CURRICULUM

Technical School Leaving Certificate

Agriculture (Plant Science)

(18 months program)

Council for Technical Education and Vocational Training

CURRICULUM DEVELOPMENT DIVISION

Sanothimi, Bhaktapur

Fourth Revision- 2016

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Introduction

Nepal Government, Ministry of Education implemented the letter grading system in SLC from 2072 B.S. The door of TSLC programme is open for those students who have appeared in SLC exam and achieved any GPA and any grade in each subject. Focusing on such students the curriculum of TSLC of 29 months and 15 months have been converted into 18 months to create uniformity among different TSLC programme.

This curriculum is designed for basic level human resources in the field of Agriculture services equipped with knowledge, skills and attitude necessary for this level of technicians so as to meet the demand of such technician in the country.

Program Title

The title of the program is 'TSLC in Agriculture (Plant Science)'

Aim

The aim of the program is to produce Junior Technical Assistant (JTA) in the field of Agriculture (plant science)**,** to provide services to the people as a demand of the country.

Objectives

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

- Fulfill the demand of junior level manpower on the field of agriculture (plant science) of the country.
- Start own business in the field of agriculture (plant science).

Programme Description

This curriculum is based on the job required to be performed by agriculture sector in Nepal. It intends to provide knowledge required for basic level Junior Technical Assistant. It especially provides the knowledge and skills focussing on agriculture and farm management. The curriculum reflects the need of present agriculture services, the professionalism in agriculture sectors, so that the graduates of this program will be readily acceptable by the farmers at community level.

Course Duration

This course will be completed within 18 months (40 hrs./week X 39 week a year = 1560 hrs.) class plus 6 month (40 hrs./week X 24 week = 960 hrs.) on the job training (OJT).

Entry Criteria

Individuals with following criteria will be eligible for this program:

- SLC with any grade and any GPA (Since 2072 SLC).
- SLC appeared (Before 2072 SLC)
- Pass entrance examination administered by CTEVT

Group size:

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

Medium of Instruction:

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

Pattern of Attendance

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

Instructors' Qualification

- The program coordinator must be a bachelor degree holder in agriculture or diploma degree in agriculture with minimum of 5 years teaching experience after completion of the diploma degree.
- The faculties must be a diploma degree holder with 2 years practical based experiences.
- The demonstrator should have TSLC level degree in agriculture with minimum of practical based 2 years' experience.

Teacher and Student Ratio

- Overall at institutional level: 1:10
- Theory: 1:40
- Practical: 1:10
- Minimum 75% of the teachers must be fulltime

Instructional Media and Materials

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

- Printed media materials (assignment sheets, handouts, information sheets, individual training packets, procedure sheets, performance check lists, textbooks etc.).
- Non-projected media materials (display, photographs, flip chart, poster, writing board etc.).
- Projected media materials (opaque projector, overhead transparencies, slides etc.).
- Audio-visual materials (audiotapes, films, slide-tape programs, videodiscs, videotapes, multimedia etc.).
- Computer-based instructional materials (computer-based training, interactive video etc.)
- Teaching learning methodologies

Teaching- Learning Methodologies

The methods of teaching for this curricular program will be a combination of several approaches. Such as:

- Theory: lecture, discussion, assignment, group work.
- Practical: demonstration, simulation, observation, guided practice and self-practice.

Evaluation Details

- The marks distribution for theory and practical tests will be as per the marks given in the course structure of this curriculum for each subject. Ratio of internal and final evaluation is as follows:

S.N.	Particulars	Internal Assessment	Final Exam	Pass %
1	Theory	50%	50%	40%
2	Practical	50%	50%	60%

- There will be three internal assessments and one final examination in each subject. Moreover, the mode of assessment and examination includes both theory and practical or as per the nature of instruction as mentioned in the course structure.
- Every student must pass in each internal assessment to appear the final exam.
- Continuous evaluation of the students' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each area of a subject specified in the curriculum.
- The on-the-job training is evaluated keeping 500 as full marks. The evaluation of the performance of the student is to be carried out by the three agencies; the concerned institute, industry/organization where the student worked and the CTEVT Office of the Controller of Examinations. The student has to score minimum 60% for successful completion of the OJT.

Grading System

The grading system will be as follows:

Grading System	Overall marks
Distinction	80% or above
First division	75% or above
Second division	65% or above
Third division	Pass aggregate to below 65%

Certificate Awarded

The council for technical education and vocational training will award certificate of **"Technical School Leaving Certificate in Agriculture (Plant Science)"** to those students who successfully complete the requirements prescribed by the curriculum.

Job Opportunity

The graduate will be eligible for the position equivalent to Non-gazetted 2nd class/level 4 (technical) as Junior Technical Assistant (Plant Science, JTA) in the field of agriculture services or as prescribed by the Public Service Commission.

Course Structure

S.N.	Subjects	Nature	Hrs/w	Theory hrs	Practical hrs	Total hrs	Full Marks		
							T	P	Total
1.	Agriculture Extension and Community Development	T+ P	6	48	186	234	30	120	150
2.	Entrepreneurship Development	T+ P	4	32	124	156	20	80	100
3.	Crop and crop seed Production	T+P	6	48	186	234	30	120	150
4.	Plant propagation and Ornamental Horticulture	T+P	2	16	62	78	10	40	50
5.	Vegetable and Vegetable Seed Production	T+P	4	32	124	156	20	80	100
6.	Fruit Cultivation, Post-Harvest Horticulture and Plantation Crop	T+P	6	48	186	234	30	120	150
7.	Agriculture Ecology and Sustainable Soil Management	T+ P	2	16	62	78	10	40	50
8.	Plant Protection and IPM FFS	T+ P	4	32	124	156	20	80	100
9.	Apiculture, Sericulture, Mushroom and Lac culture	T+P	2	16	62	78	10	40	50
10.	Farm Machinery, Structure and Irrigation	T+P	2	16	62	78	10	40	50
11.	Aquaculture	T+ P	2	16	62	78	10	40	50
Total			**40**	**320**	**1240**	**1560**	**200**	**800**	**1000**

On the Job Training	Nature	Duration (Hrs.)	Full marks
On -the -Job Training (OJT)	Practical	6 month (960 hrs)	**500**
Grand total		**2520 hrs.**	**1500**

T = Theory, P = Practical

Agriculture Extension and Community Development

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

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

Objectives:
After completion of this course, students will be able to:

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

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

SN	Task	Related Technical Knowledge	Time (Hrs)
5	Assist to run demonstration plot in farmers field	Method demonstration Result demonstration Farmers Field Trials PPVT Motivation method Selection of farmer Layout	6
6	Prepare organogram of MOA	Role of each components Role of DOA Role and duty of JT/JTA Role of leader farmer	2
7	Communicate with farmers	Definition of communication Elements of communication Barriers of communication Diffusion process Adoption & innovation process Individual communication Group and mass communication	6
8	Explain importance of a group	Definition of group Philosophy of group formation Objectives of group formation Importance of group formation Groups transformation into Cooperatives Cooperative Farming Approach	4
9	Prepare action plan for work	Introduction of program planning Role & nature of program planning Principle & scope of program planning Behavioral objectives of program planning Steps of program planning Evaluation of program planning Monitoring of program planning	4
10	Define community development	Definition of community development Objective of community development	2
11	Explain Farmer to Farmer Extension (FtF) Approach	Definition Scope and need Basic elements of FtF Experienced leader farmer and their role in FtF Role of DLS, DoA and DADO, DLSO in FtF FtF in practice Identification of experience leader farmer Institutionalization of Ftf at VDC level.	2
12	Explain the role/ responsibility of farmers groups/ District Agriculture Development committee Agriculture forest and Environment committee	Stricture of committee Proposal analysis Agreement of budget for Farmers Field School	2

SN	Task	Related Technical Knowledge	Time (Hrs)
13	Mobilize farmers group	Role of group for technology transfer Stages of group Steps of group development Attitude of group member Conflicts of group member Conflict management Creation of demand	2
14	Explain role of experience leader farmer	Definition of ELF Characteristics of ELF Relation with service provider Responsibility of ELF Agreement between ELF and committee	2
15	Explain steps of Farmers Field School (FFS)	Definition and principles, approach, components, and tools of FFS. History of FFS. Principles, importance, objectives and Steps of running farmers field school Methods of running FFS Preparation for run FFS Comprehensive Planning Coordination with concern agencies Logistic management Post FFS activities Evaluation from farmers side Use of check list	2
16	Explain skill needed for ELF	Communication skill Effective listening Acceptance of feed back Consideration at time of presentation	2
17	Explain adoption process	Definition of adoption Steps of adoption process Factors affecting adoption process Motivation factor for adoption process	2
18	Explain monitoring process followed by ELF	Group discussion Demonstration Filed visit Mobilization of ELF	2
19	Monitor/evaluate FtF approach	Method & activates of monitoring fallowed by ELF & institute Method & activates of evaluation fallowed by ELF & institute Method & activates of fallow-up fallowed by ELF & institute	2
20	Assist farmers to conduct Farmer led experiments (FLE)	Objectives and importance of FLE Why FLE Layout of experimental plot Observation Data collection and record keeping Share results to farmers	4

SN	Task	Related Technical Knowledge	Time (Hrs)
21	Collect baseline information	Introduction and importance of baseline information Procedures of baseline information collection Developing a baseline information collection form	4
22	Prepare a project proposal	Basic elements of project proposal Goal Objectives Outputs Activities Inputs Evaluation of proposal	4
23	Prepare a progress report of program	Purpose of progress report Subject matter of effective progress report Types of progress report	2
24	Explain participatory planning	Introduction of participatory planning, monitoring and evaluation (PPME) Why participatory approach? Participatory Planning Participatory Monitoring Participatory Evaluation Village level planning process	4
25	Define group approach to extension	The "group approach" to extension Criteria of group formation Various types of groups: User groups, Commodity groups, Reference groups (natural groups) Different roles of groups: Technology transfer Training Management of common recourses Empowerment	4
26	Assist to form group	Group characteristics (size, caste, ethnicity, group dynamics) Wealth ranking in group formation to assess different socioeconomic factors Advantages and disadvantages of heterogeneous versus homogeneous groups	2
27	Assist group to select leaders	Roles of group leaders Necessary criteria for selection of leader Methods of leader selection Characteristics of a good leader Helping to select leaders and volunteers	2
28	Encourage members to participate in group discussions activities	Factors of encouragement of members to participate in group discussions and activities	2

SN	Task	Related Technical Knowledge	Time (Hrs)
29	Facilitate to run the group meeting	Principles of running a meeting Agenda Allowing discussion Moderating discussion Making decisions	2
30	Mobilize the farmers to use locally available resources	Identification method of local resources Types of resources available to local groups which are properly registered e.g. forest user groups, drinking water schemes group	2
31	Assist group to plan its policies and activities	Paperwork with government agencies Technical skills for paper works	2
32	Assist to manage group welfare funds	Process to obtain loans Process of handling fund Common financial and other resources	2
33	Report group activities to sub-center or office	Demonstration of simple reporting techniques	2
34	Explain gender and social inclusion	Definition of gender Equity and equality Principal of GESI Involvement of women and DAG in AFEC, group and different committee.	2
35	Assist community / user group in formation of objectives	Principle of objective formulation Guideline of objective formulation	2
36	Explain group dynamic	Definition of group dynamic Role of change agent for group dynamic	2
37	Explain community needs assessment	Definition of community need assessment Different methods of community need assessment: PRA, RRA, PLA Selection of appropriate method Importance of community needs assessment	6
38	Explain of Participatory Rural Appraisal (PRA)	Definition of Participatory Rural Appraisal (PRA) Philosophy of PRA Principle of PRA Importance of PRA Scope of PRA (In this part of curricula student MUST do one PRA)	4
39	Explain of Participatory Learning Approach (P LA)	Definition of Participatory Learning Approach (PlA) Philosophy of PLA Principle of PLA Importance of PLA Scope of PLA	2
40	Explain tools used in PRA	Different tools used in PRA techniques	2
41	Prepare time line	Time line &its importance	2
42	Prepare Seasonal calendar	Cropping time &season	2

SN	Task	Related Technical Knowledge	Time (Hrs)
43	Prepare cropping/livestock patterns	Irrigation facilities Livestock components Cropping	2
44	Prepare land-use systems,	Making maps of land - use Making maps of land / farms / social	2
45	Prepare matrix ranking	Methods of ranking	2
46	Discuss problems of community	Problem identification through PRA approach Problem census Problem solving Group technique Group discussion	4
47	Identify need of target groups	Felt and unfelt need of community/family	2
48	Prepare reports	Methods of preparing report	2
49	Plan future work	Planning based on the results and the resources available	2
50	Attend meeting	Basic concept of meeting (agenda, discussion, decision-making) Meetings with cooperating agencies (e.g. VDC) Reporting minutes of meetings	2
51	Prepare a training cycle	Definition of training Importance of farmers' training Training cycle	2
52	Conduct training needs assessment	Methods of performing training needs assessment Base line data collection for training need assessment	4
53	Motivate women farmers to participate in training	Concept of participatory training Discuss how people learn especially rural people (learning versus doing)	4
54	Prepare plan for farmers training	Selection of training methods and materials depending upon the target groups (illiterate versus literate) Arrangements of accommodation, foods and transportation for trainees	4
55	Select trainees	Helping community to select appropriate trainees Characteristics of appropriate trainees	2
56	Prepare a lesson plan	Different models of lesson plan Elements of lesion plan Practical lesson plan Theoretical lesson plan	4
57	Run practical sessions	Venue and places for skill training Appropriate size of participants for practical session Arrangement of all necessary tools and equipment/instruments Conducting field trips Extra-curricular activities	4

SN	Task	Related Technical Knowledge	Time (Hrs)
58	Prepare training materials	Preparation of flipcharts Preparation of transparencies Preparation of charts Preparation of drawings and posters Drama, role plays, display etc Preparation of teaching games	4
59	Develop visual aids	Poster Chart Pamphlets Graph Leaflets & their uses	8
60	Explain functions of electronic audio visual aids	Function & parts of LCD Projector, OHP etc. Function and use of Multimedia	2
61	Run theory sessions of the training	Preparation of class in the training programs Using mobile projector	2
62	Use checklist for the evaluation of trainees	Elements of checklist of training evaluation Models of checklist	2
63	Assist in reporting of training program activities	Elements of report writing Reports writing skill of training activities	2
64	Follow up trainees	Purpose of follow-up (encouragement, review, monitoring etc.) Follow up format (e.g. VAHWs, NFE facilitators, Leader farmers)	2
65	Collect the demand from farmers	Demand collection of Seeds, seedlings and grasses, and improved breeds of animals How to order, distribute and inventory supplies How to fill-up a basic request form from both the NGO side and the government side What is an inventory and how it is performed	4
66	Assist farmer to run trails	Types of trails Selection criteria's of farmer for running trails Terminologies used in trail (replication, plot, layout, randomization, sampling etc)	4
67	Assist for demonstration	Selection criteria's of farmer for running demonstration Method and result demonstration Farmers field trail Mini kit distribution and evaluation	4
68	Distribute supplies	Arranging to provide the seeds, seedlings, grasses and animals requested Inventory of supplies	2
69	Maintain daily diary	Diary keeping: why it is done, and how it is done; using examples How to write a basic report	2

SN	Task	Related Technical Knowledge	Time (Hrs)
70	Prepare service center program	Planning process in agriculture Development at VDC and DDC Activities of government, semi-government, non- government and private organizations: Ideas regarding how they can work together and complement each other for the development of the country	4
71	Prepare annual calendar / plan for work in field with farmers (e.g. plan for field inspection activities, etc.)	Annual calendar and how it is put together Preparation of a sample annual calendar based of farmers' needs and demands & on the basis of resources available Preparation of work schedules according to a given format	4
77	Assist in evaluating activities	Study of an actual evaluation format used by NGO and / or a government organization Describe different agriculture and livestock related Acts and rules	2
72	Follow-up distributed supplies	Follow-up and evaluate trainees / motivators (see training module also) Study of an actual "follow-up" program used by an NGO for motivators or trainees Study of the actual follow-up required after distribution of minikits by government workers	4
73	Prepare plan for training	Objective setting Program planning Preparation of lesson plan Running practical and theory classes Evaluation criteria Use of audio visual aids Sequential presentation of skill and knowledge	4
74	Explain the involvement of institution for community development	Role of institution in community development Concept of community development Present status of participation Basic requirements in participatory program Right based approach	2
75	Write a report to assist farmers.	Writing a report regarding funds collected for farmers' groups Writing a report regarding use of improved livestock Writing a report regarding farm activities (crops, orchard, vegetable, livestock) Reporting results of harvesting (yield) Reporting activities of pocket areas	4
76	Keep Records	Statistics regarding use of improved breeding stock, Financial matters: income and expense, Statistics of agriculture and livestock farms: Activities accomplished, Emergency report & reporting	2

SN	Task	Related Technical Knowledge	Time (Hrs)
77	Explain the involvement of social institutions and their role in community /agriculture development	Role of institutions in community development Religion culture social norms and values and their role in Community development And agriculture extension.	2
78	Describe different Agriculture and livestock related acts	Different agriculture and livestock related acts and rules	2
		Total	234

Entrepreneurship Development

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

Description:

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

Objectives

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

1. Perform basic skills for management Agriculture farms
2. Prepare scheme for small agricultural enterprises
3. Market Agricultural farm products
4. Keep record properly
5. Forecast/ predict risk before starting a business

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

S N	Skill	Related technical knowledge	Time (Hrs)
		Development bank, Finance and cooperatives	
10	Explain loan procedures	Types of loan, Loan procedure, Priority sector loan, Industrial sector loan, Secured Loan Long term loan, Short term loan, Collateral for loan, Completion of loan application forms, Loan payment schedule	4
11	Explain banking systems	Explain rules of bank regarding payment of loans Calculation of simple interest for loan payment Procedure for obtaining loan form bank and other sources (ADB, Rural Dev. Bank, Women's Dev. Office etc.)	6
12	Perform bank transaction	Cash deposits and withdrawals: Fixed deposit account Saving account Current account Cheque issues and withdrawal system, demand draft, debit and credit card	6
13	Prepare livestock/ agriculture farm plan/ organic farm plan	Scheme / farm plan preparation Capital Investment: Fixed capital investment, running capital Cost of production: fixed cost, variable cost Financial analysis: Gross income and expenditure, net profit/loss, breakeven point	6
14	Make a simple yearly production plan based on market analysis	Components of a yearly production plan, including time tables and budgets (expenses expected, income expected) Decision - making regarding a particular product, based on a market analysis (including seasonal variations) Preparation of a cash flow chart based on production plan	6
15	Explain assets/ property and liability	Definition of asset Calculation methods	2
16	Complete a simple farm/ business inventory	Review of inventory procedure Keeping records Calculating profit / loss	4
17	Design a marketing plan	Designing a marketing plan, including storage, packaging, transportation, labor needed, taxes etc.	4
18	Supervise workers / direct work on the farm or enterprise	Supervision of workers	4
19	Describe the qualities of a successful entrepreneur	Introduction to principles of small business Entrepreneurs' qualities Functions of entrepreneurs Importance of creativity	4
20	Describe types of enterprise	Types of small business: Private, partnership, cooperatives, joint stock company; advantages and disadvantages of each	6

S N	Skill	Related technical knowledge	Time (Hrs)
21	Differentiate risk and uncertainly	Introduction and types of risk/ uncertainty Describe how risk and uncertainly can affect decision-making. Risk calculation Concept of decision-making - how is it done Probability of success - can all succeed?	6
22	Perform a project work on a simple marketing analysis	Basic concepts of business management Types of market and marketing, Marketing strategies, Four P's rules of marketing strategy, Marketing research, Market survey guidelines	8
23	Keep records	Keeping inventory Maintaining necessary records on regular basis (labor, livestock, feed consumption, seeds used, fertilizer, Perform a simple inventory and record Keep records of production and marketing costs Keep simple account	6
24	Perform market study	Introduction, Market study, Description of product, Complication of the product, Location of firm, Market area, Main consumer, Total demand Market share, Production level, Sales promotion	10
25	Prepare production plan	Production Plan, Production process, Fixed capital, Depreciation, Repair maintain, Source of equipment, Planned capacity, Future capacity, Purchasing of equipment	8
26	Calculate current expenses	Raw materials, Cost of raw materials, Availability of raw materials, Pre operating expenses, Availability of labor, Facilities for labor, Overhead expenses, Per unit cost	8
27	Calculate financial aspects of a agriculture/livestock/ poultry farm	Total capital, Loan requirement, Collateral for loan Selling price of the product Calculation of loss and profit Loan payment table Calculation or in term of investment Calculation breakeven point	10
		Total	**156**

Crop and Crop Seed Production

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

Description:

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

Objectives:

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

1. Explain principles of crop husbandry as related to successful production of major field crops.
2. Cultivate of major and minor crops like rice, maize, millet, and pulses (summer & winter).
3. Perform the cultural practices required for successful production of major crop seeds grown in Nepal.
4. Explain the basic principles of crop production.
5. Describe the relationship between crop productivity and, cultural practices.
6. Describe the ecological requirements for crops grown in Nepal.
7. Explain some fundamental principles of weed control.

S.N	Task statement	Related technical knowledge	Time (Hrs)
1	Define Agronomy	Definition of agronomy and its importance. The contribution of agronomy towards relationships with other, sciences Relationships with soil animal science, horticulture, other, sciences. Integrated Pest Management and crop production	2
2	Identify field crops	Identification of the field crops with their external parts Uses of the field crops	6
3	Classify crops	Classification of crops according to various agronomic Botanical and climatic categories Grain crops Legumes crops Cash crops Oil crops Industrial crops	4
4	Explain the effect of soil and climate on crop growth and production	Types of soil in relation to crop production Role of soil types in crop growth Types of climate found in Nepal Elements of climate Role of climatic factors in crop production (temperature, light, rainfall, humidity)	2

S.N	Task statement	Related technical knowledge	Time (Hrs)
5	Identify weeds found in different crops	Definition of weeds Harmful effect of weeds to crops	4
6	Classify weeds	Classification of weeds on the basis of Life cycle Annual, biannual and perennial Seasonal weeds Weed intensity with respect to crops Types of weeds Absolute weeds Economic weeds	4
7	Control weeds form crops / fields	Weeds control methods Physical method, mechanical methods Biological methods and chemical methods (herbicide)	4
8	Apply herbicide to control weeds	Types of herbicides Selective, Nonselective Name of herbicides Methods of herbicide application	4
9	Explain condition necessary for producing and marketing of cash crop	Cash crops: conditions necessary for producing and marketing Supply and demand Meaning of low-volume, high-value	4
10	Compare local varieties and " improved" varieties	Advantages and disadvantages of local and improved varieties	2
11	Determine the time / stage for which irrigation is important for crops studied	Meaning of irrigation and drainage Importance of irrigation and drainage for crops studied Frequency of irrigation	2
12	Explain the competition between crops and weeds.	Concept of competition (plant-to-plant competition with respect to light, nutrients water, etc.) Different types of weeds and nature of competition with crop Role of weeds in crop production	2
13	Grow two crops appropriate to the local area (Maize Paddy Wheat Lentil Pigeon pea)	Importance, Climatic requirements, varieties Planting methods, planting season, intercultural operations,	16
14	Harvest different crops	Maturity indices Harvesting methods	4
15	Cure Harvested product	Curing Methods	4
16	Threshing grain	Threshing methods	4
17	Clean grain	Cleaning methods	4
18	Dry grain	Drying methods	2
19	Store grain	Grain storage principles and storage structures	2
20	Develop a calendar of operations for • Rice • Maize • Wheat • Potatoes • Millet	Making operation calendar for different cops rice, maize, wheat \, potatoes, millet etc Including - time of sowing/planting Intercultural operation Harvesting and storage Collection of seed Land preparation etc.	2

S.N	Task statement	Related technical knowledge	Time (Hrs)
21	Cultivate cereal crops (**Rice, Wheat, Maize, Barley)** **(It is mandatory that each student should grow two cereal crops at school farm with IPM and FFS and discovery learning approach)**	**Introduction** Origin, Distribution ,Adopted Suitable variety, Selection and availability of variety in local area Cropping pattern crop rotation, ,mixed cropping, companion cropping ,relay cropping, **Cultivation Practices** Seed bed preparation for rice Land preparation Seed rate and treatment Sowing and planting distance **Manure and fertilizer requirement** Basel dose, topdressing dose, Application method and time for topdressing, **Weeds and weeding** identification of weeds and time of weeding oter intercultural operation, **Irrigation and drainage** Need of moisture, time for irrigation and drainage **Maturity detection, harvesting and storage** Crop maturity, estimated yield, Method of yield estimation harvesting time and method of harvesting, Threshing, cleaning, storage, Role of moisture in grain, local method of moisture detection, Protection from pest in store. Selection of seed for next season . Cost benefit analysis (excluding plant protection Measures)	30
21	Cultivate Potato pulse and other crops (It student should grow potato and one pulse crop and one selected crop among given crops by the school. In general knowledge theory should be at list one from each group is mandatory that each (**with FPM and FFS/discovery learning approach)**	**False cereals** - Buckwheat, **Millets**- Sorghum, Pearl millet, Finger millet **Pulses-** Soybeans Cowpeas, Red gram, Black gram, Green gram, Chickpeas, Lentil, Rajma bean **Oilseeds**-Groundnut, Linseed, Sunflower, **Fiber crops** – Jute, Cotton Sesamum, Rape seed and Mustard **Sugar crops** - Sugarcane **Tuber crop** – Potatoes Origin, distribution ,adopted Suitable variety, selection and available variety in local area, Cropping pattern, crop rotation, ,mixed cropping, companion cropping, relay cropping,	30

S.N	Task statement	Related technical knowledge	Time (Hrs)
		Cultivation Practices Land preparation, Seed rate, seed treatment, Sowing and planting distance, Need of moisture, time for irrigation and drainage **Manure and fertilizer requirement** Basel dose, topdressing dose, Application method and time for topdressing, **Weeds and weeding** Identification of weeds and time of weeding, **Maturity detection, harvesting and storage** Crop maturity, estimated yield, Method of yield estimation, harvesting time and method of harvesting, Thrashing, cleaning, storage, Role of moisture in grain, local method of moisture detection, Protection from pest in store. Selection of seed for next time. Cost Benefit analysis (excluding plant protection Measures	
22	Estimate crop yield by "crop cutting"	Methods of yield estimation of different crops grown	2
23	Estimate yield of different crops	Site selection criteria's for sampling Sample collection method Harvesting, thrashing and calculation Role of moisture containing	2
24	Judge maturity for harvesting of different crops	Physiological maturity stage of different crops Different methods of maturity judgment of different crops	4
25	Explain losses due to present of weed in crop field	Definition of weed, Characteristics of weed, Economic losses by weed in crop yield	2
26	Collect weed	Identification and preservation of weeds both in crop and non crop areas in different seasons	8
27	Apply herbicide in different crops by different methods.	Selection criteria of herbicide Mode of action Method and time of application	6
28	Remove weed from field crops	Weeding time Selection of off variety off plant Difference between weeding and rugging Selection of appropriate time for weeding	4
29	Identify different seeds available in the local area	Identification seeds available in the local area with the parts of seeds (internal and external) Types of seed (Breeder, Foundation, Certified and Improved) Seed certification and Labels used	4
30	Seed grading	Grading Standard and basic parameters	2

S.N	Task statement	Related technical knowledge	Time (Hrs)
31	Determine the moisture content	By "cricking"	2
32	Calculate seed application rate for different crops	Seed rate calculation on the basis of Area of land Germination percentage Purity percentage Planting distance	2
33	Participate in seed multiplication production activities	Floral structure of plants, Self and cross pollinated plants, Fertilization and seed development in different plants Seed multiplication process Seed production methods	6
34	Maintain isolation distance to prevent cross-pollination	Methods of isolation - Time isolation - Distance isolation - Caging Isolation distance between two varieties for different crops on mode of pollination	4
35	Inspect seed production field	Stage of seed crop to be inspection Frequency of crop field inspection	2
36	Participate in roughing	Meaning of rouging Importance of rouging in quality seed production Methods of rouging	2
37	Select plating material for seed potato	Size of planting material (seed potato)	2
38	Harvest seeds	Harvesting indication Harvesting methods of different crops	4
39	Take a seed sample for seed test	Seed sampling method Importance of seed test	2
40	Determine moisture % of seeds	Methods of seed moisture determination	2
41	Treat seeds for storage	Seed treating methods	2
42	Store seeds	Seed storage method Seed moisture and storage life	2
43	Perform seed germination test	Methods of germination test	2
44	Calculate germination percentage	Calculation methods on the basis of germinated and non-germinated seeds	2
45	Collect different crops seeds	Identification Different crop seeds	2
46	Collect different crops specimen	Identification of all crops studied and identification of their main external parts	6

S.N	Task statement	Related technical knowledge	Time (Hrs)
46	Identify and manage common pest	Identification and management methods of common pests	6
47	Identify common diseases	Diseases (Name, sign and symptoms) Figures color plates any visuals)	6
48	Manage common diseases	Methods of disease Management	4
49	Identify common nutrient Deficiencies	Sign and symptoms of micro nutrients deficiency. (Micronutrients deficiency symptoms, Real materials, Color plate and any visual)	2
50	Correct common nutrient deficiency	Micro nutrient application methods	2
51	Design your own experimental plots	Importance of experiment Method of lay outing Cultivation practices of crops for experiment	2
52	Visits experimental plots	Routine preparation for visit experimental plot	2
53	Tabulate experimental data	Collection and tabulation of experimental data	2
54	Presentation experimental results	Summarization and presentation of experimental results	2
55	Design a small "crop enterprise" appropriate to the local area	Calculation of cost and income of crop enterprise Examples of crop enterprises: tea, jute, tobacco etc.	2
		Total Hrs	**234**

Plant propagation and Ornamental Horticulture

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

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

Objectives:

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

1. Describe the role of horticulture in the economic development.
2. Explain the classification of fruits, vegetables and ornamental plants.
3. Identify the suitable horticultural crops for grown in different agro. Climatic regions
4. Establish nursery for horticultural plants.
5. Propagate horticultural plants.
6. Demonstrate the techniques of training & pruning ornamental plants.
7. Describe the soil management practices.
8. Produce the major ornamental plants of the Country.
9. Plan the different styles of gardening.

General Horticulture

S.N	Task Statement	Related Technical knowledge	Time (Hrs)
1	Explain Horticulture	Meaning and definition of Horticulture Branches of horticulture Importance of Horticulture	2
2	Identify the ecological niches	Classification of ecological zones of Nepal Tropical zone, Subtropical zone and Temperate zone	1
3	Explain the role of climatic factors in the plant growth	Climatic factors (temperature, humidity, rainfall, light, wind) Role of each factors in plant growth	1

Nursery Techniques and Plant Propagation

S.N.	Task Statement	Related Technical knowledge	Time Hrs)
4	Explain Nursery	Definition of nursery Importance of Nursery	1
5	Categories nursery	Classification of nursery on the basis of Ownership, Duration, Plant grown Concept of indoor nursery	1
6	Identify the nursery tools	List of nursery tools and their function	2
7	Select site for nursery	General consideration for nursery site selection	2
8	Lay-out a nursery	Space requirement for a nursery Space between two nursery Length and breath of a nursery Calculation of area for a nursery 3-4-5 triangle method of nursery bed	2
9	Prepare nursery beds	Digging of soil Treating of nursery soil Mixing of manure Raised beds, surface bed, sunken beds Condition require for each type	4
10	Sow seeds on nursery	Pre-sowing Treatment of seeds Seed stratification Seed scarification Soaking Seeding methods (line sowing, broad casting, mixing with sand) Seeding spacing, Seeding depth	2
11	Care for nursery	Mulching, Irrigating, Drainage, Weeding Protection from adverse environmental condition (Hot, cool, high rain) insect pests diseases	2
12	Prepare potting mixture	Components of potting mixture Ratio of the component Mixing of potting mixture Filling of earthen pots/ polythene pots	2
13	Grow plants in hot bed	Planting/sowing of seed in polythene pots Concept of hot bed Preparation of hot bed	4
14	Define plant propagation	Definition of plant propagation Types of plant propagation Sexual Asexual Advantage and disadvantage of both sexual and asexual propagation	2
15	Propagate plant by seed	Definition of seed Seed formation process Types of seeds Basic requirement for seed germination Seed germination process	2

S.N.	Task Statement	Related Technical knowledge	Time Hrs)
16	Classify Asexual/vegetative propagation	Definition of vegetative propagation Types of vegetative propagation Cuttings Layering Grafting Budding	2
17	Propagate plants by cutting	Definition of cuttings Importance of cutting Types of cuttings List of plants which are propagated by cuttings Process of rooting in cutting	4
18	Propagate plants by layering	Definition of layering Importance of layering Types of layering Season for layering List of plants which can be propagated by layering Process of rooting in layering Factors affecting rooting in cutting	4
19	Propagate plants by grafting	Definition of grafting Importance of grafting Types of grafting Season for grafting List of plant which are propagated by grafting Process of graft union formation Factors affecting in graft union formation	6
20	Propagate plants by budding	Definition of budding Importance on budding Types of budding Season for budding List of plants, which can be propagated by budding Factors affecting in bud union formation	4
21	Identify nucellar seedling	Concept of poly-embryonic seeds Characteristics features of nu cellars seedlings	2
22	Define micro-propagation	Concept of micro-propagation Types of micro-propagation Shoot tip culture Tissue culture	2
23	Explain the role of Plant Growth Regulators (PGR)	Definition Plant Growth Regulators Types of plant growth regulators (Auxin, Gibberellins, Cytokinine, Ethylene Inhibitors) Concept of growth and Development Role of PGR in growth and development of horticultural plant	2
24	Apply PGR in plant propagation	Rooting in cutting and layering Application methods, Dry application, Wet application/ soaking method	2

Floriculture and Ornamental Horticulture

S.N.	Task statement	Related Technical knowledge	Time (Hrs)
25	Identify ornamental plants	Identification of different flowering, non-flowering indoor, outdoor ornamental plants available in locality Name and use of ornamental plants	2
26	Design a garden	Definition of ornamental garden Types of ornamental garden Component of ornamental garden	2
27	Prepare bonsai	Definition of bonsai Importance of bonsai Types of bonsai Method of bonsai making	2
28	Grow seasonal flowers	Seasonal flowers Cultural practices for seasonal flower production	4
29	Grow cut flowers (roses, gladiolus, carnation)	Importance of cut flowers Cultural practices for cut flower	4
30	Prepare lawn	Meaning and Definition of lawn Methods of lawn preparation	2
31	Maintain lawn	Mowing, Scrapping, Irrigating,	2
32	Maintain indoor plant	Introduction to indoor gardening Plants for indoor gardening Maintenance of indoor plants	2
		Total	**78**

Vegetable and Vegetable Seed production

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

Description:

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

Objectives:

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

1. Plan, organize and establish vegetable gardening
2. Plan, organize and establish kitchen gardening
3. Produce the major vegetables crops as commercial basis.
4. Produce seeds and multiply the seeds of major vegetables.
5. Describe role of IPM in vegetable production.

Commercial Vegetable production and vegetable seed production

S.N	Task Statement	Related Technical knowledge	Time (Hrs)
1	Develop yearly calendar of operation for major vegetable for commercial purpose	Listing of major vegetables crops can be grown commercially Classification of major vegetable crops Determination of duration taken to harvesting Planning of every and each cultural operation, (planting to harvesting/marketing)	4
2	Grow vegetable commercially at least two in each season	Selection of vegetable to be grown Market analysis of the selected crops (Demand, Supply and Price) Selection of site Location, Soil, Climate, Irrigation and Drainage facilities, Availability of labor and inputs	12
3	Apply Required techniques for the commercial vegetable production.	Improved technologies for commercial vegetable production Seedling production Land preparation/planting method Irrigation and drainage Fertilizer application Calculation of fertilizers to be applied according to area nutrient available and requirement Intercultural operations Managing insect pests and diseases Identification of insects pests and their damage Method of insect pest Management	16

S.N	Task Statement	Related Technical knowledge	Time (Hrs)
		Identification of diseases, their sign and symptoms Method of disease Management techniques Harvesting cleaning sorting packing for market, transporting and marketing	
4	Keep Records	Investment record Production records Income records Profit/loss record	2
5	Analyze the records	Calculation of production cost Calculation of income/return Calculation of loss or profit	2
Off season Vegetable production			
6	Grow off season vegetable as commercial purpose	Definition of off season vegetable production Advantage and disadvantage of off season vegetable production Methods of off season vegetable production -by using of climatic variation - by using of varieties - (early, late and hybrids) - by using of control environment - (green house, plastic house, plastic tunnel, hotbeds)	10
7	Apply improved technology for off season vegetable production	Production of seedlings in hot beds with plastic tunnel (forcing in germination) - Land preparation - Manuring , Fertilizing, - Transplanting of seedlings - Irrigating - Mulching - Weeding - Hoeing - Supporting/staking	16
8	Manage insect pests and diseases	Identification of insect pests and their damages Application of appropriate control measures against the insect pests Identification of diseases and their sign and symptoms Application of appropriate control measures against the diseases	6
9	Harvest vegetable	Harvesting indication of different vegetable crops Harvesting methods Cleaning of harvested vegetables Sorting for packing Packing for transportation	6
10	Market the vegetable	Identification of marketing channel Determination of market price	4

S.N	Task Statement	Related Technical knowledge	Time (Hrs)
11	Keep Records	Investment record Production records Income records Profit/loss record	2
12	Analyze the records	Calculation of production cost Calculation of income/return Calculation of loss or profit	2
Vegetable Seed production			
13	Define seed	Definition of seeds Importance of quality seed Characteristics of good quality seed	1
14	Classify vegetable crops for seed production	Classification of vegetables crops on the basis of mode of pollination Classification on the basis of requirement of light duration	4
15	Grow vegetable for seed production	General requirements for vegetable seed production Site selection and climatic requirement Source of seeds for seed production Cultural practices Isolation and inspection Types of seeds Breed's stock seed Foundation seed Certified seed Improved Seed Seed Registration Seed Certification and labeling Hybrid seed production	8
16	Maintain Isolation distance	Isolation, distance for vegetable seed production Method of isolation 1. Time isolation 2. Distance isolation 3. Caging	2
17	Maintain seed purity	Planting of pure seed an seed materials Maintenance of distance Field inspection of seed crops Frequency and stages of field inspection (vegetative stages and reproductive stages) Rouging of off type (characteristics of the variety)	8
18	Grow major vegetables for seed production	Location and site for seed production Land preparation Manuring and fertilizer application Planting/ transplanting of seed crops Irrigating, Weeding, Hoeing Field inspection, rouging Insect pests and diseases control Harvesting, Curing, Threshing, Extracting of seeds	16

S.N	Task Statement	Related Technical knowledge	Time (Hrs)
		Cleaning, Drying, Packing,	
19	Perform seed test	Sampling of seeds Seed sampling methods Testing of seed moisture Importance of seed moisture test Seed moisture testing methods Testing of seed purity, seed vigor Importance of seed purity test Testing of seed germination Importance of germination test Method of seed germination	4
20	Market vegetable seeds	Marketing channel Marketing procedures	2
21	Keep records of vegetable seeds production	Recording system Production record Financial record (cost and income record) Loss and profit analysis	2

Kitchen Gardening

S.N.	Task statement	Related technical Knowledge	Time (hrs)
22	Select site for kitchen gardening	Requirements for a kitchen garden site Size for a kitchen garden according to size of family and location of site	4
23	Prepare land for kitchen garden	Fencing, Plotting, Bonding, Beds preparation,	4
24	Prepare a calendar of operation for a kitchen garden in a locality	List of vegetable can be grown in the kitchen garden for a year Selection of vegetable according to growing season, and nutritional value	4
25	Grow seasonal vegetables in kitchen garden	Different cultural methods of growing seasonal vegetables in kitchen garden	4
26	Prepare compost for kitchen gardening	List of composting material available in the kitchen garden, Utilization of kitchen waste Utilization of bi-product of kitchen garden	4
27	Grow spice crops	Ginger, Cardamom, Turmeric crops	6
		Total	**156**

Fruit Cultivation, Post-Harvest Horticulture and Plantation Crop

Total hours: 234
Theory : 48
Practical : 186

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

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

1. Plan, organize and establish a new orchard.
2. Demonstrate the techniques of training & pruning fruit trees.
3. Describe the orchard management practices.
4. Cultivate major fruits.
5. Demonstrate the post-harvest practices of fruits vegetables and cut flowers.
6. Demonstrate the techniques of fruit and vegetable preservation.
7. Describe role of IPM in fruit production.

Fruit production and orchard management

S.N	Task statement	Related technical Knowledge	Time (Hrs)
1	Explain the importance of fruit production in Nepal	Economic importance of fruit production Nutritional value of fruits in relation to human health Ecological importance of fruit production Religious importance	2
2	Classify fruit crops	Classification of fruit crops on the basis of climatic requirement Ecological niches for fruit growing in Nepal	4
3	Identify major fruit crop grown in Nepal	Identification of fruit crops grown in different agro climatic zone in Nepal	4
4	Lay out an orchard	System of orchard lay out Square system Rectangular system Hexagonal system (Triangular system) Contour system High density planting	8
5	Apply manure/fertilizer	Calculation of fertilizer and manure according to stages and age of fruit plant Methods of Maturing and fertilizing	10
6	Plant fruit sapling	Pit digging, Pit filling, Planting Supporting, Mulching, Irrigating	6
7	Establish an orchard	Basic consideration while establishing an orchard	10
8	Irrigate fruit plant	Stages of irrigation Method of irrigation including drip, sprinkler	10

S.N	Task statement	Related technical Knowledge	Time (Hrs)
9	Train fruit plant	Definition of training Objective of training of a fruit plant System of training	6
10	Prune fruit tree	Definition of pruning Objective of pruning Method of pruning	6
11	Thin fruit	Concept of fruit thinning Fruit thinning methods	2
12	Explain Integrated Pest Management to Control fruit insect pests	Common insect pests of fruit crops Identification of damaged by insects pests Control methods	6
13	Control fruit diseases	Common disease of fruit crops Identification of sign and symptoms of diseases Diseases control methods	6
14	Harvest fruit crops	Maturity indication of major fruits Picking methods Sorting/grading, Packing and storage (cold storage, cellar storage, rustic storage, zero energy)	4
15	Market fruit crops	Fruit markets in Nepal Existing marketing channel in Nepal Transporting system in Nepal	4
16	Apply cultural practices and management skill for major fruit crops. (**With IPM and FSS approach**)	Cultural practices for temperate fruits (Apple, Pear, walnut, Peach) Cultural practices for sub tropical fruits (Mandarin orange, Sweet orange, Lime, Lemon Pomegranate, kiwi) Cultural Practices for tropical fruits (mango, Litchi Banana, Papaya, Pineapple, Guava)	30
17	Identify Minor/important fruits	Introduction of Minor fruit crops. List of minor fruits crops Grapes, coconut, Arecanut Amala Almond, Bel Apricot, Plum, Strawberry,	26
18	Perform orchard management practices	Clean cultivation Intercropping Sod culture and basin preparation	10
19	Apply ripening hormones in Fruit ripening	Types of fruits regarding as ripening (Climacteric and non climacteric) Application Methods of ripening hormones	4
20	Define preservation	Definition of preservation Importance of vegetable and fruit preservation	2
21	Classify the preserved forms	Types of fruit and vegetable preservation Dry preservation, Wet preservation Beverage, Alcoholic and Nonalcoholic	2
22	Apply preservatives	Name and function of preservatives Application method	1
23	Prepare jam / jelly	Definition of jam and jelly List of fruit from which jam and jelly can be prepared. Procedure of jam jelly preparation	4

S.N	Task statement	Related technical Knowledge	Time (Hrs)
24	Prepare potato chips	Recipe for potato chips preparation Procedure of potato chips preparation	4
25	Prepare pickle	Recipe for pickle preparation Procedure of pickle making	4
26	Prepare tomato sauce	Recipe for tomato sauce preparation Procedure of sauce making	4
27	Prepare fruit juice	Recipe for fruit juice preparation Procedure of juice making	4
28	Prepare squash	Recipe for squash preparation Procedure of squash Making	3
29	Handle post harvest horticultural products	Cleaning Grading Value addition Packaging Storing and transporting	4
30	Identify plantation crops Grown in Nepal	Identification of plantation crops List of plantation crops Importance of plantation crops	3
31	Cultivate plantation crops(tea, coffee)	Ecological requirements Propagation Plantation Training and pruning Insect and diseases control Harvesting and processing	30
32	Introduce Agro-forestry	Importance and concept of Agro-forestry (herbal and medicinal plants)	4
		Total	**234**

Agriculture Ecology and Sustainable Soil Management

Length: 78 hrs
Theory: 16 hrs
Practical: 62 hrs

Description:
This subject provides the students the basic skills and knowledge about agriculture and its relationship with environment and public health.

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

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

SN	Skill	Related Technical Knowledge	Time (hrs)
1	Define weather/ climate	Definition of weather & climate Importance of studying weather &climate Including its various components (rainfall, temperature, humidity, sunshine, wind, frost, hail) Information included on weather reports, including their meanings. The usual measurements taken at weather stations in Nepal Rainfall, Temperature, Humidity of some major weather station in Terai, Hills and Mountain and its trend	2
2	Record rainfall	Importance of taking rainfall Simple methods appropriate for village conditions Care for rain gauges. Read rainfall gauges Use, maintenance and care of rainfall gauges	2
3	Record temperature	Care of thermometers. Read temperature C. and F. from a thermometer Read maximum and minimum temperature Record maximum and minimum temperature. Convert between C. and F. degrees, and visa versa. Information & importance about temperature, C.&F. Use, maintenance and care of thermometers, including minimum-maximum thermometers Conversion of C. to F. and visa versa	2
4	Take sun shining record	Effect of sunshine, including phenomena of north / south facing slopes, drying of soil, length of growing season etc. Explain light intensity	2
5	Explain effect of microclimate	Effect of wind to local agriculture conditions. Concept of microclimate and its affects on crops and livestock including human activities Advice regarding the suitability of a crop for a particular microclimate	2

SN	Skill	Related Technical Knowledge	Time (hrs)
6	Measure relative humidity (RH)	Definition of RH (relative humidity) Use, maintenance of barometer Information about dry and wet bulb thermometer Care for barometer Calculation of RH	1
7	Prepare weather report.	Formation and preparing data for a weather report in weekly, monthly and yearly basis	2
8	Explain causes of climate change	Causes of climate change	1
9	Explain effect of climate change in crop production	Effect of climate change in crops and plants	2
10	Identify the 4 major components of soil	Definition of "Soil", including 4 major components Air, Water, Organic matter, Inorganic matter Function of soil components	1
11	Identify Parent material of soil	Rocks & minerals Organic & inorganic matter Time required to form soil Formation	2
12	Explain soil horizon	Concept of "top-soil" Why must be top-soil conserved Soil depth	2
13	Determine soil texture by feel test	Texture type Classification of soil texture Triangle of soil General concept of soil texture and why different crops need different textures Soil structures	2
14	Determine soil moisture by feel test	Concept of water holding capacity and its importance A few factors that affect water holding capacity. Concept of moisture requirements for different crops	1
15	Collect soil sample for lab test	Soil testing and its importance Testing purpose Methods of sampling Packing Labeling	2
16	Determine soil pH using soil kit box	Importance of pH with respect to soil fertility Different crops grown in different soils of various pH Correction of pH by organic and inorganic method. Use of lime to neutralize pH Use of gypsum to neutralize pH	2
17	Explain common causes of decreasing soil fertility.	Role of organic fertilizer to enrich soil Factors affecting soil fertility (rainfall, slope, wind) Advantages and disadvantages of compost versus chemical fertilizers. Decomposition of organic matter in soil Explain the role of livestock, forest and crop residues for enhancing soil fertility.	2
18	Explain role of Nitrogen/ phosphorus/ potassium	Importance of essential major elements (Nitrogen, phosphorus, potassium) in soil N, P and K cycle in soil	2

SN	Skill	Related Technical Knowledge	Time (hrs)
19	Explain role of micro nutrient in soil	General role of micro-nutrients in the soil Name of major and minor (13) soil nutrients	2
20	Explain Soil erosion and its control Explain role of plant to control soil erosion	Soil erosion, its causes. Soil erosion and soil fertility Soil erosion control The role of plants in the control of soil and water erosion.	1
20	Explain Integrated Plant Nutrient System (IPNS) concept	Definition, importance and objectives of IPNS Source of plant nutrient Role of FYM/compost in IPNS Balanced fertilizer application Calculation of Nutrients	2
21	Define compost	Definition of organic matter and compost, vermicompost and different composts Benefits of compost Advantages of compost	1
22	Demonstrate compost making.	Materials & methods for compost making Heap method Pit method Factors affecting compost making Temperature Bacteria / micro-organisms	3
23	Protect compost from environment	Protection from heat and volatization Protection from leaching	2
24	Determine compost is ready for application	Characteristic of matured compost/FYM Nature & property of compost Methods of testing	2
25	Apply / mix compost into the soil.	Utilization of compost at best time Mixing of compost into the soil.	2
26	Define Farm Yard Manure (FYM)	Definition of FYM Importance of FYM Role of FYM in to soil Soil nutrient content in FYM	2
27	Manage FYM	Method of decomposition Cow shade improvement Protection from leaching and evaporation Role of micro-organism for decomposition Indication of decomposing	2
28	Apply FYM urine in soil	Collection, Management and application methods Time of application Precaution at application Mixing technique in to soil	2
29	Cultivate a green manure crop	Definition of green manure Role of green manure enhances soil fertility. Utilization of green manure to enhance soil fertility Characteristics of suitable green manure plants. Including proper stage of plant growth for utilization.	2
30	Mix green manure in to soil	Stage of plant for green manure. Mix green manure into the soil.	2

SN	Skill	Related Technical Knowledge	Time (hrs)
31	Apply azzolla for rice field	The role of azzollz in enhancing soil fertility. Application of azzolla to field for green manure	2
32	Apply biofertilizers	Biofertilizers available in market and their importance (Rhizobiun, Azotobactor, Azospirillum, Trichoderma Characteristics of leguminous crops Differentiate between legumes and non legumes Identification of effective types of nodules	2
33	Inoculate seeds with suitable bacterial cultures	Care for inoculums Different types of bacterial cultures found in Nepal. Process of inoculation of leguminous seeds with Rhizobium culture. Precautions during working with bacterial cultures. Calculation of concentration of bacterial sugar solution for a given amount of seed Protection of inoculated seed Sowing of inoculated seed	2
34	Explain relationship of crop rotation and soil fertility'	The concept of crop rotation with respect to soil fertility; including specific examples of leguminous crops followed non-leguminous crops.	1
35	Identify important chemical fertilizers available in Nepal	Common fertilizer found in Nepal The advantages and disadvantages of chemical fertilizers, concentrating on the major fertilizers available in Nepal	2
36	Explain nutrient content of major chemical fertilizers.	Major nutrients of fertilizer in each common chemical fertilizers. Calculation of common dosages of chemical fertilizers Review of soil test results and calculating the dosage of common chemical fertilizers for major crops	2
37	Apply chemical fertilizers	Application of fertilizers by broadcasting Application of fertilizers by top dressing Application of fertilizers by band placement Application of spraying	2
38	Demonstrate measures to control erosion by plantation	The role of plants in the control of soil erosion How dose plants to control erosion.	2
39	Demonstrate contour making	Option for land improvement techniques Various options for erosion control, including terracing, contour main, strip-farming.	2
40	Adopt soil conservation practices	SALT (Slopping Agriculture Land Technique)	2
41	Apply concept of sustainable agriculture and organic farming	Importance, scope and practices of organic farming	3
		Total	**78**

Plant Protection, IPM and FFS

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

Description

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

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

Objectives

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

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

SN	Skill	Related technical knowledge	Time (Hrs)
Plant Protection			
1.	Define Plant protection	Definition of plant protection Principle and Practices of Plant Protection Importance of plant protection	2
2.	Define Plant Disease	Definition of disease	2

SN	Skill	Related technical knowledge	Time (Hrs)
		Causes of Disease of crop plants Fungal Bacterial Viral Mycoplasma Nematode Non parasitic – plant diseases	
3.	Explain the condition for disease out break	Disease Triangel (Environment,) Susceptible host Aggressive agent	1
4.	Identify general symptoms of disease	Spots - leaf spot or fruit spots Shot hole Twig, shoot or blossom blight Mildew- Downy, Powdery Rust, smut, rot, wilt, gall, Seedling rot, leaf curl, mosaics Vascular discoloration, stalk rot, club root chlorosis, necrosis, Canker, dwarf, rusting, Sooty mold, damping off Disease in transits and storage	2
5.	Manage Weeds of Crops	Definition, importance, identification and management	2
6.	Explain life cycle of insects/pests	Complete and incomplete life cycle of Insects	2
7.	Classify insects pest	Classification based on mouth parts of insects Biting, chewing, sucking, siphoning , piercing	2
8.	Explain the condition for insect outbreak	Environmental Temperature Humidity Host- Primary secondary	1
9.	Calibrate sprayer / dusters	Types of sprayer /duster Use of sprayer /duster Parts of sprayer/ Dusters Functioning of sprayer/duster calibration of sprayer/dusters	2
10.	Explain the common control methods of insects/disease	**Physical Method** **Cultural Methods** Tillage and cultivation practice, crop rotation Planting time, companion and mixed Cropping, planting density (P4) **Biological Method** Use of natural enemies Use of parasite Use of predators Trap crop Use of Pheromones **Regulatory method** Plant quarantine **Chemical method**	4

SN	Skill	Related technical knowledge	Time (Hrs)
		Use of chemicals, **Principles and practices of OPM and IPM approaches IPM approach**	
11.	Classify pesticides	Classification of chemical pesticide Classification on the basis of origin: Organic, inorganic (chemical), biopesticides Insecticide, fungicide, herbicides, bactericide, rodenticide, acaricide, Organo Chlorinated hydrocarbon, Organo phosphorus, Carbayrl group etc **Mode of action** Systemic , Contact, Stomach **On the basis of formulation** (Forms) Dust Granules Fumigant MP/EC Oils and Emulsions **Inorganic pesticides Classification on the basis of hazard and label used** **Highly toxic, toxic, less hazardous**	2
12.	Explain the characteristics of pesticides	**Characteristics of good pesticides** **LD50** Low phyto toxicity High toxic to target organism Low toxicity to human being and livestock Stability in storage Stability after dilution to spray strength Safe handling and Storage of pesticide	2
13.	Explain application method of pesticides	**Application Method** Seed treatment Soil treatment Standing crop application Foliar Application Dusting Drenching Fumigation Safety measures in pesticide handlings	2
14.	Identify common fungicide available in market	Sulphur powder Thiram Zineb Mencozeb Bordeaux mixture Copper oxichloride Carboxil Carbedazim	2
15.	Identify common insecticide available in market	Common insecticide: Methyl parathion, malathion Fenitothron, diazinon, parachlor Methyl, dithimate trichlorophan	2

SN	Skill	Related technical knowledge	Time (Hrs)
		, phorate, Thimet, Carbyal carbofuran, indosulphate cypermemthrin Aluminum phosphide Zinc phosphide	
16.	Calculate the dosage of pesticides	Calculation of required, volume of spray solution Calculation of required concentration of spray solution Calculation of required volume of pesticides to be mixed in spray solution ($C_1V_1 = C_2V_2$) Safe Handling of Pesticide Storage of Pesticide. Destruction of empty pesticide container	2
17.	Select appropriate plant protection equipment	Sprayer and its parts Hand compression sprayer its capacity, use and maintenance Knapsack sprayer Foot sprayer Small hand sprayer 1 lt capacity Duster (rotary type)	2
18.	Apply safety measures in plant protection	Reading pesticides literature Reading label of pesticides Toxic level of pesticides Precautions to be taken during and after the application List of banded pesticides. Poisoning and first aids knowledge Using Safety gears(masks, Apron, gloves etc)	2
19.	Prepare Bordeaux mixture, Bordeaux paste	Definition of importance of Bordeaux mixture/paste Requirement and quantity of $CuSO_4$ quick lime ($CaCo_3$) and water Method of preparation Application and use of Broadax mixture paste	2
20.	Collect insect and disease/weeds sample (regular collection)	Collection and Preparation of disease ,Insect and weeds specimen for museum purpose and submission	2
21.	Handle compound microscope	Parts of microscope Function of each parts Method of handling	1
22.	Manage common bacterial disease	Name, casual organism, signs, symptoms and management. of : Bacterial blight of paddy. citrus canker, stalk rot of maize, angular leaf spot of cotton	2
23.	Manage common fungal disease	Management of : **powdery mildew** Powdery mildew of peas, cucurbits & apple **downy mildew:** Downy mildew of maize, grapes and crucifers	3

SN	Skill	Related technical knowledge	Time (Hrs)
		Rots and damping off Foot-rot of papaya, citrus gummosis, damping off of seedlings, late blight of potato **Rust** Black, yellow and brown rust of wheat, been rust, pea rust & gram rust **Smuts & bunts:** Loose smut and blunt of wheat **Wilts & root-rot** Wilt of cotton, root & stem rot of jute leaf spots, leaf blights & anthracnose early blight of potato, leaf spot of rice, leaf spot of ground nut, blast of rice, red rot of sugarcane, mango anthracnose **Galls & Abnormal Growth:** Stem gall of coriander Peach leaf curl	
24.	Manage common viral disease	Name casual organism, signs and symptoms and management of : **Viral diseases:** Yellow vein mosaic of okra, tobacco & tomato mosaic virus disease of papaya, virus disease of potato & cardamom chirkhe Furke, bunchy top of banana	2
25.	Manage common /bacterial mycoplasmal diseases	Name casual organism, signs and symptoms and management of : **Citrus greening(HLB) and rice yellow dwarf**	2
26.	Manage other common diseases	Name casual organism, signs and symptoms and management of : Root-knot **Nematod**e, Common tea diseases **Non-Parasitic diseases**: Tip burn of paddy, black heart of potato, black tip of mango, zinc deficiency in rice.	2
27.	Identify beneficial insects in plant protection	Importance of beneficial insects in plant protection predators parasites	2
28.	Apply Biological method pest control	Introduction importance Advantages Factor need to consider during applying biological method Predators, parasites and microorganism Commonly used biopesticides in market (BT, Metarhizium, Trichoderma, NPV etc)	2
29.	Prepare and apply botanical pesticides	Identification of plant used in herbal pesticides preparation Method of preparation Composition of ingredient Application method Concentration(Penchagabhya, chanelu, jaibic mal gitiamal etc)	2

SN	Skill	Related technical knowledge	Time (Hrs)
30.	Manage insect pests of cereals	Life cycle, harmful stage nature of damage and management of: Yellow Stem borer, pink borer, gundhi bug, leaf roller, gall fly, rice hispa, crickets, white grub, wire worms, army worms, aphid, cutworms, Helocoverpa Locusts, grasshoppers,	2
31.	Manage pests of pulses	Life cycle, harmful stage Nature of damage and management of: Gram pod-borer, fly and scale, stemfly	2
32.	Manage pests of fruits	Life cycle, harmful stage nature of damage and management of: Apple wooly aphis, sanjose scale; lemon butterfly, peach aphid, citrus leaf miner, mango hoppers, mango mealy bug,· mango stem borer; mango stone weevil, mango shoot and leaf gall maker, fruit sucking moth, :grapevine thrips guava - meally scale, banana weevil	2
33.	Manage pests of vegetables	Life cycle, harmful stage nature of damage and management of: Cabbage butterfly, diamond back moth, cabbage semi lopper, potato tuber moth, onion thrips, brinjal fruit borer and stem borer, red pumpkin-beetle, Fruit fly ,hairy caterpillars, cut worms,	4
34.	Manage pests of Industrial crop (Sugarcane, jute, tobacco, cotton, etc.)	Life cycle, harmful stage nature of damage and management of: Top borer, shoot borer, stalk borer, root borer, white flyAphids, Helicoverpa, Semilooper, Red cotton bug, Mites, etc	2
35.	Manage pests of oilseed crops	Life cycle, harmful stage nature of damage and management of: Mustard aphids, mustard sawfly ,painted bugs	2
36.	Manage vertebrate pests	Life cycle, harmful stage nature of damage and management of: Rodents, mice ,& moles slugs, snails, etc,	2
37.	Manage pests of Tea and coffee	Coffee white borer, red mite , Tea, Helopeltis, red spider mite and termites,	2
38.	Manage stored grain pests	Life cycle, harmful stage nature of damage and management of: Insect disease and other , Vertebrate pests	2
	IPM & FFS		78
39.	Discuss on importance of IPM	Background information on IPM program Principles of IPM History of IPM in South east Asian context Importance of IPM why IPM	2

SN	Skill	Related technical knowledge	Time (Hrs)
		Validation and adaptation of IPM technology Reduction on dependence on pesticides	
40.	Discuss on Principles of Farmers Field School	Definition and History of FFS Philosophy of FFS Principle of FFS Importance of FFS	2
41.	Discuss on roles / responsibilities of stakeholders	Explanation of comprehensive planning Briefing on roles and responsibilities of stakeholders (DDC, VDC, DCC, DTT, CBO, NGO, agro-vet, farmers, agro-line agencies) Commitment of locals' bodies.	2
42.	Discuss on basic requirements of FFS	2- 3 Preparatory meetings Participant selection criterion Preparation of crop specific schedule Suitable land venue and plot Making Seeds seedlings available in time Agro- ecosystem analysis (AESA) Report preparation and presentation Report preparation and presentation Action plan for further improvement or further improvement	2
43.	Run Comprehensive planning	Prepare Existing Cropping pattern, Cropping calendar and need identification Calculate cropping intensity Gross Margin Analysis Cost benefit analysis Prioritization of crop Gap analysis Prioritization of problems	4
44.	Discuss on methods of Agro-Ecosystem analysis (AESA)	Importance and use of AESA - tools and methods Parameters Stander format for data collection	1
45.	Discuss on criteria of running FFS meeting	Attendance procedure of participant. Methods of welcome for all participants Importance of Climate Setting Introduction Group division criteria and methods Importance of group division Wrap-up and closing of meeting Information for next meeting	2
46.	Run first preparatory meeting for Farmers field school	Objectives of meeting Preparation of agenda of meeting,(Norms and selection criteria of farmers for FFS) Selection of Executive Committee members Roles and responsibilities Methods of running meeting	2

SN	Skill	Related technical knowledge	Time (Hrs)
		Arrangement of venue, spot, refreshment, Reporting Minuting Information for next meeting Wrap-up and closing of meeting	
47.	Run second preparatory meeting for IPM Farmers field school	Attendance of participant and others Welcome Climate Setting Gender and social inclusion analysis (GAM) Participants selection Selection of land and land owner and venue Observation parameters and frequency for experiments) Sub group division	2
48.	Prepare cropping calendar	Importance of need identification Selection criteria of crop and varieties Preparation of cropping calendar	1
49.	Select topics for experiments	Identification of problems Prioritization of problems Cost benefit analysis Gap analysis Selection of topics for experiments Concepts of experiments (Natural variation, bias, replication, treatments, plot size, sample size and methods, Observation parameters and frequency for experiments)	2
50.	Discuss on field selection criteria for studies and Group dynamics	Selection criteria of land and land owner Plot selection Program planning for next meeting Group Dynamics	1
51.	Run third Preparatory meeting for IPM Farmers field school	Discussion on agenda Climate Setting Minuting Welcome	1
52.	Perform soil test of selected site of experiment	Soil sampling for testing Discussion on result	4
53.	Set norms for FFS	Socio economic analysis Individual farm plan Sub group division Norms setting Day and time setting Expectation matching Program setting for Next meeting	2
54.	Handle tools/ equipment	Handling of land preparation tools equipment and materials (primary and secondary tillage tools and equipment), Plant protection (including sample collection tools equipment and materials of insects and disease) tools equipment and materials, Intercultural operation tools equipment and	2

SN	Skill	Related technical knowledge	Time (Hrs)
		materials, Harvesting, threshing and storage tools equipment and materials Handling procedure tools equipment and materials Safety precaution during handling of tools equipment and materials Cleaning and storage of tools equipment and materials (It is necessary to teach but it can apply when ever need)	
55.	Carry out Seed Exercise	Seed quality exercise Introduction of major seed borne disease Germination test, Seed treatment, eg. Brian solution test Wrap-up and planning for next week	2
56.	Discuss /Establish Nursery. (This work to be done 21days before FFS starts)	Welcome Climate Setting Nursery establishment Farmers Practice Vs IPM Group dynamics Cattle shed management Urine collection, FYM/compost improvement	2
57.	Run Farmers field school work (week -2)	Lay out and Field preparation Fertilizer and micro nutrient calculation, PGR management Trial Set up Lay outing of experimental plot Field preparation (Site selection, land preparation, mannuring and fertilizer application methods, Methods of planting etc.) Mandatory /Supportive trials Mandatory trials • Comparative study IPM vs FP • Soil fertility related • Varietals • Pest management • Simulation/ Compensation Trial Supportive trials (Crop and Need specific) Wrap-up and closing of meeting	4
58.	Run BBT (Pretest) (week -3)	Welcome Climate Setting Explain method of preparation of test material and Runion of test.	2
59.	Discuss Crop physiology /growth stages critical stages of crop / its inputs requirement (Week -4)	Explain Crop water requirement and critical stage of irrigation/ nutrients, cultural operations Physiological development of seed/ tuber	2
60.	Run FFS activity. (Week -5)	Seedling treatment (planting spacing, depth, no of seed /seedling) Transplanting -Seed quality	1

SN	Skill	Related technical knowledge	Time (Hrs)
		- Seed treatment Importance of quality seed and its production techniques (seed plot technique)	
61.	Discuss AESA parameters / soil exercise (week-6)	Finalization of observation parameter of AESA, and monitoring, sampling, trap setting Soil management , Soil exercise (Living soil, water holding, infiltration, microbial activities, earth worm rearing FYM improvement Cattle shed management, Urine collection, biogas slurry management	1
62.	Discuss FFS activity on ecosystem analysis(Week-7)	Life cycle and food web Functional grouping of insects	2
63.	Discuss FFS activity (week-8)	AESA-1 Start AESA Exercise Zoo/Cage, Cup Study Pot Culture Insect drawing Group dynamics	2
64.	Run FFS activity FYM related demonstration (week -9)	AESA -2 Demo establishment of FYM improvement/ cattle Urine collection and Preparation and application of compost, vermin compost, bookish panchagabya, FYM Nutrient management of specific crop Chemical Fertilizer Testing, identification and dose calculation etc	2
65.	Perform FFS activity Disease/ its management (week -10)	AESA-3 Introduction of Disease triangle, diseases and their management Root and vessels exercise	2
66.	Run FFS activity (week -11) Soil nutrients management	AESA-4 Nutrient and Physiological disorder management Play group dynamics	2
67.	Run FFS activity Pesticides related topics (week -12)	AESA-5 NEs and their characteristics Agro ecosystem analysis AESA presentation Introduction of pesticide and bio pesticide NEs and their characteristics Pesticide monologue/ self monitoring of pesticide poisoning	1
68.	Run FFS activity. Explain various aspects of pesticide (week -13)	AESA-6 Effect of pesticides on IPs and NEs Pesticide monologue/ self monitoring of pesticide poisoning/ Pesticide management Effect of pesticide on IPs and NEs	2

SN	Skill	Related technical knowledge	Time (Hrs)
69.	Run FFS activity on Specific disease of crop taken for the FFS (week -14)	AESA-7 Major diseases and its management Intercultural operation, Weed management, thinning Virus and vector management	1
70.	Run FFS activity Various insects monitoring appliances and their use (week -15)	AESA-8 Major insects and Monitoring (Light trap/Baiting/Pheromone trap/Attractants/Pit fall trap etc) Functional grouping of insect Agro ecosystem analysis AESA presentation Root and vessels test Field and stored grain pests management interrelationship	1
71.	Run FFS activity Soil borne disease and pest (week -16)	AESA -9 Soil disease and Insects and their management	1
72.	Run FFS activity Insects and disease of post harvest stages (week -17)	AESA -10 Postharvest insect pest and diseases and their management Agro ecosystem analysis Presentation of trials, cup, zoo and other minor studies Common insect pest of plants, general Physiological disorders of crops and symptoms and their management practice	1
73.	Run FFS activity (week -18)	BBT (Post Test) Test material preparation and Runion of test and comparison of the skill, knowledge gained.	1
74.	Run FFS activity (week 19)	Explain Post Harvest activity Trials and study related to post harvest operation Group strengthening and cooperatives development Harvest and post harvest (harvesting, threshing storage and transportation)	1
75.	Explain FFS activity (week -20)	Planning for field day Logistic arrangement Closing arrangement Field visit timing management	1
76.	Perform FFS activity (week -21)	Run Field Day	4
77.	Run FFS activity(week-22)	Explain IPM product Marketing Participatory monitoring and Evaluation	1
78.	Discuss FFS activity (week -23) FFS group Strengthening	Benefit Cost Analysis and its use in planning next year's crop system activities Review of the seasonal activities and Planning for next season	2

SN	Skill	Related technical knowledge	Time (Hrs)
79.	Discuss method of Evaluation of course	Explain course evaluation tools Ballot Box Test (Post BBT) Field method Testing field IPM skills	1
80.	Explain Post FFS activities	Institutionalization of the groups Group registration Entrepreneurial activities Standardization of IPM products Problems based trials and studies. IPM products marketing	2
81.	Practice First aid job	Methods of performing of simple cuts, wounds, burns, disorders, injuries, poisoning, Application of simple bandage and dressing (It is necessary for teach but it can apply when ever need)	2
82.	Carryout first aid of simple cases	Identification of tools equipment and materials Required list of tools equipment and materials	1
83.	Care/maintain tools/materials	Simple care and maintenance of tools equipment and materials	1
		Total	**156**

Apiculture, Sericulture and Mushroom cultivation

Total time: 78 Hrs
Theory: 16 Hrs
Practical: 62 Hrs

Desperation

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

Objectives

At the end of this course student will be able to

1. Identify bee species for keeping purpose
2. Identify equipment in use for bee keeping
3. Keep bee for income generation
4. Explain importance of honey for healthy life
5. Harvest honey
6. Explain value chain
7. Identify select suitable variety of mulberry for silkworm.
8. Explain life cycle of silk worm and mushroom
9. Cultivate mulberry
10. Rear mulberry
11. Harvest and market cocoon
12. Prepare compost for mushroom cultivation
13. Select edible species of mushroom
14. Cultivate, harvest and market mushroom

SN	Skill	Related Technical Knowledge	Time (Hrs)
1.	Identify Different species of honey bees found in Nepal	Classification of bees Characteristics of Bees General characters of each species	1
2.	Explain importance of bee keeping	Introduction of bee keeping. History of bee keeping. Objective of bee keeping. Nepal's present scenario. Social, Nutritional, Medical value of honey. Feasibility of bee keeping Bee keeping tradition of Nepal.	1
3.	Identify potential area for bee keeping in Nepal.	Appropriate climatic zone of Nepal for different honeybee species. Bee flora Bee keeping tradition.	1
4.	Identify common forage for honeybee.	Introduction of bee forage. Identification of major, minor medium source of nectar, pollen and honeydew for bees. Preparation of calendar for bee foraging. Different species of bee forage.	1
5.	Select site to place bee hive.	Site selection criteria for apiary	1
6.	Explain communication	Dancing	1

SN	Skill	Related Technical Knowledge	Time (Hrs)
	characteristics Of each species	Forging Defensive and other behavioral characteristics.	
7.	Differentiate Queen, Workers and Drones	Understanding the age and cast related function. Need of colony. Lifecycle of honeybees. Work division.	1
8.	Identify the parts of bee hive	Functions and specification of each parts pf bee hive. Traditional bee hives with fixed comb. Modern comb. Importance of bee space Different types of bee hives.	1
9.	Identify bee keeping equipment	List of equipment Function and specification of given tools and equipment. Bee veil, smoker, honey extractor etc.	1
10.	Transfer honey bee colony from fixed to movable comb hive.	Precaution during transfer	2
11.	Manage honey bee colony	Inspection of colony Precaution to bee sting and remedy measures. Seasonal management as per need and performance of honey bee colony.	2
12.	Unite weak colony	Characteristics of weak colony Weak swarm management	2
13.	Divide strong/ over populated colony	Weak swarm over populated colony Strong swarm management.	2
14.	Feed bee during dearth	Artificial feeding materials Amount of artificial feed.	1
15.	Prevent / control absconder robbing / worker laying	Causes of robbing absconding and worker lying. Prevention and control method.	2
16.	Rear Queen	Criteria colony selection for queen rearing Methods of Queen rearing Natural reproduction in colony. Criteria for selection of mother stock and builder colony	2
17.	Handle queen cell	Handling methods	1
18.	Graft Queen larva	Method of preparation of queen cups Fixing cups to cell bars.	1
19.	Explain common diseases of honeybee	Introduction, sign, symptoms, prevention, control and treatment of EFB, TSBV, Nosema disease.	2
20.	Prevent honeybee from mites / wax moth	Nature of damage caused by mites and wax moth Identification of mites and wax moth. Prevention, control and treatment	1
21.	Identify predators of honeybee	Identification nature of damage, application of prevention and control Wasps Hornets Pine	2

SN	Skill	Related Technical Knowledge	Time (Hrs)
		Marten Ants Bee eater birds Bear	
22.	Identify crops that need to honey bee for pollination	Definitions of pollination Importance of honey bee for pollination Pollination mechanism.	1
23.	Save bee from pesticide poisoning	IPM Safe use of pesticide Symptoms and sign of pesticide poisoning Method of pesticide application Harmful pesticide for honey bee.	1
24.	Migrate colonies	Reason for migration Precaution during migration Handling methods during migration	2
25.	Harvest honeybee products	Quality parameters of honey of different honeybee species. Use of honey Use of bee wax Parameters of safe storage of honeybee products. Precaution during storage for quality	2
26.	Prepare value added products	Uses of bees wax for cosmetic purpose, medicinal purpose, lighting purpose.	2
27.	Identify the requirement of trade of honeybee's products.	Labeling, packaging, quality, standard, regulation Trade chain Creating niche and strengthening chain	1
28.	Analysis cost benefit ratio	Calculation of investment and return from the business plan. Direct and indirect benefit from the business.	1
30	Define sericulture	Definition concept Scope Importance of sericulture in Nepal Different species of silkworms	**1**
31	Draw a design/plan for sericulture house	Designs of sericulture house Construction of sericulture house Suitable climatic conditions for cocoon production	**2**
32	Select mulberry varieties	Different varieties of mulberry for sericulture according to the local climate	**2**
33	Propagate mulberry Leaves	Production of mulberry plants form cuttings Cultivation of mulberry Cutting management of mulberry Planting and care for mulberry trees Controlling pests and diseases	**2**
34	Harvest mulberry	Stage of Harvesting Methods of harvesting Time of harvesting Storage Chopping methods	**2**

SN	Skill	Related Technical Knowledge	Time (Hrs)
35	Prepare equipment required for rearing larva rearing	Equipment required for rearing larva Preparation and handling of equipment	**2**
36	Collect eggs of silkworms from reliable source	Concept of eggs Suitable spp of silkworm Selection and separation of different categories of silkworm Eggs collection methods	**2**
37	Draw life cycle of silk worm	Life cycle of silk worm Stages of silk worm Stages of larva	**1**
38	Develop annual operational calendar	Calendar of operations for sericulture: Effect of temperature, relative humidity etc	**1**
39	Rear larva (CRC/Old age}	Feed and feeding of larva according to stage Pest & disease control Environmental control Care and management of larva (CRC/Old age} Handling larva	**2**
40	Harvest cocoons	Time for cocoon harvesting Harvesting of cocoons	**2**
41	Market cocoons	Prepare for market Storage and marketing of cocoons	**2**
42	Maintain records	Systems of records keeping Types of records Analysis of records	**1**
43	Calculate profit / loss	Cost calculation Returns / income calculation Profit / loss calculation	**1**
44	Explain Importance of mushroom cultivation	Introduction Importance and scope of mushroom farming in context of Nepal	**1**
45	Select common edible mushrooms species grown in Nepal	Characters of various kinds of mushroom Identification of edible and poisonous mushroom List commonly grown mushroom	**2**
46	Cultivate common mushroom	Common species Preparation media Preparation of spawn Sterilization and aseptic condition Spawn production and sterilization and its importance to reduce the contamination.	**8**
47	Harvest mushroom	Harvesting, grading and packaging Storage and marketing Cost benefit analysis	**1**
48	Prepare soup from mushroom	Nutritive value of mushroom Method of preparation	**1**
50	Analyze cost benefit ratio	Calculation of cost of production Calculation of labor cost Calculation of return after selling	**1**
		Total Hrs	**78**

Farm Machinery, Structure and Irrigation

Length: 78 hrs
Practical: 62 hrs
Theory: 16 hrs

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

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

1. Explain parts and function of hand machine used in farm
2. Perform primary and secondary tillage
3. Use plant protection equipment
4. Use threshing equipment
5. Regular maintenance of farm tools and machinery
6. Explain importance and methods of irrigation
7. Explain and use of different structure in agricultures

SN	Skill	Related Technical Knowledge	Time (hrs)
1	Explain problems for farm mechanization in Nepal	Introduction of farm mechanization Scope of farm mechanization Problems of farm mechanization Importance of farm mechanization	2
2	Explain tillage	Meaning and types of tillage Objective of tillage	1
3	Identify tillage equipment used for primary and secondary tillage	Identification and function of tillage equipment used for primary and secondary tillage List of tillage equipment and their functions	4
4	Repair / maintain tillage equipment	Animal driven tillage equipment Power driven tillage equipment Part of plough	4
5	Identify parts of mold bold/country plough	Parts of MB & country plough with function of each parts Assembling & dissembling of MB & local plough Methods of ploughing Advantages and disadvantages of MB and local plough	2
6	Identify secondary tillage equipment	Use & parts of Spade Use & parts of Rake, Use & parts of Planker Use & parts of Sickle, Use & parts of Hoe etc & their uses	2
7	Identify parts of tractor driven Plough	Parts & function of disc plough Parts & function of Spike tooth harrow Parts & function of Cultivator	4
8	Identify farm equipment	Identification, function & parts of Seed dressing	4

SN	Skill	Related Technical Knowledge	Time (hrs)
		Sowing, Harvesting, Combined harvester Thresher and its use and maintenance., Cleaning, Chaf cutting equipment	
9	Calibrate sprayers	Types of sprayer Use of knack sap sprayer Importance of knack sap sprayer Function of knack sap sprayer Parts of knack sap sprayer Handling method	4
10	Handle duster	Types of duster Use of duster Importance of duster Function of duster Parts of duster	2
11	Explain centrifuge system	Classification & working principle of centrifugal water pump Installation & starting of centrifugal pump	4
12	Fill fuel	Types of fuel used in machine Method of filling Precaution during filling	4
13	Fill lubricant	Types of lubricant used in machine Method of filling Precaution during filling	4
14	Calibrate an “A” frame	Function of A frame Use and importance of A frame Counter & tares making principle	4
15	Repair hand pump	Water lifting system Internal parts of hand pump Causes of trouble	4
16	Identify hand tools	Hand tools & there uses Tools for propagation & there uses Nursery tools & there uses Tools for training & pruning & there uses Dairy tools & there uses	6
17	Calibrate microscope	Use, parts and calibration of microscope	4
18	Identify different structure s use in Agriculture	Thatch house Plastic house/Plastic tunnel Greenhouse Hotbeds/poly pots	2
19	Explain irrigation and drainage	Definition of irrigation Definition of drainage Importance of irrigation and drainage	2
20	Demonstrate the method of irrigation	System of irrigation Surface, subsurface and aerial Methods of Irrigation	4
21	Prepare gravity flow irrigation channel	Definition of irrigation Definition gravity flow Water intake system of plant	8

SN	Skill	Related Technical Knowledge	Time (hrs)
		Role of moisture for plant growth Wilting point Requirement of moisture for crop, vegetable & flowers Preparation of drainage channel	
22	Demonstrate methods of drainage	Methods of drainage	2
23	Prepare drainage channel	Definition of drainage Importance of drainage channel Types of drainage channel Uses of drainage	1
		Total Hrs	**78**

Aquaculture (Fish Culture)

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

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

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

1. Describe the scope and importance of fish culture in Nepal
2. Explain different species of fish cultivated in Nepal
3. Design pond for fish culture
4. Transport, rear and stock fingerling with less chances of mortality
5. Breed fish by natural way as well as artificially
6. Control diseases and parasites of fish
7. Market fish and fingerlings

SN	Skill / Task List	Related Technical Knowledge	Time (Hr)
1	Define Aquaculture	Introduction to aquaculture Types of aquaculture	2
2	Classify fish species	Introduction of fish and fish culture Zoological classification of fish Differentiation between fish culture and aquaculture	2
3	Explain scope of fish farming in Nepal	History of fish farming in Nepal Scope of fish culture in Nepal Economic importance of fish	2
4	Explain method of fish culture	Pond fish culture, Cage culture, Riverine fish culture, Pen culture Running water vs stagnant water fish culture Fish farming zone of Nepal	3
5	Identify external body parts of fish	External body parts of fish with function of each parts	2
6	Identify common fish species found in Nepal	**Indigenous species** Indian major carps: Rohu, Bhakur, Naini Locally popular fish: Asala, Katle, Buduna, Jalkapur Weed/ predatory fish: Magur, Bhoti, Shinghi, Barari **Exotic species** Chinese carps: Big head carp, Silver carp, Grass carp Common carps: German carp, Israeli carp Rainbow trout fish	8
7	Select site for fish farming	Conditions required for fish farming Source of water/ water temperature Drainage facility, Soil type Accessibility of road, market, labour, fingerlings supply	2
8	Explain method of	Lay out plan	2

SN	Skill / Task List	Related Technical Knowledge	Time (Hr)
	construction of fish pond	Dike, Core trench, Spill way, Embankment, Inlet, Outlet, Area of pond, Carrying capacity	
9	Explain types of fish pond	Incubator/ hatchery Nursery pond, Rearing pond, Breeding pond	2
10	Maintain/repair fish pond	Different problems of fish pond Maintenance of dike height/slope Cleaning of fish pond, application of fertilizer/lime in pond	2
11	Maintain water quality of pond	pH, turbidity, water temperature, dissolved oxygen level, water level	1
12	Explain type of fish culture	Monoculture, Polyculture, Monosex culture Integrated fish culture: Paddy cum fish culture, Duck cum fish culture, Pig cum fish culture etc Stocking density in each type Advantage and disadvantage of each type	3
13	Explain fish breeding	General concept of fish breeding and fingerling production Conditions required for fish breeding Natural and artificial breeding	2
14	Select brood fish	Characteristics of brood fish Differentiation of male and female brood fish Age of breeding for different species of cultivated fish	1
15	Explain natural breeding of common carp	Monosex culture, selection of brood fish, water temperature, season of breeding, male and female ratio, Kakabon preparation, spawning, hatching, feeding of hatchlings	2
16	Explain artificial breeding of Indian major carps/Chinese carps	Selection of brood fish, age and weight of brood fish, male female ration, hypophysation, injection time/ dose of pituitary extract/ injection of ovaprim and dose rate, spawning, breeding hapa, incubator, water sprinklers, feeding of hatchlings	4
17	Transport fry/fingerlings	Ordering fingerlings; Sources of fingerlings Method transportation of fingerlings Stocking density and method of stocking Precaution to be taken during transport and stocking time	2
18	Rear fry/ fingerlings	Management of nursery pond; Feeding of fry and fingerlings Protection from enemies; Symptom of dissolve O_2 deficiency Assessment of growth rate	2
19	Rear fish for table purpose	Management of rearing pond Feeding of artificial feeds for fast growth Natural food for fish,, Protection from enemies Symptom of dissolve O_2 deficiency Assessment of growth rate	2
20	Rear brood fish	Management of breeding pond	2

SN	Skill / Task List	Related Technical Knowledge	Time (Hr)
		Transportation of brood fish Protection from enemies Symptom of dissolve O_2 deficiency Assessment of growth rate and symptoms of maturity	
21	Explain concept of rearing Magur fish	General concept, sources of fingerling, rearing, stocking density, growth rate, feeding habit and marketing	2
22	Explain concept of rearing Rainbow trout fish	General concept, sources of fingerling, rearing technique, requirement of running water, water quality, water temperature, stocking density, growth rate, feeding habit and marketing	2
23	Explain concept of rearing fish in aquarium	General concept, purpose, type of fishes kept in aquarium, sources of fingerling, feeding habit and marketing	2
24	Identify natural feed in pond	Feeding habits of different fishes Phytoplankton and zooplankton Importance of fertilizer in fish pond	2
25	Prepare feed for fish from locally available ingredients	Natural and artificial food Feeding requirement for different stages and types of fish Mixing of different ingredients for fish ration Feeding time, Feeding behavior	4
26	Explain different weed fishes	Weed fishes: Puntius sps., Channa sps, Control of Weed fishes	2
27	Explain predatory fishes/ enemies	List of predatory fishes: *Wallago attu, Clarius batrachus, Heteropneutis fosillis, Anguila bengalensis* Fish enemies: Snake, Frog, Crocodile, Otter Control of predatory fishes and enemies	2
28	Control common fish diseases parasites	Common fish diseases: Icthiothyriosis, White spot disease, Fin rot, Gill rot, Argulosis, Gyrodatylus, Datylogyrus Sign and symptoms, control and treatment.	6
29	Harvest fish	Stage of harvesting, Methods of harvesting Using Nets: Drag net, Scoop net, Maji Jal Care and maintenance fish nets Fishing hook, Harvesting by removal of water Harvesting by poisoning Anomalies in fishing Poisoning, Explosion Electric current	2
30	Market fish	Time of harvesting fish Marketing channel and fish market, Pricing Costumer behavior and marketing policy	1
31	Keep records	Record keeping (feed, production, costs, sales, health) Analyzing record for management purposes	3
32	Develop and annual calendar for fish farming	Elements of a fish farming calendar	2
		Total	**78**

On the Job Training (OJT)

Full Marks: **500** **Practical: 24 weeks/960Hrs**

Description:
On the Job Training (OJT) is a 6 months (24 weeks/144 working days) program that aims to provide trainees an opportunity for meaningful career related experiences by working fulltime in real organizational settings where they can practice and expand their classroom based knowledge and skills before graduating. It will also help trainees gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks. The trainee will be eligible for OJT only after attending the final exam. The institute will make arrangement for OJT. The institute will inform the CTEVT at least one month prior to the OJT placement date along with plan, schedule, the name of the students and their corresponding OJT site.

Objectives:
The overall objective of the On the Job Training (OJT) is to make trainees familiar with firsthand experience of the real work of world as well as to provide them an opportunity to enhance skills. The specific objectives of On the Job Training (OJT)are to;

- apply knowledge and skills learnt in the classroom to actual work settings or conditions and develop practical experience before graduation
- familiarize with working environment in which the work is done
- work effectively with professional colleagues and share experiences of their activities and functions
- strengthen portfolio or resume with practical experience and projects
- develop professional/work culture
- broaden professional contacts and network
- develop entrepreneurship skills on related occupation

Activity:
In this program the trainees will be placed in the real work of world under the direct supervision of related organization's supervisors. The trainees will perform occupation related daily routine work as per the rules and regulations of the organization. In addition to the above, trainees must actively participated at least one agriculture exhibition/ result demonstration/ method demonstration/ minikit demonstration/ IPM-FFS/ IPNS-FFS/ plant clinic/ mobile soil campaign within the OJT period.

Potential OJT Placement site:
The nature of work in OJT is practical and potential areas of OJT placement site should be as follows;

- District Agriculture Development Offices
- Agricultural Development Projects
- Research Farm/ Stations
- NGOs and INGOs related to agriculture services
- Government Agriculture Development Farms- Laboratories
- Horticulture farms (flower, fruit, vegetable, seeds, etc)
- Bee Farms, Fish Farms, Sericulture Farms
- Processing Industries
- Market Enterprises
- Related academic institutes
- Cooperatives related to agriculture services

Requirements for Successful Completion of On the Job Training:

For the successful completion of the OJT, the trainees should;

- submit daily attendance record approved by the concerned supervisor and minimum 144 working days attendance is required
- maintain daily diary with detail activities performed in OJT and submit it with supervisor's signature
- prepare and submit comprehensive final OJT completion report with attendance record and diary
- secured minimum 60% marks in each evaluation

Complete OJT Plan:

SN	Activities	Duration	Remarks
1	Orientation	2 days	Before OJT placement
2	Communicate to the OJT site	1 day	Before OJT placement
3	Actual work at the OJT site	24 weeks/144 days	During OJT period
4	First-term evaluation	one week (for all sites)	After 6 to 7 weeks of OJT start date
5	Mid-term evaluation	one week (for all sites)	After 15 to 16 weeks of OJT start date
6	Report to the parental organization	1 day	After OJT placement
7	Final report preparation	5 days	After OJT completion

- First and mid-term evaluation should be conducted by the institute.
- After completion of 6 months OJT period, trainees will be provided with one week period to review all the works and prepare a comprehensive final report.
- Evaluation will be made according to the marks at the following evaluation scheme but first and mid-term evaluation record will also be considered.

Evaluation Scheme:

Evaluation and marks distribution are as follows:

S.N	Activities	Who/Responsibility	Marks
1	OJT Evaluation (should be three evaluation in six months –one evaluation in every two months)	Supervisor of OJT provider	300
2	First and mid- term evaluation	The Training Institute	200
	Total		500

Note:

- Trainees must secure 60 percent marks in each evaluation to pass the course.
- If OJT placement is done in more than one institution, separate evaluation is required from all institutions.

OJT Evaluation Criteria and Marks Distribution:

- OJT implementation guideline will be prepared by the CTEVT. The detail OJT evaluation criteria and marks distribution will be incorporated in the guidelines.
- Representative of CTEVT, Regional offices and CTEVT constituted technical schools will conduct the monitoring & evaluation of OJT at any time during the OJT period.