in Nepal	**4**
2.	Communication and innovation, extension education systems	2.1 Types of communication, communication models and process 2.2 Organizational communication (meaning, flow of communication; upward, downward, lateral, horizontal communication) 2.3 Diffusion of innovation, adoption process and adopter categories 2.4 Extension education systems and cooperatives, audiovisual aids	**6**

3	ension gram nning, nitoring evaluation	3.1 Concept and importance of program planning 3.2 Program monitoring, evaluation and follow ups 3.3 Extension program planning process and decentralization of program. 3.4Need of evaluation of program planning	**5**
4	Concept of sociology, social mobilization and community development	4.1. Concept of sociology and rural sociology and their importance in development process. 4.2 Concept and history of social mobilization in Nepal. 4.3 Objective of social mobilization in extension. 4.4Concept and importance of development, • Sustainable development • Rural and community development 4.5. Major issues and problem of rural and community development program in Nepal.	**8**
5.	Group formation and group dynamics	5.1. Groups: 5.1.1 Concept, Principle and types of group. 5.1.2 Procedure of group formation and its role in extension. 5.1.3 Dynamics of group leader in group management 5.1.4 Group meeting for problem solving and decision making 5.1.5 Types of farmers' groups and its role in agriculture extension	**8**

		5.1.6 Group as a conflict management	
6.	Introduction and concept of Cooperative	6.1 Introduction to cooperatives. 6.2 Impact of local cooperatives in livestock commodities	3
II.	**Computer Science**		
7	Introduction to Computer	7.1 The concepts of computer and its history 7.2 The Computer system characteristics 7.3. The Capabilities and limitation of computers. 7.4. The Types of computers On the basis of data: • Analog • Digital • Hybrid On the basis of size • Micro • Mini • Mainframe and • Super 7.5. The Generations of computers and their features: • First • Second • Third • Fourth and • Fifth generation 7.6. The Types of personal computer and their characteristics. • Desktop • Laptop • Notebook	**6**

		• Palmtop	
8	Computer system	8.1. The concept of Computer Organization 8.2. Familiarization with hardware parts of Computer 8.3. The basic components of a computer system – Input, Output, Processor and Storage 8.4. The Memories and storage device. Primary and Secondary, Cache (L1, L2), Buffer, RAM, ROM, PROM, EPROM, EEPROM Storage fundamentals - Primary Vs Secondary data Various Storage Devices - Magnetic Tape, Magnetic Disks: Hard Disk and Floppy Disks (Winchester Disk), Optical Disks: CD, VCD, CD-R, CD-RW, DVD, DVD-RW, Blue Ray Disc. Others: Flash drives, SD/MMC Memory cards Physical structure of floppy & hard disk, drive naming conventions in PC. 8.5. The Input Device - Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen. 8.6. The Characteristics of monitor-Digital, Analog, Size, Resolution, Refresh Rate, Interlaced/Non-Interlaced, Dot Pitch, Video Standard-VGA, SVGA, XGA etc.	**12**

		Printers and types – Impact (Dot matrix printer), Non-impact (Laser printer) 8.7. The Computer Software and its importance 8.8. Types of Software-System Software, Application software.	
9	Application of software	9.1. Conceptualize Word Processing, types and uses, Word Processor's Interface Enter and Edit Text Formatting, Text-Characters, Paragraphs and Documents, Work with Special features of Word Processing – Language tools, Tables, WordArt and Charts Add Graphics 9.2. Conceptualize Spreadsheet and Use Spreadsheet, Types of Spreadsheet Spreadsheet's Interface Enter Data in a Worksheet – Labels, Values, Dates and Formulas Edit and Format a Worksheet – Relative and Absolute Cell References, Formatting Values, Labels and Cells Add Charts Data Filter and sort data Work with Special features of spreadsheet – General Functions and Formulas 9.3. Present Program Basics, Present Program's Interface, Create a Presentation Format Slides, Special Features of Presentation Programs – Transition, Animation and Custom Animation Work with Tables, Graphics, Word ART, Graphs, Organization Charts	**12**

		and Multimedia Integrate Multiple Data Sources in a Presentation Present Slide Shows	
		Total	**64**

5. Suggested Practical and Project Works

Practical and project work is an integral part of technical and vocational subjects. They are carried out to consolidate the practical learning experiences. Some of the suggested practical and project work activities of this subject are mentioned below. As these are the basic and fundamental practical and project works, the teacher can adapt or introduce more relevant to their context and students' needs.

Unit	**Grade 9**		
	Scope	**Practical Activities**	**Hrs.**
1	Introduction to livestock extension	1. Visit livestock office and related stakeholders in the district to understand existing extension practices.	**7**
2	Communication and innovation, extension education systems and cooperatives	2. Practice on development of visual aids such as posters, charts, pamphlets, flash cards and graphs	**10**
3	Extension program planning, monitoring and evaluation	3. Conduct impact study on extension program planning, monitoring and evaluation.	**5**
4	Concept of sociology, social mobilization and community development	4.Conduct impact study of rural and community development program in Nepal	**5**
5	Group formation and group	5.Conduct case study of a farmer group.	**5**

	dynamics		
7	Computer system	6. Familiarize with different parts of a computer**.**	**8**
8	Operating system	7. Install Operating software	**12**
9	Application of software	8. Present program basics	**12**
	Total		**64**

6. Learning Facilitation Process

This course intends to provide both theoretical as well as practical knowledge and skills on the subject, thereby, blends with both theoretical and practical facilitation strategies to ensure better learning. In fulfilling the learning outcomes stated in the curriculum, the teacher should use a variety of methods and techniques that fit to the contents. In particular, the following methods, techniques and strategies are used for learning facilitation:

- Class discussion
- Practical works
- Visual demonstration
- Group discussion
- Project works

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation. There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of

Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15
		Record keeping of practical work activities	3
3	Project work	Conduction of project work activities	10
		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage. Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination

question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 9 Subjects : Veterinary Extension and Computer Science Time : 2 hrs.

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Introduction to livestock extension	4	6	2	2	2	2	0	1	1	0	9	5	2	16	9	25	16	3
2	Communication and innovation, extension education systems	6																	5
3	Extension program planning, monitoring and evaluation	5																	3
4	Concept of sociology, social mobilization and community development	8																	6

5	Group formation and group dynamics	8																	6
6	Introduction and concept of Cooperative	3																	2
7	Introduction to Computer	6																	5
8	Computer system	12																	10
9	Application of software	12																	10
	Total	64	6	2	2	2	2	0	1	1	0	9	5	2	16	9	25	16	50

General LPM (Livestock production and management) and Fodder production

Grade: 9 **Credit hrs: 4** **Working hrs: 128**

1. Introduction

Livestock production and management deals with increasing the production of the animals and animal products through suitable farm management practices. Fodder production deals with study of cultivation practices of different fodder crops. Livestock production and management and fodder production is a subject of special importance in animal science. This curriculum presumes that the students joining grade 9 Animal Science stream come with diverse aspirations, some may continue to higher level studies in specific areas of General LPM (Livestock Production and Management) and Fodder production subject. The curriculum is designed to provide students with general understanding of the fundamentals of livestock and fodder production. The basic aim of this curriculum is providing skills and knowledge to students about livestock production and management as well as fodder production systems.

This curriculum comprises of fundamental conceptual principles and practices, an introduction to livestock production and management, breeds of animals, care and management of animals, farm management, fodder production, introduction to fodder production, cultivation practice, pasture/rangeland management, conservation of fodder/forages and pasture land and carrying capacity. It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum is structured in accordance with National Curriculum Framework, 2076. It focuses on both theoretical and practical aspects having equal teaching and practical. It incorporates the level-wise competencies, grade-wise leaning outcomes, scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematically.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Acquire knowledge about livestock farming in Nepal and understand about its scope and importance.
2. To be able to identify different indigenous and exotic breeds of cattle, buffalo, sheep, goat, pig rabbit and poultry.
3. Demonstrate different care and management practices of cattle, buffalo, sheep, goat and pig.
4. Application of major farm management practices such as disinfection, isolation, quarantine and disposal of carcass.
5. Acquire knowledge about fodder production and common terminologies used in fodder production.
6. Gain practical knowledge about cultivation practices of various fodder/forages.
7. Acquire knowledge on pasture/rangeland management.
8. Demonstrate hay and silage making.

3. Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
Livestock Production And Management		
1	Introduction	1.1 Introduce Livestock farming in Nepal, scope and importance. 1.2 Explain terminologies of animal husbandry.
2	Breeds of animals	2.1 Identify different indigenous and exotic breeds of Cattle, buffalo, sheep ,goat, pig, rabbit and poultry.
3	Care and management of animals	3.1 Explain care and management of milking cattle and buffalo, dry cattle and buffalo, pregnant cattle and buffalo, newly born calves, heifers. 3.2 Explain care and management of pregnant and lactating doe, care of doe after kidding, care of newly born kids, care of young stocks, care of breeding buck. 3.3 Explain care and management of pregnant and lactating ewe, care of ewe after lambing, care of newly born lamb,

		care of young stocks. 3.4 Explain care and management of pregnant and lactating gilt and sow, care of sow and gilt after furrowing, care of newly born piglets, care and management of boar and young stocks.
4	Farm management	4.1 Introduce importance of farm management. 4.2 Discuss major farm management practices such as disinfection, isolation, quarantine and disposal of carcass.
Fodder production		
5	Introduction to fodder production	5.1 Introduce fodder production. 5.2 Explain terminologies related to fodder production. 5.3 Explain Importance and scope of fodder production. 5.4 Classify forage crops.
6	Cultivation practice/ Propagation nursery management	6.1 Introduce common annual cereal fodder/forage (maize, teosinte, bajara, oat,). 6.2 Introduce common perennial fodder/forages (Napier, Para, Guinea, Seteria, Molasses, paspalum). 6.3 Introduce common annual legumes (Cowpea, Pea, Joint vetch, Berseem). 6.4 Introduce common perennial legumes (Stylosanthes, Lucerne, Forage peanut). 6.5 Introduce common fodder trees (IpilIpil,Tanki, Badahar, Kimbu, Kabrokoilaro, kutmiro).
7	Pasture/range land management	7.1 Introduce importance and scope of pasture/rangeland management in Nepal. 7.2 Discuss animal feeding systems and Grazing systems in Nepal. 7.3 Explain plant poisoning in pasture and their management. 7.4 Discuss factors affecting pasture/rangeland management.
8	Conservation	8.1 Describe Hay making.

	of fodder/forages	8.2 Describe Silage making.

4. Scope and Sequence of Contents

Unit	Scope	Content	Hrs.
I	**Livestock Production And Management**		
1.	Introduction	1.1 Livestock farming in Nepal, its scope and importance 1.2 Terminologies of animal husbandry	**4**
2.	Breeds of animals	2.1 Indigenous and exotic breeds of Cattle, buffalo, sheep, goat, pig, rabbit and poultry	**12**
3.	Care and management of animals	3.1 Care and management of milking cattle and buffalo, dry cattle and buffalo, pregnant cattle and buffalo, newly born calves, heifers 3.2 Care and management of pregnant and lactating doe, care of doe after kidding, care of newly born kids, care of young stocks, care of breeding buck 3.3 Care and management of pregnant and lactating ewe, care of ewe after lambing, care of newly born lamb, care of young stocks 3.4 Care and management of pregnant and lactating gilt and sow, care of sow and gilt after farrowing, care of newly born piglets, care and management of boar and young stocks	**12**
4.	Farm management	4.1 Introduction and importance of farm management 4.2 Major farm management practices such as disinfection, isolation, quarantine and disposal of carcass	**4**
II	**Fodder production**		
5.	Introduction to fodder production	5.1 introduction to fodder production, 5.2 Terminology related to fodder production 5.3 Importance and scope of fodder production. 5.4 Classification of forage crops	**6**
6.	Cultivation practice/ Propagation nursery management	6.1 Common annual cereal fodder/forage (maize, teosinte, bajara, oat,) 6.2 Common perennial fodder/forages (Napier, Para,	**16**

		Guinea, Seteria, Molasses, paspalum) 6.3 Common annual legumes (Cowpea, Pea, Joint vetch, Berseem) 6.4 Common perennial legumes (Stylosanthes, Lucerne, Forage peanut) 6.5 Common fodder trees (IpilIpil, Tanki, Badahar, Kimbu, Kabhro,kutmiro, koilaro)	
7.	Pasture/rangel and management	7.1 Importance and scope of pasture/rangeland management in Nepal. 7.2 Animal feeding systems and Grazing systems in Nepal 7.3 Plant poisoning in pasture and their management 7.4 Factors affecting pasture/rangeland management	**6**
8.	Conservation of fodder/ forages	8.1 Hay making 8.2 Silage making	**4**
		Total	**64**

5. Suggested Practical and Project Works

The practical work that students do during their course is aimed at providing them learning opportunities to accomplish competency of the curriculum as well as reinforcing their learning of the theoretical subject content. Similarly, involving in a project work fosters the self-learning of students in the both theoretical and practical contents. As this subject emphasizes to develop both theoretical and practical knowledge and skills, some of the practical and project works are suggested for the students. However, the tasks presented here are the samples only. A teacher can assign the extra practical and project works as per the students' need or specific context.

Unit	**Grade 9**		
	Scope	**Practical Activities**	**Hrs.**
2	Breeds of animals	1. Identifying various breeds of livestock and	**12**

		poultry.	
3	Care and management of animals	2. Approaching and handling of farm animals. 3. Tattooing, branding, ear tagging and notching of animals for identification. 4. Methods of washing, grooming, exercise, dipping, spraying, clipping and shearing. 5. Different routes ofdrug administration. 6. Weighing of farm animals and birds by using formula	**12**
4	Farm management	7. Major farm management practices such as disinfection, isolation, quarantine and disposal of carcass	**8**
5	Introduction to fodder production	8. Identify common grass, forage legumes, and fodder trees	**12**
6	Cultivation practice	9. Carryout cultivation practices of common annual and perennial grasses and legumes 10. Prepare seasonal calendar of different cereal fodder and legumes considering sowing and harvesting time to supply green fodder all the year round	**12**
8	Conservation of fodder/forages	11. Preparation of hay. 12. Preparation of silage.	**8**
		Total	**64**

6. Learning Facilitation Process

This course aims to blend both theoretical and practical aspects of knowledge and skills required in the subject. So, its facilitation process differs from the traditional method of delivery. The practical aspect is much more focused. So, methods and strategies that enable the practical skills in the students are much used in course of content facilitation. A facilitator encourages and assists students to learn for themselves engaging in different activities with practical tasks. To achieve the entire objectives from this syllabus, the teacher must use different techniques and process while teaching. In

particular, the teacher can make use of the following methods and strategies for the learning facilitation:

- Group discussion
- project work
- Visual demonstration
- Practical method
- Field visit
- Case study
- Assignments and presentation

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation.

There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15

		Record keeping of practical work activities	3
3	Project work	Conduction of project work activities	10
		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage. Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 9 Time : 2 hrs.

Subjects : General LPM (Livestock production and management) and Fodder production

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Introduction	4	4	3	1	3	2	0	2	0	1	9	5	2	16	9	25	16	2
2	Breeds of animals	12																	10
3	Care and management of animals	12																	10
4	Farm management	4																	3
5	Introduction to fodder production	6																	5
6	Cultivation practice/ Propagation	16																	12

	nursery management																		
7	Pasture/rangeland management	6																	5
8	Conservation of fodder/forages	4																	3
	Total	64	4	3	1	3	2	0	2	0	1	9	5	2	16	9	25	16	50

Veterinary Anatomy and Physiology

Grade: 9 **Credit hrs: 4** **Working hrs: 128**

1. Introduction

Anatomy is the branch of science which deals with normal structure, shape, size and location of various parts of the body whereas physiology is the branch of science which deals with normal functioning of various organ in the body. This curriculum presumes that the students joining grade 9 Animal Science stream come with diverse aspirations, some may continue to higher level studies in specific areas of Veterinary Anatomy and Physiology subject. The curriculum is designed to provide students with general understanding of various organs in the body along with their structure, shape, size, location and their function. It focuses to develop Animal Science knowledge, skill competences and attitudes required at secondary level (grade 9) irrespective of what they do beyond this level, as envisioned by national goals. Understanding of anatomical and physiological concepts and their application as well as the process of obtaining new knowledge through holistic approach of learning in the spirit of national qualification framework is emphasized in the curriculum.

This curriculum comprises of fundamental conceptual principles and practices, an introduction to anatomy, osteology, splanchnology, physiology, and introduction to physiology, digestive system and reproductive system. It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum has been offered as per the structure of National Curriculum Framework 2076. It provides a comprehensive outline of level-wise competencies, grade-wise leaning outcomes and scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematic.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Acquire knowledge about common terminologies used in veterinary anatomy and physiology.
2. To be able to identify different parts of digestive, respiratory, urinary and reproductive system of farm animals.
3. Demonstrate the physiological mechanism of digestive and reproductive system.

3.Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
Veterinary anatomy		
1	Introduction to anatomy	1.1 Introduce and define terms used in veterinary anatomy.
2	Splanchnology	**2**.1 Introduce splanchnology. 2.2 Study of digestive system of farm animals. 2.3 Study of respiratory system of farm animals. 2.4 Study of urinary system of farm animals. 2.5Study of reproductive system of farm animals.
Physiology		
3	Introduction to physiology	3.1 Introduce and define terms used in veterinary physiology.
4	Digestive system	4.1 Explain physiology of digestive system of ruminants, non-ruminants and birds.
5	Reproductive system	5.1 Explain physiology of reproduction of different species of animals and birds, gametogenesis, sexual cycle, ovulation, fertilization, implantation, pregnancy and parturition.

4. Scope and Sequence of Contents

Unit	Scope	Content	Hrs.
I.	**Veterinary anatomy**		
1.	Introduction to anatomy	Introduction veterinary anatomy definition used	**4**
2.	Splanchnology	**2**.1 Introduction to splanchnology.	**16**

		2.2 Study of digestive system of farm animals. 2.3 Study of respiratory system of farm animals. 2.4 Study of urinary system of farm animals. 2.5 Study of reproductive system of farm animals.	
II	Physiology		
3	Introduction to physiology	3.1 Introduction in veterinary physiology and definition of terms used	**4**
4	Digestive system	4.1Physiology of digestion of ruminants, non-ruminants and birds	**16**
5	Reproductive system	5.1 Physiology of reproduction of different species of animals and birds, gametogenesis, sexual cycle, ovulation, fertilization, implantation, pregnancy and parturition	**24**
		Total	**64**

5. Suggested Practical and Project Works

The practical and project works are integral parts of reinforcing the students' learning. So the new curriculum provisions the practical and projects works as a part of curriculum. Some of the sample practical and project works are suggested herewith. However, a teacher can adapt them or use similar other project works as per their students need and specific context.

Unit	**Grade 9**		
	Scope	**Practical Activities**	**Hrs.**
1	Introduction to anatomy	1. Study of external body parts of farm animals.	**8**
2	Splanchnology	3. Study of digestive system 4. Study of respiratory system 5. Study of urinary system 6. Study of reproductive system	**24**
4	Digestive system	7. Physiology of digestive system.	**16**
5	Reproductive	9. Physiology of reproductive system	**16**

	system		
		Total	**64**

6. Learning Facilitation Method and Process

Learning facilitation process is the crux of the teaching and learning activity. One topic can be facilitated through two or more than two methods or processes. The degree of usage will be based on the nature of the content to be facilitated. However, a teacher should focus on methods and techniques that are more students centered and appropriate to facilitate the content. The following facilitation methods, techniques and strategies will be applied while conducting the teaching learning process:

- Group discussion
- Visual demonstration
- Presentation method
- Practical method
- Field visit
- Case study

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation. There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15
		Record keeping of practical work activities	3
3	Project work	Conduction of project work activities	10
		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage. Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 9 Subjects : Veterinary Anatomy and Physiology Time : 2 hrs.

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Introduction to anatomy	4	4	3	1	3	2	0	2	0	1	9	5	2	16	9	25	16	3
2	Splanchnology	16																	12
3	Introduction to physiology	4																	3
4	Digestive system	16																	12
5	Reproductive system	24																	20
	Total	64	4	3	1	3	2	0	2	0	1	9	5	2	16	9	25	16	50

Animal health-I

Grade: 9 **Credit hrs: 4** **Working hrs: 128**

1. Introduction

Animal health is one of the basic course in veterinary science. It deals with various aspects of animal health and disease conditions. This curriculum presumes that the students joining grade 9 Animal Science stream come with diverse aspirations, some may continue to higher level studies in specific areas of Animal health-I subject. The curriculum is designed to provide students with general understanding of the health and disease conditions of animals. Students can learn about basic concepts of animal health, diseases of animals and their treatment methods.

This curriculum comprises of fundamental conceptual principles and practices, Concept of health and disease, Microbiology and parasitology, Pharmacology, Systemic disease of livestock, Pathology, First aid on surgical and gynecological cases. It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum is structured in accordance with National Curriculum Framework, 2076. It focuses on both theoretical and practical aspects having equal teaching and practical. It incorporates the level-wise competencies, grade-wise leaning outcomes, scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematically.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Apply knowledge of Animal health in comparison of healthy and sick animals.
2. Identify different parasites and microorganisms causing various diseases.
3. Identify common medicine and know about different aspects of pharmacological terms, antibiotics and their uses.
4. Gain knowledge about systemic diseases of livestock.
5. Perform simple first aid procedure on surgical and gynaecological conditions.

3. Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
1	Concept of health and disease	1.1 Introduce terminologies related to animal health. 1.2 Explain signs of healthy and sick animals. 1.3 Classify disease.
2	Microbiology and parasitology	2.1 Definitions and terminologies of microbiology and parasitology. 2.2 Introduce organisms causing infectious diseases: bacteria, virus, parasite and fungus. 2.3 Differentiate bacteria and virus. 2.4 Explain immunity and immunization(vaccination). 2.5 Explain common internal and external parasites, their characteristics and control measures.
3	Pharmacology	3.1 Introduce pharmacology. 3.2 Explain route of drugs/medicines administration. 3.3 Introduce antibiotics. 3.4 Explain factors affecting dosage of drugs. 3.5 Explain poisoning; nitrate, organophosphates, snake bites.
4	Systemic disease of Livestock	4.1 Explain stomatitis, tympany, impaction, diarrhoea and dysentery. 4.2 Explain cough and pneumonia. 4.3 Describe aboutanemia. 4.4 Explain nephritis and retention of urine. 4.5 Explain metritis and retention of placenta. 4.6 Explain laminitis and GID. 4.7 Explain dermatomycosis, allergy.
5	Pathology	5.1 Introduce pathology. 5.2 Explain inflammatory status of stomach, intestine, liver, kidney, lung, heart and mammary gland.
6	First aid on	6.1 Explain wounds/injuries.

	surgical and gynecological cases	6.2 Explain dislocation and fracture. 6.3 Explain infertility/anoestrus. 6.4 Explain dystocia. 6.5 Explain prolapsed. 6.6 Explain euthanasia.

5. Scope and Sequence of Contents

S.N	Scope	Content	Hrs.
1.	Concept of health and disease	1.1 Introduction to terminologies related to animal health 1.2 Sign of healthy and sick animal 1.3 Classification of disease	**8**
2.	Microbiology and parasitology	2.1 Definitions & terminology 2.2 Organisms causing infectious diseases: bacteria, virus, parasite and fungus 2.3 Differences between bacteria and virus 2.4 Immunity and immunization(vaccination) 2.5 Common internal and external parasites, their characteristics and control measures	**14**
3.	Pharmacology	3.1 Introduction of pharmacology 3.2 Route of drugs/medicines administration 3.3 Antibiotics, 3.4 Factors affecting dosage of drugs 3.5 Traditional livestock pharmacological practices	**10**
4.	Systemic disease of livestock, parasites and disorder of different livestock species	4.1 Digestive system: stomatitis, tympany, impaction, diarrhoea and dysentery 4.2 Respiratory system,: cough and pneumonia 4.3 Circulatory system: anemia 4.4 Urinary system: nephritis and retention of urine 4.5 Reproductive system: metritis and retention of	**14**

		placenta 4.6 Nervous system: laminitis and GID 4.7 Skin: dermatomycosis, allergy	
5	Pathology	5.1 Inflammatory status of stomach, intestine, liver, kidney, lung, heart and mammary gland	**8**
6.	First aid on surgical and gynecological cases	6.1 Wounds/injuries 6.2 Dislocation and fracture 6.3 Infertility /anoestrus 6.4 Dystocia 6.5 Prolapse 6.6 Euthanasia	**10**
		Total	**64**

5. Suggested Practical and Project Works

Practical and project work is an integral part of technical and vocational subjects. They are carried out to consolidate the practical learning experiences. Some of the suggested practical and project work activities of this subject are mentioned below. As these are the basic and fundamental practical and project works, the teacher can adapt or introduce more relevant to their context and students' needs.

Unit	**Grade 9**		
	Scope	**Practical Activities**	**Hrs.**
1	Concept of health and disease	1.1 Differentiate healthy and sick animals 1.2 Perform clinical examination of animals (general appearance, temperature, pulse, respiration, palpation, percussion and auscultation, gaits and behavior) 1.3 Restrain different types of animal 1.4 Perform rumen motility test	**20**
2	Microbiology and parasitology	2.1 Perform sterilization of glassware and media	**20**

		2.2 Collect blood from different parts of animals 2.3 Prepare thin blood smears 2.4 Prepare thick blood smears 2.5 Perform physical examination of urine 2.6 Fecal sample examination by different methods	
3	Pharmacology	3.1 Administer drugs through different routes	**12**
6	First aid on surgical and gynecological cases	3.1 Treat wound 3.2 management of fracture in animals 3.3 Detection of heat in farm animals	**12**
		Total	**64**

6. Learning Facilitation Process

Learning facilitation process is determined according to the content to be dealt in the subject. It's also an art of teacher. The teacher should utilize such teaching methods and techniques that are appropriate to the contents and needs of the students. In facilitating the course, various approaches, methods and techniques are used. To be particular, the following major methods and strategies are used in this subject:

- Group discussion
- Visual demonstration
- Assignment and presentation method
- Practical method
- Field visit
- Case study
- Project work

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation.

There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15
		Record keeping of practical work activities	3
3	Project work	Conduction of project work activities	10
		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage. Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 9 Subjects : Animal health Time : 2 hrs.

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Concept of health and disease	8																	5
2	Microbiology and parasitology	14																	12
3	Pharmacology	10																	8
4	Systemic disease of livestock, parasites and disorder of different livestock species	14	4	2	1	3	2	1	2	1	0	9	5	2	16	9	25	16	12
5	Pathology	8																	5
6	First aid on surgical and gynecological cases	10																	8
	Total	64	4	2	1	3	2	1	2	1	0	9	5	2	16	9	25	16	50

Class 10
Animal Health II

Grade: 10 **Credit hrs: 4** **Working hrs: 128**

1. Introduction

Animal health is one of the basic course in animal science. It deals with various aspects of animal health and disease conditions. This curriculum presumes that the students joining grade 10 Animal Science stream come with diverse aspirations, some may continue to higher level studies in specific areas of Animal health-I subject. The curriculum is designed to provide students with general understanding of the health and disease conditions of animals. Students can learn about basic concepts of animal health, diseases of animals and their treatment methods.

This curriculum comprises of Fundamental Conceptual principles and Practices required for animal health and disease treatment. It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum has been offered as per the structure of National Curriculum Framework 2076. It provides a comprehensive outline of level-wise competencies, grade-wise leaning outcomes and scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematic.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Identify different external and internal parasites and their hosts.
2. Identify organisms causing diseases.
3. Acquire knowledge about common diseases of livestock caused by helminthes, protozoa, bacteria, virus and fungi.
4. Acquire knowledge about metabolic and deficiency disease.
5. Acquire knowledge about common diseases of poultry caused by bacteria, virus, protozoa and fungus.

6. Illustrate vaccination schedule of livestock, pets and poultry and perform vaccination in livestock, pets and poultry.
7 Gain knowledge about zoonotic diseases and its importance.
8. Apply knowledge and skills of Artificial insemination in performing AI in animals.

3. Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
1.	Introduction to parasite and parasitology	1.1. Introduce parasite and parasitology. 1.2. Explain types of parasites: external and internal parasites. 1.3. Explain types of host: definitive host and intermediate host.
2.	Disease caused by external parasites	2.1 Introduce external parasites, types of external parasites, general symptoms and treatment of lice, ticks, mite, leech, fleas. 2.2. Explain important diseases causes by external parasites.
3.	Introduce helminth parasites	3.1 Introduce common helminth parasites of ruminants and non-ruminants. 3.2. Explain effects of helminths on host. 3.3. Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control of: • liver fluke disease • round worm of ruminants and non-ruminants • Gid • Hydatidosis • dog tapeworm • pork tapeworm
4.	Protozoal diseases of livestock	4.1.Explain Babesiosis. 4.2. Explain Coccidiosis in calf.
5.	Bacterial diseases of livestock	Introduction, etiology, mode of transmission, symptoms, diagnosis, treatment, prevention and

		control of Hemorrhagic septicemia, Anthrax, Black quarter, Mastitis, Brucellosis, Enterotoxaemia, Pneumonia, Tuberculosis.
6.	Viral diseases of livestock	6.1 Introduction, etiology, mode of transmission, symptoms, diagnosis, treatment, prevention and control of Rabies, Foot and mouth disease (FMD), Peste des petitis ruminant (PPR), Swine fever, canine distemper, Rinderpest, ORF.
7	Fungal diseases of livestock	7.1. Ring worm. 7.2. Mycotoxicosis.
8	Metabolic diseases and deficiency diseases	8.1. Milk fever. 8.2. Ketosis. 8.3. Vitamin and mineral deficiency diseases.
9	Diseases of poultry	Introduction, etiology, mode of transmission, symptoms, diagnosis, treatment, prevention and control of: i. Bacterial Disease 9.1. Fowl cholera 9.2. Pullorum disease 9.3 Chronic respiratory disease 9.4. Fowl typhoid ii. Viral Disease 9.5. Newcastle (Ranikhet) diseases 9.6. Marek's diseases 9.7. Infectious Bursal Diseases (Gumboro) 9.8. Infectious bronchitis 9.9. Fowl pox 9.10. Bird flu iii. Protozoal disease

		9.11. coccidiosis iv. Fungal Disease 9.12. Brooders Pneumonia 9.13. Mycotoxicosis
10.	Vaccine and vaccination schedule	10.1 Define vaccine and its uses. 10.2. Explain Vaccine handling and storage. 10.3. Illustrate Vaccination schedule for livestock and pet. 10.4. Illustrate Vaccination schedule for layers for layers, broilers and breeders.
11.	Public health	11.1 Introduction of zoonotic disease and awareness towards zoonotic disease.
12.	Introduction of artificial insemination	12.1 Introduction, Importance and scope of AI. 12.2. Describe Advantages and disadvantages of AI. 12.3. Explain Insemination techniques.

4. Scope and Sequence of Contents

Unit	Scope	Content	Hrs.
1.	Introduction to parasite and parasitology	1.4. Parasite and parasitology 1.5. Types of parasites: external and internal parasites 1.6. Types of host: definitive host and intermediate host	2
2.	Disease caused by external parasites	2.1. Introduction, types of external parasites, general symptoms and treatment of lice, ticks, mite, leech, fleas 2.2. Important diseases caused by external parasites	4
3.	Introduce helminth parasites	3.1 Introduce common helminth parasites of ruminants and non-ruminants. 3.2.Eeffects of helminths on host	8

		3.3. Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control of: • liver fluke disease • round worm of ruminants and non-ruminants • Gid • Hydatidosis • dog tapeworm • pork tapeworm	
4.	Protozoal diseases of livestock	Introduction, etiology, mode of transmission, symptoms, diagnosis, treatment, prevention and control: 4.1. Babesiosis (Red water disease) 4.2. Coccidiosis in calf	2
5.	Bacterial diseases of livestock	Introduction, etiology, mode of transmission, symptoms, diagnosis, treatment, prevention and control: 5.1. Hemorrhagic septicemia disease 5.2. Anthrax 5.3. Black quarter 5.4. Mastitis 5.5. Brucellosis 5.6. Enterotoxaemia 5.7. Pneumonia 5.8. Tuberculosis	8
6.	Viral diseases of livestock	Introduction, etiology, mode of transmission, symptoms, diagnosis, treatment, prevention and control of: 6.1 Rabies 6.2. Foot and mouth disease (FMD)	7

		6.3. Peste des petitis ruminant (PPR) 6.4. Swine fever 6.5. canine distemper 6.6. Rinderpest 6.7. ORF	
7.	Fungal diseases of livestock	7.1. Ring worm 7.2. Mycotoxicosis	2
8.	Metabolic diseases and deficiency diseases	8.1. Milk fever 8.2. Ketosis 8.3. Vitamin and mineral deficiency diseases	6
9.	Diseases of poultry	Introduction, etiology, mode of transmission, symptoms, diagnosis, treatment, prevention and control of: i. Bacterial Disease 9.1. Fowl cholera 9.2. Pullorum disease 9.3 Chronic respiratory disease 9.4. Fowl typhoid ii. Viral Disease 9.5. Newcastle (Ranikhet) diseases 9.6. Marek's diseases 9.7. Infectious Bursal Diseases (Gumboro) 9.8. Infectious bronchitis 9.9. Fowl pox 9.10. Bird flu iii. Protozoal disease 9.11. coccidiosis iv. Fungal Disease 9.12. Brooders Pneumonia	13

		9.13. Mycotoxicosis	
10.	Vaccine and vaccination schedule	10.1. Definition and uses of vaccine 10.2. Vaccine handling and storage 10.3. Vaccination schedule for livestock and pet 10.4. Vaccination schedule for layers for layers, broilers and breeders	4
11.	Public health	11.1. Introduction of zoonotic disease and awareness towards zoonotic disease.	4
12.	Introduction of artificial insemination	12.1. Introduction, Importance and scope 12.2. Advantages and disadvantages 12.3. Insemination techniques	4
		Total	64

5. Suggested Practical and Project Works

The practical work that students do during their course is aimed at providing them learning opportunities to accomplish competency of the curriculum as well as reinforcing their learning of the theoretical subject content. Similarly, involving in a project work fosters the self-learning of students in the both theoretical and practical contents. As this subject emphasizes to develop both theoretical and practical knowledge and skills, some of the practical and project works are suggested for the students. However, the tasks presented here are the samples only. A teacher can assign the extra practical and project works as per the students' need or specific context.

Unit	**Grade 10**		
	Scope	**Practical Activities**	**Hrs.**
2.	Disease caused by external parasites	2.1 Identify common external parasites of farm animals. 2.2 Morphological structure of external parasites.	**12**
3.	Introduce helminth parasites	3.1 dentify common internal parasites of cattle and buffalo (liverfluke, paramphistomum, round worm, coccidiosis)	**16**

		3.2 Identify common internal parasites of sheep and goat 3.3 Identify common internal parasites of poultry 3.4 Perform collection and preservation of parasites 3.5 Fecal sample examination of parasites.	
4.	Protozoal diseases of livestock	4.1 Examination of blood sample for protozoal diseases	**8**
10.	Vaccine and vaccination schedule	10.1Vaccination schedule for cattle and buffalo 10.2Vaccination schedule for sheep and goat 10.3Vaccination schedule for poultry 10.4Vaccination schedule of pet animals	**12**
11.	Public health	11.1Prepare awareness pamphlet for zoonotic disease	**4**
12.	Introduction of artificial insemination	12.1Detection of heat 12.2Techniques of artificial insemination 12.3Pregnancy diagnosis in farm animals	**12**
		Total	**64**

6. Learning Facilitation Process

This course intends to provide both theoretical as well as practical knowledge and skills on the subject, thereby, blends with both theoretical and practical facilitation strategies to ensure better learning. In fulfilling the learning outcomes stated in the curriculum, the teacher should use a variety of methods and techniques that fit to the contents. In particular, the following methods, techniques and strategies are used for learning facilitation:

- Group discussion
- Visual demonstration
- Assignment and presentation method
- Practical method
- Field visit
- Case study
- Project work

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation.

There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15
		Record keeping of practical work activities	3
3	Project work	Conduction of project work activities	10
		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage.Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 10 Subjects : Animal Health Time : 2 hrs.

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Introduction to parasite and parasitology	2	4	2	1	3	2	1	2	1	0	9	5	2	16	9	2 5	1 6	1
2	Disease caused by external parasites	4																	3
3	Introduce helminth parasites	8																	6
4	Protozoal diseases of livestock	2																	1
5	Bacterial diseases of livestock	8																	6
6	Viral diseases of livestock	7																	6
7	Fungal diseases of livestock	2																	1

8	Metabolic diseases and deficiency diseases	6																	5
9	Diseases of poultry	13																	12
10	Vaccine and vaccination schedule	4																	3
11	Public health	4																	3
12	Introduction of artificial insemination	4																	3
	Total	64	4	2	1	3	2	1	2	1	0	9	5	2	16	9	25	16	50

Dairy Product Technology

Grade: 10 **Credit hrs: 4** **Working hrs: 128**

1. Introduction

Dairy and dairy products subject is designed to provide knowledge to students about dairy industry and dairy products produced in Nepal. This curriculum presumes that the students joining grade 10 Animal Science stream come with diverse aspirations, some may continue to higher level studies in specific areas of Dairy and Dairy Products subject. The curriculum is designed to provide students with general understanding of dairy sectors and products in Nepal. It focuses to develop dairy and dairy products knowledge, skill competences and attitudes required at secondary level (grade 10) irrespective of what they do beyond this level, as envisioned by national goals. Understanding of dairy concepts and their application, in day to day context as well as the process of obtaining new knowledge through holistic approach of learning in the spirit of national qualification framework is emphasized in the curriculum.

This curriculum comprises of fundamental conceptual principles and practices, Dairy industry in Nepal, explain milk and its composition, identify dairy equipment its cleaning and sanitization, clean milk production, milk quality and its test, dairy products and processing. It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum is structured in accordance with National Curriculum Framework, 2076. It focuses on both theoretical and practical aspects having equal teaching and practical. It incorporates the level-wise competencies, grade-wise leaning outcomes, scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematically.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Introduce and explain the history and importance of dairy sector and discuss about its status in Nepal.

2. Define milk and colostrum and illustrate composition and nutritive value of milk.
3. Identify the common dairy equipment.
4. Demonstrate different methods of milking.
5. Conceptualize milk quality and perform different milk tests.
6. Preparation of different milk products, their packing, storage and distribution.

3. Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
1.	Dairy industry in Nepal	1.1. Introduction to history and importance of dairy sector. 1.2. Introduction of the dairy branches and scope, importance, constraints of dairy industry. 1.3. Discuss status of milk production, collection, Processing and marketing 1.4. Explain importance of milk and milk products. 1.5. Introduce statistics of dairy animal. 1.6. Introduce major dairy industries in Nepal and their roles.
2.	Explain milk and its composition	2.1. Define milk and colostrums. 2.2. Illustrate composition and nutritive value of milk. 2.3. Explain physical properties of milk. 2.4. Explain factors affecting the composition of milk.
3	Identify Dairy equipment its cleaning and sanitization	3.1 Identifyequipment used in dairy farm. 3.2 Identify equipment used in chilling center. 3.3 Identify equipment used in dairy plants. 3.4 Discuss milk utensils on farm. 3.5 Discuss milk plant line in place. 3.6 Discuss sanitizing utensils and equipment. 3.7 Discuss chemical sanitizers. 3.8 Explain dairy detergents and method of cleaning. 3.9 Describe clean in place.
4	Clean milk	4.1. Explain methods of milking: hand and machine

	production	milking. 4.2 Discuss clean milk production: concept and methods. 4.3 Introduce raw milk. 4.4 Introduce pasteurized milk. 4.5 Objectives of heat treatment.
5	Milk quality and its test	5.1 Introduce concept of milk quality. 5.2 Explain Characteristics of quality milk. 5.3 Explain Factors affecting milk quality. 5.4 Explain Quality assurance in milk collection. 5.5 Discuss Organoleptic test. 5.6 Discuss Alcohol test. 5.7 Discuss COB test. 5.8 Discuss Fat test. 5.9 Discuss SNF test. 5.10 Explain Methylene blue reduction (MBR) test. 5.11 Explain Acidity test. 5.12 Explain tests of processed milk.
6	Dairy products and processing	6.1 Introduce importance of milks products. 6.2. Explain methods of preparation of Butter and ghee, Yoghurt and lassi, Channa and paneer, Khoa, Cheese, Condensed milk, .Milk powder, Ice cream and Churpi. 6.3.Explaintraditional sweets haluwa. 6.4 Discuss about packing, storage and distribution.

4. Scope and Sequence of Contents

Unit	Scope	Content	Hrs.
1.	Dairy industry in Nepal	1.1 History and importance of dairy sector. 1.2 Introduction of the dairy branches and scope, importance, constraints of dairy industry. 1.3 Status of production, collection, Processing and marketing of milk and milk products in Nepal. 1.4 Importance of milk and milk products	10

		1.5 Statistics of dairy animal 1.6 Major dairy industries in Nepal and their role	
2.	Explain milk and its composition	2.1 Definition of milk and colostrum 2.2 Composition and nutritive value of milk 2.3 Physical properties of milk 2.4 Factors affecting the composition of milk	8
3	Dairy equipment, its cleaning and sanitization	3.1 Equipment used in dairy farm 3.2 Equipment used in chilling center 3.3 Equipment used in dairy plants 3.4 Milk utensils on farm 3.5 Milk plant line in place 3.6 Sanitizing utensils and equipment 3.7 Chemical sanitizers 3.8 Dairy detergents, method of cleaning 3.9 Clean In Place	10
4	Clean milk production	6.1 4.1 Methods of milking: hand and machine milking 6.2 4.2 Clean milk production: concept and methods 4.3Raw milk 4.4Pasteurized milk 4.5Objectives of heat treatment	6
5	Milk quality and its test	5.1 Concept of milk quality 5.2 Characteristics of quality milk 5.3 Factors affecting milk quality 5.4 Quality assurance in milk collection 5.5 Organoleptic test 5.6 Alcohol test 5.7 COB test	15

		5.8 Fat test 5.9 SNF test 5.10 Methylene blue reduction (MBR) test 5.11 Acidity test 5.12 Tests of processed milk	
6	Dairy products and processing	6.1 Importance of milks products 6.2 Methods of preparation of 6.2.1. Butter and ghee 6.2.2. Yoghurt and lassi 6.2.3. Channa and paneer 6.2.4.Khoa, Cheese, Condensed milk 6.2.5.Milk powder 6.2.6.Ice cream and Churpi 12.3.Explain traditional sweets haluwa 12.4 Packaging, storage and distribution	**15**
		Total	**64**

5. Suggested Practical and Project Works

The practical and project works are integral parts of reinforcing the students' learning. So the new curriculum provisions the practical and projects works as a part of curriculum. Some of the sample practical and project works are suggested herewith. However, a teacher can adapt them or use similar other project works as per their students need and specific context.

Unit	**Grade 10**		
	Scope	**Practical Activities**	**Hrs.**
1	Identify Dairy equipment	3.1 Identification of commonly used dairy equipment.	4
2	Clean milk production	4.1 Milking of animal using hygienic techniques. 4.1.1 Prepare animal.	10

		4.1.2 Prepare shed 4.1.3 c. Prepare equipment 4.1.4 d. Prepare udder and teat before and after milking 4.1.5 e. Practice hand milking	
3	Milk quality and its test	5.1 Perform sampling of milk. 5.2 Perform estimation of fat by Gerber's method. 5.3 Perform estimation of specific gravity, SNF and total solid. 5.4 Perform quality control tests 5.4.1 Organoleptic test 5.4.2 Clot on boiling 5.4.3 Alcohol test 5.4.4 Titrable acid test 5.4.5 Tests for adulteration	25
4	Dairy products and processing	6.1 Pasteurization of milk 6.2 Preparation of curd, khuwa, lassi, channa, paneer, butter, ghee, icecream, churpi 6.3 Visit to nearby collection and chilling center 6.4 Visit to nearby dairy processing plant	25
		Total	**64**

6. Learning Facilitation Process

This course aims to blend both theoretical and practical aspects of knowledge and skills required in the subject. So, its facilitation process differs from the traditional method of delivery. The practical aspect is much more focused. So, methods and strategies that enable the practical skills in the students are much used in course of content facilitation. A facilitator encourages and assists students to learn for themselves engaging in different activities with practical tasks. To achieve the entire objectives from this syllabus, the teacher must use different techniques and process while teaching. In

particular, the teacher can make use of the following methods and strategies for the learning facilitation:

- Discussion
- Visual demonstration
- Presentation
- Practical works
- Field study
- Group works

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation.

There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15
		Record keeping of practical work activities	3

3	Project work	Conduction of project work activities	10
		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage. Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 10 Subjects : Dairy Product Technology Time : 2 hrs.

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Dairy industry in Nepal	10	5	3	0	2	2	1	2	0	1	9	5	2	16	9	25	16	8
2	Explain milk and its composition	8																	6
3	Dairy equipment, its cleaning and sanitization	10																	8
4	Clean milk production	6																	4
5	Milk quality and its test	15																	12
6	Dairy products and processing	15																	12
	Total	64	5	3	0	2	2	1	2	0	1	9	5	2	16	9	25	16	50

Veterinary Laboratory Technology

Grade: 10 **Credit hrs: 4** **Working hrs: 128**

1. Introduction

Veterinary laboratory techniques are an integral course in veterinary science. This curriculum presumes that the students joining grade 10 Animal Science stream come with diverse aspirations, some may continue to higher level studies in specific areas of Veterinary Laboratory Technology subject. Through this course the students can learn laboratory works and develop knowledge and skills in practical fields.

This curriculum comprises of fundamental conceptual principles and practices, common laboratory equipment and their functions, general laboratory procedures, sample collection procedure, necropsy and visceral sampling procedure It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum has been offered as per the structure of National Curriculum Framework 2076. It provides a comprehensive outline of level-wise competencies, grade-wise leaning outcomes and scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematic.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Identify common laboratory equipment's with their functions.
2. Perform general laboratory procedure and safety measures in lab.
3. Perform fecal, blood and urine sample collection and carry-out its tests in laboratory.
4. Identification of materials required for necropsy and carryout necropsy and visceral sampling procedure.

3. Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
1.	Common laboratory equipment and their functions	1.1 Introduce common laboratory equipment and their uses.
2.	General laboratory procedures	2.1 Introduce needs/importance and application of bio-safety. 2.2 Discuss bio-safety measures in laboratory. 2.3 Explain Safety and first aid in laboratory. 2.4 Discuss techniques for washing and cleaning of glassware. 2.5 Discuss sterilization. 2.6 Discuss antiseptics. 2.7 Discuss disinfectants. 2.8 Explain storage of chemicals, reagents and vaccines. 2.9 Explain collection, storage, labelling and dispatch of samples to laboratories.
3.	Sample collection procedure	3.1 Demonstrate fecal sample and external parasite collection and tool for examination. 3.2 Demonstrate skin scrapping test. 3.3 Perform blood sample collection methods for different species of animal. 3.4 Perform urine sample collection. 3.5 Perform excision of cyst, pus, abscess.

4	Necropsy and visceral sampling procedure	4.1 Identify materials required for necropsy. 4.2 Describe different Organ sample for different disease diagnosis. 4.3 Identify organ to collect for bacteria identification. 4.4 Study about Milk sampling and CMT test.

4. Scope and Sequence of Contents

Unit	Scope	Content	Hrs.
1.	Common laboratory equipment and their functions	1.1 Common laboratory equipment and their uses	14
2.	General laboratory procedures	1.1 Concept, needs/importance and application of bio-safety 1.2 Bio-safety measures in laboratory 1.3 Safety and first aid in laboratory 1.4 Techniques for washing and cleaning of glassware 1.5 Sterilization 1.6 Antiseptics 1.7 Disinfectants 1.8 Storage of chemicals, reagents and vaccines 1.9 Collection, storage, labelling and dispatch of samples to laboratories	16
3	Sample collection procedure	3.1 Fecal sample and external parasite collection and tool for examination 3.2 Skin scrapping test 3.3 Blood sample collection methods for different	16

		species of animal 3.4 Urine sample collection 3.5 Excision of cyst, pus, abscess	
4	Necropsy and visceral sampling procedure	4.1 Materials required for necropsy 4.2 Different Organ sample for different disease diagnosis 4.3 Organ to collect for bacteria identification **4.4** Milk sampling and CMT test	18
	Total		**64**

5. Suggested Practical and Project Works

Practical and project work is an integral part of technical and vocational subjects. They are carried out to consolidate the practical learning experiences. Some of the suggested practical and project work activities of this subject are mentioned below. As these are the basic and fundamental practical and project works, the teacher can adapt or introduce more relevant to their context and students' needs.

Unit	**Grade 10**		
	Scope	**Practical Activities**	**Hrs.**
1	Common laboratory equipment and their functions	1.1 Identify common veterinary laboratory equipment's 1.2 Handling of microscope	**20**
2	General laboratory procedures	2.1 Prepare/ clean glassware 2. Methods of sterilization 3. Apply antiseptics and disinfectants	**20**
3	Sample collection procedure	4. Skin scrapping test 5. Fecal sample and external parasite collection and tool for examination 6. Blood sample collection methods for different species of animal	**20**
4.	Necropsy and visceral sampling	7. Milk sampling and california mastitis test	**4**

	procedure		
		Total	**64**

6. Learning Facilitation Method and Process

Learning facilitation process is the crux of the teaching and learning activity. One topic can be facilitated through two or more than two methods or processes. The degree of usage will be based on the nature of the content to be facilitated. However, a teacher should focus on methods and techniques that are more students centered and appropriate to facilitate the content. The following facilitation methods, technique sand strategies will be applied while conducting the teaching learning process:

- Discussion
- Visual demonstration
- Presentation
- Practical works in laboratory
- Assignments

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation.

There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15
		Record keeping of practical work activities	3
3	Project work	Conduction of project work activities	10
		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage. Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 10 Subjects : Veterinary Laboratory Technology Time : 2 hrs.

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Common laboratory equipment and their functions	14	3	4	1	4	1	0	2	0	1	9	5	2	16	9	25	16	11
2	General laboratory procedures	16																	12
3	Sample collection procedure	16																	12
4	Necropsy and visceral sampling procedure	18																	15
	Total	64	3	4	1	4	1	0	2	0	1	9	5	2	16	9	25	16	50

Aquaculture and Fisheries

Grade: 10 Credit hrs: 4 Working hrs: 128

1. Introduction

Aquaculture involves rearing of fish, crustaceans, molluscs, aquatic plants and algae. Nepal is a country with higher availability of water resources with greater scope of aquaculture. This curriculum presumes that the students joining grade 10 Animal Science stream come with diverse aspirations, some may continue to higher level studies in specific areas of Aquaculture and Fisheries subject. The curriculum is designed to provide students with basic knowledge and skills of aquaculture which the students can learn and play their role for aquaculture development in the country.

This curriculum comprises of fundamental conceptual principles and practices, Introduction and scope of fish farming, fish biodiversity in Nepal, different types of fish ponds, its construction and management, feed, feeding and water quality for fish culture, fish culture system, management of fish ponds, common fish disease, prevention and treatment, harvesting, marketing and preservation of fish, utilization of village ponds in fish culture. It will be delivered using both the conceptual and theoretical inputs through presentation, discussion, reflective reading and group works as well as practical and real world experiences through different practical activities.

The curriculum is structured in accordance with National Curriculum Framework, 2076. It focuses on both theoretical and practical aspects having equal teaching and practical. It incorporates the level-wise competencies, grade-wise leaning outcomes, scope and sequence of contents, suggested practical/project activities, learning facilitation process and assessment strategies so as to enhance the learning on the subject systematically.

2. Competencies

On completion of the course, the students will have the following competencies:

1. Conceptualize history and scope of fish farming in Nepal.
2. Identify indigenous and exotic fish species prevalent in Nepal.
3. Demonstrate thesite selection for fish culture and selection of different pond.
4. Acquire knowledge about feeding system of fish.

5. Analyze different types of fish culture system.
6. Acquire knowledge about management of fish pond.
7. Identify fish diseases and control methods.
8. Application of ideas and skills about harvesting, marketing and preservation of fish, protect fish from predator and develop different feed for fish.
9. Acquire knowledge about utilization of village pond in fish farming.

3. Grade wise learning Outcomes

Unit	Content Area	Learning outcomes
1.	Introduction and scope of fish farming	1.1 Introduce History, scope and importance of fish farming in Nepal. 1.2 Study of Terminologies related to fish farming. 1.3 Illustrate Zoological classification of fish. 1.4 Explain economic importance of fish.
2.	Fish biodiversity in Nepal	2.1 Describe indigenous fish species and their identification. 2.2 Describe exotic fish species and their identification. 2.3 Illustrate external body parts of fish with function of each parts. 2.4 Explain type of fishes kept in aquarium, 2.5 Explain Integrated fish farming (Fish cum livestock) and its importance.
3.	Different types of fish ponds, its construction and management	3.1 Introduce pond survey and layout plan. 3.2 Describe appropriate land for fish culture. 3.3 Explain types of pond used in aqua culture. 3.4Explain preparation and management of fish ponds.
4	Feed, feeding and water quality for fish culture	4.1 Illustrate feeding habit of different fishes. 4.2 Explain feeding requirement for different stages of fish. 4.3 Introduce Improved fodder grass used in feeding fish. 4.4 Explain Water quality(physical and chemical parameters).

		4.5 Explain Importance of water quality in fish culture.
5	Fish culture system	5.1 Introduce monoculture and poly-culture of fish and its importance. 5.2 Explain fingering production in paddy field. 5.3 Describe nursing methods of hatchling, fry and fingerlings. 5.4 Introduce breeding of fish. 5.5 Introduce types of breeding. 5.6 Explain nursing methods of hatchling, fry and fingerlings.
6.	Management of fish ponds	6.1 Explain Cleaning and maintenance and use of lime in fish ponds. 6.2 Explain Preparation and management of fish pond. 6.3 Describe Use of feed and fertilizer in fish pond and its importance. 6.4 Introduce Organic fertilizer. 6.5 Introduce Chemical fertilizer. 6.6 Introduce Pellet feed. 6.7 Explain Aquatic Weeds and its control method. 6.8 Explain Fish predators and control methods.
7	Common fish disease, prevention and treatment	7.1 Explain fish disease caused by parasite, their treatment and control measure. 7.2 Explain bacterial and viral disease, treatment and control.
8	Harvesting, marketing and preservation of fish	8.1 Explain stage and time of harvesting. 8.2 Describe methods of harvesting using nets: fry net, drag net, gill net, cast net, majhijal. 8.3 Explain care and maintenance of fish nets, fishing hook.

		8.4 Describe harvesting method. 8.5 Explain use of ice for fish transport. 8.6 Explain fish packaging method. 8.7 Explain fish preservation methods: salting, smoking, freezing and canning. 8.8 Discuss fish transportation and packaging method. 8.9 Discuss importance of fish marketing.
9	Utilization of village ponds in fish culture	9.1Explain Management and utilization of old ponds. 9.2 Explain Conservation and management of Natural water bodies. 9.3 Explain Enclosure and cage culture in natural water bodies. 9.4Explain Trout culture and production technology.

5. Scope and Sequence of Contents

Unit	Scope	Content	Hrs.
1.	Introduction and scope of fish farming	1.1 History, scope and importance of fish farming in Nepal 1.2 Terminologies related to fish farming. 1.3 Zoological classification of fish 1.4 Economic importance of fish	4
2.	Fish biodiversity in Nepal	2.1 Indigenous fish species and their identification 2.2 Exotic fish species and their identification 2.3. External body parts of fish with function of each parts 2.4 Type of fishes kept in aquarium, 2.5 Integrated fish farming (Fish cum livestock) and its importance	8

3.	Different types of fish ponds, its construction and management	3.1 pond survey and layout plan 3.2 Appropriate land for fish culture 3.3 Types of pond used in aqua culture 3.4 Preparation and management of fish ponds	8
4.	Feed , feeding and water quality for fish culture	4.1 feeding habit of different fishes 4.2 feeding requirement for different stages of fish 4.3 Improved fodder grass used in feeding fish 4.4 Water quality(physical and chemical parameters) 4.5 Importance of water quality in fish culture	8
5.	Fish culture system	5.1 monoculture and polyculture of fish and its importance 5.2 fingering production in paddy field 5.3 nursing methods of hatchling , fry and fingerlings 5.4 Introduce breeding of fish 5.5 Introduce types of breeding 5.6 Explain nursing methods of hatchling, fry and fingerlings	8
6.	Management of fish pond	6.1 Cleaning and maintenance and use of lime in fish ponds 6.2 Preparation and management of fish pond 6.3 Use of feed and fertilizer in fish pond and its importance 6.4 Organic fertilizer 6.5 Chemical fertilizer 6.6 Pellet feed 6.7 Aquatic Weeds and its control method 6.8 Fish predators and control methods	8
7.	Common fish disease,	7.1 Fish disease caused by parasite, their treatment and control measure	4

	prevention and treatment	7.2 Bacterial and viral disease, treatment and control	
8	Harvesting, marketing and preservation of fish	8.1stage and time of harvesting 8.2 methods of harvesting using nets: fry net, drag net, gill net, cast net, majhi jal 8.3 care and maintenance of fish nets, fishing hook 8.4Harvesting method 8.5Use of ice for fish transport 8.6 fish packaging method 8.7 Explain fish preservation methods: salting, smoking, freezing and canning 8.8 fish transportation and packaging method 8.9 Importance of fish marketing	**8**
9	Utilization of village ponds in fish culture	9.1 Management and utilization of old ponds 9.2 Conservation and management of Natural water bodies 9.3 Enclosure and cage culture in natural water bodies 9.4Trout culture and production technology	**8**
	Total		**64**

5. Suggested Practical and Project Works

The practical work that students do during their course is aimed at providing them learning opportunities to accomplish competency of the curriculum as well as reinforcing their learning of the theoretical subject content. Similarly, involving in a project work fosters the self-learning of students in the both theoretical and practical contents. As this subject emphasizes to develop both theoretical and practical knowledge and skills, some of the practical and project works are suggested for the students. However, the tasks presented here are the samples only. A teacher can assign the extra practical and project works as per the students' need or specific context.

Unit	Grade 10		
	Scope	**Practical Activities**	**Hrs.**
2.	Fish Biodiversity in Nepal	2.1 Identification of external and internal organs of fish 2.2 Identification of male and female fish	**16**
3.	Different types of fish pond, its Construction and management	3.1 Basic knowledge of pond, layout and design	**8**
4.	Feed, feeding and water quality for fish culture	4.1 Physical and chemical parameter of water	**8**
7	Common fish disease, prevention and treatment	7.1 Identification of fish diseases and their treatment	**12**
8	Harvesting, marketing and preservation of fish culture	8.1 Fish harvesting method 8.2 Fish preservation methods	**10**
9	Utilization of village ponds in fish culture	9.1 Cage construction using bamboo and net setting 9.2 Rearing of trout fish	**10**
	Total		**64**

6. Learning Facilitation Process

Learning facilitation process is determined according to the content to be dealt in the subject. It's also an art of teacher. The teacher should utilize such teaching methods and techniques that are appropriate to the contents and needs of the students. In facilitating the course, various approaches, methods and techniques are used. To be particular, the following major methods and strategies are used in this subject:

- Discussion
- Visual demonstration
- Presentation
- Practical works
- Field study
- Group works
- Research methodology
- Report writing

7. Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students, teachers and parents/guardians about how student learning is. Class tests, unit tests, oral question-answer, home assignment are some ways of formative evaluation. There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces theoretical examination, practical examination and evaluation of research work or innovative work.

(a) Internal Evaluation

Internal evaluation covers 50 Percent weightage. Internal evaluation consists of Practical Activities (Practical works and projects works) (35 Percent), (b) Marks from trimester examinations (10 Percent), and (c) Classroom participation (5 Percent). Practical work should be based on list of activities mentioned in this curriculum. Project works should be based on the mentioned lists or created by teachers. Mark distribution for internal evaluation (practical work and project work) will be as follows:

S.N.	Mani activities	Activities in detail	Percent
1	Participation	Participation in attendance, homework, classwork, project work, practical works etc.	5
2	Practical work	Conduction of practical work activities	15
		Record keeping of practical work activities	3
3	Project work	Conduction of project work activities	10

		Record keeping of project work activities	2
4	Viva	Viva of practical work and project work activities	5
6	Internal exam	First trimester 5 marks and Second trimester 5 marks	10
Total			50

Note:

(i) Practical examination will be conducted in the presence of internal and external supervisors. Evaluation of experiment will focus both the product of work and skills competencies of student in using apparatus.

(ii) Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. Records of project works must be attested by external supervisor.

(b) External Evaluation

External evaluation of the students will be based on the written examination. It carries 50 percent of the total weightage. Questions for the external examination will be based on the specification grid developed by Curriculum Development Centre. Examination question paper will be developed using various levels of revised Bloom's taxonomy including remembering level, understanding level, application level and higher ability (analyzing, evaluating, creating).

Specification Grid

Grade: 10 Subjects : Aquaculture and Fisheries Time : 2 hrs.

Unit	Content	Credit hrs.	Knowledge and Understand			Application			Higher Ability			Total Question Number			Total Question	Marks Weight			Total Marks
			MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long	MCQ	Short	Long		MCQ	Short	Long	
1	Introduction and scope of fish farming	4	4	3	0	3	2	1	2	0	1	9	5	2	16	9	25	16	3
2	Fish biodiversity in Nepal	8																	6
3	Different types of fish ponds, its construction and management	8																	7
4	Feed , feeding and water quality for fish culture	8																	6
5	Fish culture system	8																	6
6	Management of fish pond	8																	6

7	Common fish disease, prevention and treatment	4																	3
8	Harvesting, marketing and preservation of fish	8																	7
9	Utilization of village ponds in fish culture	8																	6
	Total	64	4	3	0	3	2	1	2	0	1	9	5	2	16	9	25	16	50