# Royal Government of Bhutan
# Ministry of Agriculture & Forests

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# Rural Development Training, Centre, Zhemgang

## Ministry of Agriculture & Forest

## Royal Government of Bhutan

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## Certificate in Horticulture

PROGRAMME DOCUMENT

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**Developed and elaborated by:**

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## Table of Contents

**PROGRAMME: CERTIFICATE IN HORTICULTURE**

**1. Basic Information on the Programme**

Name of the Institute : Rural Development Training Centre (RDTC)
Name and Award of the Programme : Certificate in Horticulture
Duration and Mode of Study : 6 months Full time
Location : Zhemgang
Accrediting body **:** MoLHR

**2. Aims and Objectives of the Programme**

**2.1 Purpose of programme:**

The main purpose of the programme is to offer training in horticulture to prospective youth interested to take up horticulture based enterprise as a self employment and income earning option. After going through the training programme, the graduates would be equipped with the knowledge and skills required to operate their own farm enterprise.

**2.2 Specific objectives:**

The specific objectives of the programme include the following:

1. Demonstrate horticultural crop production practices.
2. Demonstrate land preparation and soil improvement practices.
3. Select quality seeds through proper seed testing methods.
4. Demonstrate crop nursery preparation and management.
5. Determine irrigation and water requirement for different crops.
6. Identify major crop pests and diseases and recommend appropriate control measures.
7. Demonstrate post harvest practices of fruits and vegetables
8. Operate and maintain farm business.

**3. Curricular Structure**

The certificate program offers both interdisciplinary and intra-disciplinary modules over a period of 6 months. Each module with credit is logically sequenced by month. The modules have been developed by horticulturist, RNRRDC, Bajo; Lecturer, CNR, Management & Instructors, RDTC

**Curriculum Map**

| Module | Code | Credit |
|---|---|---|
| Plant botany/physiology | PB 101 | 06 |
| Vegetable production | HORT 101 | 12 |
| Fruit production | HORT 102 | 12 |
| Ornamental Horticulture | HORT 103 | 06 |
| Basic computer skills | BCS 101 | 06 |
| Farm economics | FE 101 | 12 |
| Plant protection | PP 101 | 06 |
| Soil fertility management | SFM 101 | 06 |
| Institutional attachment | IA 101 | 12 |
| Total | | 78 |

**4. Regulations**

**4.1 Entrance requirements:**

The basic admission requirement from the pre-school is Class XII passed candidates preferably with science background and having being part of member of school agriculture club during school days. The applicant should also present provisional farm business plan during selection.

**5. Learning, teaching and Assessment**

The program is very much learner-centered with classroom lectures which includes direct contact hours with instructors through lecture, group works, presentation, demonstration etc that takes place inside classroom;

Practical includes both contact and non-contact hours specified for practical exercise, farm work, field visits/excursions/, attachments etc that takes away from the classroom; Assignments includes non-contact hours for group discussion, reading and information seeking to prepare written report for submission to be assessed and marked. Self study includes reading lecture notes, referencing from library, preparing for examination, group discussion for clarification without instructor direct supervision.

**5.1 Assessment approach:**

Continuous assessment on Assignment, Practical, mid-term Exams and Final Examination based on Written Exam/viva will be carried out. The assessment approach is divided in two categories. The first category includes the continuous or ongoing assessment of about 60%, i.e. class tests, assignments/presentation, practical and reports.
The second category includes the semester final examination of about 40%, i.e.written exam and viva-voce (oral).

**6. Justification for initiating program:**

Youth un-employment is a major concern of the Royal Government. It is therefore proposed that youth unemployment be reduced from 7.3 % (2012) to 5 % by the end of the 11$^{th}$ plan period. To reduce this to the proposed target, government will have to create additional employment opportunities through innovation to drive diversified economic growth. Agriculture in Bhutan as an economic sector provides huge opportunity for employment both for self employment as well as employment in agro-industry led by FDI investment.
During 11th plan RNR sector aims to accelerate growth to 4% through agriculture commercialization /diversification, private sector participation & value addition on export which provides huge scope for employment in farming sector as well as pursue self employment. However one of the key challenge of the youth today in pursuing farming is lack of key skills required by the market. Intensive and coordinated skill development on farming at present is lacking. Ministry of Agriculture and Forest therefore envisages dedicated and intensive skill development of youth as one of the priority. These young people with the appropriate skills and knowledge are well positioned to avail careers in farming business.

**7. Program Management**

RDTC is offering short farm business courses on vegetable, fruits, mushroom, poultry, piggery & dairy besides management courses for farmers group. Within the existing structure, Director II is the overall head responsible for the management and day to day functioning of the centre. The Instructors are responsible for the smooth running of the program by preparing lessons, delivery, assessment and guiding trainees. The instructors are responsible for making necessary updates of the course contents. Periodic feedbacks are collected from our trainees and stakeholders on the relevancy of the courses taught and its applications in the field.

**8. Academic Staff**

The following staffs are involved in the certificate course. There are 4 staffs in the Agriculture sector including a farm economist. Besides, some of the session will also be taken by Director II.
Agriculture staff including farm economics

- Karma Wangchuk
- Dorji Tshering
- Pema Gyeltshen
- Menuka Rai

**9. Resources and facilities**

The centre has large farm area for carrying out farm practical. The centre also has a small library and computer facility. The centre proposes to upgrade these facilities once the course is regularized and also plans to start up a small disease & pest laboratory latter. Mess and accommodation facility will be shared with short term training program in the hostel facility.

Nevertheless, some additional arrangements and support is required in the existing set up to qualify in terms of quality standards and effectiveness of the program. There will be a requirement of additional staff for plant botany/physiology, business administration and IT which would be taken initially on contract basis.

# Module Descriptors

**Module Title : Plant Physiology**
**Module Code : PPL101**
**Credit Value : 06**
**Instructor : Contract Instructor**

**General Objectives of the Module**

The principal aim of this course is to introduce the students to the importance of photosynthesis, gas exchange, water, and environment responses. Understanding of plant cell structure and function.

**Learning outcomes**

At the end of the module delivery, students will be able learn about:

- Plant structure
- Major plant tissue systems
- Chloroplasts & chromoplasts
- Water transport and transpiration
- Photosynthesis, C4 vs C2 plants
- Plant hormones

**Teaching and Learning Approach**

| | |
|---|---|
| Lecture | : 40 hours |
| Assignment | : 10 hours |
| Self study | : 10 hours |
| **Total hours** | **: 60 hours** |

**Assessment**

| | | |
|---|---|---|
| **a)** | **Continuous assessment** | **: (60%)** |
| | Assignment | : 40% |
| | Exams | : 20% |
| **b)** | **Final Examination** | **: (40%)** |
| | c) Written Exam/viva | : 40% |

**Subject matter:**

| Unit | Content | Credit hours |
|---|---|---|
| Plant structure | Plant cell structure and function<br>• Leaf<br>• Stem<br>• Root | **20** |
| Photosynthesis | Light absorption and emission by chlorophyll<br>• Photosynthesis<br>• CO2 fixation<br>• C2, C3, and C4 plants<br>• Starch and sucrose synthesis | **20** |
| Growth and Development | Plant growth hormones and functions<br>• Auxins, Gibberellins, Cytokinins, Ethylene, Abscisic Acid | **20** |
| | | **60** |

**Reading list:**

**Essential reading**


1. Taiz L & Zeiger E (2002) Plant Physiology. 3rd Edition. Sinauer.
2. Hopkins WG (1998 or 2004 ed). Introduction to Plant Physiology. 2nd or 3rd Ed. Wiley


**Date developed: 24/12/2013**

**Module Title : Soil Nutrient Management**
**Module Code : SNM101**
**Credit Value : 06**
**Instructor : Dorji Tshering/Karma Sonam**

**General Objectives of the Module**

This module aims at providing basic knowledge and skills on soil nutrient management.

**Learning outcomes**

At the end of the module delivery, students will be able to:

- Describe the importance of soil and role in plant nutrition.
- Explain the role of major and minor nutrients in plant growth.
- Carryout various methods of soil improvement.
- Describe the basic concepts and importance of organic farming.
- Prepare FYM/compost/ green manuring and its application.
- Explain the procedures involved in making vermi-compost.
- Describe the nature of different fertilizers, its management and application.
- Calculate the fertilizers dose for a given crop and area.

**Teaching and Learning Approach**

| | |
|---|---|
| Lecture | : 20 hours |
| Practical | : 25 hours |
| Assignment | : 10 hours |
| Self study | : 05 hours |
| **Total hours** | **: 60 hours** |

**Assessment**

| | | |
|---|---|---|
| **d)** | **Continuous assessment** | **: (60%)** |
| | Assignment | : 20% |
| | Practical | : 25% |
| | Exams | : 15% |
| **e)** | **Final Examination** | **: (40%)** |
| | f) Written Exam/viva | : 40% |

**Subject matter:**

| Unit | Content | Credit hours |
|---|---|---|
| Introduction | • Soil and its importance<br>• Plant nutrients-functions and deficiency symptoms of key elements | **2** |
| Manures | • Role of organic matter in soil improvement, liming, crop rotation , FYM (materials, methods of preparation and applications) | **10** |
| | • Compost (materials, methods of preparation and applications) | **10** |
| | • Green manuring | **6** |
| | • Bio-fertilizers its importance | **4** |
| | • Vermi-composting: theory and practice | **6** |
| | • Concepts and importance of organic farming | **2** |
| Fertilizers | • Fertilizers: advantages/disadvantages, types<br>• Properties of commercial fertilizers, nutrient content, functions, compatibility etc.<br>• Principles of fertilizer use, selection, time, method of applications, preparations of fertilizer mixture<br>• Calculation of required doses | **20** |
| | | **60** |

**Reading list:**

**Essential reading**


3. Dr. Tandon, Fertilizer Guide FDCO, New Delhi
4. Gupta P.K, Hand Book of soil, fertilizer and manure by., Agro-botanica, Revised edition 2000
5. Samuel L. Tisdale, Soil fertility and fertilizer (fifth edition) IBDC, New Delhi
6. Handbook of Agriculture, Revised 1997, ICAR, New Delhi.


**Web resources (if any)**

**http://www.ncagr.gov/cyber/kidswrld/plant/nutrient.htm**

**Date developed: 24/12/2013**

**Module Title** **: Farm Economics**
**Module Code** **: ECN 201**
**Credit Value** **: 12**
**Instructor** **: Menuka Rai**

**General Objectives of the Module:**

This module is designed to provide relevant knowledge on the basics of farm economics, agricultural marketing and farming systems (managerial aspect of farm production). It also aims to teach a pragmatic approach in the application of economic analysis of farm enterprises for improving the farming systems.

**Learning Outcomes:**

At the end of the module delivery, students will be able to:

- Apply the economic principles to farm management practices.
- Analyze farm management and marketing practices and assist the farmers.
- Advice on the use of land, labour and capital resources by the rural community for increasing the efficiency of the limited resources in producing high quality products.
- Analyze and assess farming systems and accordingly advice, plan, design and implement or propose acceptable changes to the existing farming system.
- Provide feedback to the planners.

**Teaching and Learning Approach:**

| | |
|---|---|
| Lecture | : 60 hours |
| Assignments | : 20 hours |
| Practical | : 20 hours |
| Self Study | : 20 hours |

**Assessment:**

| | |
|---|---|
| **a) Continuous Assessment** | **: (60%)** |
| Assignments | : (30%) |
| Tests | : (30%) |
| **b) Final Examination** | **: (40%)** |
| Written Exam | : 40% |

**Subject matter:**

| Unit | Contents | Credit hours |
|---|---|---|
| **Basic economic concepts** | • Basic economic concepts and principles relevant to farm management<br>• Typical management decisions on a farm<br>• Production economics and farm management<br>• Farm management and basic production relationships<br>• Production function<br>• Resource demand function<br>• Law of diminishing returns<br>• Principle of equi-marginal returns; opportunity cost<br>• Principle of variable and fixed costs<br>• Cost functions of a farm | 26 |
| **Factors of production** | • Types of factors of production<br>• Nature and characteristics of factors of production<br>• Efficiency in the use of factors of production<br>• Types of efficiency (economic, technical, etc.)<br>• Ways to increase efficiency<br>• Risks and uncertainties in production | 6.5 |

| | | |
|---|---|---|
| **Tools of farm management analysis** | • Farm Records<br>• Inventory, valuation and depreciation schedule<br>• Physical Records (land, labour, assets, stocks, etc.)<br>• Financial Records (Balance sheet, Income statement and Cash flow statement)<br>• Method for calculating depreciation<br>• Analysis of farm records | 6 |
| **Farm budgeting and analysis** | • Types of farm budgets<br>• Gross margin analysis<br>• Enterprise budgets<br>• Partial budgets<br>• Cash-flow budget<br>• Total or complete budgets | 19.5 |
| **Farm Credit** | • Types of credit source (Institutional and non institutional)<br>• Types of credits and steps to acquire<br>• Advantages &disadvantages of different sources | 2 |

**Essential Reading**


1. Kamara, D. (1989). An Introduction to Agricultural Economics. A Reference Manual for Extension Agents Pre-Service training In Bhutan. Ministry of Agriculture, Thimphu.
2. Ministry of Agriculture (2001). Economic Analysis of Farm Enterprises and Technologies. A Training Module.
3. Johl, S.S. & Kapur, T.R. (2005). Fundamentals of Farm Business Management.


**Web Resources**

http://www.fao.org/docrep/v5330e/V5330e01.htm

**Date developed:** 24th Dec 2013

**Module Title : Vegetable Production**
**Module Code : HORT101**
**Credit Value : 12**
**Instructor : Pema Gyeltshen**

**General Objectives of the Module**

This module aims to provide adequate knowledge and skills on production practices of vegetables. The module emphasizes on growing conditions, cultural techniques, harvest and post harvest operations of these crops.

**Learning Outcomes**

At the end of the module delivery, students will be able to:

- Explain the optimal soil and climatic conditions for the production of a chosen vegetable.
- Explain advantages of greenhouse production of vegetables.
- Describe general cultural practices required for vegetable production.
- Carry out the management of potential problems such as pests, diseases, weeds, and environmental and physiological disorders in vegetable production.

**Teaching Learning Approach**

| | |
|---|---|
| Lecture | : 40 hours |
| Practical | : 35 hours |
| Assignment | : 30 hours |
| Self study | : 15 hours |

**Assessment**

| | |
|---|---|
| **a) Continuous assessment** | **:** (60%) |
| Assignment | : 20% |
| Practical | : 20% |
| Exam | : 20% |
| **b) Final Examination** | **:** (40%) |
| Written Exam | : 40% |

**Subject Matters**

| Unit | Contents | Credit hours |
|---|---|---|
| **Introduction** | • Importance of vegetables<br>• Overview of vegetable production and consumption in Bhutan and in neighboring countries<br>• Import, export and the scope of commercial vegetable production.<br>• Classification of vegetables( family, season, edible parts) | 3 |
| Production systems | Production systems<br>• Protected<br>• Open field<br>Advantages, advantages,<br>Types of protected structures<br>Thatch, Poly tunnel, Low cost green house, automated green houses, hydroponic systems | 6 |

| | | |
|---|---|---|
| Basic production practices of vegetable crops | • Solanaceous (Chilli, Tomato, Brinjal)<br>• Leguminous (Beans)<br>• Cucurbits (Cucumber, Melons)<br>• Allium (Onion, Garlic)<br>• Asparagus | 30 |
| | • Cole crops (Cabbage, Caulifower, Broccoli)<br>• Root crops ( Radish, Carrot)<br>• Leafy vegetables( Mustard green, Spinach,)<br>• Salad crops ( Lettuce)<br>• Legumes ( Pea) | 35 |
| **Post Harvest** | • Postharvest handling practices (harvesting, grading, packaging, transporting, marketing**)** | 5 |
| | | 120 |

**Reading List**

**Essential Reading**


1. MoA. (1998). Research Recommendations for Vegetable Cultivation. RNR RC Bajo, Wangdue. Royal Government of Bhutan.
2. Handbook of Agriculture, Revised 1997, ICAR, New Delhi.
3. Pandey, P.H. (1997). Post Harvest Technology of Fruits and Vegetables. Allahabad. India.


**Web Resources**

1. www.avrdc.org

**Date developed**: 24/12/2013

**Module Title** **: Fruit production**
Module Code : HORT102
Credit Value : 12
Instructor : Karma Wangchuk

**General Objectives of the Module**

This module aims to provide adequate knowledge and skills on production practices subtropical and tropical fruit crops. The module emphasizes on growing conditions, cultural techniques, and harvest and post harvest operations of these crops.

**Learning Outcomes**

At the end of the module delivery, students will be able to:

- Select appropriate fruit cultivars for different locations.
- Explain the management of potential problems such as pests, diseases, weeds, and environmental and physiological disorders in fruit production.
- Determine harvesting and post-harvest operations of different fruits.
- Develop a calendar for cultural management of a fruit plantation or orchard.
- Carry out the establishment and appropriate management practices of pruning and training for a given crop.
- Describe the correct time and methods of harvesting and post harvest operations.

**Teaching learning approach**

| | |
|---|---|
| Lecture | : 40 hours |
| Practical | : 30 hours |
| Assignment | : 35 hours |
| Self study | : 15 hours |

**Assessment**

| | |
|---|---|
| **a) Continuous assessment** | **:** (60%) |
| Assignment | : 20% |
| Practical | : 20% |
| Exam | : 20% |
| **b) Final Examination** | **: (40%)** |
| Written Exam | : 40% |

**Subject Matter**

| Unit | Contents | Credit hours |
|---|---|---|
| **Introduction** | **Introduction to fruit crops**<br>• Importance of fruit crops.<br>• Overview of fruit crop industry as a whole and subtropical and tropical fruit crops in particular and its contribution to socio-economy in world and in Bhutan.<br>• Import and export of fruits in Bhutan | 3 |
| Basic production practices of selected fruit crops: | • Citrus | 15 |
| | • Avocado | 15 |

| | | |
|---|---|---|
| • **Plant propagation and nursery management**<br>• **Environmental requirement**<br>• **Orchard layout**<br>• **Planting**<br>• **Cultural practices**<br>• **Plant protection**<br>• **Harvest and postharvest operation** | • Banana | 10 |
| | • Mango | 12 |
| | • Peach | 12 |
| | • Pear | 12 |
| | • Apricot | 10 |
| | • Strawberry | 15 |
| | • Walnut | 15 |
| | | 120 |

**Reading List**

**Essential reading**


1. Bal, J.S. (1997). Fruit Growing. ICAR. Kalyani Publishers, New Delhi.
2. Pandey, P.H. (1997). Post Harvest Technology of Fruits and Vegetables. Allahabad. India.
3. Sharma, N. & M. A. Mashkoor, (1998). Post Harvest Diseases of Horticulture Perishable. Charbagh. Lucknow. IBDC.


**Date developed**: 24/12/2013

**Module Title** : **Landscaping and Ornamental Horticulture**
**Module code** : **HOR 103**
**Credit value** : **06**
**Teacher** : **Outside resource person**

**General Objectives of Module**:
The overall aim of this module is to introduce students to the fundamentals of nursery production, floriculture and landscape design and management. It provides competencies in plant physiology, design and planning, production management and post harvest technology and marketing as they relate to the floriculture, land-scaping and nursery industries. The students will achieve these competencies through theoretical course work, practical applications including hands on training and assignments. This module is important because nursery production floriculture and landscaping will become progressively more important for horticulture diversification and production due to increased urbanisation.

**Learning Outcomes:**

At the end of the module, students will be able to**:**

- Demonstrate a knowledge on the principles and practices of nursery production
- Display competency on the principles and practices of floriculture production and marketing; cut flower and containerized production, floral and shop designs
- Combine the principles of landscape design, planning and management; landscape benefits, types, features, design and landscape management including turf/lawn culture and arboriculture with practical application
- Construct a creative landscape using the principles of planning and landscape design

**Teaching Learning approaches**

| | |
|---|---|
| Lecture | : 20 hours |
| Practical | : 20 hours |
| Assignments | : 10 hours |
| Self study | : 10 hours |

**Assessment:**

| | | |
|---|---|---|
| **a)** | **Continuous assessment** | **: (60)** |
| | Assignment | : 20 |
| | Practical | : 20 |
| | Exam | : 20 |
| **b)** | **Final Examination** | **: (40)** |
| | Written Exam | : 40 |

**Subject Matter**

| Unit | Contents | Credit Hours |
|---|---|---|
| Introduction to Ornamental Horticulture | • General introduction to ornamental horticulture.<br>• Classification of ornamental plants.<br>• Nutrient management.<br>• Water management<br>• Pests and disease management. | 10 |

| | | |
|---|---|---|
| | • Principles of controlled environment.<br>• Physiology of ornamental plants. | |
| Nursery Production | • Principles of propagation<br>• Growing media<br>• Containerized growing<br>• Growth management<br>• Nursery handling and transportation | 20 |
| Floriculture | • Physiology of floriculture<br>• Production systems<br>• Flower production technology<br>• Harvesting and post-harvest handling | 20 |
| Landscape Design and Management | • Principles and benefits of landscapes<br>• Landscape types<br>• Landscape features<br>• Landscape planning<br>• Turf/lawn culture<br>• Arboriculture | 10 |

**Essential Reading:**


1. Webster A.D., (1996). Ornamental Flowering trees and shrubs in India. Daya Publishing House. New Delhi.
2. Marion Mackey, (1997). Landscape Management: Supplementary Readings No.5. Massey University, Palmerston North.
3. Prasad S, Kumar U. (1999). Greenhouse management for horticultural crops. Agrobios, New Delhi.
4. Vishnu Swarup, (1997). Ornamental Horticulture. Macmillan, New Delhi.


**Updated on:** Dec 2013

**Module Title : Plant Protection**
**Module Code : PP 101**
**Credit Value : 06**
**Instructor : Karma Wangchuk/Pema Gyeltshen/Dorji Tshering**

**General Objectives of the Module:**

The module aims to provide students with the knowledge and skills to identify pests, diagnose plant diseases and manage them to reduce crop loss.

**Learning Outcomes:**

At the end of the module delivery, students will be able to:

- Explain the concept of pest and pest outbreak
- Explain the general principles of integrated pest and disease management.
- Demonstrate a systemic approach to identify pests for economically important crops grown in Bhutan.
- Demonstrate field and laboratory diagnostic procedures to identify the cause of plant diseases.
- Explain how crop damage is caused by important pests and diseases and suggest specific management recommendations.
- Identify the common storage grain pests and explain their control measures.
- Explain rodent behavior, damage and management.
- Recognize the symptoms of nematode infestations in the crop and recommend necessary control measures.

**Teaching Learning Approach:**

| | |
|---|---|
| Lecture | : 50 hours |
| Practical | : 25 hours |
| Assignments | : 15 hours |
| Self study | : 15 hours |
| **Total hours** | **: 120 hours** |

**Assessment:**

| | |
|---|---|
| **a) Continuous assessment** | **: (60%)** |
| Written | : 40% |
| Assignment | : 10% |
| Practical | : 10% |
| **b) Final Examination** | **: (40%)** |
| Written Exam | : 30% |
| Project | : 10% |

**Subject Matters:**

| Unit | Contents | Credit hours |
|---|---|---|
| **Concept of pest** | • The concept of pest and pest outbreak<br>• Integrated Pest and Disease Management | **5** |
| **Identification and Diagnosis** | • Identification of pests<br>• Plant disease diagnosis<br>- Field Diagnosis of plant disease | **14** |
| **Pest** | • Pest biology, lifecycle, damage, and management:<br>- cereal & other field crops pests<br>- vegetable crops pests<br>- fruit crops pests | **16** |
| **Disease** | • Disease symptoms, damage, and management:<br>- cereal & other field crops diseases<br>- vegetable crops diseases<br>- fruit crops diseases | **10** |
| **Storage & non insect pests** | • Biology of storage insect pests<br>• Storage insect pest management<br>• Rodent pest management<br>• Nematode management | **8** |
| **Agro-chemicals** | • Application of chemicals for pest control<br>- Spray calibration, calculation of dosages,<br>- spray preparation and application of pesticides | **7** |

**Reading List:**

**Essential Reading**

1. Parmar, B.S. & Tomar, S.S. (2004). Pesticide formulation: theory and practice. CBS Publishers and Distributors. New Delhi.
2. Handbook of Agriculture, Revised 1997, ICAR, New Delhi.

**Date developed**: 24th Dec, 2013

**Module Title** : Field Attachment
**Module Code** : FA101
**Credit Value** : 12
**Subject Teacher** : Karma Wangchuk/Dorji Tshering

**General Objectives of the Modules**

This module aims to acquaint students to adapted and emerging technologies in research centre. This attachment will provide practical experience on the technologies and crops not covered in the training centre.

**Learning Outcomes**

At the end of the attachment, students will be able to:

- Explain the vegetable and fruit production technologies available in the centre.
- Describe different seed production technologies available in the centre.
- Demonstrate soil fertility management activities.
- Identify disease and pest problems and their management
- Explain various outreach programs undertaken by the research station to promote commercial farming and to reach new technology to farmer's field.

**Learning and Teaching Approach**

Students are attached to one RNR-RDC under one supervisor.

**Assessment**

| | |
|---|---|
| **a) Continuous Assessment** | **100%** |
| Confidential Report by Field Supervisor | 30% |
| Oral Presentation of Attachment | 20% |
| Final Report of Attachment | 50% |

**Subject Matters:**

| Unit | Contents | Credit hours |
|---|---|---|
| Vegetable production research & development activity | Research trials<br>• On- station/ on- farm trails<br>• Vegetable outreach programs<br>• Vegetable seed production | **20** |
| Fruit production research & development activity | • On- station/ on- farm trails<br>• Vegetable outreach programs<br>• On-station demonstration farms<br>• Fruit nursery and mother block maintenance | **20** |
| Soil fertility management activity | • Composting<br>• Manure/green manures<br>• Fertilizer application | **20** |
| Plant protection activity | • Identify pest and disease problems and apply measures<br>• Use of chemical and bio-pesticides | |
| Planning, Monitoring & Evaluation | • Planning, Monitoring & Evaluation of own attachment activities<br>- Establish a work plan framework for attachment in the beginning<br>- Work out daily detailed plan activities | |

**Module Title** **:** Basic computer skills
**Module code** **:** BCS 101
**Credit value** **:** 06
**Teacher** **:** Dechen Dema/ Tshering Dema/ Karma Sonam

**General Objectives of Module**:

The overall aim of this module is to introduce students to the basic computer skills like word processing, spreadsheet application and power point presentation.

**Learning Outcomes:**

At the end of the module, students will be able to**:**

- Demonstrate a knowledge on the word processing
- Display competency on excel based application
- Demonstrate use of power point presentation

**Teaching Learning approaches**

| | |
|---|---|
| Lecture | : 20 hours |
| Practical | : 20 hours |
| Assignments | : 10 hours |
| Self study | : 10 hours |

**Assessment:**

| | | |
|---|---|---|
| **c)** | **Continuous assessment** | **: (60)** |
| | Assignment | : 20 |
| | Practical | : 20 |
| | Exam | : 20 |
| **d)** | **Final Examination** | **: (40)** |
| | Written Exam | : 40 |

**Subject Matter**

| Unit | Contents | Credit Hours |
|---|---|---|
| Word processing | • A Very Basic Microsoft Word Tutorial: Instructions on how to perform a variety of tasks on Word, including starting the program, entering text, deleting and inserting characters, saving files, borders, clip art, tables, document templates, screen shots, hyperlinks and other features.<br>• Word 2007 Tutorial: Tutorials on using Word documents, customizing and editing documents, working with graphics and page formatting tips. | 20 |
| Excel function | • Basic Tutorial on Excel: Learn basic information on Excel and spreadsheets and how to use specific formulas and formatting.<br>• Excel Tutorial: on creating simple workbooks, using formulas , operators and functions, formatting the appearance of a workbook, linking documents and creating charts. | 20 |
| Power point | • Tutorials: Instructions on how to perform various PowerPoint functions, including creating and setting up presentations.<br>• PowerPoint Tutorial – Importing Files: Instructions on how to import and link data from Excel into a PowerPoint.<br>• How to get started in PowerPoint, create slides, graphics and graphs; insert images, clipart and movies, and build transitions and onscreen shows.<br>• Use of template | 20 |

**Web based tutorials:**

- **www.exceltutorials.info**
- www.freeoffice**tutorials**.com/

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