

CURRICULUM
Technician Level Course
in
Livestock
(JT)

(One year programme-annual system)



Council for Technical Education and Vocational Training

Curriculum Development Division

Sanothimi, Bhaktapur

Development: 1991 (2048)

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1. Introduction

With respect to agriculture training, many changes have occurred in the last few years. Previously JTA training was run by the Department of Agriculture, Tribhuvan University and CTEVT, however, CTEVT has the prime responsibility for this training. CTEVT Act 2049 has given mandate to CTEVT to conduct the TEVT programs. Following the Act, the responsibility of CTEVT has been further developed and set-forth. The primary purpose of CTEVT is "to facilitate the growth and development of human resources of the Nation". Accordingly, one of the specific objectives designed is "to organize and coordinate technical education and vocational training through human resources needs assessment, recognition, accreditation, curriculum development, etc." It is based upon this purpose and objective that this curriculum has been designed to facilitate the growth and development of human resources in Nepal's agriculture sector.

Throughout the world it has been shown that successful vocational training must be closely linked with the actual "job market". In other words, the whole training program must be developed through a process that considers both the needs of the "user-groups" which hire the graduates, and the need for graduates which are "self-employed". The question must be asked, "Which specific skills the graduates need in order to either find employment with various agencies; or to develop their own enterprise". These skills must be clearly identified and a training program must be initiated to develop them.

In this regard, Koshi Hills Agricultural Development Project was conducted the training needs assessment of technician level (JTs). During this assessment, Director Generals of Horticulture, Food and Agricultural Marketing Services; General managers of the Dairy Development Corporation, Agriculture Inputs Corporation; chiefs of the training wings of the Departments of Livestock Services and Agriculture, Agricultural Development Bank, Regional Directors of Agriculture for Central, Western, Mid-Western, Far-Western Regions, Regional Directors of Livestock for Western and Mid-Western Regions were consulted. After completing all procedures, technician level (JT) curriculum developed in 1991 (2048) and first revised in 1995 (2052) has been implementing till 2015. Department of Livestock identified the gaps and requested to revise the curriculum in order to fit the constantly changing scenario of livestock development within the country and to review the role of livestock technician in Nepal. As a result this curriculum revision work has been done with the technical support of Livestock Department and other concerned organizations in June 2016.

2. Curriculum Title

Junior Technician (JT) in Livestock

3. Programme Aims

1. To provide more effective middle-level agricultural extension personnel.
2. To improve the efficiency of the delivery of extension services to rural people.
3. To prepare JTs to start their own small business, or to be able to help farmers who are starting their business.
4. To provide an opportunity for career development and promotion to agricultural/livestock JTAs.

4. Programme objectives

By the end of the course, the trainees will be able to:

1. Fulfill the technical, administrative and sociological tasks and responsibilities of a livestock; JT in Nepal.
2. Work with rural people in a more sympathetic and constructive way to help them to identify their problems and seek their own solutions.
3. Act as a more effective catalyst of change in a rural community-women, as well as men; the poor, as well as the rich; the remote, as well as the centrally-placed-into the development process.
4. Report to superiors clearly and accurately the problems and needs of rural people.

5. Programme description:

This curriculum is designed with the purpose of producing middle level human resources in livestock which can provide guidance and support to the livestock sectors in farmers' level. It will also create employment opportunities and improve equitable livelihood of farmers' especially underprivileged societies by their skill upgrading. The course structure deals with theory and practical aspects of animal husbandry and veterinary sciences. The course should reflect the need of present livestock services, the professionalism in livestock sector, and the need based curriculum so that the graduates of this course will be readily acceptable by the farmers at community level and the roles and responsibilities of vet technician to improve the livestock economy of the country.

6. Duration:

The total duration of this curricular program is one year. Actual teaching learning weeks are 39 week per year and 40 hours per week. Teaching learning hours will be not less than 1560 hours.

7. Group Size

The group size will be maximum of 40 (forty) in a batch.

8. Entry criteria:

Minimum entry requirements are Technical School Leaving Certificate (TSLC) in Agriculture/Livestock or equivalent, plus three years' experience in agriculture sector.

9. Selection

Applicants fulfill the entry criteria and will be selected only after agreement for their sponsorship.

10. Medium of instruction:

The medium of instruction will be English and/or Nepali for all the subjects.

11. Pattern of attendance:

Minimum of 90% attendance in each subject is required to appear in the respective final examination.

12. Teacher and student ratio:

The ratio between teachers and students must be:

- 1:40 for theory and tutorial classes
- 1:10 for practical classes

13. Teachers and demonstrators:

- The program coordinator must be a master degree holder in related field or bachelor degree in related field with minimum of 3 years teaching experience after completion of the Bachelor degree.
- The faculties must be a bachelor's degree holder.
- The demonstrator should have an intermediate level degree in related subject with minimum of 2 years' experience.
- Minimum 75% faculties must be fulltime.

14. Instructional media and materials:

- **Printed materials:** Assignment sheets, case studies, handouts, performance checklists, textbooks etc.
- **Non-projected materials:** Displays, models, photographs, flipchart, poster, writing board etc.
- **Projected media materials:** Slides, overhead projectors, transparency, opaque projectors etc.
- **Audio-visual materials:** Audio tapes, films, slide-tapes, video disc, video tapes etc.
- **Computer based instructional materials:** Computer based training, interactive video etc.

15. Teaching learning methodologies:

Lecture, group discussion, demonstration, simulation, role play, guided practice, practical work, field visits, laboratory observation and work, report writing, paper presentation, case analysis, tutoring etc. Categorically the teaching and learning methodology will be as follows:

- Theory: Lecture, group discussion, assignment and group work.
- Practical: Demonstration, observation and self-practice.

16. Mode of education:

There will be inductive and deductive mode of education

17. Examination and marking scheme:

- The subject teacher will internally assess the students' achievement in each subject during the course followed by a final examination at the end of the course.
- Weightage of theory and practical marks will be 20% and 80% respectively
- A weightage of 50% for the internal assessment and 50% for the final examination will be allocated for both theoretical and practical components of a subject.
- The final semester examinations of all theory components will be administered through written tests.
- Generally the method of continuous assessment will be adopted for practical components. Internal marks distribution of the practical works is according to the weightage given to the particular practical work.
- In some cases final examinations are also conducted for practical components as per needs or as mentioned in the subjects (practical).
- Student who fails in the internal assessment will not be allowed to sit in the final examination.
- One evaluator in one setting can evaluate not more than 20 students in a day.
- Practical examination should be administered in actual situation on relevant subject with the provision of at least one internal evaluator from the concerned institute led by an external evaluator nominated by CTEVT.

18. Provision of back paper:

There will be the provision of back paper but a student must pass all the subjects within four years from the enrollment date.

19. Disciplinary and ethical requirements:

- Intoxication, insubordination or rudeness to peers will result in immediate suspension followed by a review by the disciplinary review committee of the college.
- Dishonesty in academic or practice activities will result in immediate suspension followed by an administrative review, with possible expulsion.
- Illicit drug use, bearing arms on campus, threats, or assaults to peers, faculty, or staff will result in immediate suspension, followed by an administrative review with possible expulsion.

20. Pass marks:

The pass marks for theory and practical will be 40 % and 60 % of full marks respectively.

21. Grading system:

The following grading system will be adopted:

- ❖ Distinction: 80% and above
- ❖ First division: 65% to below 80%
- ❖ Second division: 60 % to below 65%
- ❖ Pass division: Pass marks to Below 60%

22. Certification and degree awards:

- ❖ Students who have passed all the components of all subjects are considered to have successfully completed the course.
- ❖ Students who have successfully completed the course will be awarded with a certificate of "**Junior Technician (JT) in Livestock**"

23. Employment opportunity:

The graduates would be eligible to work as mid-level technicians (Junior Technician, JT) in department of livestock services and related sector as prescribed by the Public Service Commission or the concerned authorities.

24. Provision of elective subjects:

There will be no provision of elective subjects in this curricular programme.

COURSE STRUCTURE

S.N.	Course Title	Nature	Hrs/w	Theory hrs	Practical hrs	Total hrs	Theory and Practical Marks Distribution						Full Marks	Remarks
							Internal			Final				
							Th.	Pr.	Total	Th.	Pr.	Total		
1.	Agricultural Extension, Communication and Rural Development	T+ P	6	47	187	234	15	60	75	15	60	75	150	
2.	Planning and Office Management	T+ P	4	31	125	156	10	40	50	10	40	50	100	
3.	Farming Systems	T+P	2	16	62	78	5	20	25	5	20	25	50	
4.	Research Field Trials & Project Works	T+P	3	23	94	117	7.5	30	37.5	7.5	30	37.5	75	
5.	Agricultural Enterprise and Marketing	T+P	2	16	62	78	5	20	25	5	20	25	50	
6.	Aquaculture	T+P	3	23	94	117	7.5	30	37.5	7.5	30	37.5	75	
Common Core Subjects			20	156	624	780	50	200	250	50	200	250	500	
LIVESTOCK SUBJECTS														
7.	Livestock Production and Management	T+P	4	31	125	156	10	40	50	10	40	50	100	
8.	Animal Health	T+P	10	78	312	390	25	100	125	25	100	125	250	
9.	Animal Nutrition, Pasture and Fodder production	T+P	4	31	125	156	10	40	50	10	40	50	100	
10.	Animal Product Technology	T+P	2	16	62	78	5	20	25	5	20	25	50	
Livestock Specialist Subjects			20	156	624	780	50	200	250	50	200	250	500	
Total			40	312	1248	1560	100	400	500	100	400	500	1000	

Agricultural Extension, Communication and Rural Development

Credit hours: 6 /week
Total hours: 234
Theory: 47 hrs
Practical: 187 hrs

Full Marks: 150
Theory Marks: 30
Practical Marks: 120

Course Description

This course provides the basic knowledge and skills in communication as an extension worker for community development program to the students. The course includes own opinion on different sectors and the extension teaching method used in transfer of technology, innovation diffusion, their planning, monitoring and evaluation process. This course also studies sociological concept and importance in community development, group formation and dynamics on social process, motivation, gender development, leadership development, social mobilization and need based training and its importance in agriculture development.

Course Objectives

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

- Develop own concept on agriculture extension.
- Apply the knowledge of extension education in transfer of technology, program planning, monitoring and evaluation of agricultural extension programs.
- State sociological concept and terms with group dynamics, leadership and social mobilization.
- Explain gender and development, type and methods used in need based training to motivate the people in rural development programs.
- Develop the knowledge and skills in identifying social problems, data gathering technique, analysis and presentation.
- Visit different district level line agencies and understand their program, strategy and organizational structure.
- Communicates effectively with individuals and group in variety of setting by using different means of communication.

Skills/Task List	Contents	Teaching Strategies
1. Explain the nature of agricultural information	1.1 Fact v. opinion 1.2 "Right" answer may depend on many factors-scientific, climatic, physical, social, economic, political, religious etc.	Lesson discussion
2. Describe the agricultural information system in Nepal	2.1 Links between farmers' indigenous knowledge, research results, extension etc. 2.2 Agricultural education and training in the information system	Lesson discussion

3. Explain basic concepts of communication	3.1 Communication principles/methods. 3.2 Verbal/Non-verbal communication 3.3 Target audience 3.4 Selecting messages 3.5 Different communication systems.	Lesson, classroom exercise
4. Speak audibly and give clear explanations of process, opinions and events	4.1 Public speaking 4.2 Giving instructions 4.3 Contribute effectively to discussion	Classroom exercise, field exercise
5. Listen effectively to farmers, supervisors etc. and take appropriate action	5.1 Listen to farmers and record important points 5.2 Listen to spoken instructions and carry them out	Classroom exercise, games, field exercise
6. Read and respond to written messages	6.1 Questions, requests 6.2 Instructions, orders	Classroom exercises
7. Write clearly and concisely	7.1 Official letters, memos 7.2 Messages 7.3 Reports	Classroom exercises
8. Explain the group approach to extension	8.1 Basic principles and objectives 8.2 Advantages and disadvantages 8.3 Different types of group – users' group – commodity group – others 8.4 Different roles of groups – technical transfer – education/training – management of common property resource – empowerment 8.5 Roles of group leaders, members, JT/JTA 8.6 Group characteristics – size – caste/ethnic uniformity or mix – group information – group dynamics 8.7 Group development process	Lesson, discussion, visits, visiting speakers, case studies
9. Explain present government policies and programs for agricultural development of Nepal	9.1 List of Policies, DOAD, DOH, DLS, DOF, DOSC, DOI, ADS, NAPA, CAPA, LAPA 9.2 Merits and drawbacks in policies and implementation. 9.3 Ways to improve them	Lesson, visiting speaker

10. Help farmers to form and run a group	10.1 Identify need 10.2 Identify potential members 10.3 Help to organize group 10.4 Help group to choose its leaders 10.5 Help group to formulate its policies, plans etc. 10.6 As necessary, deal with problems of conflict within the group 10.7 Organize delivery of requirements to group as necessary, e.g. training, loans, inputs 10.8 As necessary, help group in other activities such as formation of welfare fund, drug/input shop 10.9 Monitor and evaluate the success (or failure) of the group	Field exercise, role play (suggestion: If it proves impossible for trainees to be involved with real farmers' group formation, trainees could be involved in a role play extending over several weeks which explores the issues involved. Interaction with real farmers is preferable.)
11. Organize, facilitate and participate effectively in discussion	11.1 Organize a group of people to discuss a topic, question or issue 11.2 Act as leader, recorder, participant	Classroom, field exercise
12. Use appropriate responses in various situations	12.1 Situations-e.g. JT/farmer 12.2 Responses-e.g. use of authority, status, aggression, appeasement, reasoning, emotional pressure 12.3 Use appropriate language	Role play, during extension work
13. Give own definition of agricultural (including livestock/horticulture) extension	13.1 What do you think should be the definition of "agricultural extension"?	Discussion
14. State own opinion as to what should be the aims of agricultural extension in Nepal	14.1 Technical transfer-diffusion, trickle-down 14.2 Education 14.3 Empowerment 14.4 People's participation 14.5 Top-down v, bottom-up 14.6 What can Nepal afford?	Discussion
15. State own opinion as to who should be the target population	15.1 Defining the target population 15.2 Those living near the sub-center v. those far away 15.3 Those who come and ask v. those who don't 15.4 Resource-richer v. resource-poorer 15.5 The very poor 15.6 Women farmers 15.7 How can the target population (s) be reached?	Discussion

16. Explain fundamental concepts in extension	16.1 Innovation and its sources-the farmer, research 16.2 Diffusion 16.3 Adoption	Lesson
17. Describe and compare the different extension approaches being used in Nepal and suggest the best method for given situation	17.1 General (traditional) extension approach 17.2 Training and Visits 17.3 Integrated rural development 17.4 Farming systems research and extension 17.5 Commodity user group approach 17.6 Small farmer development program 17.7 Farmer's Field School Approach 17.8 PPP approach.	Lesson, discussion, case studies
18. Suggest what motivates various groups in the extension process	18.1 What is "motivation"? 18.2 Maslow's hierarchy of needs 18.3 What is likely to motivate: – The farmer? – The JT/JTA? 18.4 How can we use this knowledge to make extension more effective?	Lesson, discussion, case studies
19. Explain the role of the extension worker(JT)	19.1 Change agent/catalyst 19.2 Educator/teacher 19.3 Facilitator 19.4 Organizer 19.5 Advisor/consultant 19.6 Researcher 19.7 Role in farmers' decision making process 19.8 Friend 19.9 etc.	Discussion
20. Explain how the JT can ensure farmers' participation in the various stages of initiating, planning and carrying out an extension activity	20.1 What is meant by "Farmer' participation" 20.2 Method and stages	Discussion, lesson, case studies
21. Carry through an extension campaign from identification of problem with farmers to evaluation of the activity (see: "Planning and Office Management Budgeting")	21.1 What is a campaign? 21.2 What are the stages in campaign? 21.3 Identify the problem to be tackled 21.4 Plan, carry out and evaluate the campaign.	Lesson, discussion, field exercise

22. Monitor and evaluate an extension program	22.1 What are "monitoring" and "evaluation"? Why are they necessary: 22.2 Carry out monitoring 22.3 Carry out evaluation 22.4 Involve the farmer in monitoring and evaluation	It is suggested that JT trainees monitor and evaluate an extension activity of the TSLC trainees.
23. Record and report on extension activities	23.1 Maintain a daily diary 23.2 Complete reports as necessary for appropriate line agencies	Field exercise, classroom exercise
24. Explain the basic principles of training adults	24.1 Formal, non-formal and informal training 24.2 Characteristics of the adult learner 24.3 Profile of the learner 24.4 The learning contract 24.5 Facilitative approach	Field exercise, classroom exercise
25. Use training methods appropriate to training situation	25.1 Compare methods 25.2 Lesson 25.3 Teaching a skill 25.4 Role play 25.5 Group discussion 25.6 Case study	Lessons, demonstrations, role plays, field exercise
26. Prepare and use audiovisual aids appropriate to the training situation	26.1 Compare various aids 26.2 Real materials 26.3 Chalkboard, whiteboard 26.4 Posters, charts, flipcharts 26.5 Models, simulations 26.6 Slides, filmstrips, video, films (as available) 26.7 handouts 26.8 Test own-made media before use	Lessons, classroom exercises, field exercises
27. Plan a short course for farmers(or junior staff)	27.1 Assess the training needs of a group of farmers (or junior staff) 27.2 Learn training cycle. 27.3 Design a short course to meet their needs 27.4 Write aims and objectives 27.5 Select training methods	Field and classroom exercise
28. Train a group of farmers using course designed in 27	28.1 Decide who, when, where 28.2 Invite farmers 28.3 Arrange seating, etc. at training venue 28.4 Carry out training 28.5 Evaluate training 28.6 Follow-up training with farmers	Field exercise

<p>29. Explain the importance of common property resources in rural Nepal and how they are managed at present</p>	<p>29.1 Discuss with reference to:- forests – pastures/common grazing – irrigation water – drinking water – Community or group ownership of nursery, breeding animal, etc. 29.2 Traditional management – advantages and disadvantages 29.3 Recent changes and developments including the user group approach</p>	<p>Lesson, discussion, visits, visiting speakers, case study</p>
<p>30. State own opinion on the effect of various social factors on the success of extension can help them</p>	<p>30.1 Norms, values and beliefs 30.2 Caste, ethnic group 30.3 Religion 30.4 Wealth-how is it measured? 30.5 Age 30.6 Gender</p>	<p>Discussion</p>
<p>31. Explain the role of women in agricultural development and how extension can help them</p>	<p>31.1 Gender roles in agriculture (which kinds of work do women do?) 31.2 Women's contribution to agriculture 31.3 Women's roles in household/farm decision making and control of agricultural resources 31.4 Differences due to – caste/ethnic group – area of Nepal – socio-economic status 31.5 Involving women in general extension – group – research outreach</p>	<p>Lesson, discussion, guest speakers (suggestion: use the knowledge of trainees from different castes/ethnic groups and different parts of Nepal to explore these issues)</p>
<p>32. Work with women farmers in an extension activity</p>	<p>32.1 Learn concept of GESI and its applications 32.2 Take active steps to involve women farmers in the various extension activities carried out by trainees</p>	<p>Field exercise</p>
<p>33. Work with rural youth in an extension activity See 36.3 Practical work with rural youth and others on poverty alleviation</p>	<p>33.1 Either take active steps to involve rural youth in the various extension activities carried out by trainees 33.2 Organize an activity aimed specifically at rural youth</p>	<p>Field exercise</p>
<p>34. Explain the role of local of local leaders in agricultural extension</p>	<p>34.1 Different types of leaders – traditional – formal and informal – professional/expert – political their roles and effects</p>	<p>Lesson, discussion</p>

	34.2 Involving local leaders in – general extension – groups – planning	
35. Describe the incidence of rural poverty in Nepal	35.1 Definitions of poverty 35.2 Where rural poverty is found in Nepal 35.3 Mountains, hills terai 35.4 West v. East	Lesson, discussion
36. Describe major causes of poverty in Nepal rural communities	36.1 Farm size, availability of resources 36.2 Population growth 36.3 Nutrition, health 36.4 Education 36.5 Availability of inputs 36.6 Lack of irrigation 36.7 Lack of marketing 36.8 Lack of improved technologies related to specific areas, e.g. hills 36.9 Poor performance of extension and communication system 36.10 Lack of coordination between line agencies	Lesson, discussion
37. Describe major effects of rural poverty in Nepal	37.1 Migration 37.2 Low income 37.3 Need to supplement farm income with other work 37.4 Poor nutrition 37.5 Poor health 37.6 Lack of taxable activities to fund national programs	Lesson, discussion
38. Describe how extension workers can improve nutritional status of people	38.1 Describe the role of extension workers in improving nutritional status of rural people 38.2 Nutritional content of food 38.3 Malnutrition problems 38.4 Extent of malnutrition problems in Nepal. 38.5 Extension programs for nutrition 38.6 Nutrition requirements	Lesson, discussion
39. Identify problems	39.1 Describe problem 39.2 Identification techniques 39.3 Describe problem census 39.4 Describe problem Solving (PS) techniques	Lesson, discussion
40. Explain the roles of ICT in agricultural Development	40.1 Concept of ICT 40.2 Importance and applications 40.3 Digital media-Computer, Internet, Email, Mobile applications	

Planning and Office Management

Credit hours: 4 / week
Total Hours: 176
Theory: 31 hours
Practical: 125 hours

Full Marks: 100
Theory Marks: 20
Practical Marks: 80

Course Description

This course provides skills and knowledge related to Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) in relation to community development and agricultural extension activities as approaches of extension used in different time. This covers planning, analyzing, identifying problems, need assessment and other activities in RRA and PRA including implementation. This subject is also design as a foundation course which gives reading, writing, and speaking skills as a leader appropriate for JTs to make them an effective occupational administrator. The emphasis will be given on the correct usage of the related technical terminologies while writing, speaking, and understanding simple technical publications.

Course Objectives

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

- Gather information, data, and problems
- Conduct need assessment of farmers
- Compare different methods like PRA, RRA, formal survey, etc.
- Assist to form farmers group and communicate effectively.
- Assist for evaluation, fallow-up and monitoring of farmers program
- Manage time and handle official administrative as well as financial works.
- Collect and process farmers' orders.
- Conduct meetings and coordinate with other agencies.
- Prepare annual plan, programs and budget.
- Familiar with procurement rules and related constitutional agencies of Nepal.
- Deal with senior, junior and other related line agencies.

Skill/Task List	Contents	Teaching Strategies
1. Explain the reasons for planning and the different types of plan	1.1 Reasons for planning 1.2 Types of plan 1.3 Short-term v. long-term planning 1.4 District, village, farm	Lesson, discussion
2. Describe the planning cycle	2.1 Planning cycle	Lesson

3. Analyze the SWOT	3.1 Concept of SWOT 3.2 Concept of external and internal factors 3.3 Concept of negative and positive factors	Lesson, discussion
4. Explain how to gather information, date, problems	4.1 Sources of information and date 4.2 Compare different methods – RRA, Formal survey, etc.	Lesson, discussion
5. Gather information by careful routine observation and recording	5.1 Report routinely on what has been observed, e.g. on school farm or during outreach visit 5.2 Carry out a transact study of a ward or other local area	Classroom exercise, games, field exercise
6. Gather information from farmers using Rapid/participatory Rural Appraisal	6.1 Basic principles of RRA/PRA 6.2 Choose type of RRA/PRA according to need/objective 6.3 Interviewing technique – with individuals – with groups 6.4 Use different types of RRA/PRA – Resource mapping – matrix ranking – wealth ranking 6.5 Analyze results and draw conclusions 6.6 Identify problems and place in order of priority	Lesson, discussion, role play, field exercise
7. Gather information using a questionnaire	7.1 Use and complete a questionnaire 7.2 Identify problems and place in order of priority 7.3 Summarize results and draw conclusions	Field exercise
8. Draw up a village or ilaka profile	8.1 Cooperate with other agencies/departments as necessary	Field exercise or case study
9. Prepare a plan based on information collected	9.1 Identify alternative solutions/actions using techniques such as – small group discussion – brainstorming – asking experts 9.2 Predict likely outcomes of suggested solutions 9.3 Evaluate or climate solutions in a systematic way	Classroom exercise, field exercise

	9.4 Discuss criteria for choosing between alternatives e.g. circumstances, available resources 9.5 Prepare a plan based on chosen solution/action 9.6 Write aims and objectives	
10. Implement a plan	10.1 Monitor and adapt plan to circumstances as necessary 10.2 Evaluate effectiveness of plan 10.3 Identify lessons to be learnt for the future	Field exercise
Note: The above objective can be taught as part of the process of carrying out an extension exercise. (See "Agricultural Extension, Communication and Rural Development" objective 21)		
11. Identify problems and constraints on an individual farm (see also small enterprise Development)	11.1 Discuss with farm family, including farm calendar 11.2 Carry out quick farm inventory 11.3 Identify possible underlying problems and constraints 11.4 Suggest possible solutions	Field exercise
Note: Whether Livestock, Plant Science JTAs are involved, it is necessary that this exercise looks at all aspects of the farm, not just those of the specialization. If the problems or constraints identified fall within a different specialization from that of the trainee, then she/he should refer it to the appropriate office. See also, " Livestock Production and Management ".		
12. Prepare different types of plan (See also Small Enterprise Development)	12.1 Individual farm plan 12.2 Agree on Plant science /Livestock component of village or ilaka plan 12.3 Extension plan 12.4 Personal work plan	Classroom exercise
13 Manage own time and set priorities among different duties	13.1 Make effective use of time available 13.2 Make personal work programs-daily, weekly, etc. 13.3 Set priorities amongst competing demands and duties	Classroom exercise, games
14 Understand and follow departmental rules, concerning general and financial administration and accounting	14.1 Structural, roles and responsibilities of MOA Department, Directorate and all units 14.2 General and financial administration and accounting rules and regulations of department	Classroom exercise
15 Handle and file official correspondence	15.1 Read official correspondence and take necessary action or response 15.2 File in-coming and copies of out-going correspondence systematically	Classroom exercise, role play

16 Maintain necessary official records	16.1 According to department, e.g. Livestock treatment register	Classroom exercise
17 Manage cash transactions	17.1 Receive and pay out small amounts of cash 17.2 Maintain correct records and accounts 17.3 Complete and issue official bills 17.4 Fill and issue official receipts	Classroom exercise, role play
18 Manage stores, supplies and equipment	18.1 Make and maintain inventories of stores, supplies and equipment 18.2 Keep store records 18.3 Manage consumable on a "first in, first out" basis 18.4 Order replacements of consumable items on a timely basis 18.5 Store materials safely, cleanly and in an orderly fashion 18.6 Take proper precautions for storage of drugs, pesticides, fertilizers and other potentially dangerous materials 18.7 Store seeds correctly 18.8 Maintain proper cleanliness and security	Practical, role play, visits
19 Collect and process farmer's orders for inputs	19.1 Maintain necessary records 19.2 Pass on orders to correct agency 19.3 Follow-up in order to try for timely delivery	Classroom exercise, role play
20 Organize and conduct meetings	20.1 Sub-center staff meetings 20.2 Meetings with farmers 20.3 Formal and informal meetings 20.4 Make the agenda 20.5 Inform participants in good time 20.6 Chair a meeting 20.7 Take minutes and other records 20.8 Follow-up decisions of a meeting	Practical, role play (Suggestion: One period per week is scheduled as course meeting. Trainees can take turns to carry out the various steps and functions.)
21 Explain the role of other agencies which may operate at sub-center, ilaka or village level	21.1 DoA, HoH, DLS, DDC 21.2 Forestry range office 21.3 ADB, SFDP 21.4 AIC, Sajha, Cooperative 21.5 Irrigation dept. 21.6 Women's program 21.7 Village secretariat 21.8 Village development committee (or similar future body) 21.9 Others as suggested by trainees	Trainee presentations, visiting speakers, visits

22 Cooperate with other agencies in effective rural development activities/programs	22.1 Responding to farmers' needs 22.2 Working in/as a team	As necessary in other activities: some activities should be done by trainees in teams or groups
23 Draw up as annual work program at sub-center level	23.1 Relate to local plans and farmers' needs 23.2 Co-ordinate with other agencies as necessary	Classroom exercise
24 Prepare an annual budget for the sub-center level program	24.1 Collect necessary rates, costs and prices 24.2 Estimate quantities/amounts of materials and inputs required 24.3 Prepare budget	Field and classroom exercise
25 Explain the main management styles and state own preference for (a) Supervisor's style and (b) Own style	25.1 Different styles and their relation to motivation of staff 25.2 Choices	Lesson, discussion, role play
26 Agree job description with junior staff	26.1 Lines of authority 26.2 Responsibilities and duties 26.3 Write clear and simple job description	Lesson, discussion, role play field exercise
27 Assign work to juniors, giving spoken or written instructions	27.1 Clarity and precision 27.2 Check that instructions have been understood	Field exercise, role play (Suggestion: JT trainees can assign work to and supervise the work of TSLC trainees or school farm laborers, where available)
28 Supervise the work of subordinates	28.1 Ensure work is done correctly 28.2 Provide encouragement and motivation as necessary 28.3 Correct faults sympathetically and sensitively	Field exercise, role play
29 Maintain proper records of personnel	29.1 Attendance records 29.2 Leave and travel registers 29.3 Performance records	Field exercise, role play
30 Administer payment of laborers	30.1 Maintain necessary work records 30.2 Prepare payrolls, vouchers 30.3 Pay labor	Field exercise if possible, otherwise role play

31 Deal correctly with breach of discipline or unsatisfactory performance of a subordinate	31.1 Follow official procedures concerning warnings, etc. 31.2 Interview offender in calm and fair manner 31.3 Find out the facts of the matter as far as possible 31.4 Agree action with offender or take own action or decide to pass case to other authority	Role play
32 Explain the act and rules related to procurements	32.1 Formation of procurement committee 32.2 Estimation, Tender document preparation	Lesson, discussion, role play field exercise
33 Follow the official decision process	33.1 Tipani, program estimate 33.2 Meeting for decision process	Lesson, discussion, role play field exercise
34 Explain the roles of Constitutional Agencies of Nepal (नेपालको सबिधानमा व्यवस्था भएका सबैधानिक निकायको भुमिका)	34.1 CIBA (Akhatiyar Durupayog Anusanthan Aayog) and its unit in district level 34.2 Rastiya Satarkata Kendra and its unit in district level	Lesson, discussion, role play field exercise
35 Develop the skill on latest technologies	35.1 Computer handling, Microsoft office (XL, Word, Power point etc) 35.2 E mail, internet, photocopy, Fax handling and operating procedure	Lesson, discussion, role play Practical exercise

Farming Systems

Credit hours: 2/week
Total Hours: 78
Theory: 16 hours
Practical: 62 hours

Full Marks: 50
Theory Marks: 10
Practical Marks: 40

Course Description

This course provides the basic knowledge of farming system in the context of Nepal. The course includes the components and characteristics of farming system and their roles in agriculture. It includes the natural ecosystem, agriculture systems and its interaction. The course also provides the relationship between agriculture system and extension.

Course Objectives

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

- Define the farming system and its approaches.
- Explain the different components and characteristics of farming system for sustainable food security.
- Apply the knowledge of cropping system to maintain the soil fertility
- Suggest how a particular system (a farm or group of farms) could be managed to conserve and utilize community and farm resources to maximize overall productivity and efficiency.
- Explain the relationship between natural (wild) eco systems, agricultural systems and social systems.
- Describe the linkage between agricultural research, education, and extension, credit and input supply and local farming systems.

Skill/Task list	Contents	Teaching strategies
1. Explain how the Farming System Approach has developed in Nepal and its advantages over earlier approach	1.1 Definition of farming system 1.2 Earlier approaches - Disciplinary based - Cropping system based 1.3 Farming system is a multidisciplinary approach	Lesson, discussion
2. Explain the different components of farming system	2.1 Different components Farming system 2.2 Difference between farming system and cropping system 2.3 Farming system in different agro-climatic zones of Nepal	Lesson, discussion

3. Explain the basic characteristics of a farm	3.1 Characteristics of farm (farm and family, source of water, land type (irrigated, rain fed), soil structure and type, soil fertility status 3.2 Irrigation system, irrigation channel 3.3 Source of manure and fertilizers 3.4 Crop calendar 3.5 Relationship among various farm characteristics	Lesson, discussion
4. Explain the relationship between natural (wild) eco systems, agricultural systems and social systems	4.1 Interaction of Human with different components of farming system, farming components in Nepal and their linkage with each other.	Lesson, discussion
5. Farming system approach for sustainable food security	5.1 Farm enterprises (crops, livestock, poultry, horticulture, aquaculture, apiculture, mushroom) 5.2 Farm production based on market and consumer demand	Lesson, discussion
6. Describe the importance of natural ecosystems for present and future agriculture	6.1 Source of genetic/breeding material for crop improvement 6.2 Source of new crops 6.3 Source of predators and parasites of agricultural pests/diseases 6.4 Minimizing the “greenhouse effect” 6.5 Importance of national parks, lakes, reserves	
7. Explain the interaction among crops, horticulture livestock, forest, grazing land and the household	7.1 Cereals, pulses, oilseeds, fruit trees 7.2 Role of forest to maintain farming systems 7.3 Implications for the farmer	Lesson, field visits, discussion
8. Describe the various types of cropping systems	8.1 Cropping patterns -On khet (irrigated) and bari land (upland) - at different altitudes (Terai, Mid-hill, High-hill) 8.2 Mono cropping, Relay cropping, Mixed cropping, Multiple cropping, inter cropping and crop rotation 8.3 Cropping index and intensity (calculation of Cropping intensity) 8.4 Maintenance of soil fertility through different cropping system	Field exercise, visits, discussion, Case study
9. Livestock Farming Systems	9.1 livestock based farming systems (Goat farming, duck farming, piggery farming, fisheries) 9.2 Role of livestock in crop production 9.3 Fodder supply system	

	<p>9.4 Importance of fodder trees and grasses for Livestock animals</p> <p>9.5 Role of labor, gender in livestock raising</p> <p>9.6 Livestock products marketing</p>	
<p>10. Describe the principles of agro-forestry and their possible roles in Nepalese agriculture</p>	<p>10.1 Agro forestry in different altitudes</p> <p>10.2 Types of agro forestry</p> <p>10.3 Traditional practices and improved practices for fodder trees production</p> <p>10.4 Relationship between agro forestry and Livestock raising</p> <p>10.5 Sources of organic matter for crop production and bedding materials</p>	<p>Lesson, visits, discussion</p>
<p>11. Suggest how a particular system (a farm or group of farms) could be managed to conserve and utilize community and farm resources to maximize overall productivity and efficiency</p>	<p>11.1 What can be done by individual farmer?</p> <p>11.2 What would be better done by a group?</p> <p>11.3 Most effective use of inside generated inputs?</p>	<p>Field exercise, discussion</p>
<p>12 Describe the linkage between agricultural research, education, and extension, credit and input supply and local farming systems</p>	<p>12.1Nepal Agricultural Research Council (NARC)</p> <p>12.2Department of Agriculture (DoA)</p> <p>12.3Institute of Agriculture and animal Science (IAAS)</p> <p>12.4Agriculture and Forestry University (AFU)</p> <p>12.5Credit Institutions (Banks)</p>	<p>Classroom exercise, discussion</p>
<p>13 Explain the importance of farming system research and extension in Nepal.</p>	<p>13.1Past research programs on farming system and their achievements</p> <p>13.2Present research programs on farming system and their aims</p>	<p>Lesson and visit if possible</p>

Research Field Trials & Project Works

Credit hours: 3/week
Total Hours: 117
Theory: 23 hours
Practical: 94 hours

Full Marks: 75
Theory Marks: 15
Practical Marks: 60

Course Description

In this course the students will chose a project under the instruction of instructors in the institute. The nature of the project works/ trials depend on type of livestock species/ crops. They will select sites for various types of trail on school farm (on-station) or on farmers' fields (on farm). The course also provides the skills from proposal writing to presentation of data including management of whole trials.

Course Objectives

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

- Understand the importance and explain the role of agricultural research in increasing agricultural production and improving agricultural productivity in Nepal.
- Explain the basic principles of field trail techniques.
- Prepare proposal for individual project
- Design and conduct the simple trails.
- Manage whole trial and apply treatments to a field trail.
- Analyze and present the data and gather feedback from farmer regarding individual project or outreach trails.

Skill/Task List	Contents	Teaching Strategies
1. Understand the importance and explain the role of agricultural research in increasing agricultural production and improving agricultural productivity in Nepal. At the same time, they will be familiarized in cooperating the simple trails and designs	1.1 Agricultural Research: Concepts, Definition and Objectives 1.2 Farmers own knowledge and resources as a source of research. e.g. traditional varieties; traditional pest control 1.3 The link between research and extension 1.4 The organization in Agri research in Nepal 1.5 NARC, Private Sectors, Farmers, AFU, TU, NAST 1.6 Other research stations 1.7 Types of Agricultural Research: Basic Research (IET, CVT), Adaptive Research and Applied Research (PPVT, FFT, IRD, Farmers Field School) 1.8 Research Tiers: Station Research, Off-station Research, Research Outreach	Discussion, Lectures, Field Experiments , visits to research stations and outreach sites

<p>2. Explain the basic principles of field trail techniques</p>	<p>2.1 Objectives of field trails 2.2 On-station v. on-farm 2.3 Methods of estimation of errors 2.4 1. Replication 2.5 Randomization 2.6 Local control 2.7 Common experimental designs e.g. Randomized Complete Block Design (RCBD) 2.8 Complete Randomized Block Design (CRD)</p>	<p>Lessons, classroom exercises, Field layout, Visit to Research Farms/Centers</p>
<p>3. Select sites for various types of trail a. on school farm (on-station) b. Off-station or on farmers' field trials (on farm)</p>	<p>3.1 Characteristics of a good trial site a. soil/micro-climate b. slope/size c. previous use d. one or several terraces e. accessibility for supervision 3.2 selection of farmer and adjoining farming area 3.3 Irrigation canal, trees and other physical obstacles</p>	<p>Lesson: field exercises on station and on-farm</p>
<p>4. Prepare proposal for individual project (Lay out, and apply treatments to a field trail following a trail plan or protocol)</p>	<p>4.1 Reading/understanding plans/protocols 4.2 Adapting plan to site as necessary 4.3 Randomization of treatment 4.4 3-4-5 triangle method of laying out a right angle 4.5 Laying out plots/blocks 4.6 Setting up of the trials 4.7 Sowing/planting 4.8 Applying treatments 4.9 Labeling, tagging 4.10 Keeping necessary records 4.11 Data inputting in computer</p>	<p>Field exercise carried out by trainees (individual project), Data inputting, use the analyzed data</p>
<p>5. Manage a field trail</p>	<p>5.1 Set varietal trials, fertilizer trial, plant protection trial, soil related trials 5.2 Closely observe and monitor 5.3 Apply inputs as necessary 5.4 Weed, irrigate, etc. as necessary 5.5 Recognize and record growth stages as necessary 5.6 Keep necessary records 5.7 Report condition and problems to supervisor as necessary</p>	<p>Field exercise, individual project</p>

<p>6. Harvest and record a field trail</p>	<p>6.1 Harvest trial, according to plan or protocol, eliminating border effects as necessary 6.2 Weight and record necessary yield components 6.3 Where necessary, dry produce and adjust results to standard moisture content 6.4 Compile, tabulate, summarize data as necessary</p>	<p>Classroom exercise, individual project</p>
<p>7. Make simple analysis and presentation of data</p>	<p>7.1 Calculate treatment means medians and standard deviation 7.2 Explain the difference between a significant and a non-significant result 7.3 Present results in various forms a. a table b. Diagram e.g. histogram, curve, bar chart, etc. 7.4 Prepare necessary reports</p>	<p>Classroom exercise, individual project</p>
<p>8. Gather feedback from farmer regarding individual project or outreach trails</p>	<p>8.1 Gather information from individual project, including his/her observations and opinions 8.2 Complete necessary forms or report 8.3 Submit report 8.4 Prepare paper</p>	<p>Field exercise, individual project</p>

Agricultural Enterprise and Marketing

Credit hours: 2/week
Total Hours: 78
Theory: 16 hours
Practical: 62 hours

Full Marks: 50
Theory Marks: 10
Practical Marks: 40

Course Description

This course is designed to provide basic skills and knowledge of marketing in relation to agricultural enterprises. The course also provides simple techniques of market survey and financial analysis of enterprise. It includes the loan application procedures to develop the own enterprise. It also covers the simple market survey of local areas to decide the production scale of business and make the yearly production schedule.

Course Objectives

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

- Perform basic skills for simple market survey.
- Prepare scheme for small enterprises.
- Market the agricultural products.
- Keep record properly.
- Forecast/ predict risk before starting a business.

Skill/Task List	Contents	Teaching Strategies
1. Describe basic economic terminologies and types of marketing	1.1 Concepts and uses of economic enterprise, market, marketing, commercial, subsistence, agribusiness, contract farming, fixed cost, variable cost, production cost, marketing cost 1.2 Concept of HIA (high input agricultural system) and LIA (low input agricultural system) 1.3 Types of market (monopoly, perfect competition, monopolistic competition) 1.4 Scope and importance of small enterprise development	- Classroom - Discussion
2. Perform a simple market survey	2.1 Designing a simple market survey Data collection, analysis and reporting methods 2.2 Methods of reviewing secondary data, collecting relevant ones and analyzing	- Lesson, classroom exercise, field exercise

Skill/Task List	Contents	Teaching Strategies
	2.3 Reviewing study report done by others <ul style="list-style-type: none"> – Specific consideration of seasonal market fluctuations that are so common for many agriculture products – The advantages and disadvantages of "off-season" production of agriculture products 	
3. Conduct market and financial analysis	3.1 Methods of financial analysis : Methods of calculating BCR, break-even point, and rate of profit IRR (internal rate of return)	Lesson, classroom exercise, field exercise
4. Decide upon a product based on market and financial analysis	4.1 Decision-making regarding a particular product, based on a market and financial analysis (including seasonal variations)	
5. Make a simple yearly production plan for chosen product based on market and financial analysis	5.1 Methods of preparing a yearly production plan for a product, including quantity, quality, timetables and budgets (expenses expected, income expected)	– Classroom exercise, homework
6. Keep simple farm records as applicable	6.1 Field/Plot records 6.2 Livestock breeding records 6.3 Nursery/orchard records 6.4 Record of home consumption 6.5 Livestock input and production records 6.6 Crop/hortic input and production records 6.7 Inventories 6.8 Weather records	If possible keep for all or a part of the school farm
7. Keep simple accounts	7.1 Single entry book-keeping	Classroom exercise
8. Make a budget for an informal project (e.g. as needed before applying for a loan)	8.1 Collect costs of inputs and likely prices of products 8.2 Draw up a budget 8.3 Evaluate project from an economic point of view	Classroom exercise
9. Compare two projects using gross margin analysis	9.1 Gross margin analysis	Classroom exercise
10. Prepare a cash flow chart based on production plan	10.1 Method of preparing a yearly production plan for a product, including quantity, quality, timetables and budgets (expenses expected, income expected)	Classroom exercise
11. Complete loan application forms based on production plan, budget, cash flow <ul style="list-style-type: none"> • Calculate simple interest 	11.1 Procedure for obtaining loan from bank & other sources (ADB, rural Dev. Bank, financial cooperatives, Women's Dev. Office, etc.)	Classroom exercise, visit to bank

Skill/Task List	Contents	Teaching Strategies
<ul style="list-style-type: none"> • Explain the loan payment schedule • Explain rules of bank regarding payment of loans • Perform cash deposits and withdrawals at the local bank 	<ul style="list-style-type: none"> ○ Calculation of simple interest ○ Loan payment schedules 	
<p>12. Complete simple farm/business inventory</p> <ul style="list-style-type: none"> • Maintain necessary records on regular basis (livestock, feed, seeds used, fertilizer, etc.) • Keep records of production* marketing costs • Keep records of income • Determine cost of production and profit/loss based on records 	<p>12.1 Review of inventory procedure 12.2 Keeping records of all expenditures and inflows including purchases and sales 12.3 Book keeping 12.4 Contents of fixed and variable cost 12.5 Methods of calculating fixed cost per crop 12.6 Methods of calculating variable cost per crop 12.7 Methods of calculating fixed, variable and total cost per hectare and per kg. 12.8 Calculating loss/profit, gross margin and net margins 12.9 Marketing cost, gross marketing and net marketing margins</p>	Lesson, classroom exercise, homework
<p>13 Design a marketing plan including target market, supply volumes and timetables, storage, packaging, transportation, and labor needed</p>	<p>13.1 Concept of target market 13.2 Designing a marketing plan, including target market, supply volumes, time and price, with marketing cost, storage, packaging, transportation, labor needed, taxes, and marketing strategies etc.</p>	Classroom field exercise
<p>14 Determine product prices</p>	<p>14.1 Estimation of the cost of production per unit and market price level 14.2 Simple interpretation of price determination under monopoly, perfect competition and monopolistic competition 14.3 Nepal government policy of agri. product pricing 14.4 Farm product price determination models : cost based, demand supply based, competition oriented and market segments or perception models</p>	Classroom exercise
<p>15 Describe the marketing outlets or market places with importance and select</p>	<p>15.1 Farm product marketing outlets such as organized wholesale markets, supermarkets, cooperative markets,</p>	Classroom, homework

Skill/Task List	Contents	Teaching Strategies
appropriate ones	processing plants, periodic markets & retail markets 15.2 Characteristics of and benefit from each outlets 15.3 Outlet selection	
16 Describe the procedures of salesmanship	16.1 Concept and need of salesmanship 16.2 Process and methods of salesmanship for marketing farm products	Classroom Exercise
17 Explain the benefits and methods of developing cooperative marketing	17.1 Concept and advantages of cooperative marketing 17.2 Methods of developing cooperative marketing	Classroom, homework
18 Design and deliver market information	18.1 Uses of product-market information 18.2 Collection, processing and dissemination technologies 18.3 Current market information systems in Nepal	Classroom Exercise, Field
19 Supervise workers/direct work on the farm or enterprise	19.1 Supervision of workers in private sector	Lesson, role play
20 Describe concept and process of agribusiness development	20.1 Concept of agribusiness and value chain 20.2 Processes of value additions on primary agri.-commodities 20.3 Agribusiness policy of Nepal 20.4 Value chain analysis and development Process of contract farming and advantages	Classroom homework
21 Explain the existing agricultural insurance policies of Nepal	21.1 Define agricultural insurance 21.2 Existing agricultural insurance policies 21.3 Advantages and disadvantages 21.4 Problems in implementation 21.5 Procedure of insurance	Classroom homework

Aquaculture

Credit hours: 3/week
Total Hours: 117
Theory: 23 hours
Practical: 94 hours

Full Marks: 75
Theory Marks: 15
Practical Marks: 60

Description

This course is designed to provide basic skills and knowledge on fish culture including species identification, its requirements, breeding, rearing and transportation of brood fish, fish seed and table fish. It gives basic skills on water quality and health management including the control of diseases, parasites as well as protection of cultivated fishes from enemies and predators. It also provides a basic concept of rearing Rainbow trout and other emerging fish species along with post-harvest management of fish.

Objectives

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

- Understand fish and Aquaculture.
- Describe the scope and importance of fish and fish culture in Nepal.
- Explain different species of fish cultivated in Nepal including their behavior.
- Select site, design and construct pond.
- Requirements of fish and fish farming.
- Transportation, rearing and stocking of fish seed.
- Practice on fish breeding.
- Identify disease and manage health.
- Describe and manage water quality.
- Learn harvest and post-harvest management.

SN	Skill / Task List	Related Technical Knowledge
1	Define and Understand fish , fisheries and aquaculture	1.1 Introduction to fish and fish culture 1.2 Zoological classification of fish 1.3 Differentiate between fisheries and aquaculture
2	Explain scope of fish farming in Nepal	2.1 History of fish farming in Nepal 2.2 Scope of fish culture in Nepal 2.3 Economic and other importance of fish and fish culture 2.4 Organizational structure of research, development and education 2.5 Current status, policies and programs
3	Explain method of fish culture	3.1 Methods of fish farming :based on water body, climate, rearing facility, water use, intensity, management ,fish farming zone of Nepal
4	Identify important body parts of fish	3.2 Collection and preservation of fish 3.3 Body parts (external and internal) and their functions

SN	Skill / Task List	Related Technical Knowledge
5	Identify common fish species found in Nepal	5.1 Indigenous species <ul style="list-style-type: none"> • Indian major carps: Rohu, Bhakur, Naini • Locally popular fish: Asala, Sahar, Katle, Buduna, Jalkapur • Weed/ predatory fish: Magur, Bhoti, Shinghi, Barari 5.2 Exotic species <ul style="list-style-type: none"> • Chinese carps: Big head carp, Silver carp, Grass carp • Common carps: German carp, Israeli carp • Rainbow trout, Pangassius, Tilapia
6	Select site for fish farming	6.1 Conditions required for fish farming 6.2 Source of water/ water temperature, water budgeting 6.3 Drainage facility, soil type 6.4 Accessibility and security
7	Explain method of construction of fish pond	7.1 Farm/pond design, lay out plan 7.2 Dike, bernline, core wall and key trench, spill way, embankment and its slope, inlet, outlet, water surface area
8	Explain types of fish pond	8.1 Nursery pond 8.2 Rearing pond 8.3 Breeding pond
9	Maintain/repair/ preparation of fish pond	9.1 Different problems of fish pond, seepage control 9.2 Maintenance of dike height/slope 9.3 Cleaning of fish pond, application of fertilizer/lime in pond
10	Maintain water quality of pond	10.1 pH, turbidity, water temperature, dissolved oxygen level, ammonia, alkalinity, hardness, water level, pond fertility
11	Explain type of fish culture	11.1 Monoculture, Polyculture, Monosex culture, Integrated fish culture: Paddy cum fish culture, Duck cum fish culture, Pig cum fish culture etc 11.2 Stocking density in each type 11.3 Advantage and disadvantage of each type
12	Explain fish breeding	12.1 General concept of fish breeding and fingerling production, genetic approach to fish breeding 12.2 Conditions required for fish breeding 12.3 Natural and artificial breeding
13	Select brood fish	13.1 Characteristics of brood fish 13.2 Differentiation of male and female brood fish 13.3 Age of breeding for different species of cultivated fish
14	Explain natural breeding of common carp	14.1 Selection of brood fish, water temperature, season of breeding, male and female ratio, pond preparation, preparation of substrate, spawning, hatching, feeding of hatchlings, predator control, routine management

SN	Skill / Task List	Related Technical Knowledge
15	Explain artificial breeding of Indian major carps/Chinese carps	15.1 Selection of ripe brood fish, hatchery facilities, hypophysation technique, injection time/ dose of different hormones, spawning, fertilization, embryonic development, hatchling management, counting and transfer.
16	Transport fish seed	16.1 Ordering fingerlings; sources of fingerlings 16.2 Method transportation of fingerlings 16.3 Stocking density and method of stocking 16.4 Precaution to be taken during transport and stocking time, prerequisites before transportation
17	Rear fry/ fingerlings	17.1 Management of nursery pond; feeding of fry and fingerlings, stocking densities, water quality and health management 17.2 Protection from enemies; symptom of dissolve O ₂ deficiency 17.3 Assessment of growth rate, health check up
18	Rear fish for table purpose	18.1 Pond preparation, water management 18.2 Feeding of artificial feeds for fast growth 18.3 Natural food for fish,, Protection from enemies 18.4 Symptom of dissolve O ₂ deficiency 18.5 Assessment of growth rate
19	Rear brood fish	19.1 Procurement of brood stock, transportation of brood fish, food and feeding, routine management, 19.2 Protection from enemies, symptoms of maturity, brood handling
20	Understand Pangassius and Tilapia culture	20.1 General concept 20.2 Sources of fingerling 20.3 Rearing 20.4 Stocking density 20.5 Growth rate 20.6 Feeding habit 20.7 Artificial feeding 20.8 Routine management and marketing
21	Explain concept of rearing Rainbow trout fish	21.1 General concept 21.2 Site selection (requirement of running water, water quality, water temperature) 21.3 Stocking density, growth rate 21.4 Feeding habit and marketing 21.5 Water quality and health management
22	Explain concept of rearing fish in aquarium	22.1 General concept 22.2 Purpose 22.3 Type of fishes kept in aquarium 22.4 Sources of fingerling 22.5 Feeding habit and marketing 22.6 Aquarium maintenance.

SN	Skill / Task List	Related Technical Knowledge
23	Identify natural feed in pond	23.1 Feeding habits of different fishes 23.2 Natural food production 23.3 Types of natural food (phytoplankton, zooplankton and others) 23.4 Pond fertilization
24	Understand fish nutrition	24.1 Natural and artificial food 24.2 Nutritional requirements 24.3 Feeding the fish based on size, period and species 24.4 Mixing of different ingredients for fish ration 24.5 Feeding time, feeding behavior
25	Explain different weed and weed fishes	25.1 Aquatic weeds and their control 25.2 Weed fishes: Puntius spp. Glassogobius spp etc. 25.3 Control of weed fishes
26	Explain fish predators and methods to control	26.1 List of predatory fishes: Wallago attu, Clarius batrachus, Heteropneustes fossilis, Anguilla bengalensis, ophiocephalus spp etc. 26.2 Fish enemies: Insects, Snake, Frog, Crocodile, birds Otter and others 26.3 Control of predatory fishes and other enemies.
27	Common fish diseases and health management	27.1 Types of diseases 27.2 Common fish diseases: Trichodiniosis, White spot disease, Black spot disease, Tail and fin rot, Gill rot, Argulosis, Gyrodactylus, Dactylogyrus, EUS, seprolegniasis, coccidiosis, dropsy 27.3 Sign and symptoms, common drugs and chemicals, preventive and control and measures.
28	Harvest fish	28.1 Time and stages of harvesting 28.2 Methods of harvesting, types of nets, (Drag net, gill net, cast net, scoop net) 28.3 Care and maintenance fish nets 28.4 Fishing hooks and angling
29	Market fish	29.1 Process of Fish spoilage, maintenance of good quality 29.2 Marketing channel and fish market, pricing 29.3 Customer behavior and marketing policy, recipes and processed products
30	Keep records	30.1 Record keeping (feed, production, costs, sales, health) 30.2 Analyzing record for management purposes
31	Develop and annual calendar for fish farming	31.1 Elements of a fish farming calendar 31.2 Operational calendar

Livestock production and Management (LPM)

Credit hours: 4/week
Total Hours: 156
Theory: 31 hours
Practical: 125 hours

Full Marks: 100
Theory Marks: 20
Practical Marks: 80

Course Description

This course is designed to provide basic skills and knowledge of livestock management, animal breeding and livestock rules in relation to recent advances. Basically the course describes the pertinent aspects on livestock housing covering cattle, buffalo, goats, sheep and pig housing, poultry production and animal breeding. Besides it also covers issues related to livestock housing and environment. The course also includes major problems facing to improve the livestock and poultry production in Nepal.

Course Objectives

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

- Provide basic knowledge on common livestock housing system and their functions.
- Describe core concept of environment to the housing requirement and management of livestock rearing.
- Provide basic knowledge about environmental concerns to livestock including climate change, animal wellbeing and strategies to reduce the adverse impact of climatic variability to the livestock.
- Maintain the livestock inventory and necessary farm records.
- Understand basic principles of animal breeding.
- Explain the fundamentals of animal reproduction.
- Apply the application of reproductive techniques for genetic improvements of livestock.

Skill/Task List	Contents	Teaching Strategies
1. Overview the present situation of livestock sector of Nepal	1.1 Livestock population and its trend 1.2 Production trend 1.3 Scope and importance of livestock production	Discussion
2. Describe major problems facing improvement of livestock production in Nepal	2.1 Problems experienced by trainees in different parts of Nepal 2.2 Management problems 2.3 Nutrition problems, feed supply 2.4 Limitations of local breeds.	Discussion
3. Suggest approaches to tackle problems of livestock development which have been identified	3.1 Broad strategies rather than detailed action	Discussion

Skill/Task List	Contents	Teaching Strategies
4. Explain the Animal Health and Livestock Services Act, 2055	4.1 Importance of Animal Health and Livestock Services Act, 2055 4.2 Important provision under Animal Health and Livestock Services Act, 2055 4.3 Provision under Animal Health and Livestock Services Regulation , 2056 4.4 Functions, Duties and Powers of Veterinary Inspector and Appointment of Veterinary Inspector 4.5 Terms and conditions for exporter or importer in exporting or importing animal, animal products or animal production inputs 1.5 Functions of Quarantine Officer 1.6 Gaps of Animal Health and Livestock Services Act, 2055 and Regulation , 2056	Lesson discussion
5. Explain the Feed Act, 2033	5.1 Features of Feed act, 2033 5.2 Technical and recommendation Committee at DLS	Lesson, classroom exercises
6. Explain the Standard for transportation of livestock, 2064	6.1 Important provision of Standard for transportation of livestock, 2064	Lesson, classroom exercises
7. Explain the OIE (World Organization for Animal Health)	7.1 Establishment of OIE 7.2 Objective of OIE 7.3 Terrestrial Animal Health Code	Lesson discussion
8. Explain the Livestock Loan policy	10.1 provision related to loan for livestock farmers	
9. Observe and report on condition of different classes of livestock and suggest actions..	9.1 Visit school farm regularly 9.2 Observe (health, cleanness and sanitation, space feed, water, etc) 9.3 Report for suggestion	Practical Suggestion: Reports on the condition of school stock and recommendations for necessary action can form a part of the weekly course meeting.)
10. Explain animal welfare	10.1 Concept of animal welfare 10.2 Provision related to animal welfare in Nepalese legislation 10.3 Role of OIE in animal welfare 10.4 International trends in animal welfare	Lesson discussion

Skill/Task List	Contents	Teaching Strategies
11. Compare performance of livestock by analyzing different types of livestock records	11.1 Compare performance from season to season 11.2 Detect problems, poor performance, management defects, etc. 11.3 Suggest where improvements can be made	Interactive lecture, classroom exercise, case study
12. Work with farmers and other agencies to develop livestock component of village or ilaka level plans (See "Planning and Budgeting")	12.1 Coordinate with farmers and other agencies 12.2 Assist in incorporating livestock component in village or ilaka level plan	Discussion
13. Detect heat in female animals	13.1 Behavior and external signs	Interactive lecture, Practical
14. Detect pregnancy	14.1 Behavior and external signs	Practical, field visit
15. Cull the unproductive animals and birds	15.1 Characteristics of the good milk producing cow and points to be considered to cull the dairy cow and buffalo from the herd 15.2 Characteristics of the good layers and bad layer 15.3 Visit the school farm or any other organized cattle farm to find out the non producing animals and birds	Discussion, visiting speaker ” Practical
16. Describe different breeding strategies	16.1 Management of the herd in closed nucleus breeding scheme 16.2 Management of the herd in the open nucleus breeding scheme 16.3 Advantage and disadvantage of the closed and open nucleus breeding scheme 16.4 Prepare a closed nucleus breeding scheme for goat and open nucleus breeding scheme for cattle	Discussion ,, ,, Practical
17. Characterize the community based breeding system (CBBS) for cattle and goats	17.1 Listing the main activities in the CBBS from the experience of trainee 17.2 Develop the different types of performance recording format for goat and cattle 17.3 Visit goat rearing community and practice the filling of those format 17.4 Visit the cattle rearing community and practice to fill the format developed by the participants	Discussion ,, Practical ,,

Skill/Task List	Contents	Teaching Strategies
18. Practice artificial insemination of cows and buffalo	18.1 Advantages and disadvantages of AI 18.2 Different methods of AI 18.3 Collect and store semen 18.4 Transport semen correctly 18.5 Inseminate female animals 18.6 Maintain necessary records 18.7 Follow-up inseminated animals	Lesson, practical, training at an AI center
19. Detect birth imminent and take appropriate action	19.1 From behavior 19.2 From external signs and symptoms 19.3 Appropriate action	Interactive lecture, practical
20. Explain housing system of farm animals and poultry	20.1 Explain criteria for site selection of livestock farm 20.2 List different types of housing system of farm animals and poultry 20.3 Explain advantages and disadvantages of each housing system of Livestock and poultry 20.4 List precautions to be considered in each housing system of livestock and poultry 20.5 List floor space, feeding, water space requirement of different stages of livestock and poultry in different types of housing system	Interactive lecture, class room exercise
21. Manage different types of houses for farm animals and poultry	21.1 List the different types of activities done in the animal farm and poultry house 21.2 Prepare routine for different types of activities done in the farm house 21.3 Manage different types of farm houses	Class room and practical activities
22. Care and manage different stages of animals and poultry	22.1 Explain care and management of new born animal, lactating animal, pregnant animal, breeding animal, heifer, dry and draft animal	
23. Manage broiler and layer	23.1 Preparation of poultry house for receiving day old chicks 23.2 Management of feeding, watering, lighting, temperature, space of broiler/layers	Interactive lecture, class room exercise
24. Manage hatchery	24.1 Explain techniques of handling fertile eggs 24.2 Explain factors affecting incubation of hatching eggs	Interactive lecture, class room exercise

Skill/Task List	Contents	Teaching Strategies
25. Transport live animals and poultry	25.1 Describe different factors to be considered before and during livestock and poultry transportation 25.2 Describe methods of livestock and poultry transportation	Interactive lecture, class room exercise
26. Manage bio-security management	26.1 Define bio-security 26.2 Explain importance of bio-security 26.3 Describe the different measures of bio-security 26.4 Identify the places needed for bio-security	Interactive lecture, class room exercise
27. Manage farm wastes	27.1 List the different types of wastes produced in the farm 27.2 Explain different method/techniques of manage/handling waste of livestock and poultry farm	Interactive lecture, class room exercise
28. Manage livestock during emergency	28.1 Impact of flood, landslide, earthquake, fire on livestock 28.2 Management of livestock during emergency	Interactive lecture, class room exercise

Note: Practical training in A.I skills will probably involve arranging training for trainees at an A.I center for some days. May only be possible if a semen collection center or semen bank is nearby and if animals in the area around the school are artificially inseminated.

Animal Health

Credit hours: 10/week
Total Hours: 390
Theory: 78 hours
Practical: 312 hours

Full Marks: 250
Theory Marks: 50
Practical Marks: 200

Course 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 in laboratory disease diagnosis techniques including the common terms in laboratory techniques, and postmortem findings, disposal of dead birds, sterilization and administration of drugs. Basically this course is based on practical work of the students which is useful in their daily laboratory work or in disease diagnosis in the hospital or field. Fecal, urine and blood examinations are also included which helps proper diagnosis as well as proper treatment of animal diseases.

Course Objectives

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

- Explain function of different organs/ systems.
- Assist to treat diseases and ailments of different body systems.
- Differentiate healthy and sick animals.
- Assist to perform clinical examination of animals and birds.
- Administer drugs.
- Assist in postmortem examination.
- Identify locally available medicinal plant and their use.
- Explain the importance of lab techniques.
- Work in the national and private veterinary hospital/lab sector.
- Perform basic laboratory techniques for some important disease diagnosis.
- Use microscope in laboratory to diagnose the disease.
- Apply technical skills in disease diagnosis and disease investigation techniques.

Skill/Task List	Contents	Teaching Strategies
1. Explain briefly different systems of livestock and poultry with their physiological function.	1.1 Anatomical and physiological studies of <ul style="list-style-type: none"> - Skeletal system - Muscular system - Digestive system - Respiratory system - Circulatory system - Blood and lymphatic system - Urinary system - Reproductive System - Nervous system - Endocrine system - Special system 	Lesson, discussion and practical for slaughtered animal to carefully examine the organs and describe the functions.
2. Explain the Nepal Veterinary Council Act, 2055	2.1 Importance of Nepal Veterinary Council Act, 2055 and Regulation, 2057 2.2 Establishment, composition as well as functions , duties and powers of Council 2.3 Provision for the registration of veterinarian 2.4 Important Provision under Nepal Veterinary Council Act, 2055 and Regulation, 2057	Lesson, classroom exercise
3. Explain the Bird Flu Control Order , 2064	3.1 Importance of Bird Flu Control Order , 2064 3.2 Important Provision under Bird Flu Control Order , 2064	Classroom exercise, Lesson
4. Explain the Code of Conduct of Paraveterinarian	4.1 Code of Conduct of Paraveterinarian	
5. Explain the One Health Approach	5.1 Concepts and importance of One Health approach 5.2 One Health approach in Nepal	Lesson discussion
6. Difference between healthy and disease animal	6.1 Concept of health and disease 6.2 Physical examination, palpation 6.3 General examination-appearance, behavior, physical condition, skin coat, posture, any discharge 6.4 Normal physiological values- temperature, respiratory rate, heart rate, pulse rate, urinary volume and faecal output	Practical
7. Examine sick animals	7.1 History taking 7.2 Physical and Clinical examination of sick animals 7.3 Collect samples for lab test 7.4 As and when necessary, refer cases to veterinarian 7.5 Keep proper records	Practical

8. Describe systemic diseases of livestock	8.1 Diarrohea, Oesophageal obstruction (Choke), Gastritis, Colic, Constipation, Impaction, Tympany, Indigestion, Traumatic Reticulo peritonitis, Cystitis, Haematuria, Urolithiasis, Paralysis, Otitis, Dermatitis, Scabies, Arthritis, Conjunctivitis, Keratitis, Cataract	Practical and lesson
9. Describe metabolic and deficiency diseases of livestock and poultry	9.1 Cause, diagnosis, treatment and control of ketosis, milk fever, tetany, fatty cow syndrome, downer cow syndrome 9.2 Cause, Diagnosis, treatment and control of Vitamin A, D, E. K and B deficiency, 9.3 Cause, diagnosis, treatment and control of Calcium, Phosphorus and Iron deficiency	Lesson, discussion
10. Explain reproductive disorders	10.1 Causes and correction of anestrus, Infertility, Repeat breeding, Dystocia, 10.2 Douching	Lesson, discussion, practical
11. Explain general principles of disease transmission in livestock	11.1 Infection 11.2 Contagion 11.3 Prevention 11.4 Epidemiological terms: prevalence, incidence, Mortality, morbidity, case fatality	Lesson, discussion, practical
12. Identify major economic diseases and describe their Etiology, epidemiology, symptoms, treatment and control of these diseases	12.1 Define term TADs, Emerging and reemerging diseases 12.2 Viral Diseases : FMD, Rinderpest, PPR, Blue Tongue, Canine Distemper, Rabies, Parvo Virus Infection, Swine fever, Avian Influenza, Ranikhet, Infectious Bronchitis, Infectious Bursal Disease 12.3 Bacterial Diseases: Anthrax, Haemorrhagic Septicaemia, Brucellosis, Tuberculosis, Leptospirosis, Black quarter, Tetanus, Mastitis 12.4 Protozoan Diseases: Babesiosis, Theileriosis, Trypanosomiasis, Coccidiosis 12.5 Rickettsial Diseases: Anaplasmosis 12.6 Fungal Diseases: Dermatophytosis	Lesson, discussion
13. Explain Parasitic Disease Control	Diagnosis and control of 13.1 Endoparasites: Liver fluke, tape worm, Nematodes 13.2 Ectoparasite: Tick, mite, lice, flea, fly, maggot	Lesson, discussion, practical
14. Explain zoonoses and their prevention, especially related to milk and meat	14.1 Definition and types of zoonoses 14.2 Major milk-borne zoonoses 14.3 Major meat-borne zoonoses	Lesson, discussion

15. Report Diseases	15.1 Notifiable diseases of Nepal 15.2 Diseases reporting procedures	Field exercise, Lesson, discussion
16. Describe brief in surgical problems	16.1 First aid and basic treatment of fracture, Broken horns, Abscess, cysts, wound, bleeding control 16.2 Fluid and electrolyte therapy	Lesson, discussion
17. Collect, Preserve and dispatch samples	17.1 Blood, serum 17.2 Urine 17.3 Feces 17.4 Skin scraping 17.5 Swab samples 17.6 Postmortem specimens 17.7 Preservatives 17.8 Labeling and documentation 17.9 Dispatch of sample	Lesson, discussion, practical
18. Perform vaccination from different routes	18.1 Importance and types of vaccine and vaccination routes 18.2 Vaccination schedule for different farm animals and pets 18.3 Cold chain maintenance for vaccines 18.4 Recording and reporting 18.5 Vaccination campaigns	Lesson, discussion and practical
19. Manage stress of farm animals and poultry	19.1 Causes and types of stress 19.2 Management of stress	Lesson, discussion
20. Familiar with pharmacological terms	20.1 Anaesthesia, Hypnotic and sedatives, Tranquilizers, Analgesics, Antipyretics, Anti inflammatory drug	Lesson, discussion and practical
21. Perform Emergency Veterinary Services (First Aid)	21.1 Poisoning 21.2 Snake bite 21.3 Insect stings 21.4 Burn and Scalds 21.5 At times of disaster	Lesson, discussion
22. Perform drug administration from different routes	22.1 Different forms of drug 22.2 Routes of drug administration	Lesson, discussion and practical
23. Comprehend prescriptions	23.1 Study of prescription by veterinarian 23.2 Commonly used abbreviations	Lesson, discussion and practical
24. Calculate drug dosage	24.1 Dose calculation	Lesson, discussion and practical

25. Follow standard laboratory preparatory procedures	25.1 Personal hygienic measures in laboratory 25.2 Personal protective equipment (Lab coats, gloves, mask, lab boots)	Lesson, Laboratory practical
26. Use, care and handling of a microscope	26.1 Care and safety during handling and use 26.2 Choosing correct lens 26.3 Focusing 26.4 Cleaning and maintenance of objective and eye piece	Lesson, Laboratory practical
27. Follow basic rules of safety and cleanliness in the laboratory	27.1 Care with glassware 27.2 Care with acids, alkalis and other chemicals 27.3 Importance of labeling 27.4 Cleanliness of surfaces 27.5 Storage of sterile and sterilized materials 27.6 Disposal of laboratory wastes	Laboratory practical
28. Follow aseptic procedures	28.1 Disinfection and sterilization 28.2 Commonly used disinfectants 28.3 Use of sterilized materials	Lesson, Laboratory practical
29. Sterilize surgical equipment and dressings, and other laboratory equipment	29.1 Use locally applicable methods, e.g. boil in water 29.2 Procedure of sterilization with autoclave	Lesson, Laboratory practical
30. Assist post-mortem examination	30.1 Necessary preparation, precautions and hygienic practices 30.2 Preparation of the carcass 30.3 Assist the veterinarian for the examination for lesions of diseases or parasites 30.4 Note-taking 30.5 Collect samples as directed 30.6 Report preparation as directed	Laboratory practical
31. Examine urine samples	31.1 Preparation of sample 31.2 Physical examination of sample 31.3 Detection of Haematuria and Haemoglobinuria 31.4 Report preparation as directed	Laboratory practical
32. Identify eggs of internal parasites in fecal samples	32.1 Preparation of sample 32.2 Direct method 32.3 Flotation method 32.4 Sedimentation method 32.5 Identification 32.6 Report preparation as directed	Laboratory practical

33. Culture of bacteria	33.1 Introduction to microorganisms 33.2 Nutrient agar, Mc Conkey agar 33.3 Preparation of media 33.4 Inoculation of bacteria from samples 33.5 Care of culture 33.6 Antibiotic Sensitivity test	Laboratory practical
34. Prepare and stain slides of bacteria	34.1 Preparation of slide 34.2 Staining <ul style="list-style-type: none"> • Gram • Leishman • Wright 	Laboratory practical
35. Prepare and stain blood smears	35.1 Preparation of slide (sample collection, making smear and fixation) 35.2 Staining of slide 35.3 Observation of slide under the microscope	Laboratory practical
36. Use of anticoagulants	36.1 Why use anticoagulants 36.2 Different types 36.3 Their uses	Lesson, Laboratory practical
37. Count blood cell and estimate blood parameters	37.1 Differential white blood cell count 37.2 Total white blood cell count 37.3 Total red blood cell count 37.4 Total platelet count 37.5 Estimation of hemoglobin 37.6 Estimation of PCV 37.7 Estimation of ESR 37.8 Report preparation	Laboratory practical

Animal Nutrition, Pasture and Fodder production

Credit hours: 4/week

Total Hours: 156

Theory: 31 hours

Practical: 125 hours

Full Marks: 100

Theory Marks: 20

Practical Marks: 80

Course Description

This course is designed to provide basic skills and knowledge in animals' feeds and classification, roughages and concentration, functions and deficiency symptoms of nutrients. It includes about the energy and protein rich feed ingredients and feeding standards, concept of energy, nutrient requirement of farm animals and birds, feed formulation. The course also provides the cultivation practices of forage crops, concept of forages conservation, pasture and natural grasslands, common fodder trees, agro forestry and silvipastarel systems to the students.

Course Objectives

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

- Describe the status of feed and fodder production in Nepal
- Explain nutrients requirement for different animal species and poultry birds
- Classify the feed stuffs
- Cultivate fodder and grasses
- Develop and manage pasture.
- Assist to formulate ration for livestock and poultry
- Conserve fodder and forage for lean season

Skill/Task List	Contents	Teaching Strategies
1. Explain the status of animal feed and fodder in Nepal	1.1 Status of feed availability according to different geographical region: surplus and deficit 1.2 Status of feed industry 1.3 Availability of raw material for feed industry	Feed industry visit, lesson, discussion
2. Explain different nutrients (Carbohydrates, protein, fat, mineral, vitamin, water)	2.1 Classification of nutrients 2.2 Functions of different nutrients 2.3 Major Deficiencies	Lesson, discussion
3. Explain the nutrient requirements of cattle, buffalo, goat, sheep and poultry	3.1 Nutrient requirements of different livestock 3.2 Low cost feed formulation 3.3 Forage based dairy farming 3.4 Use of local feed for livestock	Lesson, discussion
4. Explain the cultivation	4.1 Oats	Lesson, discussion,

Skill/Task List	Contents	Teaching Strategies
practices of different annual and perennial forage crops	4.2 Amliso (Broom grass) 4.3 Napier grass 4.4 Setaria 4.5 Maize 4.6 Teosinte 4.7 Sorghum 4.8 Dinanath 4.9 Molasses grass 4.10 Berseem 4.11 Forage peanuts 4.12 Sudan 4.13 Paspalam 4.14 Mulato 4.15 Flemingia 4.16 Desmodium 4.17 Para grass 4.18 Vetch	practical
5. Cultivate the fodder trees and explain their nutritive values.	5.1 Cultivation of Ipil-ipil, Tanki, Nimaro, Badahar, Kimbu, Koiralo, Kabro, Bakaino, Kutmiro, Khanyu 5.2 Characteristics, cultivation, yield of important fodder trees. 5.3 Identification and Prepare an inventory of fodder trees in an area	Lesson, discussion , herbarium collection, Field exercise(RRA/PRA technique of matrix ranking can be used)
6. Propagate the fodder trees and grasses	6.1 Seed Collection and storage 6.2 Site selection 6.3 bed preparation 6.4 seed sowing 6.5 Establishment of nursery 6.6 Propagation of fodder trees by vegetative method (Cutting, layering, grafting)	Practical and discussion
7. Prepare a fodder calendar for a farm and suggest how to overcome shortages; explain the utility and advantages of stall feeding	7.1 Interview farmer (RRA technique for eliciting seasonal calendar can be used – See "Planning & Office Management) 7.2 Draw up calendar showing sources of fodder at different times of the year 7.3 Discuss with farmer how to overcome seasonal shortages (in conjunction with PRA/RRA in 2 above) 7.4 Stall feeding	Field exercise
8 Explain the rangeland as source of feed	8.1 Different local and improved pasture species 8.2 Rangeland resources of Nepal 8.3 Local pasture species	Lesson, discussion

Skill/Task List	Contents	Teaching Strategies
9 Describe the particular problems of high altitude pastures in Nepal	9.1 Overgrazing 9.2 Uncontrolled grazing 9.3 Weeds, poisonous plants	Lesson, visit if possible
10 Suggest activities to improve high altitude pastures in Nepal and their use	10.1 Present research and extension findings 10.2 Pasture improvement 10.3 Other sources of fodder 10.4 Improved management	Lesson, discussion, visiting speaker
11 Inoculate legume seed with Rhizobium	11.1 Nitrogen fixation 11.2 Rhizobium strains and legume species 11.3 Sources of inoculums 11.4 Inoculation methods 11.5 Sowing inoculated seed	Lesson, practical
12 Describe different method of fodder Conservation	12.1 Hay Making 12.2 Silage Making	Lesson, Practical
13 Improve the quality of crop residues used as fodder	13.1 By chemical means, e.g. urea treated straw, urea supplementation	Lesson, practical
14 Identify different concentrate feeds and Agro-industrial By – products	14.1 Identification of Rice bran, rice polish, soybean cake, mustard cake, sesame cake, bone meal, feather meal, blood meal 14.2 Storage of concentrate feed 14.3 Use of different feed additives	Lesson, practical
15 Explain the method of preparation of Urea molasses mineral block (UMMB) or Mineral Block	15.1 Preparation of Urea molasses mineral block 15.2 Preparation of Mineral Block by using locally available ingredients	Lesson, practical
16 Explain unconventional feedstuffs	16.1 Importance of unconventional feedstuff 16.2 Identify major unconventional feedstuffs	Lesson, practical
17 Explain the proximate analysis of feed	17.1 Evaluation of feed, fodder for DM, CF, CP, EE, Ash	Lesson, practical
18 Explain the anti-nutritional factors present in livestock feeds and fodders and their amelioration	18.1 Evaluation of major anti-nutritional factors present in different feeds and fodders 18.2 Different methods for amelioration	Lesson, discussion
19 Explain recent technology in Animal Nutrition	19.1 Total Mixed Ration (TMR) 19.2 Concept of Hydroponic technique	Lesson, practical

Animal Product Technology

Credit hours: 2/week
Total Hours: 78
Theory: 16 hours
Practical: 62 hours

Full Marks: 50
Theory Marks: 10
Practical Marks: 40

Course Description

This course is designed to provide basic skills and knowledge of dairy technology in relation to human hygiene. The course also provides simple techniques of dairy productions, standardization of milk and milk test. It includes the meat and meat products like barbeque, salami, tanduri, sauces to preserve the meat. It also covers the disposal of slaughter house, quality wool and hides production.

Course Objectives

After completion of this course, the student will be able to:

- Explain the importance of animal products.
- Work in the national and private dairy sectors.
- Understand the definition, composition, physicochemical properties and nutritional value of milk.
- Study about the physiology of lactation and hormones related to it.
- Gain knowledge about milk quality and marketing of milk and milk products.
- Understand the products of milk and methods of their preparation.

Skill/Task List	Contents	Teaching Strategies
1 Describe milk and its composition	1.1 Definition 1.2 Composition of milk in different species 1.3 Factors affecting milk composition 1.4 Physio-chemical properties of milk	Lesson, discussion
2 Explain clean and hygienic milk production and legal standards of milk and milk products	2.1 Clean and hygienic milk production 2.2 Quality and standard of processed milk and milk products 2.2.1 Cow milk 2.2.2 Buffalo milk 2.2.3 Cream 2.2.4 Pasteurized milk 2.2.5 Butter 2.2.6 Ghee 2.2.7 Condensed milk	Lesson and discussion
3 Receive milk and perform tests	3.1 Importance of milk reception for quality of raw milk 3.2 Sampling procedure 3.2.1 Milk grading	Lesson and practical

Skill/Task List	Contents	Teaching Strategies
	3.3 Milk test 3.3.1 Physical Tests 3.3.1.1 Organoleptic test 3.3.1.2 Specific gravity test 3.3.1.3 Sediment test 3.3.1.4 COB test 3.3.2 Chemical test 3.3.2.1 Acidity Test 3.3.2.2 Alcohol Test 3.3.2.3 Fat Test 3.3.3 Bacteriological test 3.3.3.1 Methylene blue reduction test 3.3.3.2 Phosphatase test	
4 Explain milk standardization procedure	4.1 Importance of milk standardization for preparation of different dairy products 4.2 Methods of milk standardization	Lesson, discussion and calculation
5 Explain milk pasteurization techniques	5.1 Definition of pasteurization 5.2 Importance of pasteurization 5.3 Different methods of pasteurization	Lesson, discussion and dairy industry visit
6 Explain homogenization techniques	6.1 Definition of homogenization 6.2 Importance of homogenization	Lesson, discussion and dairy industry visit
7 Perform cream separation	7.1 Methods of cream separation	Lesson, discussion, practical
8 Prepare dairy products	8.1 Standard milk 8.2 Dahi 8.3 Khoa 8.4 Paneer 8.5 Chhena 8.6 Ghee 8.7 Chhurpi	Lesson, discussion, practical
9 Describe cleaning and sanitization of dairy equipment	9.1 Why cleaning and sanitization 9.2 Cleaning (characteristics of detergent used in dairy equipment cleaning) 9.3 Types of detergent 9.3.1 Alkali detergents 9.3.2 Acid detergents 9.3.3 Polyphosphatases 9.3.4 Wetting chemicals 9.3.5 Sanitization 9.3.6 Cleaning procedure of some dairy equipment a. Cleaning in place (CIP) b. Milk can only	Lesson, discussion, practical

Skill/Task List	Contents	Teaching Strategies
10 Explain composition, structure and nutritive value of meat	10.1 Composition of meat 10.2 Structure of meat 10.3 Nutritive value of meat	Lesson, discussion
11 Explain the Animal Slaughterhouse and Meat Inspection Act, 2055	11.1 Need of Animal Slaughterhouse and Meat Inspection Act, 2055 and Regulation , 2056 11.2 Functions, Duties and Powers of Meat supervisor and Meat inspector 11.3 Important provision under Animal Slaughterhouse and Meat Inspection Act, 2055 and regulation 2056 11.4 Difficulties in implementation of Animal Slaughterhouse and Meat Inspection Act, 2055	Lesson discussion
12 Model of slaughter house	12.1 Importance of slaughter house 12.2 Basic knowledge on layout and component of slaughter house	Lesson, discussion, practical
13 Explain different method of slaughtering and hygienic meat production	13.1 Different method of slaughtering 13.2 Hygienic meat production	Lesson, discussion, practical
14 Describe different equipment used for meat processing	14.1 Equipment used for meat processing 14.2 Cleaning and sterilization	Lesson, discussion, practical
15 Describe types of sausages and production method	15.1 Types of sausages and 15.2 Different method of sausage production	Lesson, discussion, practical
16 Explain method of Bacon and Ham production	16.1 Method of Bacon production 16.2 Method of Ham production	Lesson, discussion, practical
17 Describe method of Barbecue, Tanduri and Salami cooking	17.1 Method of Barbecue cooking 17.2 Method of Tanduri cooking 17.3 Method of Salami cooking	Lesson, discussion, practical
18 Explain different procedure to produce common meat products (sukuti, sauces, barbeque, and tandoori)	18.1 Different methods of preservation of meat (sukuti, sauces, barbeque, and tandoori)	Lesson, discussion, practical
19 Describe disposal management of slaughter house	19.1 Disposal management of Slaughter house	Lesson, discussion, practical
20 Describe shearing of wool	20.1 Method of shearing 20.2 Storage of wool	Lesson, discussion, practical
21 Describe different methods of hide production	21.1 Different methods of hide production	Lesson, discussion, practical