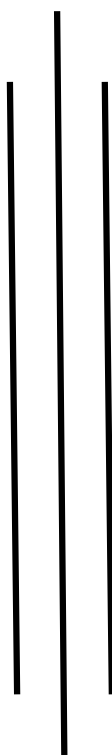


CURRICULUM
For
Technical School Leaving Certificate
In
Agriculture and Livestock Production /Animal Health
(Pre SLC Program)



Council for Technical Education and Vocational Training
CURRICULUM DEVELOPMENT DIVISION
Sanothimi, Bhaktapur
Second Revision, 2010

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1. Introduction:

This course is designed for those who have passed CLASS 10. This curriculum is designed for lower level human resources in the field of Agriculture and Livestock Production / Animal health services equipped with knowledge, skills and attitude necessary for this level of technicians so as to meet the demand of such technician in the country

1. Aim:.

The aim of the program is to produce Agriculture, Livestock Production and Animal Health Junior Technical Assistant (JTA) to provide services to the people as a demand of this level of the country

2. Objectives:

- To fulfill demand of manpower of the agriculture/livestock sector of the country.
- To start their own business in the field in agriculture and livestock

3. Programme Description:

This course is based on the job required to be performed by a livestock sector in Nepal. This course intends to provide knowledge about following basic level Junior Technical Assistant. It especially provides the knowledge and skills focussing on Agriculture and livestock production and management,

To meet the man power needs of the various agricultural institutions in Nepal through the training .for the Governmental and non governmental sector

The student may choose either **livestock or Crop production** option in second year.

4. Target group:

The target group for this training will be all the interested individuals of the country with academic qualification of **class 10 pass**.

5. Target location:

The target location of this training program will be all over country.

6. Group size:

The group size of this training program will be not more than 40.

7. Entry criteria:

Individuals who meet the following criteria will be allowed to enter into this program:

- Should submit class 10 pass certificate
- Should pass entrance examination administered by CTEVT
- Citizenship certificate (for the name, parents' name, age, date of birth and address verification purpose only)
- Character certificate

- Final selection will be made on the basis of merit list.
- special quota for different category of students will be as per the policy of CTEVT
- Preference will be given to female, Dalit, Janjati, Conflict affected people and Disadvantaged Groups (DAGs)

8. Medium of Instruction:

The medium of instruction will be in English and/or Nepali language.

9. Course Duration:

This course will be completed within 24 months 78 weeks 3120 hours. In addition, 5 months on-the-job assignment should also be completed for issuing successful completion of the course.

10. Pattern of Attendance:

The students should have at list 80% attendance in theory classes and 90% in practical/ performance to be eligible for internal assessments and final examinations.

11. Teacher and Student Ratio:

- Overall ratio of teacher and student must be 1:10 (at the institution level).
- Teacher and students ratio for theory class should be as per nature of classroom
- Teacher and student ratio for practical should be 1:10
- Minimum 75% of the teachers must be fulltime.
-

12. Instructional Media and Materials:

The following instructional media and materials are suggested for the effective instruction and demonstration.

- Printed Media Materials (Assignment sheets, Case studies, Handouts, Information sheets, Individual training packets, Procedure sheets, Performance Check lists, Textbooks etc.).
- Non-projected Media Materials (Display, Models, Photographs, Flip chart, Poster, Writing board etc.).
- Projected Media Materials (Opaque projections, Overhead transparencies, Slides etc.).
- Audio-Visual Materials (Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- Computer-Based Instructional Materials (Computer-based training, Interactive video etc.)

13. Teaching Learning Methodologies:

The methods of teaching for this curricular program will be a combination of several approaches. Such as Illustrated Lecture, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork, Laboratory observation, Field visit, Report writing, Term paper presentation, Case analysis, Tutoring, Role-playing, and Other Independent learning.

- Theory: Lecture, Discussion, Assignment, Group work.
- Practical: Demonstration, Observation and Self-practice, Field work
- On the Job Training

14. Evaluation Details:

Continuous evaluation of the students' performance is to be done by the related instructor/trainer to ensure the proficiency over each competency under each area of a subject specified in the curriculum.

Related technical knowledge learnt by students will be evaluated through written tests.

Students must score a minimum of 40% marks in theory test and 60% in practical test in all subjects.

There will be three at list internal assessments and one final examination in each subject. Moreover, the mode of an assessment and an examination will include both theory and practical or as per the nature of instruction as mentioned in the course structure.

Students should pass internal assessments both in theory and practical tests in all subjects for attending final examination.

The ratio between the theory and practical tests will be 20:80 in case of a practical nature subject.

Out of 100%, 50% weightage is allotted for the internal assessments and the remaining is allotted for the final examination

The on-the-job training has to be evaluated keeping 500 as full marks. The evaluation of the performance of the student is to be carried out by the three agencies; **the concerned institute, industry/organization where the student worked and the CTEVT** unless otherwise directed by office of the Controller of examinations /Technical Division of the CTEVT. Here also the student should score 60% or above for successful completion of the course.

15. Grading System:

The grading system will be as follows:

Grading

Distinction

First division

Second division

Third division

Theory part pass mark is 40%

Practical part pass mark is 60%

80% marks of total weight of course is allocated for Practical where Nature of course is **T+P** and 20% marks of total weight is allocated for theory.

Nature of course is **T** and 100% marks of total weight is allocated for theory.

Overall marks

80% or above

75% or above

65% or above

16. Certificate Requirements:

The council for technical education and vocational training will award certificate those who choose crop production option in second year will get **“Technical School Leaving Certificate in Agriculture Production”** and those who choose livestock production option in second year will get **“Technical School Leaving Certificate in Livestock Production /Animal Health”** after successfully completion of the requirements as prescribed by the curriculum.

17. Career Path:

The graduate will be eligible for the position equivalent to Non-gazetted 2nd class/level 4 (technical) as Junior Technical Assistant in the field of Livestock Production and Management /Animal Health or as prescribed by the Public Service Commission.

19. Course Structure

General Course Structure for First year TLSC in Crop production and Livestock Production /Animal Health on

Year: First

S.N.	Subjects	Nature	Hrs/w	Theory	Practical	Total hrs	Full marks
1.	Applied Nepali	T	2	78	-	78	50
2.	Applied English	T	2	78	-	78	50
3.	Applied Science	T	2	78	-	78	50
4.	Applied Mathematics	T	2	78	-	78	50
5.	Environment and Soil Science	T+P	6	48	186	234	150
6.	Crop Production I	T+P	6	48	186	234	100
7.	Horticulture I	T+P	6	48	186	234	150
8.	Livestock Production and Management I	T+P	4	32	124	156	150
9.	Animal Health I	T+P	6	48	186	234	150
10.	Apiculture	T+P	2	16	62	78	50
11.	Farm Machinery	T+P	2	16	62	78	50
Total			40	568	992	1560	1000

Year: Second

SN	Subjects	Nature	Hrs/w	Theory	Practical	Total hrs	Full marks
A	Common subjects						
1	Agriculture Extension and Community Development	T+P	8	64	248	312	200
2	Entrepreneurship Development	T+P	6	48	186	234	150
3	Fishery	T+P	2	16	62	78	50
	Sub total		16	128	496	624	400
B	Crop Production Specialization						
1	Crop Production II	T+P	8	64	248	312	200
2	Horticulture II	T+P	8	64	248	312	200
3	Plant Protection IPM and FFS	T+P	6	48	186	234	150
4	Sericulture and Mushroom Production	T+P	2	16	62	78	50
	Sub total		24	192	744	936	600
C	Livestock Specialization						
1	Livestock Production and Management II	T+P	8	64	248	312	200
2	Animal Health II	T+P	8	64	248	312	200
3	Animal Nutrition and Fodder Production	T+P	4	32	124	156	100
4	Dairy and Dairy Products	T+P	4	32	124	156	100
	Total		24	192	744	936	600
	Grand Total (A+B) and (A+C)		40	320	1240	1560	1000

On the Job Training	Nature	Duration(Hrs.)	Full marks
On -the -Job Training (OJT)	Practical	800	500
Grand total		3920	2500

व्यावहारिक नेपाली

पूर्णाङ्क ५०
समय ७८ घण्टा

पाठचांश विवरण

यो विषय कृषि र पशुपालन विषयको प्राविधिक प्रवेशिका अध्ययन गर्ने विद्यार्थीहरूका लागि आधारभूत विषयको रूपमा तयार पारिएको हो । यो विषयले व्याकरण, शुद्धाशुद्धी जस्ता कुराहरूलाई भन्दा बढी कृषि र पशुपालन विषयसंग सम्बन्धित भाषा अध्ययन गर्ने कुरामा जोड दिन्छ । कृषि र पशुपालन, कृषि प्रसार, उद्यमशिलता जस्ता विषयहरूमा प्रयोग हुने शब्द, वाक्य र लेख रचनाको अध्ययनका साथै कार्यालयमा प्रयोग हुने चिठीपत्र तथा अन्य व्यवहारिक सीप र ज्ञान समेत यो विषयमा समावेश गरिएको छ ।

उद्देश्यहरू:

विद्यार्थीहरू निम्न लिखित कुरामा सक्षम हुनेछन् ।

- कृषि र पशुपालन सम्बन्धी शब्दहरू प्रयोग गर्न तथा वाक्यहरू परिभाषित गर्न ।
- लेखाइमा आवश्यक पर्ने विराम चिन्हहरूको प्रयोग गर्न ।
- आफूले गरेको र देखेको कुराहरूलाई भाषागत रूपमा लेख्न र प्रस्तुत गर्न ।
- कृषक तथा कार्यालयमा प्रयोग गरिने र चिठीपत्रमा प्रयोग हुने शब्दको संयोजन गर्न ।
- प्रस्तावना लेख्न ।
- आफ्नो वैयक्तिक विवरण तयार गर्न ।
- आफूले गरेका कामको प्रगति विवरण तयार गर्न ।
- संपादकलाई चिठी लेख्न ।

क्र.सं.	सीप	आवश्यक प्राविधिक ज्ञान	समय
१	कृषि र पशुपालन सम्बन्धी शब्दहरू र तिनको प्रयोग	कृषि र पशुपालन, कृषि प्रसार, उद्यमशिलता जस्ता विषयहरूमा प्रयोग हुने शब्दहरू र तिनबाट बन्ने वाक्यहरू	६
२	पूर्ण विराम, अर्धविराम, प्रश्न चिन्ह, विशमयवाचक चिन्हहरूको प्रयोग	पूर्ण विराम, अर्धविराम, प्रश्न चिन्ह, विशमयवाचक चिन्हहरूको प्रयोग गर्ने ज्ञान	२
३	विवरण तयार पार्ने	विवरणको परिचय, विवरण लेखन गर्दा प्रयोग गरिने शब्दावली, विवरणको स्वरूप तथा आकारको ज्ञान ।	४
४	प्रतिवेदन लेखन विधि	प्रतिवेदनको परिभाषा, महत्व, यसका भागहरू, स्वरूप र यसमा उल्लेख गरिने गतिविधि तथा लेखन सम्बन्धी ज्ञान	६
५	प्रस्ताव लेखन विधि	प्रस्तावको परिचय, ढाँचा, प्रस्तावमा उल्लेख गरिनु पर्ने बुँदाहरूको ज्ञान	८
६	संवाद/ परिसंवाद लेखन	संवाद/ परिसंवादको परिभाषा र तिनमा प्रयोग	६

	/प्रस्तुतीकरण विधि	हुने शब्द तथा वाक्य संगठनको ज्ञान	
७	निर्देशन तयार पार्ने	निर्देशनको परिभाषा लिखित तथा मौखिक निर्देशन दिने विधिको ज्ञान निर्देशन दिनु पर्ने अवस्थाको ज्ञान	२
८	प्रवचन दिने	प्रवचनको परिभाषा, सम्बोधन, विषय वस्तुको सीमितता र प्रवचन विधिको ज्ञान	४
९	चिठ्ठीपत्र लेखन	चिठ्ठीपत्रका किसिम (व्यक्तिगत, व्यापारिक र कार्यालय) को ज्ञान चिठ्ठीपत्रको ढाँचा (सम्बोधन, विवरण र अन्त्य) को ज्ञान र प्रयोग विधि	४
१०	कृषि र पशुपालन सम्बन्धी नाटिका लेखन (सडक नाटक)	नाटक र नाटिकाका पात्रको चयन नाटक र नाटिकाका पात्रको चरित्रको ज्ञान ।	६
११	वैयक्तिक विवरण तयार गर्ने	वैयक्तिक विवरणको परिचय, ढाँचा र यसमा हुनु पर्ने अत्यावश्यक कुराहरूको ज्ञान ।	४
१२	स्मरण पत्र लेखन	स्मरण पत्रको परिचय स्मरण पत्रको ढाँचा स्मरण पत्रमा लेखिनु पर्ने विवरण, निर्देशन आदि	२
१३	निवेदन लेखन	निवेदनको परिचय र ढाँचाको ज्ञान	२
१४	पर्चा अध्ययन र विवरण प्रस्तुतीकरण	पर्चा (Label) को परिचय, विषादी र औषधीको पर्चामा लेखिनु पर्ने विवरणको ज्ञान	४
१५	प्रश्नावली तयार गर्ने	प्रश्नावलीको परिचय, उद्देश्य प्रश्नावलीमा प्रयोग गर्नु पर्ने शब्द, भाषा, विवरणको ज्ञान प्रश्नावली परीक्षण विधिको ज्ञान	४
१६	सीप र ज्ञान सिकाउन प्रयोग गरिने प्रदर्शनी प्रस्तुती	प्रदर्शनीको परिचय, आवश्यकता, प्रदर्शनीमा ध्यान दिनु पर्ने कुराहरू, प्रदर्शनी विधि, प्रस्तुतीकरणका शैलीहरू	४
१७	संपादकलाई चिठ्ठी लेख्ने	सम्बोधन, विषयको विवरण अन्त्यको लेखनको ज्ञान	२
१८	व्याख्यान तयार गर्ने	व्याख्यानको परिचय, व्याख्यान विधि, व्याख्यान पूर्व स्वअध्ययन, विषय केन्द्रीयताको ज्ञान	४
१९	संक्षेपीकरण तयार गर्ने	संक्षेपीकरणको परिचय, संक्षेपीकरण गरिने विषयको अध्ययन, प्रमुख बुँदाको प्रतिवेदन सम्बन्धी ज्ञान	४
जम्मा			७८

Applied English

Full marks: 50
Total hours: 78

Description:

This subject is design as a foundation course which gives reading, writing, and speaking skills in English language as appropriate for JTAs to make them an effective occupational communicator. The emphasis will be given on the correct usage of the related technical terminologies while writing, speaking, and understanding simple technical publications written in English

Objectives:

At the end of the training the trainees will be able to:

- Read and write simple English language
- Write simple letters for official purpose
- Prepare self bio-data
- Prepare simple proposal
- Prepare simple report

SN	Skill	Related Technical Knowledge	Time (Hrs)
1.	Spell English words	The words should come from the technical terminologies used in various agriculture subjects being instructed	4
2.	Write English sentences	The words should come from the technical terminologies used in various agriculture subjects being instructed	4
3.	Apply correct punctuation in written English	Use of correct punctuation in written English	4
4.	Write descriptions in English	Definition of descriptions Style of short descriptions Elements of descriptions Technical descriptions writing style in English	6
5.	Write short reports in English	Definition of short reports Style of short reports Elements of short reports Preparation of activity report of nearest farm family and school farm	8
6.	Write reports of observations in English	Style of observation report writing Elements of observation reports Preparation of observed activity report of nearest farm family and school farm	4
7.	Write simple proposals Trade head to establish a small nursery in school farm	What is proposal? Style of simple proposal	4
8.	Give short talks in English	Preparation for short talks in English in your own interest. Presentation of talk in class room	4

9.	Write letters in English	Types of letter (private, business, and official) Component of different types of letter Use of language and selection of Words in different types of letters	4
10.	Write memos in English	What is memo? Elements of memo, words used in memo	4
11.	Instruct in English	Selection of word to give instruction to cullies senior and junior.	4
12.	Prepare bio-data (CV) in English	Components of bio-data,	4
13.	Write application	Components of application for leaves, scholarship and employment in English	4
14.	Read short technical publications written in English	Reading of daily English magazines Reading of English language instructions Preparation of note after reading Conversation practices in English on agriculture topics	4
15.	Follow directions of labels in English	What is label? Importance of label reading Essential components of label.	4
16.	Develop questionnaires in English	What is questionnaires Uses of questionnaires Purpose of questionnaires	4
17.	Prepare demonstration in English	Preparation for demonstration Note writing if necessary	4
18.	Write short descriptive letter for editor for news paper in English	Topic and description and writing style	4
		Total Time	78

Applied Science

Full marks: 50
Total hours: 78 hrs

Description

This subject is design as a foundation course which gives basic skills and knowledge of science necessary for mastering the course activities in JTA training to make them efficient in their future occupation.

Objectives:

At the end of this course student will be able to:

- 1, explain plant and their parts
2. Explain body structure of livestock
- 3, explain soil and formation process
- 4, explain effect of climate for agriculture
- 5, explain Ecology and ecosystem and their relationship with agriculture and livestock production

SN	Skill	Related Technical Knowledge	Time (Hrs)
1.	Define biology	Definition of biology Importance of studying biology Difference between plants animal Important classes of animals associated with agriculture and livestock	4
2.	Calibrate microscope	Use of microscope Identification of the parts of a microscope Handling of microscope Types of microscope	3
3.	Define soil	Definition of soil Soil formation process Function of soil in relation to plants Function of soil organisms Conditions necessary for plants growth Techniques of soil sampling	3
4.	Explain nutrients requirement of plants	Definition of major nutrients Define micro nutrients Explain movements of nutrients in plants	2
5.	Explain the biological process involvement	Biological process involvement in: Compost making Silage making Curd making	4
6.	Explain ecosystem	Broad description of ecosystem and the various components interacts	4
7.	Explain different types of cycle in the earth	Explanation of the water cycle Explanation of the nitrogen cycle Explanation of the carbon cycle Explanation of the food chain Importance of conserving natural resources	4

8.	Explain taxonomy of ideal plant	External and internal structure and function of the flowering plant including the stem, leaf, root and flower	4
9.	Explain root system of plant	Describe the various types of root systems and list agricultural plants with each type Nature of the plant and the type of the root system affects cultural practices when caring for agricultural crops	4
10.	Explain sexual reproduction	Process of sexual reproduction in flowering plants including role of pollination and fertilization	2
11.	Identify plant parts which is used for asexual reproduction	Process of asexual reproduction in of plants giving examples of different reproductive organs: tubers, corms, suckers, bulbs, grafts, budding, layering, and nu cellars	2
12.	Compare sexual v/s asexual reproduction	Compression of sexual and asexual reproduction as forms of reproduction in agriculture and explain when one might be better than other	4
13.	Explain general terms used in biology	Explanation of the following terms Germination Photosynthesis Respiration Transpiration	2
14.	Difference elements v/s compounds	Difference between elements, compounds and mixture, and name and give the symbol of these common elements: Hydrogen, Carbon, Nitrogen, Oxygen, Sodium, Magnesium, Potassium, Calcium, Phosphorus, and Sulfur	2
15.	Define pH	Explain acidity and alkalinity, and how the pH scale shows the degree of acidity or alkalinity	2
16.	Describe function of each of the following system of livestock:	General function of each of the following system of livestock: Skeletal Muscular Skin Digestive Circulatory Glandular Nervous Urinary Reproductive	6
17.	Difference ruminant v/s non-ruminant digestion	Types of stomach Digestion process of ruminant and non ruminant	2
18.	Enlist the primary sources of following nutrients for livestock	Primary sources of the following nutrients for livestock nutrition: Carbohydrates	4

		Fats Proteins (amino acid- general concept only) Minerals Vitamins Concept of a balanced diet or ration	
19.	Explain the role of parasite in livestock production	Meanings of parasitism and pathogen and give examples of each. Harmful effects of parasitism. Example of a symbiotic relationship.	4
20.	Explain reproduction of pathogen	General description characteristics and methods of reproduction of bacteria, fungi and viruses.	2
21.	Define insects	External structure of a typical insect. Life-cycle of the two insects with differing life cycles	2
22.	Define the term climate	Definition of climate and explain how the various factors affect climate. Definition of term weather and the components that make up weather..	4
23.	Explain the process of preservation	Preservation by drying. Preservation by pickling. Preservation by sterilization. Preservation by using sugar.	4
24.	Draw a simple breeding line of plants and animals.	Definition of breeding In- breeding and the problems related to it in agriculture production. Cross breed and the concept of hybrid vigor.	4
		Total hrs	78

Applied Mathematics

Full marks: 50

Total hours: 78

Description

This subject is design as a foundation course which gives basic mathematical skills and knowledge necessary for mastering the course activities in JTA training to make them efficient in their future occupation

Objectives

At the end of the training the trainees will be able to:

- Calculate of different aspect of agriculture and livestock relater factors
- Calculate area, dose, space requirement etc
- Calculate different mathematic calculation

SN	Skill	Related Technical Knowledge	Time (Hrs)
1.	Add the followings:	Mixed multiple digit whole numbers Mixed fractions	2
2.	Subtract the followings:	Mixed multiple digit whole numbers Mixed fractions	2
3.	Multiply the followings:	Mixed multiple digit whole numbers Mixed fractions	2
4.	Divide the followings:	Mixed multiple digit whole numbers Mixed fractions	2
5.	Apply the principles of moving decimal	Application of the principles of moving decimal points when multiplying and dividing by 10, 100, 1000 etc.	2
6.	Apply conversion factors	Conversion from fractions to decimals Conversion from decimals to fractions Conversion between metric and imperial measures Conversion from metric liquid volume measures to local measures Conversion from local measures to metric liquid volume measures Conversion from local weights to metric weights Conversion from metric weights to local weights Conversion of land area in square meters to hectare, ropani and bigha Conversion of land area given in hectares, ropani and bigha into square meters Use of conversion tables	4
7.	Prepare report of analog / digital	Reading analog and digital clock on 12 and 24 hour basis	2
8.	Calculate average value	Calculation of averages Calculation of volume of container, pieces of wood	2
9.	Calculate space	Calculation of space requirement for a given number	6

	requirement for livestock	of livestock when space per unit is known	
10.	Calculate no. of livestock as availability of pasture land	Calculation of stocking rate for a given area of pasture when the livestock unit for a species is given Calculation of percentages	2
11.	Calculate profit/ loss	Calculation of gross income, expenditures, net income, and percentage of profit	2
12.	Calculate net profit/loss	Calculation of difference in real profit amount and % profit amount	2
13.	Calculate seed rate	Calculation of amount of seed/seedlings needed for a given area of land when the spacing is given	2
14.	Calculate moisture content in grain	Calculation of the harvesting loss in percentages when the field weight and weight at store are given	2
15.	Calculate requirement of nutrient for foliar application	Calculation of the weight or volume of pesticide or fertilizer containing a given quantity of active ingredient or nutrient when the % of active ingredient or nutrient is given	2
16.	Calculate requirement of pesticide for dilution	Calculation of the amount of concentrated chemical to use for making a spray solution when the dilution is given, the rate of application per hectare or other unit is given and the total area is known or can be determined by measuring	4
17.	Calculate requirement of medicine for animal	Calculation of the amount of medicine to give when the doses for a given weight is known and the weight of the animal can be determined	2
18.	Calculate requirement of feed for animal	Calculation of the amount of feed to be given to a certain number of animals when the amount for one is known	4
19.	Calculate number of plant of given area	Importance of calculation Calculation of the plant population for a hectare or other unit of measure when the number of plants in a given area is provided Calculate Cropping Intensity Explain disease scoring technique.	2
20.	Calculate fertilizer rate	Calculation of the amount for a given area of land when the seed rate, rate of application of a chemical or fertilizer is given	2
21.	Calculate dilution ratio	Calculate the amount for any other volume, yet keeping the same concentration when a given dilution rate per liter or 10 liters	2
22.	Calculate yield	Calculation of the yield per hectare when the yield of a plot of known size is given,	2
23.	Perform geometrical calculation	Calculations and estimations of perimeter, area, and volume of right-angled figures, triangles, trapezoids, circles, and cylinders	2
24.	Calculate unit cost	Calculation of cost per unit of agriculture/livestock	2
25.	Take Measurement of fallowing	Measurement and record of length and distances Measurement of liquids using metric system	2
26.	Interpret ratio	Application and interpretation of ratio and proportion	2

27.	Estimate fallowing	Estimation of distance by pacing (stepping off) Estimation of areas of irregular shaped land by dividing them into right-angled triangles and/or trapezoids	2
28.	Determine the area of land	Determination of the area of various shapes of land Square, Triangular, Rectangular, Hexagonal etc.	2
29.	Calculate cost of production	Calculation of wage, input, rent of agriculture items by the metric system Calculation of harvest price, storage costs and off season price are given	4
30.	Interpret results of calculation	Interpretation and presentation of simple graphs, histograms, charts and maps, choosing an appropriate form for the information being illustrated	4
31.	Assess the accuracy of results	Approximations and estimations, and assess the accuracy of results obtained by carrying out the exact calculation	2
32.	Convert Centigrade to Fahrenheit	Elementary algebraic substitutions e.g. conversion between centigrade and Fahrenheit and livestock weighing formulas	2
		Total Hrs	78

Agriculture and Environment

Length: 234 hrs
Theory: 48 hrs
Practical: 186 hrs

Description

This subject provides the students the basic skills and knowledge about agricultural its relationship with environment soil and public health.

Objectives:

At the end of the course student will demonstrate skills and knowledge related to the following

- Explain effect of weather and climate
- Explain soil, soil nutrient and soil testing
- Prepare and protect farm yard manure, compost making, green manure and bio fertilizer
- apply chemical fertilizer
- explain and soil conservation
- Explain concept of IPM
- deal simple public health issues

SN	Skill	Related Technical Knowledge	Time (hrs)
1	Define weather/ climate	Definition of weather & climate Importance of studying weather & climate Including its various components (rainfall, temperature, humidity, sunshine, wind, frost, hail) Information included on weather reports, including their meanings. The usual measurements taken at weather stations in Nepal	4
2	Record rainfall	Importance of taking rainfall Simple methods appropriate for village conditions Care for rain gauges. Read rainfall gauges Use, maintenance and care of rainfall gauges	8
3	Record temperature	Care of thermometers. Read temperature C. and F. from a thermometer Read maximum and minimum temperature Record maximum and minimum temperature. Convert between C. and F. degrees, and visa versa. Information & importance about temperature, C. & F. Use, maintenance and care of thermometers, including minimum-maximum thermometers Conversion of C. to F. and visa versa	8
4	Take sun shining record	Effect of sunshine, including phenomena of north / south facing slopes, drying of soil, length of growing season etc explain light intensity	4

5	Explain effect of microclimate	Effect of wind to local agriculture conditions. Concept of microclimate and its affects on crops and livestock including human activities Advise regarding the suitability of a crop for a particular microclimate	2
6	Measure relative humidity (RH)	Definition of RH (relative humidity) Use, maintenance of barometer Information about dry and wet bulb thermometer Care for barometer Calculation of RH	4
7	Prepare weather report.	Formation and preparing data for a weather report in weekly, monthly and yearly basis	4
8	Identify the 4 major components of soil	Definition of "Soil", including 4 major components Air, Water, Organic matter, Inorganic matter Function of soil components	8
9	Identify Parent material of soil	Rocks & minerals Organic & inorganic matter Time required to form soil Formation	4
10	Explain soil horizon	Concept of "top-soil" Why must be top-soil conserved Soil depth	4
11	Determine soil texture by feel test	Texture type Classification of soil texture Triangle of soil General concept of soil texture and why different crops need different textures Soil structures	4
12	Determine soil moisture by feel test	Concept of water holding capacity and its importance A few factors that affect water holding capacity. Concept of moisture requirements for different crops	4
13	Collect soil sample for lab test	Soil testing and its importance Testing purpose Methods of sampling Packing Labeling	6
14	Determine soil pH using soil kit box	Importance of pH with respect to soil fertility Different crops grown in different soils of various pH Correction of pH by organic and inorganic method. Use of lime to neutralize pH Use of gypsum to neutralize pH	6
15	Explain common causes of decreasing soil fertility.	Role of organic fertilizer to enrich soil Factors affecting soil fertility (rainfall, slope, wind) Advantages and disadvantages of compost versus chemical fertilizers. Decomposition of organic matter in soil Explain the role of livestock, forest and crop residues for enhancing soil fertility.	4
16	Explain role of Nitrogen/ phosphorus/ potassium	Importance of essential major elements (Nitrogen, phosphorus, potassium) in soil	4

17	Explain role of micro nutrient in soil	General role of micro-nutrients in the soil Name of major and minor (13) soil nutrients	4
18	Explain role of plant to control soil erosion	The role of plants in the control of soil and water erosion.	4
19	Explain Integrated Plant Nutrient System (IPNS) concept	Definition, importance and objectives of IPNS Role of FYM/compost in IPNS Estimation of n	2
20	Explain Integrated Pest Management (IPM) concept	Principle of IPM Philosophy of IPM Importance of IPM Tools of IPM Components of IPM	2
21	Define compost	Definition of organic matter and compost Benefits of compost Advantages of compost	2
22	Demonstrate compost making.	Materials & methods for compost making Heap method Pit method Factors affecting compost making Temperature Bacteria / micro-organisms	4
23	Protect compost from environment	Protection from evaporation Protection from leaching Compost making, protection of compost,	4
24	Determine compost is ready for application	Nature & property of compost Methods of testing	4
25	Apply / mix compost into the soil.	Utilization of compost at best time Mixing of compost into the soil.	4
26	Define Farm Yard Manure (FYM)	Definition of FYM Importance of FYM Role of FYM in to soil Soil nutrient content in FYM	2
27	Decompose FYM	Method of decomposition Role of micro-organism for decomposition Protection from leaching and evaporation Indication of decomposition	4
28	Apply FYM in soil	Application methods Time of application Precaution at application Mixing technique in to soil	6
29	Collect cattle urine	Composition of fresh cattle urine Uses of cattle urine Role of cattle urine in environment Method of collection in local condition	2
30	Decompose cattle urine	Importance of decomposition Use of decomposed cattle urine Method of decomposition in local area	4

31	Apply decomposed cattle urine	Purpose of application (Insecticide or plant nutrient) Stage of plant, Preparation before application Selection of time for application, Methods of application	4
32	Cultivate a green manure crop	Definition of green manure Role of green manure enhances soil fertility. Utilization of green manure to enhance soil fertility Characteristics of suitable green manure plants. Including proper stage of plant growth for utilization.	4
33	Mix green manure in to soil	Stage of plant for green manure. Mix green manure into the soil.	4
34	Apply azzolla for rice field	The role of plants in enhancing soil fertility. Application of azzolla to field for green manure	4
35	Identify effective types of nodules of leguminous crops	Characteristics of leguminous crops Differentiate between legumes and non legumes Identification of effective types of nodules	4
36	Inoculate seeds with suitable bacterial cultures	Care for inoculum Different types of bacterial cultures found in Nepal. Process of inoculation of leguminous seeds with Rhizobium culture. Precautions during working with bacterial cultures. Calculation of concentration of bacterial sugar solution for a given amount of seed Protection of inoculated seed Sowing of inoculated seed	4
37	Explain relationship of crop rotation and soil fertility'	The concept of crop rotation with respect to soil fertility; including specific examples of leguminous crops followed non-leguminous crops.	4
38	Identify important chemical fertilizers available in Nepal	Common fertilizer found in Nepal The advantages and disadvantages of chemical fertilizers, concentrating on the major fertilizers available in Nepal	4
39	Explain nutrient content of major chemical fertilizers.	major nutrients of fertilizer in each common chemical fertilizers. Calculation of common dosages of chemical fertilizers Review of soil test results and calculating the dosage of common chemical fertilizers for major crops	4
40	Apply chemical fertilizers	Application of fertilizers by broadcasting Application of fertilizers by top dressing Application of fertilizers by band placement Application of spraying	4
41	Demonstrate measures to control erosion by plantation	The role of plants in the control of soil erosion How dose plants to control erosion.	4
42	Develop contour lines with an "A"-frame	Calibration of an A-frame Methods of lining Development of contour lines, including the use of an A-frame and other methods	4
43	Demonstrate contour making	Option for land improvement techniques Various options for erosion control, including terracing, contour main, strip-farming.	8

44	Make simple gravity flow irrigation systems.	Design of simple irrigation system	4
45	Store/dispose used materials.	Proper storage and disposal of chemicals, Designing & implementing safe methods to store and dispose chemicals, medicines and sharps medicines and sharp instruments	4
46	Conserve source of safe water	Safe water, protection of water sources methods of purification of water Most common parasites in humans and their methods of control (roundworms, tapeworms, hookworms, ziardia, amoebae)	4
47	Explain methods of prevention of infectious diseases	Source of infection for hepatitis, its prevention Prevention of tuberculosis, treatment Prevention of Brucellosis, treatment Parasites, HIV / AIDS, Malaria, Hepatitis, Tuberculosis, Brucellosis	4
48	Perform fist aid measures for the following conditions	Common first and measures, Bleeding wounds Fractures, Airway obstructions, Burns, Poisoning	4
49	Explain role of balanced diet	Importance of nutrition for mental as well as physical growth and development of men an women	4
50	Build a pit latrine	Importance of Latrine Latrines and sanitation: different types of latrines	6
51	Explain options for family planning	Definition of population Methods of Family planning Importance of Family planning Options for family planning	4
52	Build a smokeless stove	Smokeless stoves, their advantages, disadvantages and construction Methods of recycling: composting and biogas Recycling - compost, biogas	4
53	Explain Organic farming	Definition of Organic farming Importance of Organic farming Philosophy of Organic farming Standards of organics products Basic requirements for Organic farming.	2
53	Explain basic principles of Permaculture	Definition of permaculture Philosophy and principle Objectives of permaculture Importance of studying permaculture	2
54	Identify common components of Permaculture in local area	Identification of locally available plants and other elements Arrangements of locally available components	4
55	Apply methods of pollution control	Soil and tree conservation General principles of air, water and soil pollution using terminology that villagers can understand Methods of pollution control	4
56	Explain role of sterilization	Prevention of disease through boiling of milk and water; hygienic handling of milk	2
		Total	234

Crop Production I

Total: 234
Practical: 187
Theory: 47

Description:

Description of this includes discussions and practices of the principles of crop husbandry as related to successful production of major field crops of Nepal like rice, maize, millet, pulses (summer & winter) sugarcane, fiber crop, oilseeds, narcotic & tuber crop. It also includes weeds and their control.

Objectives:

At the end of the course student will be able to:

1. Explain principles of crop husbandry as related to successful production of major field crops
2. Cultivate of major and minor crops like rice, maize, millet, pulses (summer & winter)
3. Produce seeds of crops

S.N	Task statement	Related technical knowledge	Time (Hrs)
1	Define Agronomy	Definition of agronomy and its importance. The contribution of agronomy towards relationships with other, sciences Relationships with soil animal science, horticulture, other, sciences. Integrated Pest Management and crop production	2
2	Identify field crops	Identification of the field crops with their external parts Uses of the field crops	8
3	Identify different seeds available in the local area	Identification seeds available in the local area with the parts of seeds (internal and external)	7
4	Classify crops	Classification of crops according to various agronomic categories Grain crops Legumes crops Cash crops Oil crops Industrial crops	3
5	Explain the term tillage	Meaning and types of tillage Objective of tillage	1
6	Identify tillage equipment used for primary and secondary tillage	Identification and function of tillage equipment used for primary and secondary tillage List of tillage equipment and their functions	8
7	Repair / maintain tillage equipments	Animal driven tillage equipment Power driven tillage equipments Part of plough	8
8	Explain the effect of soil and climate on crop growth and production	Types of soil in relation to crop production Role of soil types in crop growth Types of climate found in Nepal Elements of climate Role of climatic factors in crop production (temperature, light, rainfall, humidity)	4

9	Identify weeds found in different crops	Definition of weeds Harmful effect of weeds to crops	8
10	Classify weeds	Classification of weeds on the basis of Life cycle Annual, biannual and perennial Seasonal weeds Weed intensity with respect to crops Types of weeds Absolute weeds Economic weeds	2
11	Control weeds form crops / fields	Weeds control methods Physical method, mechanical methods Biological methods and chemical methods (herbicide)	10
12	Apply herbicide to control weeds	Types of herbicides Selective, Nonselective Name of herbicides Methods of herbicide application	8
13	Grow two crops appropriate to the local area (Maize Paddy Wheat Lentil Pigeon pea)	Importance, Climatic requirements, varieties Planting methods, planting season, intercultural operations,	30
14	Harvest grain	Harvesting methods	8
15	Cure grain	Curing Methods	8
16	Threshing grain	Threshing methods	8
17	Clean grain	Cleaning methods	6
18	Dry grain	Drying methods	4
18.1	Seed grading	Grading Standard and basic parameters	2
19	Determine the moisture content	by "cricking"	2
20	Store grain	Grain storage principles	1
21	Control of most common pests	Identification of most common pests related to grain storage Prevention and control methods of most common pests related to grain storage	10
22	Define seeds	Definition of seed Importance of quality seeds Characteristics of quality seeds	1
23	Classify seeds	Types of seeds breeder's stock seed foundation seed registered seed certified seed	1
24	Explain principle of seed production	Basic principles involved i seed production Seed formation process Pollination fertilization Maintenance of seed purity physical purity genetical purity Isolation distance Rouging Field inspection Seed certification Production of quality seeds	2
25	Select pocket area for seed production	Climatic, environmental, land requirement for different types of seed production	4

26	Calculate seed application rate for different crops	Seed rate calculation on the basis of Area of land Germination percentage Purity percentage Planting distance	8
27	Participate in seed multiplication production activities	Seed multiplication process Seed production methods	10
28	Maintain isolation distance to prevent cross-pollination	Methods of isolation - Time isolation - Distance isolation - Caging Isolation distance between two varieties for different crops on mode of pollination	6
29	Inspect seed production field	Stage of seed crop to be inspection Frequency of crop field inspection	8
30	Participate in rouging	Meaning of rouging Importance of rouging in quality seed production Methods of rouging	8
31	Select plating material for seed potato	Size of planting material (seed potato)	4
32	Harvest seeds	Harvesting indication Harvesting methods of different crops	6
33	Take a seed sample for seed test	Seed sampling method Importance of seed test	4
34	Determine moisture % of seeds	Methods of seed moisture determination	4
35	Treat seeds for storage	Seed treating methods	4
36	Store seeds	Seed storage method Seed moisture and storage life	4
37	Perform seed germination test	Methods of germination test	4
38	Calculate germination percentage	Calculation methods on the basis of germinated and non germinated seeds	4
39	Explain Different methods of Irrigation	Describe Small irrigation System, Basin, ring, drip, Flooding, Sprinkler irrigation system and application	4
		Total	234

Horticulture I

Total hours	234
Theory	53
Practical	181

Description:

This course is designed to provide trainees to developed necessary skills and knowledge of horticultural techniques required for general nursery management, plant propagation, kitchen gardening, flower production and landscaping. This course provides various principles and practices in the field of plant propagation, nursery techniques, kitchen gardening and basic principles and practices for the flower culture, and land beautification, indoor and outdoor gardening.

Objectives:

At the end of this course, the trainees will be able to

1. Describe the role of horticulture in the economic development.
2. Explain the classification of fruits, vegetables and ornamental plants.
3. Identify the suitable horticultural crops for grown in different agro. Climatic regions
4. Describe importance of Integrated Pest management in horticulture.
5. Establish nursery for horticultural plants.
6. Describe the soil management practices.
7. Produce the major vegetables of the Kitchen garden
8. Produce seeds and multiply the seeds of major vegetables.
9. Plan the different styles of gardening.

General Horticulture

S.N	Task Statement	Related Technical knowledge	Time (Hrs)
			1
2	Identify the ecological niches	Classification of ecological zones of Nepal Tropical zone, Subtropical zone and Temperate zone	1
3	Explain the role of climatic factors in the plant growth	Climatic factors (temperature, humidity, rainfall, light, wind) Role of each factors in plant growth	1
4	Explain the role of plant nutrient in plant growth	Essential plant nutrients Macro (N,P,K, Ca, Mg, S) Micro (Zn, B, Mo, Mn, Cu, Fe, Na) Functions and deficiency symptoms of macro and micro nutrients Sources of macro and micro nutrients	3
4.1	Explain Importance of integrated Pest management in Horticultural crop	Definition of IPM , Philosophy of IPM, History Of IPM Components of IPM	2
5	Explain the role of Plant	Definition Plant Growth Regulators	2

	Growth Regulators (PGR)	Types of plant growth regulators (Auxin, Gibberellins, Cytokinin, Ethylene Inhibitors) Concept of growth and Development Role of PGR in growth and development of horticultural plant	
6	Apply PGR in plant propagation	Rooting in cutting and layering Application methods, Dry application, Wet application/ soaking method	4
7	Apply PGR in Fruit ripening	Types of fruits regarding as ripening (Climacteric and non climacteric) Application Methods	4
8	Establish an orchard	Basic consideration while establishing an orchard	1
9	Lay out an orchard	System of orchard lay out Square system Rectangular system Hexagonal system (Triangular system) Contour system	7
10	Transplant fruit saplings	Using of planting board Digging of planting pits Filling of planting pits Plant fruit tree on the filled pits	9
		Total	35

Nursery Techniques and plant Propagation

S.No	Task Statement	Related Technical knowledge	Time(Hrs)
1			
2	Categories nursery	Classification of nursery on the basis of Ownership, Duration, Plant grown Concept of indoor nursery	1
3	Identify the nursery tools	List of nursery tools and their function	6
4	Select site for nursery	General consideration for nursery site selection	5
5	Lay-out a nursery	Space requirement for a nursery Space between two nursery Length and breath of a nursery Calculation of area for a nursery 3-4-5 triangle method of nursery bed	8
6	Prepare nursery beds	Digging of soil Treating of nursery soil Mixing of manure Raised beds, surface bed, sunken beds Condition require for each type	10
7	Sow seeds on nursery	Pre-sowing Treatment of seeds Seed stratification Seed scarification Soaking	7

		Seeding methods (line sowing, broad casting, mixing with sand) Seeding spacing, Seeding depth	
8	Care for nursery	Mulching, Irrigating, Drainage, Weeding Protection from adverse environmental condition (Hot, cool, high rain) insect pests diseases	4
9	Prepare potting mixture	Components of potting mixture Ratio of the component Mixing of potting mixture Filling of earthen pots/ polythene pots	6
10	Grow plants in hot bed	Planting/sowing of seed in polythene pots Concept of hot bed Preparation of hot bed	7
11	Define plant propagation	Definition of plant propagation Types of plant propagation Sexual Asexual Advantage and disadvantage of both sexual and asexual propagation	2
12	Propagate plant by seed	Definition of seed Seed formation process Types of seeds Basic requirement for seed germination Seed germination process	5
13	Classify Asexual/vegetative propagation	Definition of vegetative propagation Types of vegetative propagation Cuttings Layering Grafting Budding	2
14	Propagate plants by cutting	Definition of cuttings Importance of cutting Types of cuttings List of plants which are propagated by cuttings Process of rooting in cutting	10
15	Propagate plants by layering	Definition of layering Importance of layering Types of layering Season for layering List of plants which can be propagated by layering Process of rooting in layering Factors affecting rooting in cutting	10
16	Propagate plants by grafting	Definition of grafting Importance of grafting Types of grafting Season for grafting List of plant which are propagated by grafting Process of graft union formation Factors affecting in graft union formation	10

17	Propagate plants by budding	Definition of budding Importance on budding Types of budding Season for budding List of plants, which can be propagated by budding Factors affecting in bud union formation	10
18	Identify nucellar seedling	Concept of poly-embryonic seeds Characteristics features of nu cellars seedlings	3
19	Define micro-propagation	Concept of micro-propagation Types of micro-propagation Shoot tip culture Tissue culture	3
		Total	110

Floriculture and Ornamental Horticulture

S.N.	Task statement	Related Technical knowledge	
2	Identify ornamental plants	Identification of different flowering, non-flowering indoor, outdoor ornamental plants available in locality Name and use of ornamental plants	8
4	Design a garden	Definition of ornamental garden Types of ornamental garden Component of ornamental garden	10
5	Propagate bonsai	Definition of bonsai Importance of bonsai Types of bonsai Method of bonsai making	8
6	Grow seasonal flowers	Seasonal flowers Cultural practices for seasonal flower production	8
7	Grow cut flowers (roses, gladiolus, carnation)	Importance of cut flowers Cultural practices for cut flower	6
8	Prepare lawn	Meaning and Definition of lawn Methods of lawn preparation	7
9	Maintain lawn	Mowing, Scarping, Irrigating,	6
10	Prepare pots	Preparation of potting mixture List of potting mixture materials Methods of pot filling Plantation of flower/plant in pot Methods of repotting	6
		Total	60

Kitchen Gardening

S.N.	Task statement	Related technical Knowledge	Time (hrs)
2	Select site for kitchen gardening	Requirements for a kitchen garden site Size for a kitchen garden according to size of family and location of site	4
3	Prepare land for kitchen garden	Fencing, Plotting, Bonding, Beds preparation,	5
5	Prepare a calendar of operation for a kitchen garden in a locality	List of vegetable can be grown in the kitchen garden for a year Selection of vegetable according to growing season, and nutritional value	3
6	Grow seasonal vegetables in kitchen garden	Different cultural methods of growing seasonal vegetables in kitchen garden	10
7	Prepare compost for kitchen gardening	List of composting material available in the kitchen garden, Utilization of kitchen waste Utilization of bi-product of kitchen garden	6
		Total	29

Apiculture

Total time: 78 Hrs

Theory: 16 Hrs

Practical: 62 Hrs

Desperation

This course provides basic knowledge and skills for bee keeping as appropriate to Nepal

Objectives

At the end of this course student will be able to

- Identify bee species for kepping purpose
- Identify equipments in use for bee keeping
- Keep bee for income generation
- Explain importance of hony for healthy life
- Harvest honey
- Explain value chain

SN	Skill	Related Technical Knowledge	Time (Hrs)
1.	Identify Different species of honey bees found in Nepal	Classification of bees Characteristics of Bees General characters of each species	2
2.	Explain importance of bee keeping	Introduction of bee keeping. History of bee keeping. Objective of bee keeping. Nepal's present scenario. Social, Nutritional, Medical value of honey. Feasibility of bee keeping Bee keeping tradition of Nepal.	2
3.	Identify potential area for bee keeping in Nepal.	Appropriate climatic zone of Nepal for different honeybee species. Bee flora Bee keeping tradition.	2
4.	Identify common forage for honeybee.	Introduction of bee forage. Identification of major, minor medium source of nectar, pollen and honeydew for bees. Preparation of calendar for bee foraging. Different species of bee forage.	
5.	Select site to place bee hive.	Site selection criteria for apiary	4
6.	Explain communication characteristics Of each species	Dancing Forging Defensive and other behavioral characteristics.	2
7.	Differentiate Queen, Workers and Drones	Understanding the age and cast related function. Need of colony. Lifecycle of honeybees. Work division.	4
8.	Identify the parts of bee hive	Functions and specification of each parts pf bee hive. Traditional bee hives with fixed comb. Modern	2

		comb. Importance of bee space Different types of bee hives.	
9.	Identify bee keeping equipments	List of equipments Function and specification of given tools and equipments. Bee veil, smoker, honey extractor etc.	4
10.	Transfer honey bee colony from fixed to movable comb hive.	Precaution during transfer	4
11.	Manage honey bee colony	Inspection of colony Precaution to bee sting and remedy measures. Seasonal management as per need and performance of honey bee colony.	6
12.	Unite weak colony	Characteristics of weak colony Weak swarm management	4
13.	Divide strong/ over populated colony	Weak swarm over populated colony Strong swarm management.	4
14.	Feed bee during dearth	Artificial feeding materials Amount of artificial feed.	2
15.	Prevent / control absconder robbing / worker laying	Causes of basending robbing and worker lying. Prevention and control method.	4
16.	Rear Queen	Criteria colony selection for queen rearing Methods of Queen rearing Natural reproduction in colony.	4
17.	Preparing nucs for Queen rearing	Criteria for selection of mother stock and builder colony.	2
18.	Handle queen cell		2
19.	Graft Queen larva	Method of preparation of queen cups Fixing cups to cell bars.	4
20.	Explain common diseases of honeybee	Introduction, sign, symptoms, prevention, control and treatment of EFB, TSBV, Nosema disease.	4
21.	Prevent honeybee from mites / wax moth	Nature of damage caused by mites and wax moth Identification of mites and wax moth. Prevention, control and treatment	2
22.	Identify predators of honeybee	Identification nature of damage, application of prevention and control Wasps Hornets Pine Marten Ants Bee eater birds Bear	4
23.	Identify crops that need to honey bee for pollination	Definitions of pollination Importance of honey bee for pollination Pollination mechanism.	2
24.	Save bee from pesticide poisoning	IPM Safe use of pesticide Symptoms and sign of pesticide poisoning Method of pesticide application	2

		Harmful pesticide for honey bee.	
25.	Migrate colonies	Reason for migration Precaution during migration Handling methods during migration	2
26.	Harvest honeybee products	Quality parameters of honey of different honeybee species. Use of honey Use of bee wax Parameters of safe storage of honeybee products. Precaution during storage for quality	4
27.	Prepare value added products	Uses of bees wax for cosmetic purpose, medicinal purpose, lighting purpose.	2
28.	Identify the requirement of trade of honeybee's products.	Labeling, packaging, quality, standard, regulation Trade chain Creating niche and strengthening chain	2
29.	Analysis cost benefit ratio	Calculation of investment and return from the business plan. Direct and indirect benefit from the business.	2
30.		Total	78

Farm Implement Maintenance and Repair

Length: 78 hrs

Practical: 62 hrs

Theory: 16 hrs

Description:

This course provides basic skills and knowledge and practical skills necessary for the regular maintenance of farm tools and machinery.

Objectives

At end of the course the student will be able to:

1. explain parts and function of hand machine used in farm
2. perform primary and secondary tillage
3. use plant protection equipment
4. use threshing equipments
5. regular maintenance of farm tools and machinery

SN	Skill	Related Technical Knowledge	Time(hrs)
1	Explain problems for farm mechanization in Nepal	Introduction of farm mechanization Scope of farm mechanization Problems of farm mechanization Importance of farm mechanization	2
2	Identify tillage equipments	Definition of tillage Definition primary & secondary tillage Primary tillage equipments & their uses Secondary tillage equipments & their uses	4
3	Identify parts of mold bold/country plough	Parts of MB & country plough with function of each parts Assembling & disassembling of MB & country plough Methods of ploughing Advantages and disadvantages of MB and country plough	4
4	Identify secondary tillage equipments	Use & parts of Spade Use & parts of Rake, Use & parts of Planker Use & parts of Sickle, Use & parts of Hoe etc & their uses	4
5	Identify parts of tractor driven Plough	Parts & function of disc plough Parts & function of Spike tooth harrow Parts & function of Cultivator	6
6	Identify farm equipments	Identification, function & parts of Seed dressing Sowing, Harvesting, Thresher and its use and maintenance., Cleaning, Chaf cutting equipments	8
7	Calibrate sprayers	Types of sprayer Use of knack sap sprayer Importance of knack sap sprayer Function knack of sap sprayer	6

		Parts of knack sap of sprayer Handling method	
8	Handle duster	Types of duster Use of duster Importance of duster Function of duster Parts of duster	2
9	Explain centrifuge system	Classification & working principle of centrifugal water pump Installation & starting of centrifugal pump	4
10	Fill fuel	Types of fuel used in machine Method of filling Precaution during filling	4
11	Fill lubricant	Types of lubricant used in machine Method of filling Precaution during filling	4
12	Calibrate an “A” frame	Function of A frame Use and importance of A frame Counter & tares making principle	8
13	Prepare gravity flow irrigation channel	Definition of irrigation Definition gravity flow Water intake system of plant Role of moisture for plant growth Wilting point Requirement of moisture for crop, vegetable & flowers Preparation of drainage channel	6
14	Repair hand pump	Water lifting system Internal parts of hand pump Causes of trouble	4
15	Identify hand tools	Hand tools & there uses Tools for propagation & there uses Nursery tools & there uses Tools for training & pruning & there uses Dairy tools & there uses	6
16	Calibrate burdizo castrator	Use and calibration of castrator	2
17	Calibrate microscope	Use, parts and calibration of microscope	4
		Total Hrs	78

Livestock Production and Management I

(Cattle/Buffalo and Yak/ Chauri Production)

Total Hours : 156 hrs
Theory : 32 hrs
Practical : 124 hrs

Description:

This parts of course is designed to provide basic skills and knowledge of cattle, buffalo, sheep and goat farming including breeds of cattle and buffalo, housing, care and manage of newly born calves, pregnant/lactating female, breeding bull, replacement stock for commercial farming and marketing of live animal and milk. It is suggested that school of high altitude should **Choose Yak & Chauri**.

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of cattle, buffalo sheep and goat farming in Nepal
2. explain different breeds of cattle and buffalo sheep and goat
3. design shed for commercial farming
4. care/ manage newly born calves, pregnant/lactating female, breeding bull, replacement stock
5. Explain cattle and buffalo breeding
6. Explain feeds and feeding of cattle and buffalo sheep and goat
7. Market live animal and milk

S.N	Skill	Related technical knowledge	Time (Hr)
Cattle/Buffalo and Yak/ Chauri Production			
1.	Introduce livestock farming	Introduction of animal husbandry Scope of livestock production in Nepal Role of livestock in National economy Present status, problem, prospect and strategy for Livestock production	2
2.	Classify livestock	Zoological classification of common livestock	1
3.	Study animal behavior	Importance of study of animal behavior Feeding behavior Breeding behavior Behavior during sick Excitement by seeing strangers	1
4.	Explain role of cattle and buffalo production in Nepal	History of cattle/ buffalo production Strategy of cattle and buffalo production in Nepal	1
5.	Explain relationship between agriculture/forestry and livestock	Concept of agro forestry, interrelation between livestock and agriculture, silvipature, lease hold forest, role of community forest in livestock production	1
6.	Explain social problems for cattle/buffalo&	Social problems in cattle/buffalo farming Legal prohibition for slaughtering of cattle	1

	yak/chaori production	Socio environmental problems	
7.	Classify cattle / buffalo & yak/chaori breed on the basis of use	Zoological classification of cattle/buffalo Milch breed, Dual purpose, Draft purpose	1
8.	Identify external body parts of cattle/buffalo & yak/chaori	Objectives to study external body parts Identification of body parts on live animal and with help of well labeled diagram of live animal	1
9.	Identify local breeds of cattle	Breed characteristics of Pahadi, Achhami, Lulu, Chauri, Yak Nak	1
10.	Identify improved breeds of cattle	Breed characteristics of Milch breed-Jersey, Holstein, Brown Swiss, Red Sindhi, Sahiwal Dual Porpose: Hariyana, Nelore, Tharparkar Draft breed: Amritmall, Khilari, Hallikar	4
11.	Identify local breeds of buffalo& yak/chaori	Breed characteristics of Lime, Parkote Local breeds of yak & chauri	1
12.	Identify improved breeds of buffalo	Breed characteristics of Murrah, Jafarbadi, Surti, Mehsana	1
13.	Handle calf for treatment	Introduction Objectives of restraining Restraining by casting Restraining by catching Precaution to be taken	2
14.	Restrain adult cattle by casting	Introduction of casting Purpose of casting Length and thickness of casting rope Casting methods: Burly method, Reef's method	2
15.	Restrain buffalo by casting	Introduction of casting Length and thickness of casting rope Casting methods: Rope squeeze method	2
16.	Restrain adult cattle/ buffalo by using Travis/Crate	Introduction Size of trevis: Length, height etc Preparation of Travis by local materials	1
17.	Restrain by using local made Damlo	Preparation of Damlo by using local material Casting by Damlo	1
18.	Collect manure	Composition of cattle/buffalo dung as manure Importance of cattle/buffalo manure for improving soil quality/ fertility Methods of collection/ composting Demonstration of compost manure Protection from leaching and evaporation Application of manure	2
19.	Castrate male calf by close method	Introduction of castration Importance of castration of bull Proper age of castration Handling during castration Tools, materials, equipments used in castration Precaution during castration Use of antiseptic Advice to the farmer	2
20.	Calculate live weight	Importance of body weight calculation	2

	by body measurement of cattle/buffalo& yak/chaury	Principle of body wt .calculation Methods of body measurements Calculation of live wt. by using formulas Tools and equipment used Live wt. estimation according to age, lifting weighing and other method.	
21.	Perform branding for identification	Introduction of branding Importance and principle of branding Handling method for branding Tools equipments used in branding Formula used for numbering Methods of branding Other temporary marking system if in used	1
22.	Perform hoof trimming	Introduction of hoof trimming Importance and principle of hoof trimming Handling method of hoof trimming Tools equipments of hoof trimming Formula used for numbering Methods of hoof trimming	1
23.	Provide minerals/salt for cattle /buffalo& yak/chaury	Importance of mineral & salt Signs and symptoms of mineral deficiency Methods of providing salt &minerals	1
24.	Select breeding bull /female	Definition of selection for breeding purpose Importance of selection Principle of selection Selection criteria for male and female for breeding Importance of records for selection Criteria for selection	1
25.	Defect heat by external sign	Oestrous cycle Importance of heat detection Age of puberty cattle/buffalo Signs and symptoms of heat in cattle/buffalo Appropriate time for mating/ AI	1
26.	Detect standing heat on cow/ buffalo& yak/chaury	Use to detect heat by teaser Mounting to other animals	1
27.	Care pregnant cattle/buffalo& yak/chaury	Introduction Feeding management Housing management Space requirement for female Sanitation of barn Maintaining health record Correction of health related problems Pregnancy diagnosis -Routine drenching management.	1
28.	Provide care for breeding male bull	Introduction Feeding management Housing management Space requirement Sanitation Health care management	1

		Routine drenching against parasites	
29.	Care during parturition	Signs and symptoms of before parturition Space requirement Cleaning and sanitation of barn assisting during parturition time Precaution during parturition	2
30.	Care newly born calf	Removal of mucous from nose Importance of colostrums feeding Assisting for colostrums feeding Assisting for breathing Assisting for walking/ moving Removing of navel Orphan management if necessary	2
31.	Arrange for breeding management of cattle/buffalo& yak/chaury	Importance of breeding Sexual maturity of male and female Reproductive parts of male and female Spermatogenesis and oogenesis of cattle/buffalo Sensational effect Appropriate time of mating Arrangement of mating Methods of breeding of cattle/buffalo	2
32.	Provide feed for cattle/buffalo& yak/chaury	Importance of feeding of cattle/buffalo Routine feeding time Amount/quantity of feed/day/time Feeding style Utilization of feed and water Requirement of feed and feeding standard	2
33.	Provide preventive health care	List of ecto-endo parasite of cattle/buffalo. List of common diseases of cattle/buffalo Preventive measure of disease and parasite Vaccination schedule of cattle/buffalo Barn sanitation and disinfectant use for barn sanitation(See detail of parasite and diseases of cattle/buffalo)	2
34.	Explain housing system of cattle/buffalo& yak/chaury	Types of Housing -Open yard, Intensive, Semi intensive Space requirement of different stages of animal Head to head and tail to tail system Provision of ventilation, door, windows Wall, roof and roofing type Floor system type and importance Provision of store, labour room, isolation room Fencing and its importance	2
35.	Select the site for cattle/buffalo& yak/chaury farm	Objectives of site selection Criteria for site selection Factors considering in site selection	1
36.	Calculate space requirement for cattle/buffalo & yak/chaury	Importance and scope Space requirement for breeding male Space required for breeding female Space required for replacement stock Space required for calving pen Space required for isolation pen	2

		Space required for store, manure pit etc	
37.	Arrange facilities for cattle/buffalo & yak/chaori farm	Electricity, lighting facility, water supply etc	1
38.	Collect farm animal urine for manure	Composition of cattle urine its relation to environment Losses of nutrients due to sunlight Losses of nutrient due to leaching Methods of decomposition	1
39.	Apply cattle urine as a source of soil nutrient and pesticide	Objective of dilution Source of pesticide & soil nutrient Soil & foliar application	1
40.	Apply bio-gas slurry in to soil	Definition of bio-gas slurry Composition of bio-gas slurry Importance of bio-gas slurry Protection from bio-gas slurry Methods of application bio-gas slurry	2
41.	Arrange tools/materials in cattle/buffalo farm	Arrange of feeding watering equipments Arrangement of market tools Arrangement of veterinary tools. Arrangement of handling tools/equipments methods of storage of tools equipments materials	2
42.	Sale product	Preparation of marketable product Channel of marketing Demand of consumers Processing before marketing of product Quality occurrence Labeling if necessary Importance of billing system	2
43.	Keep records of cattle/buffalo farm	Importance of record keeping Elements of records Types of farm records: Breeding, Production, Health, Feed, Calving	4
44.	Explain Artificial Insemination (AI)	Introduction, History, Advantages and Disadvantages of AI	2
45.	Explain Steps of AI	Semen collection, Examination, Dilution, Storage	4
46.	Inseminate cow by AI method	Insemination techniques Sterilization and assembling of AI gun Thawing, loading and insemination	4
47.	Detect proper time of AI	Breeding behavior, History taking from owner, Examination of vaginal mucosa	2
		Total	78

(Sheep and Goat Production)

Total Hours : 78 hrs

Theory : 16 hrs

Practical : 62 hrs

Description:

This part of course is designed to provide basic skills and knowledge of sheep and goat farming including breeds of sheep and goat, housing, care and manage of newly born kids/lambs, pregnant/lactating female, breeding buck/ram, replacement stock for commercial farming and marketing of live animal and meat.

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of sheep and goat farming in Nepal
2. explain different breeds of sheep and goat
3. design shed for commercial farming
4. care/ manage newly born kids/ pregnant/lactating female, breeding male, replacement stock
5. explain sheep and goat breeding
6. explain feeds and feeding of sheep and goat
7. market live animal, meat and wool

S.No	Skill	Related technical knowledge	Time (Hrs)
Sheep and Goat Production			
1	Explain scope of sheep/goat production in Nepal	History of sheep and goat production Scope and importance of sheep and goat production in Nepal	2
2	Identify external body parts of sheep/goat	Objectives to study external body parts Identification of body parts on live animal and with help of well labeled diagram of animal	1
3	Identify local breeds of goat	Characteristics of Kari goat, Terai goat, Sinhal goat, Chyangra	1
4	Identify improved breeds of goat	Breed characteristics of Jamunapari, Barberi, Sanen	4
5	Identify local breeds of sheep	Breed characteristics of Kage, Baruwai, Bhote, Lampuchhre	1
6	Identify improved breeds of sheep	Breed characteristics Merino, Ramboulet	2
7	Restrain sheep/goat for treatment/castration	Objectives of restraining Method of restraining Precaution to be taken	2
8	Collect manure	Composition of sheep/goat manure Importance of sheep/goat manure for improving soil quality/ fertility Methods of collection/ composting Application of manure	2
9	Castrate buck/ram by close method	Introduction of castration Proper age of castration Handling during castration	2

		Equipments used in castration Precaution during castration Use of antiseptic Advice to the farmer	
10	Calculate live weight by body measurement of sheep/goat	Importance of body weight calculation Principle of body wt .calculation Methods of body measurements Calculation of live wt. by using formulas Live wt. estimation according to age, lifting weighing and other method.	2
11	Perform tagging for identification	Introduction of tagging Importance and principle of tagging Handling method for tagging Tools equipments used in tagging Formula used for numbering Methods of tagging Other temporary marking system if in used	1
12	Score condition of sheep/goat	Introduction Method of condition scoring	1
13	Provide minerals/salt for goat /sheep	Importance of mineral & salt Signs and symptoms of mineral deficiency Methods of providing salt &minerals	1
14	Select breeding male /female	Definition of selection for breeding purpose Importance of selection Principle of selection Selection criteria for male and female for breeding Importance of records for selection Criteria for selection	1
15	Defect heat by external sign	Oestrous cycle Importance of heat detection Age of puberty sheep/goat Signs and symptoms of heat in sheep/goat	1
16	Care pregnant sheep/goat	Introduction Feeding management Housing management Space requirement for female Sanitation of pen Maintaining health record Correction of health related problems Pregnancy diagnosis Routine drenching management.	1
17	Provide care for breeding male	Introduction Feeding management Housing management Space requirement Sanitation Health care management Routine drenching against parasites	1
18	Care during parturition	Signs and symptoms of before parturition Space requirement Cleaning and sanitation of barn	2

		assisting during parturition time Precaution during parturition	
19	Care newly born kids	Removal of mucous from nose Importance of colostrums feeding Assisting for colostrums feeding Assisting for breathing Assisting for walking/ moving Removing of navel Orphan management if necessary	2
20	Explain ten point technology of goat farming	Ten point technology prepared by Bandipur goat farm	2
21	Arrange for breeding management of sheep/goat	Importance of breeding Sexual maturity of male and female Reproductive parts of male and female Spermatogenesis and oogenesis of sheep/goat Sensational effect Appropriate time of mating Arrangement of mating Methods of breeding of sheep/goat	2
22	Provide feed for sheep/goat	Importance of feeding of sheep/goat Routine feeding time Amount/quantity of feed/day/time Feeding style Utilization of feed and water Requirement of feed and feeding standard	2
23	Make feeding rack from local materials	Introduction and Importance of feeding rack Size and height of feeding rack	4
24	Prepare mineral block for goat/sheep	Introduction and importance Ingredients required Feeding method of mineral block	4
25	Explain cultivation practice of fodder trees for sheep/goat	List of fodder trees Cultivation practices	2
26	Cultivate grasses for sheep/ goat	Annual/ Perennial/ Biannual grasses for pasture	4
27	Provide preventive health care	List of ecto-endo parasite of sheep/goat. List of common diseases of sheep/goat Preventive measure of disease and parasite Vaccination schedule of sheep/goat Sanitation and disinfectant for sanitation (detail of parasite and diseases of sheep/goat in AH I and II)	2
28	Make ecto-parasitocidals by using tobacco and other local material	Method of preparation of ecto paracial drugs by using local materials	2
29	Dip goat to control from external parasites	Dip tank: shape and size	4
30	Explain housing system of sheep/goat	Types of Housing Space requirement of different stages of animal Fencing and its importance	2
31	Select the site for	Objectives of site selection	1

	sheep/goat farm	Criteria for site selection Factors considering in site selection	
32	Calculate space requirement for sheep/goat	Importance and scope Space requirement for breeding male Space required for breeding female Space required for replacement stock Space required for kidding pen Space required for isolation pen Space required for store, manure pit etc	2
33	Arrange facilities for sheep/goat farm	Electricity, lighting facility, water supply etc	1
34	Arrange tools/materials in sheep/goat farm	Arrange of feeding watering equipments Arrangement of market tools Arrangement of veterinary tools. Arrangement of handling tools/equipments methods of storage of tools equipments materials	2
35	Sale product	Preparation of marketable product Channel of marketing Demand of consumers Processing before marketing of product Quality occurrence Importance of billing system	2
36	Slaughter sheep/goat	Introduction Methods of slaughtering Different parts used for meat, offal	6
37	Keep records of sheep/goat farm	Importance of record keeping Elements of records Types of farm records: Breeding, Production, Health, Feed, kidding	4
		Total	78

Animal Health I

Total Hours: 234 hrs
Theory: 48 hrs
Practical: 186 hrs

Description:

This course provides skills and knowledge related to the structure and functions of the different organs/ body system; assist to diagnose and treat common systematic diseases and ailments of farm animals and birds. It also provides basic knowledge and skills of clinical examination, first aids, PM findings, disposal of dead birds, sterilization and administration of drugs

Objectives:

Upon completion of this course students will be able to:

1. Identify different organs of body system
2. Explain function of different organs/ systems
3. Assist to treat diseases and ailments of different body systems
4. Differentiate healthy and sick animals
5. Assist to perform clinical examination of animals and birds
6. Administer drugs
7. Assist in PM examination

S N	Tasks Statements	Related Technical Knowledge	Time (Hrs)
1	Define anatomy of farm animals	Definition of anatomy Anatomical terms Definition of physiology Importance of studying anatomy and physiology of farm animals	3
2	Identify parts of skeletal system of farm animals	Definition of skeleton Classification of bones: according to the shape and location Teeth and dentition, aging by dentition Well labeled diagram of skeleton of cow and chicken General function of skeletal system List of major diseases and ailments related to the system	3
3	Introduce arthritis in animals	Introduction, causes, sign and symptoms and prevention of arthritis	3
4	Treat simple fracture of limbs	Introduction, causes, symptoms, treatment of fracture by using splint and plaster of Paris bandage.	4
5	Explain muscular system of animals	Definition of muscular system Types of muscles: Skeletal, smooth and cardiac muscles and their functions	2
6	Treat simple fresh wound	Definition, type, treatment of simple fresh wound Suturing and suturing techniques	7

7	Explain myositis	Definition, type, management of myositis case Suturing and suturing techniques	2
8	Identify parts of respiratory system of animal and birds	Introduction of respiratory system Well labeled diagram of the respiratory organs : mammals and birds	2
9	Introduce pneumonia	Introduction, causes, symptoms and prevention pneumonia	3
10	Explain circulatory system of animals	Introduction of circulatory system Heart: structure and function Blood vessels: structure and function Circulation of blood Blood: composition and function List of major diseases and ailments related to the system	3
11	Introduce anemia	Introduction, causes, sign and symptoms and prevention anemia	3
12	Collect blood sample	Site of blood collection from different animal species, purpose of blood sample collection, anticoagulants, blood collection techniques, smear preparation, serum separation, dispatch of samples	5
13	Identify parts of male reproductive system	Introduction of reproductive system Well labeled diagram of reproductive organs of a bull Study of slaughter house specimen Function of major organs List of major diseases and ailments related to the system	5
14	Identify parts of female reproductive system of a cow/hen	Well labeled diagram of reproductive organs of a cow and hen,; function of major organs Study of slaughter house specimen List of major diseases and ailments related to the system	5
15	Explain causes of infertility	Introduction, different causes, symptoms and prevention of infertility in farm animals; counseling to the farmers	4
16	Assist correction of dystocia	Introduction, causes, types ,sign and symptoms, correction techniques of dystocia, precaution to be taken	5
17	Assist correction of prolapsed uterus/vagina	Introduction, causes, correction techniques, precaution to be taken	6
18	Assist correction of retained placenta	Introduction, causes, correction techniques, precaution to be taken	6
19	Introduce abortion	Introduction and causes of abortion, precaution to be taken	3

20	Identify parts of digestive system of ruminants	Introduction of digestive system Well labeled diagram of ruminant digestive system Function of major organs List of major diseases and ailments related to the system	5
21	Treat bloat / tympany	Introduction, causes, types ,sign and symptoms, treatment of tympany/bloat	3
22	Identify parts of digestive system of non-ruminants	Well labeled diagram of non- ruminant digestive system Function of major organs List of major diseases and ailments related to the system	4
23	Identify parts of digestive system of a fowl	Well labeled diagram of the digestive organs of a fowl Function of major organs	3
24	Treat indigestion / impaction	Introduction, causes, sign and symptoms, treatment of indigestion /impaction	3
25	Treat diarrhea/dysentery	Introduction, causes, sign and symptoms, treatment of diarrhea/dysentery	3
26	Explain colic	Introduction, types, causes, sign and symptoms, treatment of colic	2
27	Identify parts of urinary system	Introduction of urinary system Well labeled diagram of urinary system Function of major organs Major diseases and ailments related to the system	4
28	Introduce urolithiasis	Introduction, cause and treatment of urolithiasis	4
29	Differentiate haematuria / haemoglobinuria	Introduction, cause and treatment haematuria/ haemoglobinuria	3
30	Explain nervous system(NS)	Introduction of nervous system Well labeled diagram of neuron Classification of neuron: according to structure- unipolar, bipolar, multipolar; according to function- sensory , motor, mixed neuron Central NS, Peripheral NS, Autonomic NS General function of NS Major diseases and ailments related to the system	5
31	Introduce paralysis	Introduction, causes and treatment of paralysis	2
32	Explain structure of mammary gland	Mammary gland of a cow Well labeled diagram of mammary gland and milk ducts Disease related to mammary gland	3
33	Explain structure of eye/ ear	Well labeled diagrams	5

34	Explain conjunctivitis	Introduction, cause and treatment of conjunctivitis	4
35	Explain ootitis	Introduction, cause and treatment of ootitis	4
36	Introduce health/ disease	Definition of health and disease Differentiation between healthy and sick animal Classification of disease: based on cause of disease, based on duration , based on intensity and spread of disease, based on organ or system affected Importance of prevention versus treatment	5
37	Assist in clinical examination of animals	History taking Examination of sick animal: General inspection, physical examination,(temperature, pulse, respiration), examination of body parts (palpation, percussion, auscultation) Examination of environment	7
38	Assist to diagnose diseases	Causes of diseases Infectious: bacteria, virus, protozoa, parasites, fungus Non infectious: injury, malnutrition, poisoning, Metabolic disorders, polluted environment, systemic disorders.	5
39	Explain resistance/ immunity	Immunity: active immunity, passive immunity , disease susceptibility	3
40	Maintain healthy stock	Proper feeding, routine treatment against parasites, sanitation, rotation in grazing , isolation of sick animal, use of vaccines and biological	3
41	Identify common instruments used in veterinary practice	Identification, use and maintenance of most common veterinary instruments	6
42	Sterilize equipments	Definition, concept and methods of sterilization	4
43	Disinfect barn and poultry farm	Use of common antiseptics and disinfectants	4
44	Describe the role of veterinary drugs	Introduction Classification of vet drugs Common vet drugs available in local market Generic names versus brand names Safe use of chemicals and medicines	7
45	Make some formulatory in laboratory	Method of preparation of tincture iodine, golden lotion, iodine ointment, eye lotion, turpentine liniment, boric acid ointment, zinc oxide ointment	4
46	Follow prescription	Introduction, writing a prescription Reading of prescription Recommended dosage Use of alternatives in case of	4

		unavailability of prescribed drugs	
47	Store medicines	Read labels and follow directions Store medicines: protection from direct sun light, moisture, vermin Keeping old stock up/ outer face in store	2
48	Explain side effects of drugs	Allergic reactions of drugs Restriction of use of antibiotics in ruminants Antimicrobial resistance	3
49	Calculate dosage of drug	Determine approximate weight of animals Calculate the dosages of drugs, vaccines and biological. Concept of drug measurements (μg , mg, ml, L, g, I.U.); use of conversion table.	5
50	Administer drugs orally	Route of drug administration Feeding of tablet, bolus, powder, capsule, electuary, liquid with feed, grasses, water Drenching of liquid with drenching pipe/ drenching gun/ using stomach tubes Precaution to be taken during drenching	5
51	Administer drugs by injection	Cleaning syringes and needles, filling syringes, mixing medicines, intramuscular, sub-cutaneous and intravenous injections.	10
52	Administer drugs locally	Use of ointment, lotion, liniments, pessaries, topical use of antiseptic, eye and ear drops.	5
53	Prepare for field trip	Medicines and equipment needed for field trips Prepare bag / backpack with necessary equipment and medicines for field trip	2
54	Perform first aid	Definition of first aid First aid for the following cases: fractures, burns, common poisonings, bleeding, acute clinical diseases	4
55	Assist to perform post-mortem (PM) of poultry	Principle, material required, procedure of PM examination	4
56	Explain PM of livestock	Principle, material required, procedure of PM examination	4
57	Assist to prepare PM report	Identification the internal organs, gross pathological lesions, preparation of brief report regarding findings Dispatch of samples/ specimen with PM report	3
58	Dispose specimens/ dead birds/ chemicals/ drugs and other wastes	Types of vet hospital waste/ Method of waste disposal	4
		Total	234

Second Year

SN	Subjects	Nature	Hrs/w	Theory	Practical	Total hrs	Full marks
A	Common subjects						
1	Agriculture Extension and Community Development	T+P	8	64	248	312	200
2	Entrepreneurship Development	T+P	6	48	186	234	150
3	Fishery	T+P	2	16	62	78	50
	Sub total		16	128	496	624	400
B	Crop Production Specialization						
1	Crop Production II	T+P	8	64	248	312	200
2	Horticulture II	T+P	8	64	248	312	200
3	Plant Protraction, IPM and FFS	T+P	6	48	186	234	150
4	Sericulture and Mushroom Production	T+P	2	16	62	78	50
	Sub total		24	192	744	936	600
C	Livestock Production Specialization						
1	Livestock Production and Management II	T+P	8	64	248	312	200
2	Animal Health II	T+P	8	64	248	312	200
3	Animal Nutrition and Fodder Production	T+P	4	32	124	156	100
4	Dairy and Dairy Products	T+P	4	32	124	156	100
	Total		24	192	744	936	600
	Grand Total (A+B) and (A+C)		40	320	1240	1560	1000

On the Job Training	Nature of Instruction	Duration(Hrs.)	Full marks
On -the -Job Training (OJT)	Practical	800	500
Grand total		3920	2500

Agriculture Extension and Community Development

Total Hours: 312 hrs

Theory: 64 hrs

Practical: 248 hrs

Description:

This course provides skills and knowledge related to basic extension and communication, community development, group formation, farmers training farmers field school, approaches of extension used in different time. This covers need assessment, communication skills and other social factors.

Objectives:

Upon completion of this course students will be able to:

- explain extension and communication methods
- conduct need assessment of farmers
- assist to run farmers training
- assist to form farmers group
- conduct simple field trial
- communicate with farmers
- assist for evaluation, follow-up and monitoring of farmers program
- assist to leader farmer
- able to run farmers field school

SN	Task	Related Technical Knowledge	Time (Hr)
1	Compare formal and non formal education	Meaning and types of education Objectives of education Comparison of formal, informal and non-formal education	3
2	Define extension education	Principle of extension education Objective of extension education Importance of extension education Philosophy of extension education	6
3	Explain teaching learning process	Extension teaching methods Effective teaching plan Effective learning in extension Method of teaching of adult farmer Law of learning	4
4	Explain extension approach of Nepal from past to now	Different kinds of extension approaches used in Nepal Training and Visit systems Conventional extension approach Group approach IRD extension approach, Farming systems approach Tuki system approach Farmer to farmers Approach (Farmers field school)	4

5	Develop visual aids	Poster Chart Pamphlets Graph Leaflets & their uses	12
6	Assist to run demonstration plot in farmers field	Method demonstration Result demonstration Farmers Field Trials PPVT Motivation method Selection of farmer Layout	8
7	Explain functions of electronic audio visual aids	Function & parts of LCD Projector, OHP etc. Function and use of Multimedia	2
8	Prepare organogram of MOAC	Role of each components Role of DOA Role and duty of JT/JTA Role of leader farmer	2
9	Communicate with farmers	Definition of communication Elements of communication Barriers of communication Diffusion process Adoption & innovation process Individual communication Group and mass communication	8
10	Explain importance of a group	Definition of group Philosophy of group formation Objectives of group formation Importance of group formation Group Byelaws preparation Groups transformation into Cooperatives Cooperative Farming Approach	4
11	Prepare a training cycle	Definition of training Importance of farmers' training Training cycle	4
12	Explain need assessment	Definition of need assessment Importance of need assessment Different methods of need assessment (RRA &PRA)	4
13	Prepare individual action plan for work	Introduction of program planning Role & nature of program planning Principle & scope of program planning Behavioral objectives of program planning Steps of program planning Evaluation of program planning Monitoring of program planning	4

14	Define community development	Definition of community development Objective of community development	2
15	Conduct training needs assessment	Methods of performing training needs assessment Base line data collection for training need assessment	8
16	Assist community / user group in formation of objectives	Principle of objective formulation Guideline of objective formulation	2
17	Motivate women farmers to participate in training	Concept of participatory training Discuss how people learn especially rural people (learning versus doing)	8
18	Prepare plan for farmers training	Selection of training methods and materials depending upon the target groups (illiterate versus literate) Arrangements of accommodation, foods and transportation for trainees	4
19	Select trainees	Helping community to select appropriate trainees Characteristics of appropriate trainees	4
20	Prepare posters for training	Materials and methods required for poster preparation Shape, size, color and content of the posters	4
21	Prepare a lesson plan	Different models of lesson plan Elements of lesson plan Practical lesson plan Theoretical lesson plan	4
22	Run practical sessions	Venue and places for skill training Appropriate size of participants for practical session Arrangement of all necessary tools and equipments/instruments Conducting field trips Extra-curricular activities	4
23	Prepare training materials	Preparation of flipcharts Preparation of transparencies Preparation of charts Preparation of drawings and posters Drama, role plays, display etc Preparation of teaching games	8
24	Run theory sessions of the training	Preparation of class in the training programs Using mobile projector	2
25	Use checklist for the evaluation of trainees	Elements of checklist of training evaluation Models of checklist	1
26	Assist in reporting of training program activities	Elements of report writing Reports writing skill of training activities	3
27	Follow up trainees	Purpose of follow-up (encouragement, review, monitoring etc.) Follow up format (e.g. VAHWs, NFE facilitators, Leader farmers)	4

28	Explain Farmer to Farmer Extension (FtF) Approach	<ul style="list-style-type: none"> Definition Scope and need Basic elements of FtF Experienced leader farmer and their role in FtF Role of DLS, DoA and DADO, DLSO in FtF FtF in practice Identification of experience leader farmer 	4
29	Explain the role/ responsibility of farmers committee	<ul style="list-style-type: none"> Structure of committee Proposal analysis Agreement of budget for Farmers Field School 	2
30	Mobilize farmers group	<ul style="list-style-type: none"> Role of group for technology transfer Stages of group Steps of group development Attitude of group member Conflicts of group member Conflict management Creation of demand 	2
31	Explain role of experience leader farmer	<ul style="list-style-type: none"> Definition of ELF Characteristics of ELF Relation with service provider Responsibility of ELF Agreement between ELF and committee 	2
32	Explain steps of IPM Farmers Field School (FFS)	<ul style="list-style-type: none"> Definition and principles, approach, components, and tools of IPM History of IPMFFS, Principles, importance, objectives and Steps of running farmers field school Methods of running FFS Preparation for run FFS Comprehensive Planning Coordination with concern agencies Logistic management Post FFS activities 	6
33	Prepare plan for training	<ul style="list-style-type: none"> Objective setting Program planning Preparation of lesson plan Running practical and theory classes Evaluation criteria Use of audio visual aids Sequential presentation of skill and knowledge 	2
34	Explain skill needed for ELF	<ul style="list-style-type: none"> Communication skill Effective listening Acceptance of feed back Consideration at time of presentation 	2

35	Explain adoption process	Definition of adoption Steps of adoption process Factors affecting adoption process Motivation factor for adoption process	2
36	Explain monitoring process followed by ELF	Group discussion Demonstration Filed visit	2
37	Monitor/evaluate FtF approach	Method & activates of monitoring fallowed by ELF & institute Method & activates of evaluation fallowed by ELF & institute Method & activates of fallow-up fallowed by ELF & institute	4
39	Evaluate impact of FFS	Evaluation from farmers side Use of check list	4
40	Assist farmers to conduct Farmer led experiments (FLE)	Objectives and importance of FLE Why FLE Layout of experimental plot Observation Data collection and record keeping Share results to farmers	4
41	Explain the involvement of institution for community development	Role of institution in community development Concept of community development Present status of participation Basic requirements in participatory program Right based approach	2
42	Collect baseline information	Introduction and importance of baseline information Procedures of baseline information collection Developing a baseline information collection form	4
43	Prepare a project proposal	Basic elements of project proposal Goal Objectives Outputs Activities Inputs	4
44	Prepare a progress report of program	Purpose of progress report Subject matter of effective progress report Types of progress report	2
45	Explain participatory planning	Introduction of participatory planning, monitoring and evaluation (PPME) Why participatory approach? Participatory Planning Participatory Monitoring Participatory Evaluation	2
46	Define group approach to extension	The "group approach" to extension Criteria of group formation	2

		<p>Various types of groups: User groups, Commodity groups, Reference groups (natural groups) Different roles of groups: Technology transfer Training Management of common recourses Empowerment</p>	
47	Assist to form group	<p>Group characteristics (size, caste, ethnicity, group dynamics) Wealth ranking in group formation to assess different socioeconomic factors Advantages and disadvantages of heterogeneous versus homogeneous groups</p>	2
48	Assist group to select leaders	<p>Roles of group leaders Necessary criteria for selection of leader Methods of leader selection Characteristics of a good leader Helping to select leaders and volunteers</p>	2
49	Encourage members to participate in group discussions activities	<p>Factors of encouragement of members to participate in group discussions and activities</p>	3
50	Facilitate to run the group meeting	<p>Principles of running a meeting Agenda Allowing discussion Moderating discussion Making decisions</p>	2
51	Conduct follow- up	<p>Different methods of follow-up Importance of follow-up Different methods of fallow-up</p>	4
52	Mobilize the farmers to use locally available resources	<p>Identification method of local resources Types of resources available to local groups which are properly registered e.g. forest user groups, drinking water schemes group</p>	2
53	Assist group to plan its policies and activities	<p>Paperwork with government agencies Technical skills for paper works</p>	2
54	Assist to manage group welfare funds	<p>Process to obtain loans Process of handling fund Common financial and other resources</p>	2
55	Report group activities to sub-center or office	<p>Demonstration of simple reporting techniques</p>	2
56	Explain group dynamic	<p>Definition of group dynamic Role of change agent for group dynamic</p>	2
57	Explain community needs assessment	<p>Definition of community need assessment Different methods of community need assessment: PRA, RRA, PLA Selection of appropriate method Importance of community needs assessment</p>	4

58	Explain of Participatory Rural Appraisal (PRA)	Definition of Participatory Rural Appraisal (PRA) Philosophy of PRA Principle of PRA Importance of PRA Scope of PRA (In this part of curricula student MUST do one PRA)	4
59	Explain of Participatory Learning Approach (P LA)	Definition of Participatory Learning Approach (PLA) Philosophy of PLA Principle of PLA Importance of PLA Scope of PLA	4
60	Explain tools used in PRA	Different tools used in PRA techniques	2
61	Prepare time line	Time line & its importance	2
62	Prepare Seasonal calendar	Cropping time & season	2
63	Prepare cropping/livestock patterns	Irrigation facilities Livestock components Cropping	2
64	Prepare land-use systems,	Making maps of land - use Making maps of land / farms / social	2
65	Prepare matrix making	Methods of ranking	2
66	Discuss problems of community	Problem identification through PRA approach Problem census Problem solving Group technique Group discussion	4
67	Identify need of target groups	Felt and unfelt need of community/family	4
68	Prepare reports	Methods of preparing report	4
69	Plan future work	Planning based on the results and the resources available	4
70	Attend meeting	Basic concept of meeting (agenda, discussion, decision-making) Meetings with cooperating agencies (e.g. VDC) Reporting minutes of meetings	2
71	Collect the demand from farmers	Demand collection of Seeds, seedlings and grasses, and improved breeds of animals How to order, distribute and inventory supplies How to fill-up a basic request form from both the NGO side and the government side What is an inventory and how it is performed	8
72	Assist farmer to run trails	Types of trails Selection criteria's of farmer for running trails Terminologies used in trail (replication, plot, layout, randomization, sampling etc)	8

73	Assist for demonstration	Selection criteria's of farmer for running demonstration Method and result demonstration Farmers field trail Mini kit distribution and evaluation	8
74	Distribute supplies	Arranging to provide the seeds, seedlings, grasses and animals requested Inventory of supplies	4
75	Prepare service center program	Activities of government, semi-government, non- government and private organizations: Ideas regarding how they can work together and complement each other for the development of the country	4
76	Prepare annual calendar / plan for work in field with farmers (e.g. plan for vaccination activities, etc.)	Annual calendar and how it is put together Preparation of a sample annual calendar based of farmers' needs and demands & on the basis of resources available Preparation of work schedules according to a given format	8
77	Assist in evaluating activities	Study of an actual evaluation format used by NGO and / or a government organization Describe different agriculture and livestock related Acts and rules	8
78	Follow-up distributed supplies	Follow-up and evaluate trainees / motivators (see training module also) Study of an actual "follow-up" program used by an NGO for motivators or trainees Study of the actual follow-up required after distribution of minikits by government workers	8
79	Maintain daily diary	Diary keeping: why it is done, and how it is done; using examples How to write a basic report	4
80	Write a report of your work in the field.	Writing a report regarding funds collected for farmers' groups Writing a report regarding use of improved livestock Writing a report regarding farm activities (crops, orchard, vegetable, livestock) Reporting results of harvesting (yield) Reporting activities of pocket areas	8
81	Keep Records	Statistics regarding use of improved breeding stock, Financial matters: income and expense, Statistics of agriculture and livestock farms: Activities accomplished, Emergency report & reporting	4
		Total	312

Entrepreneurship Development

Total Hours : 234 hrs

Theory : 48 hrs

Practical : 186 hrs

Description:

This course is designed to provide basic skills and knowledge necessary for entrepreneurship development and basic management skills.

Objectives

Upon completion of course, the students will be able to:

1. perform basic skills for management of livestock and poultry farms
2. prepare scheme for small livestock enterprises
3. market animal products
4. keep record properly
5. forecast/ predict risk before starting a business

S N	Skill	Related technical knowledge	Time (Hrs)
1	Define economic terms	Basic terminologies related to economics: agriculture economics, farm management, goods and services, utility, value, price, wealth, money, income, profit, loss, revenue, product, input Role of agriculture in Nepalese economy	8
2	Show the relationship between total, average and marginal products	Total products Average products Marginal products Interrelationship	8
3	Explain production function	Land, labor, capital Entrepreneur	8
4	Calculate cost relationship of a firm	Calculation of total cost, fixed cost, variable cost Calculation of average variable cost, average fixed cost, average total cost and average marginal cost	8
5	Explain law of diminishing return	Law of diminishing return	6
6	Gather farm management information	Farm record system Farm inventory Net-worth Deciding upon level of input, level of production and combination of input & product	8
7	Explain farm planning/budgeting	Principle of farm planning and budgeting Importance of farm planning and budgeting Steps of farm planning and budgeting Methods of farm planning and budgeting	6
8	Identify sources of credits	Sources of loan: Individual lending, Institutional loan: Bank and other financial institutions	10

9	Explain types of banks	Types of bank: Central bank, Commercial bank, Industrial bank Development bank, Finance and cooperatives	6
10	Explain loan procedures	Types of loan, Loan procedure, Priority sector loan, Industrial sector loan, Secured Loan Long term loan, Short term loan, Collateral for loan, Completion of loan application forms, Loan payment schedule	6
11	Explain banking systems	Explain rules of bank regarding payment of loans Calculation of simple interest for loan payment Procedure for obtaining loan form bank and other sources (ADB, Rural Dev. Bank, Women's Dev. Office etc.)	6
12	Perform bank transaction	Cash deposits and withdrawals: Fixed deposit account Saving account Current account Cheque issues and withdrawal system, demand draft, debit and credit card	8
13	Prepare livestock/ agriculture farm plan	Scheme / farm plan preparation Capital Investment: Fixed capital investment, running capital Cost of production: fixed cost, variable cost Financial analysis: Gross income and expenditure, net profit/loss, break even point	8
14	Make a simple yearly production plan based on market analysis	Components of a yearly production plan, including time tables and budgets (expenses expected, income expected) Decision - making regarding a particular product, based on a market analysis (including seasonal variations) Preparation of a cash flow chart based on production plan	8
15	Explain assets/ property	Definition of asset Calculation methods	4
16	Complete a simple farm/ business inventory	Review of inventory procedure Keeping records Calculating profit / loss	6
17	Design a marketing plan	Designing a marketing plan, including storage, packaging, transportation, labor needed, taxes etc.	10
18	Supervise workers / direct work on the farm or enterprise	Supervision of workers	8
19	Describe the qualities of a successful entrepreneur	Introduction to principles of small business Entrepreneurs' qualities Functions of entrepreneurs Importance of creativity	6

20	Describe types of enterprise	Types of small business: Private, partnership, cooperatives, joint stock company; advantages and disadvantages of each	8
21	Differentiate risk and uncertainty	Introduction and types of risk/ uncertainty Describe how risk and uncertainty can affect decision-making. Risk calculation Concept of decision-making - how is it done Probability of success - can all succeed?	10
22	Perform a project work on a simple marketing analysis	Basic concepts of business management Types of market and marketing, Marketing strategies, Four P's rules of marketing strategy, Marketing research, Market survey guidelines	16
23	Keep records	Keeping inventory Maintaining necessary records on regular basis (labor, livestock, feed consumption, seeds used, fertilizer, Perform a simple inventory and record Keep records of production and marketing costs Keep simple account	10
24	Perform market study	Introduction, Market study, Description of product, Complication of the product, Location of firm, Market area, Main consumer, Total demand Market share, Production level, Sales promotion	12
25	Prepare production plan	Production Plan, Production process, Fixed capital, Depreciation, Repair maintain, Source of equipment, Planned capacity, Future capacity, Purchasing of equipments	12
26	Calculate current expenses	Raw materials, Cost of raw materials, Availability of raw materials, Pre operating expenses, Availability of labor, Facilities for labor, Overhead expenses, Per unit cost	12
27	Calculate financial aspects of a agriculture/livestock/ poultry farm	Total capital, Loan requirement, Collateral for loan Selling price of the product Calculation of loss and profit Loan payment table Calculation or in term of investment Calculation break even point	16
		Total	234

Fishery

Total Hours : 78 hrs
Theory : 16 hrs
Practical : 62 hrs

Description:

This course is designed to provide basic skills and knowledge of fish culture including species identification, breeding, rearing and transportation of brood fish and fingerlings. It gives basic skills of the control of diseases, parasites as well as protection of cultivated fishes from enemies and predators. It also provide a basic concept of rearing Rainbow trout and a popular Magur fish

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of fish culture in Nepal
2. explain different species of fish cultivated in Nepal
3. design pond for fish culture
4. transport, rear and stock fingerling with less chances of mortality
5. breed fish by natural way as well as artificially
6. control diseases and parasites of fish
7. market fish and fingerlings

SN	Skill / Task List	Related Technical Knowledge	Time (Hr)
1	Classify fish species	Introduction of fish and fish culture Zoological classification of fish Differentiation between fish culture and aquaculture	2
2	Explain scope of fish farming in Nepal	History of fish farming in Nepal Scope of fish culture in Nepal Economic importance of fish	2
3	Explain method of fish culture	Pond fish culture, Cage culture, Riverine fish culture, Pen culture Running water vs stagnant water fish culture Fish farming zone of Nepal	3
4	Identify external body parts of fish	External body parts of fish with function of each parts	2
5	Identify common fish species found in Nepal	Indigenous species Indian major carps: Rohu, Bhakur, Naini Locally popular fish: Asala, Katle, Buduna, Jalkapur Weed/ predatory fish: Magur, Bhoti, Shinghi, Barari Exotic species Chinese carps: Big head carp, Silver carp, Grass carp Common carps: German carp, Israeli carp Rainbow trout fish	10
6	Select site for fish farming	Conditions required for fish farming Source of water/ water temperature Drainage facility, Soil type Accessibility of road, market, labour, fingerlings supply	2

7	Explain method of construction of fish pond	Lay out plan Dike, Core trench, Spill way, Embankment, Inlet, Outlet, Area of pond, Carrying capacity	2
8	Explain types of fish pond	Incubator/ hatchery Nursery pond, Rearing pond, Breeding pond	2
9	Maintain/repair fish pond	Different problems of fish pond Maintenance of dike height/slope Cleaning of fish pond, application of fertilizer/lime in pond	2
10	Maintain water quality of pond	pH, turbidity, water temperature, dissolved oxygen level, water level	1
11	Explain type of fish culture	Monoculture, Polyculture, Monosex culture Integrated fish culture: Paddy cum fish culture, Duck cum fish culture, Pig cum fish culture etc Stocking density in each type Advantage and disadvantage of each type	3
12	Explain fish breeding	General concept of fish breeding and fingerling production Conditions required for fish breeding Natural and artificial breeding	2
13	Select brood fish	Characteristics of brood fish Differentiation of male and female brood fish Age of breeding for different species of cultivated fish	1
14	Explain natural breeding of common carp	Monosex culture, selection of brood fish, water temperature, season of breeding, male and female ratio, Kakabon preparation, spawning, hatching, feeding of hatchlings	2
15	Explain artificial breeding of Indian major carps/Chinese carps	Selection of brood fish, age and weight of brood fish, male female ration, hypophysation, injection time/ dose of pituitary extract/ injection of ovaprim and dose rate, spawning, breeding hapa, incubator, water sprinklers, feeding of hatchlings	4
16	Transport fry/fingerlings	Ordering fingerlings; Sources of fingerlings Method transportation of fingerlings Stocking density and method of stocking Precaution to be taken during transport and stocking time	2
17	Rear fry/ fingerlings	Management of nursery pond; Feeding of fry and fingerlings Protection from enemies; Symptom of dissolve O ₂ deficiency Assessment of growth rate	2
18	Rear fish for table purpose	Management of rearing pond Feeding of artificial feeds for fast growth Natural food for fish,, Protection from enemies Symptom of dissolve O ₂ deficiency Assessment of growth rate	2
19	Rear brood fish	Management of breeding pond Transportation of brood fish Protection from enemies	2

		Symptom of dissolve O ₂ deficiency Assessment of growth rate and symptoms of maturity	
20	Explain concept of rearing Magur fish	General concept, sources of fingerling, rearing, stocking density, growth rate, feeding habit and marketing	2
21	Explain concept of rearing Rainbow trout fish	General concept, sources of fingerling, rearing technique, requirement of running water, water quality, water temperature, stocking density, growth rate, feeding habit and marketing	2
22	Explain concept of rearing fish in aquarium	General concept, purpose, type of fishes kept in aquarium, sources of fingerling, feeding habit and marketing	2
23	Identify natural feed in pond	Feeding habits of different fishes Phytoplankton and zooplankton Importance of fertilizer in fish pond	2
24	Prepare feed for fish from locally available ingredients	Natural and artificial food Feeding requirement for different stages and types of fish Mixing of different ingredients for fish ration Feeding time, Feeding behavior	4
25	Explain different weed fishes	Weed fishes: <i>Puntius</i> spp., <i>Channa</i> spp, Control of Weed fishes	2
26	Explain predatory fishes/enemies	List of predatory fishes: <i>Wallago attu</i> , <i>Clarius batrachus</i> , <i>Heteropneutis fosillis</i> , <i>Anguila bengalensis</i> Fish enemies: Snake, Frog, Crocodile, Otter Control of predatory fishes and enemies	2
27	Control common fish diseases parasites	Common fish diseases: Ichthyothiriosis, White spot disease, Fin rot, Gill rot, Argulosis, Gyrodactylus, Dactylogyus Sign and symptoms, control and treatment.	6
28	Harvest fish	Stage of harvesting, Methods of harvesting Using Nets: Drag net, Scoop net, Maji Jal Care and maintenance fish nets Fishing hook, Harvesting by removal of water Harvesting by poisoning	2
29	Market fish	Time of harvesting fish Marketing channel and fish market, Pricing Customer behavior and marketing policy	1
30	Keep records	Record keeping (feed, production, costs, sales, health) Analyzing record for management purposes	3
31	Develop and annual calendar for fish farming	Elements of a fish farming calendar	2
		Total	78

Crop Production Option

Year: Second

SN	Subjects	Nature	Hrs/w	Theory	Practical	Total hrs	Full marks
A	Common subjects						
1	Agriculture Extension and Community Development	T+P	8	64	248	312	200
2	Entrepreneurship Development	T+P	6	48	186	234	150
3	Fishery	T+P	2	16	62	78	50
	Sub total		16	128	496	624	400
B	Crop Production Specialization						
1	Crop Production II	T+P	8	64	248	312	200
2	Horticulture II	T+P	8	64	248	312	200
3	Plant Protraction and IPM Approach in FFS	T+P	6	48	186	234	150
4	Sericulture and Mushroom Production	T+P	2	16	62	78	50
	Sub total		24	192	744	936	600
	Grand Total (A+B) and		40	320	1240	1560	1000

On the Job Training	Nature of Instruction	Duration(Hrs.)	Full marks
On -the -Job Training (OJT)	Practical	800	500
Grand total		3920	2500

Crop production II

Length: 312

Theory: 64

Practical: 248

Course description

This course includes discussions and practices of the principles of crop husbandry as related to successful production of major field crops of Nepal like rice, maize, millet, pulses (summer & winter) sugarcane, fiber crop, oilseeds, narcotic & tuber crop. It also includes weeds and their control. The practical aspect of the course should link with the Plant protection, IPM and FFS course

Objectives

Upon completion of this time, the students will be able to:

- 1) Explain the basic principles of crop production.
- 2) Describe the relationship between crop productivity and, cultural practices.
- 3) Describe the ecological requirements for crops grown in Nepal.
- 4) Perform the cultural practices required for successful production of major crops grown in Nepal.
- 6) Explain some fundamental principles of weed control.

SN	Skill	Related Technical Knowledge	Time (Hrs)
1	Explain agronomy	Definition of agronomy Role of agronomy Interrelationship with other disciplines, Integrated Pest and crop Management	2
2	Explain importance of agronomy	Food situation and contribution of agronomy towards its solution	2
3	Explain importance of research in agronomy	Current status and station of agronomic research Role of research station Past achievements on a worldwide basis	2
4	Classify agronomic crops	Classification of agronomic crops Climatic Classification Botanical Classification	4
	Identify Agronomic crops used for industrial processing	Meaning of 'Agro-based industries' and various types Crops used for industrial processing	
5	Explain condition necessary for producing and marketing of cash crop	Cash crops: conditions necessary for producing and marketing Supply and demand Meaning of low-volume, high-value	4

6	Compare local varieties and " improved" varieties	Advantages and disadvantages of local and improved varieties	6
7	Develop a calendar of operations for <ul style="list-style-type: none"> • Rice • Maize • Wheat • Potatoes • Millet 	Making operation calendar for different crops rice, maize, wheat \, potatoes, millet etc Including - time of sowing planting Intercultural operation Harvesting and storage Collection of seed Land preparation etc.	4
8	Determine the time / stage for which irrigation is important for crops studied	Meaning of irrigation and drainage Importance of irrigation and drainage for crops studied Frequency of irrigation	2
9	Explain the competition between crops and weeds.	Concept of competition (plant-to-plant competition with respect to light, nutrients water, etc.) Different types of weeds and nature of competition with crop Role of weeds in crop production	2
10	Cultivate cereal crops (Rice, Wheat, Maize, Barley) (It is mandatory that each student should grow two cereal crops at school farm)	Introduction Origin, Distribution ,Adopted Suitable variety, Selection and availability of variety in local area Cropping pattern crop rotation, ,mixed cropping, companion cropping ,relay cropping, Cultivation Practices Seed bed preparation for rice Land preparation Seed rate and treatment Sowing and planting distance Manure and fertilizer requirement Basal dose, topdressing dose, Application method and time for topdressing, Weeds and weeding identification of weeds and time of weeding other intercultural operation, Irrigation and drainage Need of moisture, time for irrigation and drainage Maturity dictation, harvesting and storage Crop maturity, estimated yield, Method of yield estimation harvesting time and method	75

		of harvesting, Thrashing, cleaning, storage, Role of moisture in grain, local method of moisture detection, Protection from pest in store. Selection of seed for next time. Cost benefit analysis (excluding plant protection Measures)	
11	Cultivate Potato (It is mandatory that each student should grow potato and one pulse crop and one selected crop among given crops by the school. In general knowledge theory should be at list one from each group)	<p>False cerea - Buckwheat, Millets- Sorghum, Pearl millet, Finger millet Pulses- Soybeans Cowpeas, Red gram, Black gram, Green gram, Chickpeas, Lentil, Rajma bean Oilseeds-Groundnut, Linseed, Sunflower, Sosaumum, Rape & mustard Fiber crops – Jute, Cotton Sugar crops - Sugarcane Tuber crop – Potatoes Plantation crop - Tea</p> <p>Introduction</p> <p>Origin, distribution ,adopted Suitable variety, selection and available variety in local area, Cropping pattern, crop rotation, ,mixed cropping, companion cropping, relay cropping,</p> <p>Cultivation Practices</p> <p>Land preparation, Seed rate, seed treatment, Sowing and planting distance, Need of moisture, time for irrigation and drainage</p> <p>Manure and fertilizer requirement</p> <p>Basel dose, topdressing dose, Application method and time for topdressing,</p> <p>Weeds and weeding</p> <p>Identification of weeds and time of weeding,</p> <p>Maturity dictation, harvesting and storage</p> <p>Crop maturity, estimated yield, Method of yield estimation, harvesting time and method of harvesting, Thrashing, cleaning, storage, Role of moisture in grain, local method of moisture detection, Protection from pest in store. Selection of seed for next time. Cost Benefit analysis (excluding plant protection Measures)</p>	60
12	Control of most common pest	Controlling methods	6
13	Identify common diseases	Diseases (Name, sign and symptoms) Figures color plates any visuals)	6

14	Control most common diseases	Methods of disease control	8
15	Identify common nutrient Deficiencies	Sign and symptoms of micro nutrients deficiency. (Micronutrients deficiency symptoms, Real materials, Color plate and any visual)	6
16	Correct common nutrient deficiency	Micro nutrient application methods	6
17	Estimate crop yield by "crop cutting"	Methods of yield estimation of different crops grown	4
18	Harvest crops grown	Harvesting methods	4
19	Thresh crops grown	Methods of threshing	8
20	Estimate yield of different crops	Site selection criteria's for sampling Sample collection method Harvesting, thrashing and calculation Role of moisture containing	6
21	Judge maturity for harvesting of different crops	Physiological maturity stage of different crops Different methods of maturity judgment of different crops	8
22	Harvest field crops	Threshing cleaning, drying of grain crops	12
23	Explain losses due to present of weed in crop field	Definition of weed, Characteristics of weed, Economic losses by weed in crop yield	2
24	Collect weed	Identification and preservation of weeds both in crop and non crop areas in different seasons	12
25	Apply herbicide in different crops by different methods.	Selection criteria of herbicide Mode of action Method and time of application	6
26	Remove weed from field crops	Weeding time Selection of off variety off plant Difference between weeding and rugging Selection of appropriate time for weeding	10
27	Design your own experimental plots	Importance of experiment Method of lay outing Cultivation practices of crops for experiment	6
28	Visits experimental plots	Routine preparation for visit excremental plot	8
29	Tabulate experimental data	Collection and tabulation of experimental data	5
30	Presentation experimental results	Summarization and presentation of experimental results	6
	Design a small "crop enterprise" appropriate to the local are	Calculation of cost and income of crop enterprise Examples of crop enterprises: tea, jute, tobacco etc.	10
	Collect different crops seeds	Identification Different crop seeds	10
	Collect different crops specimen	Identification of all crops studied and identification of their main external parts	10
		Total Hrs	312

Horticulture II

Total hours 312
Theory 64
Practical 248

Description:

This course provides trainees various principles and practices in the field of vegetable production and fruit production, fruit and vegetable seed production. Vegetables and fruits preservation techniques are to be provided by this course. Describe the role of horticulture in the economic development of the country. The practical aspect of the course should link with the Plant protection IPM and FFS course

Objectives:

At the end of this course, the trainees will be able to

1. Plan, organize and establish a new orchard.
2. Propagate horticultural plants.
3. Demonstrate the techniques of training & pruning fruit trees as well as ornamental plants.
4. Describe the soil management practices.
5. Produce the major fruits, and vegetables of the Country.
6. Produce seeds and multiply the seeds of major vegetables..
7. Plan the different styles of gardening.
8. Describe role of IPM in Horticulture
- 9.

Commercial Vegetable production and vegetable seed production

S.N	Task Statement	Related Technical knowledge	Time (Hrs)
1	Describe the role of vegetable in the economic development of Nepal	Importance of vegetables in economic development in Nepal Cash return Employment Import substitution and export promotion Importance of vegetable in relation to human health As the sources of nutrients -Carbohydrates, -Protein, -Vitamins, - Minerals and fats	2
2	Explain the general Requirements for commercial vegetable farming/ production	Definition of commercial vegetable farming/ production Types of commercial vegetable farming Scope of commercial vegetable farming in Nepal Difficulties associated with commercial vegetable farming in Nepal Basic requirements for commercial	3

		vegetable farming - Natural factors - Management factors Explain importance of IPM	
3	Develop yearly calendar of operation for major vegetable for commercial purpose	Listing of major vegetables crops can be grown commercially Classification of major vegetables on the basis of growing season Determination of duration taken to harvesting Planning of every and each cultural operation, (planting to harvesting/marketing)	6
4	Grow vegetable commercially at least two in each season	Selection of vegetable to be grown Market analysis of the selected crops (Demand, Supply and Price) Selection of site Location, Soil, Climate, Irrigation and Drainage facilities, Availability of labor and inputs	20
5	Apply Required techniques for the commercial vegetable production.	Improved technologies for commercial vegetable production Seedling production Land preparation/planting method Irrigation and drainage Fertilizer application Calculation of fertilizers to be applied according to area nutrient available and requirement Intercultural operations Controlling insect pests and diseases Identification of insects pests and their damage Method of insect pest control Identification of diseases, their sign and symptoms Method of disease control techniques Harvesting cleaning sorting packing for market, transporting and marketing	20
6	Keep Records	Investment record Production records Income records Profit/loss record	2
7	Analyze the records	Calculation of production cost Calculation of income/return Calculation of loss or profit	2
8	Grow off season vegetable as commercial purpose	Definition of off season vegetable production Advantage and disadvantage of off season vegetable production Methods of off season vegetable production	10

		<ul style="list-style-type: none"> -by using of climatic variation - by using of varieties - (early, late and hybrids) - by using of control environment - (green house, plastic house, plastic tunnel, hotbeds) 	
9	Apply improved technology for off season vegetable production	<p>Production of seedlings in hot beds with plastic tunnel (forcing in germination)</p> <ul style="list-style-type: none"> - Land preparation - Manuring , Fertilizing, - Transplanting of seedlings - Irrigating - Mulching - Weeding - Hoeing - supporting/staking 	20
10	Control insect pests and diseases	<p>Identification of insect pests and their damages</p> <p>Application of appropriate control measures against the insect pests</p> <p>Identification of diseases and their sign and symptoms</p> <p>Application of appropriate control measures against the diseases</p>	6
11	Harvest vegetable	<p>Harvesting indication of different vegetable crops</p> <p>Harvesting methods</p> <p>Cleaning of harvested vegetables</p> <p>Sorting for packing</p> <p>Packing for transportation</p>	5
12	Market the vegetable	<p>Identification of marketing channel</p> <p>Determination of market price</p>	3
13	Keep Records	<p>Investment record</p> <p>Production records</p> <p>Income records</p> <p>Profit/loss record</p>	2
14	Analyze the records	<p>Calculation of production cost</p> <p>Calculation of income/return</p> <p>Calculation of loss or profit</p>	2
15	Define seed	<p>Definition of seeds</p> <p>Importance of quality seed</p> <p>Characteristics of good quality seed</p>	1
16	Classify vegetable crops	<p>Classification of vegetables crops on the basis of mode of pollination</p> <p>Classification on the basis of requirement of light duration</p>	3
17	grow vegetable for seed production	<p>General requirements for vegetable seed production</p> <p>Site selection and climatic requirement</p> <p>Source of seeds for seed production</p> <p>Cultural practices</p> <p>Isolation and inspection</p>	6

		Types of seeds Breed's stock seed Foundation seed Registered seed Certified seed	
18	Maintain Isolation distance	Isolation, distance for vegetable seed production Method of isolation 1. Time isolation 2. Distance isolation 3. Caging	2
9	Maintain seed purity	Planting of pure seed an seed materials Maintenance of distance Field inspection of seed crops Frequency and stages of field inspection (vegetative stages and reproductive stages) Rouging of off type (characteristics of the variety)	6
10	Grow major vegetables for seed production	Location and site for seed production Land preparation Manuring and fertilizer application Planting/ transplanting of seed crops Irrigating, Weeding, Hoeing Field inspection, rouging Insect pests and diseases control Harvesting, Curing, Threshing, Extracting of seeds Cleaning, Drying, Packing,	20
11	Perform seed test	Sampling of seeds Seed sampling methods Testing of seed moisture Importance of seed moisture test Seed moisture testing methods Testing of seed purity Importance of seed purity test Testing of seed germination Importance of germination test Method of seed germination	6
12	Market vegetable seeds	Marketing channel Marketing procedures	2
13	Keep records of vegetable seeds production	Recording system Production record Financial record (cost and income record) Loss and profit analysis	3
14	Define preservation	Definition of preservation Importance of vegetable and fruit preservation	1
15	Classify the preserved forms	Types of fruit and vegetable preservation Dry preservation, Wet preservation Beverage, Alcoholic and Nonalcoholic	2
16	Apply preservatives	Name and function of preservatives Application method	1

17	Prepare jam / jelly	Definition of jam and jelly List of fruit from which jam and jelly can be prepared. Procedure of jam jelly preparation	4
18	Prepare potato chips	Recipe for potato chips preparation Procedure of potato chips preparation	4
19	Prepare pickle	Recipe for pickle preparation Procedure of pickle making	4
20	Prepare tomato sauce	Recipe for tomato sauce preparation Procedure of sauce making	4
21	Prepare fruit juice	Recipe for fruit juice preparation Procedure of juice making	4
22	Prepare squash	Recipe for squash preparation Procedure of squash Making	4
		Total	180

Fruit production and orchard management

S.N	Task statement	Related technical Knowledge	Time (Hrs)
1	Explain the importance of fruit production in Nepal	Economic importance of fruit production Nutritional value of fruits in relation to human health Ecological importance of fruit production Religious importance	2
2	Classify fruit crops	Classification of fruit crops on the basis of climatic requirement Ecological niches for fruit growing in Nepal	1
3	Identify major fruit crop grown in Nepal	Identification of fruit crops grown in different agro climatic zone in Nepal	4
5	Plant fruit sapling	Pit digging, Pit filling, Planting Supporting, Mulching, Irrigating	6
6	Apply manure/fertilizer	Calculation of fertilizer and manure according to stages and age of fruit plant Methods of Manuring and fertilizing	10
7	Irrigate fruit plant	Stages of irrigation Method of irrigation	10
8	Train fruit plant	Definition of training Objective of training of a fruit plant System of training	6
9	Prune fruit tree	Definition of pruning Objective of pruning Method of pruning	6
10	Thin fruit	Concept of fruit thinning Fruit thinning methods	2
12	Explain Integrated Pest Management to Control fruit insect pests	Common insect pests of fruit crops Identification of damaged by insects pests Control methods	6
13	Control fruit diseases	Common disease of fruit crops Identification of sign and symptoms of diseases Diseases control methods	6

14	Harvest fruit crops	Maturity indication of major fruits Picking methods Sorting/grading, Packing	4
15	Market fruit crops	Fruit markets in Nepal Existing marketing channel in Nepal Transporting system in Nepal	3
16	Apply cultural practices and management skill for major fruit crops	Cultural practices for temperate fruits (Apple, Pear, walnut, Peach) Cultural practices for sub tropical fruits (Mandarin orange, Sweet orange, Lime, Lemon Pomegranate) Cultural Practices for tropical fruits (mango, Litchi Banana, Papaya, Pineapple, Guava)	30
17	Identify Minor fruits	Introduction of Minor fruit crops. List of minor fruits crops Amala Almond, Bel Apricot, Plum, Strawberry,	4
18	Grow grapes	Introduction of viticulture Propagation and nursery management Soil and Climatic Requirement Varieties and planting method Other cultural practices (Manuring, fertilizing Irrigating, Controlling of disease s and pests, Harvesting and Marketing)	6
19	Train grapes vine	Training system of grape vine Time and stages of training (Telephone system, Kniffine system) Umbrella kniffine System)	3
20	Prune grape vine	Methods of vine pruning Cane method, spure method.	3
21	Grow coconut	Introduction Propagation and nursery management Soil and Climatic Requirement Varieties and planting method Other cultural practices (Manuring, fertilizing Irrigating, Controlling of diseases and pests, Harvesting and Marketing)	10
22	Perform orchard management practices	Clean cultivation Intercropping Sod culture and basin preparation	10
		Total	312

Plant Protection, IPM and FFS

Total time: 234 hrs

Theory: 48 hrs

Practical: 186 hrs

Description

This course is designed for gathering skill and knowledge about insects, pest and diseases of plants. It deals introduction, of different types of pests, nature of damage caused by pests, sign and symptoms, management and preventive methods followed by farmers and technicians. This course emphasizes on Integrated Pest Management (IPM) approach and also deals about preparation and use of organic pesticide for pest management.

It also includes skill and knowledge about Running **Farmers Field School** (FFS) through Integrated Pest Management (IPM) approach without disturbing the natural ecosystem and discusses the scope and basic concepts of IPM from a practical point of view. The basic knowledge and skill in Agronomy, Economics, Horticulture, Soil, and Agriculture Extension and Agric. Engineering required for running FFS is taught through the concerned courses in plant Science and it is coordinated through Plant Protection unit. To run FFS crop based FFS weekly schedule needs to be prepared.

Objectives

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

- Describe the external anatomy of a typical insect.
- Collect the insects pests of major crops identify and preserve them.
- Illuminate the principles of pest control
- Explain the hazards of chemical pesticides and the tolerance limit.
- Illustrate the nature of damage caused by major pests of crops, their life cycle and suggest appropriate control measures'
- Handle pesticides & pesticide equipment.
- Prepare and use organic pesticide
- Identify the disease causing agents
- State the concept of plant diseases & their importance to human
- Identify the disease, insects and pest problems of major crops of and apply control measures.
- Discuss the role of fungicides and Insecticides in agriculture with their uses and sources.
- Calculation of Pesticide
- Calibrate and handle equipments used in plant protection
- State concept of IPM
- State concept of FFS
- Apply IPM system and carry out FFS in Farmers field

SN	Skill	Related technical knowledge	Time (Hrs)
	Plant Protection		
1.	Define Plant protection	Definition of plant protection Principle and Practices of Plant Protection Importance of plant protection	2
2.	Define Plant Disease	Definition of disease Causes of Disease of crop plants Fungal Bacterial Viral Mycoplasma Nematode Non parasitic – plant diseases	2
3.	Explain the condition for disease out break	Environmental (Favorable environment) Susceptible host Aggressive agent	2
4.	Differentiate disease	Caused by pathogen Cause by unfavorable environment	2
5.	Identify general symptoms of disease	Spots - leaf spot or fruit spots Shot hole Twig, shoot or blossom blight Mildew- Downy, Powdery Rust, smut, rot, wilt, gall, Seedling rot, leaf curl, mosaics Vascular discoloration, stalk rot, club root chlorosis, necrosis, Canker, dwarf, rusting, Sooty mold, damping off Disease in transits and storage	4
6.	Diagnose plant disease	Technique Collecting Specimen for laboratory identification	2
7.	Manage Weeds of Crops	Definition, importance, identification and management	2
8.	Explain life cycle of insects/pests	Complete and incomplete life cycle of Insects	2
9.	Classify insects pest	Classification based on mouth parts of insects Biting, chewing, sucking, siphoning , piercing	2
10.	Explain the condition for insect outbreak	Environmental Temperature Humidity Host- Primary secondary	2
11.	Calibrate microscope	Types of microscope Use of microscope Parts of microscope Functioning of microscope calibration of microscope	2
12.	Calibrate sprayer / dusters	Types of sprayer /duster Use of sprayer /duster Parts of sprayer/ Dusters Functioning of sprayer/duster calibration of sprayer/dusters	2

13.	Explain the common control methods of insects/disease	Physical Method Cultural Methods Tillage and cultivation practice, crop rotation Planting time, companion and mixed Cropping, planting density (P4) Biological Method Use of natural enemies Use of parasite Use of predators Trap crop Regulatory method Plant quarantine Chemical method Various chemicals, IPM approach	4
14.	Classify pesticides	Classification of chemical pesticide Organic Insecticide, fungicide, herbicides, bactericide, rodenticide, acaricide, Organo Chlorinated hydrocarbon, Organo phosphorus, Carbaryl group etc Mode of action Systemic , Contact On the basis of formulation (Forms) Dust Granules Fumigant MP/EC Oils and Emulsions Inorganic pesticides	2
15.	Explain the characteristics of pesticides	Characteristics of good pesticides LD50 Low phyto toxicity High toxic to target organism Low toxicity to human being and livestock Stability in storage Stability after dilution to spray strength Safe handling and Storage of pesticide	4
16.	Explain application method of pesticides	Application Method Seed treatment Soil treatment Standing crop application Foliar Application Dusting Drenching Fumigation Safety measures in pesticide handlings	4
17.	Identify common fungicide available in market	Sulphur powder Thiram Zineb Mencozeb Bordeaux mixture Copper oxichloride Carboxil	2

		Carbedazim	
18.	Identify common insecticide available in market	Common insecticide: Methyl parathion, malathion Fenitrothron, diazinon, parathion Methyl, dithimate trichlorophan , phorate, Thimet, Carbyl carbofuran, indosulphate cypermethrin Aluminum phosphide Zinc phosphide	2
19.	Calculate the dosage of pesticides	Calculation of required, volume of spray solution Calculation of required concentration of spray solution Calculation of required volume of pesticides to be mixed in spray solution ($C_1V_1 = C_2V_2$) Safe Handling of Pesticide Storage of Pesticide. Destruction of empty pesticide container	2
20.	Select appropriate plant protection equipment	Sprayer and its parts Hand compression sprayer its capacity, use and maintenance Knapsack sprayer Foot sprayer Small hand sprayer 1 lt capacity Duster (rotary type)	2
21.	Apply safety measures in plant protection	Reading pesticides literature Reading label of pesticides Toxic level of pesticides Precautions to be taken during and after the application Poisoning and first aids knowledge Using Safety gears(masks, Apron, gloves etc)	2
22.	Prepare Bordeaux mixture, Bordeaux paste	Definition of importance of Bordeaux mixture mixture/paste Requirement and quantity of $CuSO_4$ quick lime ($CaCO_3$) and water Application and use of Bordeaux mixture paste	2
23.	Collect insect and disease/weeds sample (regular collection)	Collection and Preparation of disease ,Insect and weeds specimen for museum purpose and submission	4
24.	Handle compound microscope	Parts of microscope Function of each parts Method of handling	2
25.	Manage common bacterial disease	Name, casual organism, signs, symptoms and management. of : Bacterial blight of paddy. citrus canker, stalk rot of maize, angular leaf spot of cotton	4
26.	Manage common fungal disease	Management of : powdery mildew Powdery mildew of peas, cucurbits & apple downy mildew:	8

		<p>Downy mildew of maize, grapes and crucifers</p> <p>Rots and damping off Foot-rot of papaya, citrus gummosis, damping off of seedlings, late blight of potato</p> <p>Rust Black, yellow and brown rust of wheat, bean rust, pea rust & gram rust</p> <p>Smuts & bunts: Loose smut and blunt of wheat</p> <p>Wilts & root-rot Wilt of cotton, root & stem rot of jute leaf spots, leaf blights & anthracnose early blight of potato, leaf spot of rice, leaf spot of ground nut, blast of rice, red rot of sugarcane, mango anthracnose</p> <p>Galls & Abnormal Growth: Stem gall of coriander Peach leaf curl</p>	
27.	Manage common viral disease	<p>Name casual organism, signs and symptoms and management of :</p> <p>Viral diseases: Yellow vein mosaic of okra, tobacco & tomato mosaic virus disease of papaya, virus disease of potato & cardamom chirkhe Furke, bunchy top of banana</p>	4
28.	Manage common /bacterial mycoplasmal diseases	<p>Name casual organism, signs and symptoms and management of :</p> <p>Citrus greening virus and rice yellow dwarf</p>	2
29.	Manage other common diseases	<p>Name casual organism, signs and symptoms and management of :</p> <p>Root-knot Nematode, Common tea diseases</p> <p>Non-Parasitic diseases: Tip burn of paddy, black heart of potato, black tip of mango, zinc deficiency in rice.</p>	2
30.	Identify beneficial insects in plant protection	<p>Importance of beneficial insects in plant protection</p> <p>predators</p> <p>parasites</p>	2
31.	Apply Biological method pest control	<p>Introduction importance</p> <p>Advantages</p> <p>Factor need to consider during applying biological method</p> <p>Predators, parasites and microorganism</p>	2

32.	Prepare and apply botanical pesticides	Identification of plant used in herbal pesticides preparation Method of preparation Composition of ingredient Application method Concentration(Penchagabhya, chanelu, jaibic mal gitiamal etc)	4
33.	Manage insect pests of cereals	Life cycle, harmful stage nature of damage and management of: Yellow Stem borer, pink borer, gundhi bug, leaf roller, gall fly, rice hispa, crickets, white grub, wire worms, army worms, aphid, cutworms, Helocoverpa Locusts, grasshoppers,	4
34.	Manage pests of pulses	Life cycle, harmful stage Nature of damage and management of: Gram pod-borer, fly and scale,stemfly,	2
35.	Manage pests of fruits	Life cycle, harmful stage nature of damage and management of: Apple wooly aphis, sanjose scale; lemon butterfly, peach aphid, citrus leaf miner, mango hoppers, mango mealy bug, mango stem borer; mango stone weevil, mango shoot and leaf gall maker, fruit sucking moth, :grapevine thrips guava -meally scale, banana weevil	4
36.	Manage pests of vegetables	Life cycle, harmful stage nature of damage and management of: Cabbage caterpillar, diamond back moth, cabbage semi lopper, potato tuber moth, onion thrips, brinjal fruit borer and stem borer, red pumpkin-beetle, Fruit fly ,hairy caterpillars, cut worms,	2
37.	Manage pests of Industrial crop (Sugarcane, jute, tobacco, cotton, etc.)	Life cycle, harmful stage nature of damage and management of: Top borer, shoot borer, stalk borer, root borer, white flyAphids, Helicoverpa, Semilooper, Red cotton bug, Mites, etc	2
38.	Manage pests of oilseed crops	Life cycle, harmful stage nature of damage and management of: Mustard aphids, mustard sawfly ,painted bugs,	2
39.	Manage vertebrate pests	Life cycle, harmful stage nature of damage and management of: Rodents, mice ,& moles slugs, snails, etc,	2
40.	Manage pests of Tea and coffee	Coffee white borer, red mite , Tea, Helopeltis, red spider mite and termites,	2
41.	Manage stored grain pests	Life cycle, harmful stage nature of damage and management of: Insect disease and other , Vertebrate pests	2
	IPM & FFS		0

42.	Discuss on importance of IPM	Background information on IPM program Principles of IPM History of IPM in South east Asian context Importance of IPM why IPM Validation and adaptation of IPM technology Reduction on dependence on pesticides	2
43.	Discuss on Principles of Farmers Field School	Definition and History of FFS Philosophy of FFS Principle of FFS Importance of FFS	2
44.	Discuss on roles / responsibilities of stakeholders	Explanation of comprehensive planning Briefing on roles and responsibilities of stakeholders (DDC, VDC, DCC, DTT, CBO, NGO, agro-vet, farmers, agro-line agencies) Commitment of locals' bodies.	2
45.	Discuss on basic requirements of FFS	2- 3 Preparatory meetings Participant selection criterion Preparation of crop specific schedule Suitable land venue and plot Making Seeds seedlings available in time Agro- ecosystem analysis (AESA) Report preparation and presentation Report preparation and presentation Action plan for further improvement or further improvement	2
46.	Run Comprehensive planning	Prepare Existing Cropping pattern, Cropping calendar and need identification Calculate cropping intensity Gross Margin Analysis Cost benefit analysis Prioritization of crop Gap analysis Prioritization of problems	4
47.	Discuss on methods of Agro-Ecosystem analysis (AESA)	Importance and use of AESA - tools and methods Parameters Stander format for data collection	2
48.	Discuss on criteria of running FFS meeting	Attendance procedure of participant. Methods of welcome for all participants Importance of Climate Setting Introduction Group division criteria and methods Importance of group division Wrap-up and closing of meeting Information for next meeting	2
49.	Prepare lesson plan for practical/ theory season	Structure of session Types of lesson plan (Theory and practical) Structure of theory and practical lesson plan topic, objective setting, time allocation for topic, methodology, evaluation criteria, list of required tools equipment and	2

		materials, Motivation factors, Lesson plan for special classes for special group and sub group	
50.	Run first preparatory meeting for Farmers field school	Objectives of meeting Preparation of agenda of meeting,(Norms and selection criteria of farmers for FFS) Selection of Executive Committee members Roles and responsibilities Methods of running meeting Arrangement of venue, spot, refreshment, Reporting Minuting Information for next meeting Wrap-up and closing of meeting	4
51.	Run second preparatory meeting for IPM Farmers field school	Attendance of participant and others Welcome Climate Setting Gender and social inclusion analysis (GAM) Participants selection Selection of land and land owner and venue Observation parameters and frequency for experiments) Sub group division	2
52.	Prepare cropping calendar	Importance of need identification Selection criteria of crop and varieties Preparation of cropping calendar	4
53.	Select topics for experiments	Identification of problems Prioritization of problems Cost benefit analysis Gap analysis Selection of topics for experiments Concepts of experiments (Natural variation, bias, replication, treatments, plot size, sample size and methods, Observation parameters and frequency for experiments)	2
54.	Discuss on field selection criteria for studies and Group dynamics	Selection criteria of land and land owner Plot selection Program planning for next meeting Group Dynamics	2
55.	Run third Preparatory meeting for IPM Farmers field school	Discussion on agenda Climate Setting Minuting Welcome	2
56.	Perform soil test of selected site of experiment	Soil sampling for testing Discussion on result	2
57.	Set norms for FFS	Socio economic analysis Individual farm plan Sub group division Norms setting Day and time setting	2

		Expectation matching Program setting for Next meeting	
58.	Handle tools/ equipments	Handling of land preparation tools equipments and materials (primary and secondary tillage tools and equipments), Plant protection (including sample collection tools equipments and materials of insects and disease) tools equipments and materials, Intercultural operation tools equipments and materials, Harvesting, threshing and storage tools equipments and materials Handling procedure tools equipments and materials Safety precaution during handling of tools equipments and materials Cleaning and storage of tools equipments and materials (It is necessary to teach but it can apply when ever need)	2
59.	Carry out Seed Exercise	Seed quality exercise Introduction of major seed borne disease Germination test, Seed treatment, eg.Brian solution test Wrap-up and planning for next week	4
60.	Discuss /Establish Nursery. (This work to be done 21days before FFS starts)	Welcome Climate Setting Nursery establishment Farmers Practice Vs IPM Group dynamics Cattle shed management Urine collection, FYM/compost improvement	4
61.	Run Farmers field school work (week -2)	Lay out and Field preparation Fertilizer and micro nutrient calculation, PGR management Trial Set up Lay outing of experimental plot Field preparation (Site selection, land preparation, manuring and fertilizer application methods, Methods of planting etc.) Mandatory /Supportive trials Mandatory trials <ul style="list-style-type: none"> • Comparative study IPM vs FP • Soil fertility related • Varietals • Pest management • Simulation/ Compensation Trial Supportive trials (Crop and Need specific) Wrap-up and closing of meeting	4

62.	Run BBT (Pre test) (week - 3)	Welcome Climate Setting Explain method of preparation of test material and Runion of test.	4
63.	Discuss Crop physiology /growth stages critical stages of crop / its inputs requirement (Week -4)	Explain Crop water requirement and critical stage of irrigation/ nutrients, cultural operations Physiological development of seed/ tuber	4
64.	Run FFS activity. (Week -5)	Seedling treatment (planting spacing, depth, no of seed /seedling) Transplanting -Seed quality - Seed treatment Importance of quality seed and its production techniques (seed plot technique)	2
65.	Discuss AESA parameters / soil exercise (week-6)	Finalization of observation parameter of AESA, and monitoring, sampling, trap setting Soil management , Soil exercise (Living soil, water holding, infiltration, microbial activities, earth worm rearing FYM improvement Cattle shed management, Urine collection, biogas slurry management	2
66.	Discuss FFS activity on ecosystem analysis (Week -7)	Life cycle and food web Functional grouping of insects	4
67.	Discuss FFS activity (week-8)	AESA-1 Start AESA Exercise Zoo/Cage, Cup Study Pot Culture Insect drawing Group dynamics	4
68.	Run FFS activity FYM related demonstration (week -9)	AESA -2 Demo establishment of FYM improvement/ cattle Urine collection and Preparation and application of compost, vermin compost, bookish panchagabya, FYM Nutrient management of specific crop Chemical Fertilizer Testing, identification and dose calculation etc	4
69.	Perform FFS activity Disease/ its management (week -10)	AESA-3 Introduction of Disease triangle, diseases and their management Root and vessels exercise	4
70.	Run FFS activity (week - 11) Soil nutrients management	AESA-4 Nutrient and Physiological disorder management Play group dynamics	4

71.	Run FFS activity Pesticides related topics (week -12)	AESA-5 NEs and their characteristics Agro ecosystem analysis AESA presentation Introduction of pesticide and bio pesticide NEs and their characteristics Pesticide monologue/ self monitoring of pesticide poisoning	2
72.	Run FFS activity. Explain various aspects of pesticide (week -13)	AESA-6 Effect of pesticides on IPs and NEs Pesticide monologue/ self monitoring of pesticide poisoning/ Pesticide management Effect of pesticide on IPs and NEs	4
73.	Run FFS activity on Specific disease of crop taken for the FFS (week -14)	AESA-7 Major diseases and its management Intercultural operation, Weed management, thinning Virus and vector management	2
74.	Run FFS activity Various insects monitoring appliances and their use (week -15)	AESA-8 Major insects and Monitoring (Light trap/Baiting/Pheromone trap/Attractants/Pit fall trap etc) Functional grouping of insect Agro ecosystem analysis AESA presentation Root and vessels test Field and stored grain pests management interrelationship	2
75.	Run FFS activity Soil borne disease and pest (week -16)	AESA -9 Soil disease and Insects and their management	2
76.	Run FFS activity Insects and disease of post harvest stages (week -17)	AESA -10 Postharvest insect pest and diseases and their management Agro ecosystem analysis Presentation of trials, cup, zoo and other minor studies Common insect pest of plants, general Physiological disorders of crops and symptoms and their management practices	2
77.	Run FFS activity (week -18)	BBT (Post Test) Test material preparation and Runion of test and comparison of the skill, knowledge gained.	2
78.	Run FFS activity (week 19)	Explain Post Harvest activity Trials and study related to post harvest operation Group strengthening and cooperatives development	2

		Harvest and post harvest (harvesting, threshing storage and transportation)	
79.	Explain FFS activity (week -20)	Planning for field day Logistic arrangement Closing arrangement Field visit timing management	2
80.	Perform FFS activity (week -21)	Run Field Day	6
81.	Run FFS activity (week -22)	Explain IPM product Marketing Participatory monitoring and Evaluation	2
82.	Discuss FFS activity (week -23) FFS group Strengthening	Benefit Cost Analysis and its use in planning next year's crop system activities Review of the seasonal activities and Planning for next season	4
83.	Discuss method of Evaluation of course	Explain course evaluation tools Ballot Box Test (Post BBT) Field method Testing field IPM skills	2
84.	Explain Post FFS activities	Institutionalization of the groups Group registration Entrepreneurial activities Standardization of IPM products Problems based trials and studies. IPM products marketing	2
85.	Practice First aid job	Methods of performing of simple cuts, wounds, burns, disorders, injuries, poisoning, Application of simple bandage and dressing (It is necessary for teach but it can apply when ever need)	2
86.	Carryout first aid of simple cases	Identification of tools equipments and materials Required list of tools equipments and materials	2
87.	Care/maintain tools/materials	Simple care and maintenance of tools equipment and materials	2
		Total	234

Sericulture and Mushroom cultivation

Length: 39 hours

Theory: 8 hours

Practical: 31 hours

Description:

This course provides basic knowledge and skills on sericulture and mushroom cultivation practices used in Nepal. This is an enterprise related course. At the end of their course student will be able to start their own business with very low cost and space.

Objectives:

At the end of this course student will be able to:

- Identify select suitable variety of mulberry for silkworm.
- Explain life cycle of silk worm and mushroom
- Cultivate mulberry
- Rear mulberry
- Harvest and market cocoon
- Prepare compost for mushroom cultivation
- Select edible species of mushroom
- Cultivate, harvest and market mushroom

SN	Skill	Related Technical Knowledge	Time (Hrs)
1	Define sericulture	Definition concept Scope Importance of sericulture in Nepal Different species of silkworms	2
2	Draw a design/plan for sericulture house	Designs of sericulture house Construction of sericulture house Suitable climatic conditions for cocoon production	4
3	Select mulberry varieties	Different varieties of mulberry for sericulture according to the local climate	4
4	Propagate mulberry	Production of mulberry plants from cuttings Cultivation of mulberry Cutting management of mulberry Planting and care for mulberry trees Controlling pests and diseases	8
5	Harvest mulberry	Stage of Harvesting Methods of harvesting Time of harvesting Storage Chopping methods	4
6	Prepare equipment required for rearing larva	Equipment required for rearing larva Preparation and handling of equipment	2
7	Collect eggs of silkworms from reliable source	Concept of eggs Suitable spp of silkworm Selection and separation of different	2

		categories of silkworm Eggs collection methods	
8	Draw life cycle of silk worm	Life cycle of silk worm Stages of silk worm Stages of larva	2
9	Develop annual operational calendar	Calendar of operations for sericulture: Effect of temperature, relative humidity etc	2
10	Rear larva	Feed and feeding of larva according to stage Pest & disease control Environmental control Care and management of larva Handling larva	6
11	Harvest cocoons	Time for cocoon harvesting Harvesting of cocoons	6
12	Market cocoons	Prepare for market Storage and marketing of cocoons	4
13	Maintain records	Systems of records keeping Types of records Analysis of records	2
14	Calculate profit / loss	Cost calculation Returns / income calculation Profit / loss calculation	2
15	Explain Importance of mushroom cultivation	Introduction Importance and scope of mushroom farming in context of Nepal	2
16	Select common edible mushrooms species grown in Nepal	Characters of various kinds of mushroom Identification of edible and poisonous mushroom List commonly grown mushroom	2
17	Prepare media for mushroom cultivation	Compost preparation through various method Sterilizing the straw	4
18	Cultivate common mushroom	<i>Agarics</i> species Preparation of spawn Sterilization and aseptic condition Spawn production and sterilization and its importance to reduce the contamination.	10
19	Harvest mushroom	Harvesting, grading and packaging Storage and marketing Cost benefit analysis	4
20	Prepare soup from mushroom	Nutritive value of mushroom Method of preparation	4
21	Analyze cost benefit ratio	Calculation of cost of production Calculation of labor cost Calculation of return after selling	2
		Total Hrs	78

Livestock Option

Year: Second

SN	Subjects	Nature	Hrs/w	Theory	Practical	Total hrs	Full marks
A	Common subjects						
1	Agriculture Extension and Community Development	T+P	8	64	248	312	200
2	Entrepreneurship Development	T+P	6	48	186	234	150
3	Fishery	T+P	2	16	62	78	50
	Sub total		16	128	496	624	400
C	Livestock Production Specialization						
1	Livestock Production and Management II	T+P	8	64	248	312	200
2	Animal Health II	T+P	8	64	248	312	200
3	Animal Nutrition and Fodder Production	T+P	4	32	124	156	100
4	Dairy and Dairy Products	T+P	4	32	124	156	100
	Total		24	192	744	936	600
	Grand Total (A+C)		40	320	1240	1560	1000

On the Job Training	Nature of Instruction	Duration(Hrs.)	Full marks
On -the -Job Training (OJT)	Practical	800	500
Grand total		3920	2500

Livestock Production and Management II

Total Hours : 234 hrs

Theory : 48 hrs

Practical : 186 hrs

Description:

This course is designed to provide basic skills and knowledge of different livestock enterprises. Course includes breeds and breeding, Housing, general health management and other related issues of livestock production and management

Poultry production

Total Hours : 78 hrs

Theory : 16 hrs

Practical : 62 hrs

Description

This part of the course is designed to provide basic skills and knowledge of poultry farming including breeds of chicken, housing, care and manage of broiler and layer chicken for commercial farming and marketing of meat and eggs.

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of poultry farming in Nepal
2. explain different breeds of chicken
3. design poultry house for commercial farming
4. care/ manage chicks, grower and layers
5. care/ manage broiler chickens
6. explain poultry breeding
7. explain feeds and feeding of poultry
8. market meat and eggs

SN	Task statement	Related Technical knowledge	Time (hrs)
1	Explain scope of poultry production in Nepal	History of poultry production in Nepal Scope and importance of poultry farming Present status (statistics), problems and future prospect of poultry production in Nepal	2
2	Explain government policies for poultry farming/ hatchery industry in Nepal	Government policies, norms, rules and regulation for poultry industry Government and private chicken hatcheries	1
3	Explain common terms used in poultry	Poultry, broiler, layer, pullet, capon, rooster, culling, moulting, starter, grower, finisher, cock, hen, chicks, geld,	1
4	Explain poultry breeds	Zoological classification	1
5	Identify external body parts of a chicken	Well labeled diagram of a chicken Live chicken	1

6	Explain Asiatic breeds	Breed characteristics of chicken : Asiatic-Brahma, Cohchin, Lngsan	2
7	Explain Mediterranean breeds	Mediterranean: Leghorn, Minorka	1
8	Explain English breeds	English: Australorp, Sussex	1
9	Explain American breeds	American: Rhode Island Red, New Hampshire, Plymouth Rock	1
10	Identify commercial broiler chicken	Broiler: Vencob, Cob 100, Hubbard, Arboracre, Ross	1
11	Identify commercial layer chicken	Layer: Hyline brown, Lomann, Isha brown, Babcock, Saver star cross 579	1
12	Identify Nepali local chicken	Sakhini, Ghatikhuile, Pwankhulte	1
13	Identify commercial dual purpose breed of chicken	Giriraj	1
14	Explain housing system of poultry	Housing system: Free range, semi intensive, intensive(cage ,deep litter) Advantages and disadvantages of each system	3
15	Explain deep litter housing system of poultry	Advantages and disadvantages Litter management: Application of lime and bleaching powder Thickness of litter in summer and winter months Floor space requirements in different age group	2
16	Select site for poultry farm construction	Purpose of farming: Hatchery/ commercial Topography Availability of feeds/ medicine Workers/ technician availability Market accessibility Water and electricity supply Roads Availability of low cost construction materials	2
17	Explain poultry shed construction	Lay out diagram Purpose of construction(hatchery, layer, broiler farm);Small farm , Large scale farm Construction materials: Sand, gravel, cement, GI sheet, stone/ brick, local roofing materials Area calculation on basis of no. of birds and type	2
18	Identify the parts of digestive system of a fowl	Well labeled diagram Dissection of chicken Name and function of different parts	1
19	Identify the parts of reproductive system of a fowl	Well labeled diagram Dissection of chicken Name and function of different parts Process of egg formation in reproductive tract	1
20	Identify internal structure of an egg	Well labeled diagram Fresh egg Nutrient composition of egg Normal and abnormal eggs	1
21	Identify poultry equipments	Feeder, drinker, nest box, hover, perches, weighing balance, candler, debeaker, vaccinator, refrigerator,	1

		light source	
22	Prepare for brooding	Installation of hover, height of brooder, chick guard, fitting light, temperature maintaining, litter placing, checking water sources, emergency light source, space calculation, proper ventilation, protection from chilling and air draft.	1
23	Care chicks (0-8 weeks)	Receiving chicks from reliable hatchery, maintaining bio-security, feeding chicks (L1 ration), incorporation of electrolytes, vitamin and antibiotics in feed or water in order to prevent early chick mortality, vaccination, record keeping(daily feed consumption, weight gain, medicine and vaccination, mortality)	3
24	Care grower (8-16 weeks)	Bio-security measure, feeding pullet (L2 ration), feed restriction, reducing artificial light, moulting, debeaking, vaccination, vitamin and antibiotics supplement, record keeping	3
25	Vaccinate birds	Vaccine and vaccination in poultry Vaccination schedule for layer chicken Vaccination method Precaution to be taken	1
26	Perform debeaking	Purpose of debeaking, age and method of debeaking Precaution to be taken	1
27	Deworm bird	Anthelmintics used in poultry, dose of anthelmintics, method of deworming(with feed/ water)	1
28	Care laying chicken (16 weeks and above)	Bio-security measure, feeding layer (L3 ration), increasing artificial light, culling and selection of layer and non- layer, vaccination, vitamin and antibiotics supplement, record keeping(daily feed consumption, egg production, medicine and vaccination, mortality, culling, sales record), comparison with performance record provided by the hatchery	3
29	Sale of layer after productive life	Age and stage of removal(sale) of layer Sale of culled birds	1
30	Keep local Nepali chicken	Breed of local chicken, market demand, price rate, taste, rearing method, advantage and disadvantage og keeping local chicken, feeds and feeding	2
31	Protect bird from hot/ chilled weather	Summer management and winter management of poultry bird	2
32	Differentiate layer vs non layer	Characteristics of layer and non layer chicken	2
33	Collect eggs	time of collection, method of collection, storage of eggs	1
34	Sort eggs for sale	Broken eggs, abnormal eggs(double yolk egg, yolkless egg, extra-large and small eggs, thin shelled egg)	1
35	Sale eggs	Packing., storage, transportation of eggs Marketing of eggs	1
36	Keep account	Calculation of cost of production, profit and loss analysis, feed cost, medicine cost, labor cost, rent,	3

		electricity cost, maintenance and repair	
37	Care broiler chicks (starter)	Receiving chicks from reliable hatchery, maintaining bio-security, feeding chicks (B1 ration), incorporation of electrolytes, vitamin and antibiotics in feed or water in order to prevent early chick mortality, vaccination, record keeping(daily feed consumption, weight gain, medicine and vaccination, mortality)	3
38	Care broiler finisher	Maintaining bio-security, feeding broiler (B2 ration), incorporation of electrolytes, growth promoter and antibiotics in feed or water, vaccination, record keeping(daily feed consumption, weight gain, medicine and vaccination, mortality)	2
39	Market broiler chicken	Live bird marketing Price fixing Reason of price fluctuation Marketing channel for broiler Slaughtering technique Freezing of meat	2
40	Manage poultry manure	Collection, disposal and conservation of poultry manure, quality of manure , differentiation of layer and broiler manure on the basis of plant nutrients, sale of manure, application method	1
41	Explain feeds/feeding of chicken	Layer ration: L1, L2, L3 ration Broiler ration: B1 and B2 Breeder ration Nutrient content of different type of ration Use of locally available feed ingredients Time of storage of ration	2
42	Explain hatchery management	Hatchery, parent stock, sources of parent stock, breeding and feeding management of parent stock, ratio of male and female	3
43	Explain concept of AI in bird	Definition of AI, advantage and disadvantage, semen collection from rooster, technique of AI in bird	3
44	Introduce common diseases/ parasites of poultry birds	Common diseases and parasites of poultry (detail study in animal health II)	1
45	Explain concept of duck farming	Common breeds, feeding, breeding, rearing and diseases of duck	3
46	Explain concept of quail farming	Common breeds, feeding, breeding, rearing and diseases of Japanese quail	2
47	Prepare scheme for poultry farming	Component of scheme preparation, scheme for broiler farm, layer farm, breeder farm, large and small scale poultry farm, banking procedure for loan	2
		Total	78

Swine production

Total Hours : 78 hrs
Theory : 16 hrs
Practical : 62 hrs

Description:

This part of course is designed to provide basic skills and knowledge of pig farming including breeds of swine, housing, care and manage of piglet, sow, breeding boar fattening pig for commercial farming and marketing of meat and piglets.

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of swine farming in Nepal
2. explain different breeds of swine
3. design pig sty for commercial farming
4. care/ manage piglets, sow, gilt, breeding boar and fattening pig
5. Explain swine breeding
6. Explain feeds and feeding of swine
7. Market meat and piglets

S.No	Skill	Related technical knowledge	Time (hrs)
1	Explain Importance of pig farming in Nepal	Introduction of pig farming Scope and importance of pig farming in Nepal Socio economic and cultural aspect of pig farming	2
2	Explain present status/ prospect of pig production in Nepal	Role of government to improve pig farming Government and private pig farms in Nepal Possibilities of pig farming in Nepal	2
3	Explain social problems regarding pig farming	Points to be considered before establishment of pig farming Social problems in pig farming Environmental problems	1
4	Define terminologies used in swine production:	Terminologies used in swine production: Sow, boar, piglet, gilt, farrowing, litter, pork, ham, geld, runt, flushing, steaming up	1
5	Classify pig species	Zoological classification of pig	1
6	Identify external body parts of a pig	Purpose of study of external body parts Identification of body parts by well labeled diagram and live animal	2
7	Identify the suitable breeds for commercial piggery	Breed characteristics of improve breed: Landrace, Yorkshire, Hampshire, Tamworth, Duroc Jersey, Pakhribas Cross	3
8	Identify local breeds of pig	Characteristics of local breed: Hurra, Chwanche	1
9	Study behavior of pigs	Importance of study common behavior Feeding behavior Body movement Behavior on heat period Behavior on pregnancy Behavior during farrowing Behavior in sick period Excitement at strange places	2

10	Handle/ restrain pig	Objectives of restraining/ handling pig Handling of small piglets Method of restraining of adult boar and sow Handling sow in heat and pregnant time Handling of sick pig Precaution to be taken during handling	4
11	Collect/ dispose manure	Nutrient composition of dung Demonstration of methods of collection Protection from leaching and evaporation Environment pollution Application of manure Selling of manure	1
12	Castrate male piglet by open method	Definition of castration Purpose of Castration Proper age for castration Handling of piglet during castration Tools, materials, equipments required for castration Precaution to be taken during castration Use of antiseptic Advices to the farmers.	4
13	Calculate live weight by body measurement formula for pig	Purpose of body weight calculation Different formula used for estimation of live body weight Measuring length and hearth girth Calculation of live wt. by using formula Tools and equipment used Estimation of live wt. according to age, lifting and weighing by balance	2
14	Identify pig by ear noticing method	Introduction of ear noticing Handling method for ear noticing Equipments needed for ear noticing Numbering technique Methods of ear noticing Other identification system: naming...	2
15	Perform teeth clipping	Age for teeth clipping Purpose of teeth clipping Methods of handling during teeth clipping Tools and equipment used Precaution to be taken during teeth clipping	2
16	Inject iron for piglet	Importance of iron in piglet Piglet anamia -Signs and symptoms Proper age for iron injection Dose of iron dextran Methods of iron injection to piglets Other sources of iron supplement in piglets	3
17	Select breeding boar	Importance of selection Principle of selection Selection methods: Individual selection, Progeny testing, Pedigree selection	1
18	Select sow/ gilt for	Importance of selection	2

	breeding purpose	Principle of selection Selection methods: Individual selection, Progeny testing, Pedigree selection	
19	Explain reproduction in swine	Reproductive organs of sow and boar Function of different organs Hormonal roles on reproduction	2
20	Defect heat by external symptoms of sow	Estrous cycle of swine Puberty and sexual maturity in pig Signs and symptoms of heat in saw Heat and appropriate time for mating.	2
21	Explain housing system of pig	Types of Housing -Open yard type -Closed type Ventilation, door, windows, fencing Wall system: type and importance Roof and roofing type and importance Floor system type and importance Feeding trough, waterer, gutter, manure yard. Store, labour room, isolation room, farrowing box Fencing and its importance Lay out plan	2
22	Select the site for piggery	Criteria for site selection Factors to be considered for site selection	1
23	Calculate space requirement for different age and stages of pig	Space requirement for fattening Space required for open system Space required for Breeding boar and sow Space required for farrowing crate Space required for isolation pen Space required for store, manure pit etc	1
24	Arrange facilities for piggery	Provision of electricity for light and heat Provision of fresh water supply	1
25	Arrange tools/materials in piggery	Arrange of feeding, watering equipments Provision of weighing/ measuring tools/ restraining materials Provision of first aid box Storage of tools and equipments	2
26	Repair /maintain piggery	Maintaining fence Repairing of permanent structure (House, Tools, equipments etc)	1
27	Care pregnant sow	Feeding ; daily feed requirement, steaming up Space requirement for pregnant sow Sanitation of pig sty Pregnancy diagnosis Weight gain during pregnancy Isolation at the time of farrowing Routine de-worming	2
28	Care breeding boar	Feeds and Feeding requirements Housing Management- space requirement Sanitation of sty Health care management Routine drenching	2

29	Care sow during/ after farrowing	Signs and symptoms of farrowing Preparation of farrowing place Cleaning and sanitation of farrowing crate Provision of guard rail Dystocia management Precaution to be taken during farrowing	3
30	Provide post natal care of piglet	Removal of mucous from nose Providing bedding material Protection from chilling in winter Importance colostrums feeding Assisting for breathing Removing of umbilicus cord Special care of runt and weak piglets Orphan management if necessary	2
31	Care piglet before weaning	Space requirement Creep area Feeds for piglets and creep feeding Weaning of piglets	2
32	Provide preventive health care	Ecto and endoparasites of pig. List of common diseases of pig Vaccination schedule of pig Sanitation and disinfectant in piggery (Details of parasites and diseases of pig- see in Animal Health I and II)	4
33	Assist to find market demand/ supply of piglet	Number and capacity of piggery in local areas, Weaning age and Price of piglet	2
34	Sale product(meat)	Marketing channel Local, national and international market Project work to find out actual sales of meat and live pigs in terms of amount and quantity/number	4
35	Keep records of piggery	Breeding record, Sales record, Health record, Feeding record and Labor record	4
36	Keep account of pig production	Daily transaction, Profit and loss, Financial analysis Scheme preparation	5
		Total	78

Horse and Mule Production

Total Hours : 78 hrs
Theory : 16 hrs
Practical : 62 hrs

Description:

This part of course is designed to provide basic skills and knowledge of horse and mule production including housing, care and management, breeding and health care of riding horse and pack animals. **School may choose any one from Horse and Mule Production and Rabbit Dog and Lab animal**

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of horse and mule in Nepal
2. design housing/ shelter for horse and mule
3. care/ manage different stages and age of horse and mule
4. Explain feeds and feeding

S N	Task/skill	Related technical knowledge	Time (hrs)
1	Explain scope of horse/ mule in Nepal	Introduction of horse and mule Scope and importance of horse and mule in Nepal Use of horse/mule in Nepal Statistics horse/mule in Nepal Terminology used in horse/mule	2
2	Select horse/mule	Purpose of selection Selection criteria for horse/mule Method of selection	3
3	Identify external body part of horse/mule	Importance of study external body parts Identification of external body parts	2
4	Explain breed characteristics of horse/mule	Importance of study of breed character Body structure based character Color based character Behavior based character Size based character Draft based character	5
5	Study behavior of horse/mule	Purpose of study Feeding behavior Body movement Behavior during Pregnancy Behavior during foaling	2
6	Handle horse/mule	Purpose of restraining Method of handling: by casting, by using twitch, by lifting of limb, by using anesthetics Precaution during handling	4

7	Restrain animal using casting rope	Purpose of casting Size of rope (length and thickness) used for casting a horse Preparation for casting Precaution during casting	3
8	Manage manure of horse/mule	Proper method of management Precaution during management	2
9	Castrate male horse by open method	Meaning of castration Advantage of castration Proper age for castration Casting animal Materials required: anesthetics with dose rate, surgical instruments, bedding materials Surgical procedure Post operative care	4
10	Estimate body weight of horse/mule	Estimate body weight by observation for calculation of dosage of drug	2
11	Detect heat of mare	Importance of detection of heat Estrus cycle Age of puberty Sign and symptoms of heat Mating time and mating behavior	2
12	Care pregnant mare	Feeding of pregnant mare Housing and space requirement Cleaning and sanitation Preventive health care	2
13	Care newly born foal	Removal of mucous from nose Bedding material Assistance for walking and suckling Feeding colostrums Removal of navel	3
14	Care post parturient mare	Feeding of mare Housing and space requirement Cleaning and sanitation Preventive health care	3
15	Care riding/ race horse/pack animal	Feeding of riding horse/mule Feeding requirements of horse/ mule Housing and space requirement Cleaning and sanitation Preventive health care	3
16	Fit saddle	Purpose and method of fitting a saddle	3
17	Place a pack frame for loading pack animal	Purpose and method of placing a pack	3
18	Assist in training a riding/pack animal	Purpose and method of training	4
19	Care equipments of work animal	Care of Pack, harness, saddle, bridle	3
20	Explain digestion in horse	Digestive system of horse Role of digestion in caecum	4

21	Trim hoof of horse/mule	Purpose of hoof trimming Precaution during hoof trimming Handling of animal for hoof trimming Procedure of trimming hooves	2
22	Perform sole fitting	Purpose of sole fitting Shape and size Fitting sole/ nailing of sole	3
23	Age animal by dentition	Purpose of aging Technique of aging	2
24	Explain housing for horse/mule	System of housing Space requirement for foal, stallion, mare, breeding male and female	4
25	Explain special disease of horse/mule	Spasmodic colic sign and symptoms Laminitis sign and symptoms Pole-evil sign and symptoms Thrush of sole sign and symptoms Making thrush powder and use	6
26	Care foot of horse	Anatomy of horse foot Sole of horse (frog), care to prevent laminitis	2
	Total		78

Rabbit, Dog and Laboratory Animals

Total Hours : 78 hrs
Theory : 16 hrs
Practical : 62 hrs

Description:

This part of the course is designed to provide basic skills and knowledge of rabbit, dog and laboratory animal production including breeds, breeding, housing, care and management and marketing. **School may choose any one from horse and Mule Production and Rabbit Dog and Lab animal**

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of rabbit, dog and laboratory animal in Nepal
2. explain different breeds of rabbit, dog and laboratory animal
3. design housing and shelter for rabbit, dog and laboratory animal
4. care/ manage rabbit, dog and laboratory animal
5. explain breeding rabbit, dog and laboratory animal
6. explain feeds and feeding of rabbit, dog and laboratory animal
7. market rabbit, dog and laboratory animal

S. No.	Task/skill	Related technical knowledge	Time (Hr)
Rabbit production			
1	Explain scope of rabbit production in Nepal	Introduction and classification of rabbit Scope of rabbit production Economic importance of rabbit	2
2	Explain breed characteristic of rabbit	Characteristics of meat type breed Characteristics of fur breed	3
3	Explain housing requirement of rabbit	Housing type Space requirement Site selection Equipment necessary inside housing Hutch and organizing run Nest box	3
4	Explain feeds/feeding of rabbit	Requirements of nutrient for different age and stages of rabbit Nutrient requirements for fur production Nutrient requirement for meat production Nutrient requirement for lactating mother Method of feeding and water supply for rabbit	3
5	Handle rabbit	Methods of handling Precaution during handling	1
6	Manage breeding of rabbit	Breeding behavior of rabbit Age for breeding Sexing of rabbit	1
7	Manage mating	Mixing male and female Coitus stimulation	1

		Precaution	
8	Care pregnant rabbit	Signs of pregnancy Care of pregnant Handling during pregnancy Gestation period of rabbit	1
9	Care newly born kitten	Removal of kitten Prevention from enemies Chances of refusal of kitten by mother in case of touching by man at birth Bedding materials used	1
10	Care lactating female	Feeding lactating female Nutritive and palatable food for female	1
11	Wean young from mother	Weaning and its importance Age of weaning Feeding and care after weaning	1
12	Care rabbit kept for meat/ fur production	Proper feeding Daily care and management Cleaning and sanitation of pen Protection from enemies	2
13	Provide health care service for rabbit	Prevention, control and treatment of: Coccidiosis, Liver fluke, Ear mange, Metritis	2
14	Remove fur	Technique of removal Storage of fur Marketing of fur Quality of fur	2
15	Slaughter rabbit for meat purpose	Methods of handling before killing Slaughtering techniques Dressing methods Preparation of meat Keeping quality Nutritive value of rabbit meat	2
16	Keep records	Types of record: breeding, production, feeding, weigh gain, financial, health records Analysis of records	2
Pet animal (Dog)			
17	Introduce dog as a pet animal	History of dog keeping as companion animal Dog behavior	1
18	Explain scope pet animal	Scope and importance of dog as pet animal	2
19	Classify dogs on the basis of usage	Popular breed of dogs: Dog breeds kept as a friend of children Dog breeds kept as home guard Dog breeds utilized as household workers	2
20	Explain the breed character of dog	Doberman Mastiff Alsatian Boxer Mungral	2
21	Handle dog	Importance of handling dogs Methods of handling Use of mouth cover Handling by owner	1

		Precaution during restraining	
22	Provide routine care for dog	Tools equipment used for care of dogs Bathing method Catch care Exercise for dog Training of dog Teeth care	2
23	Castrate male dog	Principle and procedure of castration	3
24	Explain spaying in female	Principle and procedure of spaying	4
25	Provide preventive care for dog	Routine deworming schedule Vaccination against Rabies, Distemper, Parvoenteritis, Parainfluenza, Leptospirosis, Hepatitis	3
26	Perform physical examination of dog	History taking Inspection Examination of body part	2
27	Explain construction of kennel for dog	Kennel space Bedding materials Routine cleaning and sanitation of kennel	2
28	Arrange for dog breeding	Oestrus cycle of dog Mating behavior Heat period of dog False pregnancy Accidental pregnancy	2
29	Care for pregnant dog	Pregnancy diagnosis Feeding requirement during pregnancy Kennel management Problems during pregnancy (Morning sickness)	1
30	Care puppy	Nursing management of puppy	1
31	Explain about concept of kennel club	Scope and importance of kennel clubs Minimum requirement to establish a kennel club Preparation of a model of kennel club Services to be provided by a kennel club Example of kennel clubs in Nepal	2
32	Explain common diseases of dog	Signs symptoms control treatment of Distemper, Parainfluenza, Parvo enteritis and Rabies ,Hepatitis, Parasites and parasitic diseases	6
33	Keep record	Breeding, Vaccination and Health records	2
Lab animal			
34	Explain importance of laboratory animals	Purpose keeping lab animal Different use of lab animal	2
35	Explain characteristics of laboratory animal	Characteristics of Guinea pig, Mouse, Rabbit kept as lab animal	4
36	Explain care of laboratory animals	Feeding, housing, breeding, daily care and management of lab animal	4
37	Keep record	Feeding, Breeding, Vaccination and Health records	2
		Total hours	78

Animal Health II

Total hours : 234 hrs
Theory : 48 hrs
Practical : 186 hrs

Description:

This course provides skills and knowledge of identification of external parasites, internal parasites their eggs, etiology, symptoms diagnosis, treatment, prevention and control of parasitic, bacterial, viral, protozoa, fungal diseases of livestock and poultry.

Objectives:

Upon completion of this course students will be able to :

1. Identify external parasites livestock and poultry
2. Identify internal parasites livestock and poultry
3. Explain etiology, symptoms, diagnosis and treatment of parasitic disease livestock and poultry
4. Explain etiology, symptoms, diagnosis and treatment of bacterial disease livestock and poultry
5. Explain etiology, symptoms, diagnosis and treatment of viral disease livestock and poultry
6. Explain etiology, symptoms, diagnosis and treatment of protozoal disease livestock and poultry
7. Explain etiology, symptoms, diagnosis and treatment of fungal disease livestock and poultry
8. Explain etiology, symptoms, diagnosis and treatment of metabolic disease livestock and poultry
9. Explain causes and treatment of common poisoning in livestock

S. N	Tasks Statements	Related Technical Knowledge	Time (hrs)
1	Introduce parasite and parasitology.	Parasite and parasitology Types of parasites: external and internal parasites Types of host : definitive host and intermediate host	4
2	Identify/treat external parasites	Introduction, types, general symptoms and treatment of lice, ticks, mite and leech infestation.	6
3	Introduce helminthe parasites	Common helminth parasites of cattle, buffalo, horse, sheep, goat, pig, dog and poultry. Effects of helminte on host.	6
4	Identify/treat liver fluke	Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control of liver fluke disease.	6
5	Identify/treat paramphistomum	Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control of paramphistomiasis.	6
6	Explain/treat <i>moniziasis</i>	Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control	6
7	Explain <i>Gid</i> (study)	Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control	6

8	Explain pork tapeworm	Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control	6
9	Explain hydatidosis	Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control	6
10	Explain dog tapeworm	Introduction, morphology, lifecycle, diagnosis, treatment, prevention and control	6
11	Identify/treat small round worm	Introduction, general life cycle of small round worm Type of small round worms Symptoms, diagnosis, prevention and control	8
12	Handle simple microscope	Parts of Microscope, general cleaning and handling procedures	6
13	Collect sample, store and dispatch	Collection, storage and dispatch of blood, urine, feces, milk sample, skin scrapping from livestock and pet	6
14	Examine feces	Fecal examination by different techniques: direct smear, sedimentation, floatation method Identify helminthes eggs: trematodes, custodies, nematodes	16
15	Introduce/treat hemorrhagic septicemia disease	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
16	Introduce black quarter	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
17	Introduce anthrax	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
18	Introduce tetanus	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
19	Introduce tuberculosis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
20	Introduce foot rot	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
21	Assist to treat mastitis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
22	Introduce actinomycosis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
23	Introduce actinobacillosis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
24	Introduce/treat calf scour	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
25	Introduce atrophic rhinitis of swine	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6

26	Introduce/prevent foot and mouth disease	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
27	Introduce rinderpest	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
28	Introduce orf	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
29	Introduce ephemeral fever	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
30	Introduce swine fever	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
31	Introduce rabies	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
32	Introduce parvo – enteritis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
33	Introduce swine – influenza	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
34	Introduce peste des petits ruminant (PPR)	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
35	Introduce bird Flu	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
36	Introduce babesiosis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
37	Introduce/treat coccidiosis in calf	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
38	Introduce/treat milk fever	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	6
39	Introduce ketosis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
40	Introduce fowl cholera	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
41	Introduce pullorum	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
42	Introduce chronic respiratory disease	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4

43	Introduce fowl typhoid	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
44	Introduce Newcastle diseases	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
45	Introduce marek's disease	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
46	Introduce gumboro disease	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
47	Introduce infectious bronchitis	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
48	Introduce/treat coccidiosis in poultry	Introduction, etiology, mode of transmission, symptoms, diagnosis, line of treatment, prevention and control.	4
49	Prepare for vaccination camp	Definition and uses of vaccines Planning, organizing and running a vaccination campaign; maintain cold chain and vaccine handling, quality control	4
50	Assist in vaccination schedule of livestock pet / poultry	Vaccination schedule for livestock and pet Vaccination schedule for layers broilers and breeders	12
51	Explain burn	Introduction, types, causes, symptoms, first aid of burn	6
52	Explain yoke gall/Sore neck	Introduction, causes, symptoms, first aid of yoke gall	6
53	Explain vomiting	Introduction, causes, first aid of vomiting	6
54	Introduce government rules and regulations related to animal health	Government acts, rules, regulations and orders related to animal health and livestock production.	6
55	Keep record of animal health	Different types of animal health records	6
		Total	312

Animal Nutrition and Fodder Production

Total Hours : 156 hrs
Theory : 32 hrs
Practical : 124 hrs

Description:

This course is designed to provide basic skills and knowledge necessary for feeds and feeding of animals and cultivation of fodder and pasture required to feed livestock and poultry

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of animal nutrition and fodder production in Nepal
2. explain nutrients required for different animal species and poultry birds
3. classify feed stuffs
4. cultivate fodder and grasses
5. produce and manage pasture
6. assist to formulate ration for livestock and poultry
7. conserve fodder and forage for lean season
8. calculate dry matter and total feeds required for animals

S.N	Skill	Related technical knowledge	Time (hrs)
1	Define Animal Nutrition	Definition of animal nutrition and related terminology used in animal nutrition: Nutrition, Nutrient, Ration, Feed, Dry matter, DE, ME,	2
2	Classify nutrients	Water, Carbohydrate, Protein, Fat, Mineral, Vitamin	2
3	Explain function of water in animal body	Source of fresh clean water Function of water Dehydration / rehydration Water requirements in hot summer, for milk producing animal, animal in draft purpose, general requirements /day	2
4	Explain the role of carbohydrate in animal body	Introduction Source of carbohydrate Function of carbohydrate Deficiency symptoms Requirements	2
5	Explain the role of protein in animal body	Introduction Type of protein Amino acids: essential amino acid Source of protein Function of protein Deficiency symptoms Requirements	3
6	Explain the role of fat/lipid in animal body	Fat and Lipid Essential fatty acid Source of fat Function Deficiency symptoms Energy requirements	2

7	Explain the role of vitamins in animal body	Introduction Type of vitamins: Fat soluble and water soluble vitamins Source and functions of different vitamins Deficiency symptoms Requirements	3
8	Explain the roles of minerals in animal body	Introduction Micro minerals: Fe, Co, Cu, Se, I, Zn Macro minerals: Ca, P, Na, K, Mg, Cl Sources and functions of minerals Mineral deficiency symptoms Requirements	4
9	Explain the digestion process in animal body	Microbial digestion in ruminants Enzymatic digestion in non-ruminants Microbial activities in rumen/ caecum	3
10	Determine nutrient requirement for animals	Concept of NRC and ARC standard Nutrient requirements for layer / broiler chicken Nutrient requirement for pigs Nutrient requirement for dairy cattle and buffalo Nutrient requirements for sheep and goat Nutrient requirements for horse and mule	4
11	Classify the feed stuffs	Roughage: dry roughage and succulent roughages Concentrate: energy rich, protein rich Feed supplements: mineral and vitamin supplements Feed additives: antibiotics, preservatives, antifungal	4
12	Identify locally available feed ingredients	Feed ingredients: energy rich, protein rich	3
13	Formulate ration for different animal species	Importance of balance ration Feed formulation for poultry Feed formulation for dairy cattle and buffalo Feed formulation for pig	6
14	Calculate dry matter for cattle and buffalo	Dry matter requirements for cattle and buffalo Calculation of green fodder Calculation of the dry fodder Calculation of energy rich concentrate Calculation of protein rich concentrate	4
15	Process feed ingredients	Introduction of feed processing Husking, wilting, drying, soaking, grinding, ensiling, chopping, roasting, pelleting	4
16	Explain the importance of crop/ animal by-product in animal rate	Introduction of byproduct Crop by products: rice polish, wheat bran, molasses, oil cakes, brewery extract Animal by- products: fish meal, meat meal, blood meal, feather meal, bonemeal dairy by-products	4
17	Design yearly feeding plan	Importance of feeding plan Locally available feed stuff	2

18	Collect fodder/forage grass (herbarium collection)	Herbarium collection method and importance	4
19	Classify grass	Annual, biennial, perennial grasses Leguminous and non leguminous grasses and fodder	3
20	Explain factor nutritive value of feeds stuff	Live stock supplies and breed Feeding method, -Level of feeding Protein and fiber ratio Physiological condition of animal	4
21	Cultivate perennial leguminous grasses	Cultivation practice of Stylo, Kudzu, Desmodium,	3
22	Cultivation of annual legume grass	Cultivation practice of Beseem, Vetch	2
23	Cultivation of perennial non legume grasses	Cultivation practice of Napier, Setaria Molasses, Paspalum, Rye grass	5
24	Cultivate the annual forage grass	Cultivation practice of oat	2
25	Follow mixed cropping system	Maize, cowpea and soyabean Oat and berseem	2
26	Explain importance of grass for livestock farming	Importance of green grass Fodder trees for livestock Nutritive value of fodder	2
27	Identify multipurpose fodder trees found in local area	Introduction of multipurpose tree Importance of multipurpose trees Local, Botanical, English name of fodder and grasses Nutritive value of locally available multipurpose tree	3
28	Establishing fodder nursery in school farm	Introduction of nursery Site selection Lay outing for nursery Arrangement of irrigation drainage, path Fencing Soil preparation for seed bed Plastic bag Nursery tools and equipments	5
29	Propagate fodder trees by vegetative methods	Propagation by cutting Propagation of layering Propagation of budding Propagation of grafting Planting of cutting Media preparation for layering	4
30	Cultivate local fodder tree	Badahar-Kutmiro Nivaro, Tanki, Pakhuri, Kharsu, Ipilipil, Dabadabe, Kimbu	8
31	Propagate by reproductive method	Preparation of media Reliable source of seed Seed collection time and storage Dormancy breaking process if necessary Germination test Soiling of seed Preparation of plastic bag Preparation of soil mixture	5

		Filling of soil mixture in plastic Plantation method Daily care and management Inoculation	
32	Transplant fodder trees	Site selection for transplanting Preparation of pit for transplant Transplantation of seedling	4
33	Provide care for fodder trees	Manuring, irrigation, weeding, lopping techniques of fodder trees	2
34	Identify main plant parts stage of fodder trees used for feeding	Parts of grass and trees Identify nutritive stage and part of plant	2
35	Lope fodder	Lopping method; Lopping season Lopping time (morning/ day)	2
36	Feed/grass fodder	Preparation grass fodder before feeding Frequency of feeding Time for feeding	2
37	Introduce pasture management	Definition of pasture Importance and scope of pasture land Range land management Annual legume/non legume; Perennial Classification of pasture on the basis of climatic/geographical region	2
38	Improve pasture land	Rejuvenation, Renovation, Renewal	2
39	Explain problems of pasture improvement	Problem of pasture improvement Lack of coordination between stakeholders Lack of inputs: seed, fertilizer, irrigation Lack of technical knowledge Government rules and regulation	2
40	Manage local/improved pasture	Management of local and improved pasture Factors for improving pasture	2
41	Explain the method of increasing productivity of pasture	Methods of increasing productivity of pasture: sowing, planting, fertilizer application and irrigation, gap filling Grazing system	2
42	Explain factors responsible for the deterioration of nutrient content in pasture	Factors of pasture deterioration: Soil condition, heavy rain, over grazing, growth of unwanted plants, lack of fertilizer application	2
43	Apply fertilizer / manure in pasture land	Deficiency symptoms of NPK and other soil nutrients Application of NPK: foliar spray, fertilizer application in soil, application of organic manure	2
44	Explain gazing system	Grazing system; Productivity of pasture Live stock unit; Carrying capacity	2
45	Explain plant poisoning in pasture	Poisonous plants Signs and symptoms of plant poisoning Local treatment method Poisonous parts of plants	2
46	Explain Fodder conservation	Introduction of fodder conservation Importance of fodder conservation	2

		Method of fodder conservation; Dry conservation Wet conservation	
47	Make Hay	Definition of hay Principles of hay making Selection of fodder/forage for hay making Characteristics of good quality hay	3
48	Make silage	Definition of silage; Principle of silage making Advantage of silage; Method of silage making Characteristics of good silage	4
49	Explain types of silo	Silos: trench silo, bunker, tower silo, pit silo	3
50	Explain the storage of crop residues	Importance of crop residues for livestock feeding Storage of rice straw, oat straw, millet straw	2
51	Improve the nutritive value of crop residues	Urea treatment Treatment of salt, molasses Soaking	2
52	Prepare mineral block	Material requires for making mineral block: Salt, Red soil, Egg shell, wheat four millet floor	2
53	Make fodder calendar	Importance of fodder calendar Alternative arrangements during scarcity period/season	2
		Total	156

Dairy and Dairy Products

Total Hours : 156 hrs
Theory : 32 hrs
Practical : 124 hrs

Description:

This course is designed to provide basic skills and knowledge necessary for clean, hygienic milking and milk handling as well as the processing of milk to make milk products.

Objectives:

Upon completion of course, the students will be able to:

1. describe the scope and importance of dairying in Nepal
2. explain milk and its composition
3. perform milking
4. produce hygienic milk
5. perform quality control tests
6. process raw milk
7. prepare chhana based sweets
8. prepare khoa based sweets
9. market milk and milk products

SN	Task statement	Related Technical knowledge	Time (hrs)
1	Explain the scope of dairy industry in Nepal	History of dairy development, scope and importance, constraints, present dairy policies, major dairy industries in Nepal, role of DDC, NDDDB, private dairy and dairy cooperative in dairy development, present status of milk production- demand and supply ratio of milk, statistics of dairy animals	3
2	Explain the composition of milk	Definition of milk Composition of milk: Water, Fat, Protein, Lactose, Minerals, Vitamins, Phospholipids, Cholesterol Pigments, enzymes etc	3
3	Explain the factors affecting the composition of milk	Factors affecting the composition of milk: species, breed, individuality, stage of lactation, age of animal, seasonal variation, disease and udder infection, Nutrition, interval of milking, day to day variation, portion of milking and time of milking, milk yield, feeding, excitement, drug and hormone, condition of cow at calving	4
4	Explain the properties of milk	Physical state of milk, color, odor, specific gravity, specific heat, boiling point, refractive index, viscosity, freezing point, Ph and acidity, adhesive properties, effect of heat on milk.	3
5	Identify dairy equipments	Dairy equipments used in dairy farm, equipments used in chilling center, equipment used in dairy plants	4

6	Clean dairy equipments	Dairy detergents, method of cleaning	4
7	Sanitize dairy equipments	Sanitization, chemical sanitizers	3
8	Prepare animal for hygienic milking	Cleaning and sanitization milking barn, cleaning of utensils, cleaning of milch animal, personal hygiene of workers.	3
9	Milk animal	Hand milking: stripping, full hand milking, knuckling Machine milking	5
10	Collect milk	Establishment of milk collection center, site selection, management of collection center, measurement, platform test, pricing and payment	5
11	Explain chilling of milk	Role temperature in bacterial growth, chilling process, bulk milk tank cooler, plate chiller, dairy equipments required in chilling center	3
12	Transport milk	Transportation of milk from dairy farm to chilling center, chilling center to dairy plant.	3
13	Perform organoleptic test	Principle, procedure, result and interpretation of test	1
14	Perform COB test	Principle, procedure, result and interpretation of test	1
15	Perform alcohol test	Principle, procedure, result and interpretation of test	1
16	Perform acidity test	Principle, procedure, result and interpretation of test	5
17	Perform methylene blue reduction (MBR) test	Principle, procedure, result and interpretation of test	5
18	Perform Fat test	Principle, procedure, result and interpretation of test	5
19	Perform SNF /TS test	Principle, procedure, result and interpretation of test	4
20	Explain the role of bacteria in the making milk products	Common bacteria used in making Dahi, yoghurt, butter and cheese	2
21	Explain milk borne diseases	Milk borne diseases: bovine origin, human origin	3
22	Prepare for milk processing	Grading and sampling, Weighing, pre-heating	3
23	Pasteurize milk by batch pasteurizer	Definition of pasteurization, LTLT method	3
24	Pasteurize milk by HTST method	HTST method of pasteurization	3
25	Homogenize milk	Principal and procedure of homogenization of milk	3
26	Standardize milk	Definition, method of standardization :reconstitution, toning, recombination, Pearson square method	3
27	Perform adulteration test	Principle, procedure, result and interpretation of the adulteration of starch, sugar, soda, hydrogen peroxide, formalin and common salt	8
28	Separate cream	Definition of cream, uses, types, composition and nutritive value of milk, cream separator, method of cream separation, standardization of cream.	5
29	Make ice-cream	Definition, nutritive value, composition, properties, types, ingredients used in making ice--cream, procedure of making ice-cream(ice cream-mix	4

		preparation, aging, freezing, hardening, packaging), storage, distribution, over run calculation, production cost.	
30	Prepare starter culture	Definition, types, making procedure, preservation and quality of starter culture	3
31	Make dahi/ yoghurt	Definition, nutritive value, production procedure, market quality, packing and storage, keeping quality.	5
32	Make butter	Definition, nutritive value, production procedure, market quality, packing and storage, defect in butter, production cost.	3
33	Make ghee	Definition, nutritive value, production procedure (traditional method, butter method, cream method), market quality, packing, storage, defect in ghee, production cost	5
34	Explain cheese making procedure	Definition, classification, nutritive value, composition, making procedure, packing and storage	3
35	Make chhana	Definition, nutritive value, uses, making procedure, packing, storage, and production cost.	5
36	Make paneer	Making procedure, packing, storage.	4
37	Make chhana based sweets	Procedure of making rasgolla, cham cham, Sandesh, Rasmalai	7
38	Make khoa	Definition, nutritive value, uses, making procedure, packing, storage, and production cost.	7
39	Make khoa based sweets	Procedure of making peda, lalmohan, gulabjamun, pustakari, gundh pak.	9
40	Market milk/ milk products	Packing, distribution, advertisement and marketing strategy of milk/ milk products	3
		Total	156

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