

## Course Contents for Second Year First Semester

### **AGR 21012 VEGETABLE PRODUCTION TECHNOLOGY (2:20/20)**

#### **Objectives**

To impart knowledge and practical skills on classification of vegetable crops, climate requirements for vegetable crops, agronomic practices adopted for vegetable crops, role of technology in vegetable production and harvesting and post harvest handling of vegetable crops.

#### **Learning Outcomes**

- Identify and classify major vegetable crops
- Describe the climatic requirement for different vegetable crops
- Discuss growth and development patterns of vegetable crops
- Develop management plans for soil fertility, irrigation, and pest control and other agronomic practices for vegetable crops
- Explore the best conditions for post-harvest handling of vegetables
- Critically analyze data of vegetable industries at the regional, national, and global levels

#### **Course Contents**

##### **Theory**

Present status of vegetable Production in Sri Lanka. Production technology of major vegetable crops of local and up country which includes selection of cultivars, nursery management, crop establishment, nutrient management, weed management, water management, harvesting, transporting and storage.

##### **Practical**

Identification of seeds of different local and exotic vegetables, Identification of different varieties of local and exotic vegetables, Land preparation and nursery establishment, Field planting, Fertilizer application and Weed control for important local and exotic vegetables, Field visit to study the different management practices adopted for local and exotic Vegetable crops.

### **Recommended Readings**

- 1) Mubarail Ali. (2000) Dynamics of vegetable production; distribution and consumption in Asia. AVRDC publication, Taiwan.
- 2) Arya, P.S. (2000) Off season vegetable growing in hills. APH publication, New Delhi.
- 3) Arya, P.S. (2002) A text book vegetable culture. Kalyani publication, Ludhiana.
- 4) Tindall, H.D. (1993) Vegetable in the tropics. ELBS with Macmillan, London.
- 5) SasankaBarooah. (1993) Vegetable growing in India. Kalyani publication, Ludhiana.
- 6) Wien, H. C. (1997) The Physiology of Vegetable Crops.

### **AGR 21022 PLANT PROPAGATION TECHNIQUES (02:20/20)**

#### **Objectives**

To furnish the students art and science of plant propagation by sexual and asexual methods of producing quality propagation materials, the basic principles and skills needed for producing plantlets by micro-propagation, and relevant physiological principles involved in propagating horticultural plants.

#### **Learning Outcomes**

- Propagate plant materials using various sexual and asexual propagation techniques.
- Discuss the biology of plant propagation
- Define and explain the concept of micro propagation and its importance in agriculture
- Describe plant growth processes in the tissue culture environment
- Demonstrate knowledge of the importance and application of plant propagation methods in horticultural crops

## **Course Contents**

### **Theory**

Introduction, principles and techniques used in seedling production, cuttings, grafting, budding, division, layering, factors determined the success of rooting of cutting, grafting, layering, types of layering, introduction to micro propagation and tissue culture, stages in tissue culture, explants selection, propagation methods of horticultural and ornamental plants.

### **Practical**

Identification of different propagation materials; Propagation of plants by specialized vegetative organs; Establishing and plants by different types of cuttings; Budding, grafting and layering; Hands on experience in micro propagation techniques; Visit to commercial horticultural nurseries.

### **Recommended Readings**

- 1) Hartmann, T. (2002) Plant propagation; Principles and practices. Prentice hall of India, New Delhi.
- 2) Sharma, R.R. and Srivastar, M. (2004) Plant propagation and nursery management. International Book Distributing Charbagh.
- 3) Bose, T.K. (2005) Propagation of tropical and sub tropical horticultural crops. 3<sup>rd</sup> revised edition. Nayaudyog, Kalkatte.
- 4) Torres, K.C. (1989) Tissue culture techniques for horticultural crops. Chapman and hall, New York.
- 5) Hartmann, H. T., Kester, D.E., Davies, F.T. and Geneve, R. (2001) Hartmann and Kester's Plant Propagation; Principles and Practices. Prentice Hall

## **ANS 21012 APPLIED ANIMAL NUTRITION (2:23/15)**

### **Objectives**

This course will provide understanding of principles of animal nutrition; importance of different components of nutrition; knowledge of common animal feedstuff; process by which nutritional

requirements are determined; be able to evaluate and formulate diets for a wide variety of ruminants and monogastrics.

### **Learning Outcomes**

- Acquainted with principles of animal nutrition
- Identify the causes for deficiency symptoms exhibited by different species of animals and rectify it
- Demonstrate the ability to identify different feedstuff and select feedstuff according to the needs
- Determine the nutritional requirement of different stages of animals
- Demonstrate the ability to evaluate and formulate rations for different stages of ruminants and monogastrics.

### **Course Contents**

#### **Theory**

Principles of animal nutrition, feed stuffs; feed evaluation, feeding trials; deleterious factors; feed additives; vitamins; minerals; partitioning of energy within an animal; energy evaluation; protein evaluation; microbial digestion in ruminants; feed formulation and practical feeding of swine, rabbit, poultry and ruminants.

#### **Practical**

Identification of feedstuff, proximate analysis of feedstuff, feed evaluation, anti-nutritional factors, ration formulation for monogastrics and ruminants, visit to local and commercial farms to see different feeding equipments and to study the different feeding systems.

### **Recommended Readings**

1. Church, D.C. (1993) *The ruminant Animal; digestive physiology and nutrition*. Waveland pr.
2. Cole, D.J. and Garnsworthy, P.C. (1996) *Recent developments in ruminant nutrition* 3. Nottingham university press.
3. Miller, E.R., Ullrey, D.E. and Alwis, A.J. (1992) *Swine nutrition*. CRC Press.

4. Pesti, G.M. and Miller, B.R. (1993) Animal feed formulation; economic and computer applications (plant & animal science). Springer.
5. Muir, J.F. and Roberts, R.J. (1993) Recent advances in aquaculture. Osney Mead, Oxford.
6. Jannes Dopperberg, and Piet van der Aa. (2010) Dynamics in Animal Nutrition.
7. Butterworth, M.H. (2010) Beef cattle nutrition and tropical pastures. Longman inc., New York, USA.
8. Cheeke, P.R. (2004) Applied animal nutrition; feeds and feeding. 3<sup>rd</sup> Edition. Prentice hall.
9. Greenhalgh, J.F.D., Morgan C.A., Edwards R. and Peter Macdonald. (2002) Animal Nutrition. Pearson Education.

## **ANS 21021: FORAGE PRODUCTION AND CONSERVATION (1:08/15)**

### **Objectives**

Students will understand the importance of pasture and fodder development in Sri Lanka; selection of suitable pasture and fodder for different agro- climatic zones; pasture management and pasture conservation.

### **Learning Outcomes**

- Be able to select suitable improved varieties of pasture and fodder for different agro-climatic zones.
- Demonstrate the ability of establish and manage pasture and fodder to ensure maximum yield.
- Determine the yield, quality and quantity of pasture and fodder produced.
- Use different methods to conserve pasture and fodder when it is surplus.

### **Course contents**

#### **Theory**

Potential for pasture production in Sri Lanka; agronomic description; establishment of pastures and fodders; fertilizer application; role of legumes in pasture production; defoliation

management; grazing management; stocking rate and carrying capacity, estimation of yield and quality of herbage; conservation of pasture and fodder; measurement of pasture production.

### **Practical**

Identification of pasture grasses, pasture legumes, fodder grasses and fodder legumes, establishment of pasture grasses, fodder grasses, pasture legume and fodder legumes, establishment of pure and mixed stand; yield determination, silage making, hay making and straw treatment.

### **Recommended Readings**

- 1) Bogden, A.V. (1977) Tropical pasture and fodder plants (tropical agriculture). Longman.
- 2) Crouch Thomas, C. (2003) Forage Crop Production in the Tropics. Kalyani Publishers, India.
- 3) Frank Raymond and Richard Waltham. (1998) Forage conservation and feeding. 5<sup>th</sup> Edition. Diamond farm book pubns.
- 4) Neil tainton. (2001) Pasture management in South Africa. Univ of natal pr.
- 5) Pitman, W.D. and Sotomayor, A. (2000) Tropical Forage Plants: Development and Use. 1<sup>st</sup>Edition.CRC Press.
- 6) Whiteman, P.C. (1980) Tropical pasture science. Oxford university press.

## **AGB 21012: ECONOMIC ENTOMOLOGY (2:15/30)**

### **Objectives**

To impart knowledge on the basic morphology and anatomy of the insects and the functions of different systems, Field level identification of insects, their damage to crops. Have a thorough knowledge on the natural enemy complex and their role in pest management, identify the different groups of arachnid pests, their morphology, anatomy and management, role of beneficial insects in agriculture and production systems and their commercial use.

### **Learning outcomes**

- Familiarize with the insects and mites with respect to their morphological and physiological aspects.
- Describe the modification of insect appendages, morphological and physiological aspects that enable the insects and mites to survive as the best organisms in any habitat.
- Compare the pests and beneficial insects, other natural enemies on the crop ecosystem
- Describe the role of social and productive insects in the agro ecosystem

### **Course contents**

#### **Theory**

Diagnostic features of Arthropoda and Class Insecta, Morphological features of the economically important orders, Thysanura, Dictyoptera, Neuroptera, Phasmida, Mallophaga, Diptera, Psocoptera, Hemiptera, Isoptera, Coleoptera, Hymenoptera, Lepidoptera, External morphology of insects, Growth and development of insects. Internal anatomy of insects. Apiculture and Sericulture.

#### **Practical**

External features of cockroach/grass hopper, insect's antennae and their modifications, mouthparts and their modifications. Modification of legs and wings of insects. Methods of collection and preservation of insects. Study on important insect orders: Thysanura, Neuroptera, Odonata, Orthoptera, Phasmida, Dermaptera and Dictyoptera, Coleoptera, Hemiptera, Lepidoptera, Isoptera, Diptera and Hymenoptera and their role in agro ecosystem, Digestive, Circulatory, Reproductive and Nervous system of insects. Apiculture, Bee keeping appliances and bee box, Field visit to study the habitats of insects and Sericulture.

#### **Recommended Readings**

- 1) Chapman, R.F. (1998) The insects; Structure and functions. Hong Kong ColoraftLtd.
- 2) StephereRere. (1999) Introduction to Bee keeping. Vikas publishing house Pvt ltd.,  
New Delhi.
- 3) Krishnaswamy, R. (2000) Silkworm is a beneficial insect. Kalyani publications, New Delhi.

- 4) David, V.B. and Kumarawami, T, (1975) Elements of economic entomology. Popular Book depot, Chennai, India

### **ACH 21013: BIOCHEMISTRY AND NUTRITION (3:30/30)**

#### **Objectives**

The aim of the course is to develop basic knowledge of structure, function and characteristics of the basic molecules and their metabolism in the living cells, food and its components, role of key nutrients and their deficiencies and toxicities, food security and nutritional labeling.

#### **Learning Outcomes**

- Describe and demonstrate the Chemistry of carbohydrates, proteins and lipids and discuss their metabolism, chemistry of nucleic acids and the characteristics and kinetic properties of enzymes
- Categorize the nutritional characteristics of foods and nutritional requirements for different stages of life cycle
- Describe the methods of measurement of body energy expenditure and the factors determining the basal metabolic rate
- Illustrate the functions, deficiency and toxicity symptoms, cite sources of micronutrients, discuss the causes and preventive measures for the major malnutritional problems and explore global food security

#### **Course Contents**

##### **Theory**

Chemistry of carbohydrates, proteins, fat and nucleic acids, metabolism of carbohydrates, proteins and lipids, characteristics and kinetic properties of enzymes, functions of food, composition and nutritional aspects of foods of plant and animal origin, vitamins and minerals, nutrition for different stages of life cycles, measurement of energy expenditure, basal metabolic rate, protein quality, balanced diet, malnutrition, body mass index, food fortification, food security, nutritional labeling.



### **Practical**

Qualitative tests for carbohydrates, amino acids, proteins and lipids, determination of chemical constants of lipids (acid value, iodine value and saponification number), estimation of some fruit components (titrable acidity and ascorbic acid), qualitative examination of milk components (fat, casein, lactalbumin, and calcium), quantitative examination of milk components (lactose content, fat content, specific gravity, total solids and titrable acidity), estimation of BMR, baseline energy and BMR factor

### **Recommended Readings**

1. Deb, A.C. (2008). Fundamentals of biochemistry, 9<sup>th</sup>ed. New Central Books Agency (P) Ltd.
2. Murray, R.K., Bender, D.A., Botham, K.M., Kennely, P.J., Rodwell, V.W. and Weil, P.A. (2009). Harper's illustrated biochemistry, McGraw-Hill education.
3. Nelson, D.L. and Cox, M.M. (2005). Principles of Biochemistry, 4<sup>th</sup> Edition, W.H. Freeman and Co.
4. Jain, J.L. (2000). Fundamentals of Biochemistry, 5<sup>th</sup>ed.,S. Chand and Co., New Delhi.
5. Bender, D.A. (2008) Introduction to nutrition and metabolism, 4<sup>th</sup> edition, CRC Press, New York.
6. Shubhangini, A.J. (2010), Nutrition and dietetics, 3<sup>rd</sup> edition, Tata McGraw-Hill publishing company limited, New Delhi.
7. Brown, J.E. (2005) Nutrition now, 4<sup>th</sup> edition, Thomson Learning, Inc.
8. Blank, F.C. (2007) A hand book of foods and nutrition, Agrobios, India
9. Nielsen, S.S. (2003) Food Analysis, 3<sup>rd</sup> edition, Plenum Publishers, New York.

### **AEN 21023: WATER RESOURCE ENGINEERING (3:30/30)**

#### **Objectives**

The aim of the course is to provide better knowledge on the amount of groundwater availability and quality, to achieve knowledge in drainage theories and design of drainage system, to obtain

knowledge on hydrodynamics, to design irrigation structures for controlling water flow and to study the design criteria for dam and irrigation hydraulic structures.

### **Learning Outcomes**

- Explain the water management applications in the field of agriculture
- Select irrigation structures and landscaping for efficient water application
- Discuss irrigation structures and its suitable design to minimize water losses
- Solve numerical problems related to pressure and its position created by standing water in various irrigation control structures

### **Course content**

#### **Theory**

Groundwater, Confined & Unconfined aquifer, Quality of surface and groundwater, Water demand, Groundwater classification of Sri Lanka, Effects of poor drainages, composite hydraulic conductivity, seepage losses, drainage spacing, leaching requirements, Design of drainage, Drainage investigation, drainage materials and axillaries, operation and maintenance of drainages system. Field dynamics and channel flow, Introduction to open channel flow, Chezy's formula for discharge, channel of most economical cross section, Manning's formula for discharge, discharge through rectangular and circular channels, conditions for maximum discharge, design for pen channels, Hydrostatics, Centroid and second movement of area, pressure diagram, center of pressure, water pressure on sluice gate and dam, Hydrodynamics, Energy of liquid in motion, Brnoulli's theorem, uniform flow through open channels, Pumps for water lifting.

#### **Practical**

Pumping test, Recuperation test, Thesis well function test, Water quality of groundwater, Dry sieving analysis for drainage filling materials, Selection of filling materials, Design of drainage spacing, Flow measurement in V-notch, Installation of partial flume, Measurement of flow in partial flume, Structural verification of dam sluice and spillway, Types of pump and Mantling and dismantling of water pump

### **Recommended Readings**

1. Sharma, R.K. (1993) A text book of hydrology and water resources. Shriganesh offset Press, Shahdara, Delhi.
2. Ghanshyam, D. (2000) Hydrology and Soil Conservation. Prentice Hall of India
3. Wanielista, M.P. (1990) Hydrology and water quality control. John Wiley and sons Newyork.
4. Davis, M.L. and Cornwell, D.A. (1991) Interdiction to Environmental Engineering. 2<sup>nd</sup> edition. Mcgrow hill Inc., New Delhi.
5. Chhabra, R. (1996) Soil salinity and water quality. Oxford and IBH publishing co.pvt.ltd, New Delhi.

### **AEC21032 INTERMEDIATE MICROECONOMICS (2:30/00)**

#### **Objectives**

To enhance the microeconomic knowledge of students and to improve their techniques of economic analysis; The course combines the use of economic theory, diagrams and mathematical concepts to ensure that students understand that all of these are necessary tools to be used when economic analysis is being conducted. Therefore, one of the aims of this course is to ensure that students can distinguish when the methods should be used independently and when they should be combined for a more comprehensive analysis.

#### **Learning outcomes**

- Describe the fundamentals of microeconomic theory.
- Apply a core set of microeconomic concepts useful in analyzing supply, demand, market, and policy issues.
- Apply algebraic and calculus tools needed to analyze microeconomic issues when many relevant variables change concurrently.

- Apply microeconomic concepts and related tools to unfamiliar real world situations and to critically analyze the effects of alternative policy tools on market outcomes.
- Interpret the results of economic analysis.

### **Course content**

#### **Theory**

Consumer choice, producer theory and market equilibrium analysis, Microeconomics is the study of rational choice behavior of individual consumers and firms. Microeconomic theory is based on the notion that individuals and firms have well defined objectives and behave systematically according to the incentives and constraints of their economic environment. Consumers choose the goods and services which maximizes their utility or well being, from which we derive the demand curve. Firms choose the combination of inputs and outputs that maximizes their profits, subject to the constraints imposed by their technology, from which we derive the supply curve. We will combine both in the study of different types of individual markets. We will also examine how different market mechanisms operate to allocate resources. We will discuss the efficiency properties of competitive market system and the circumstances in which competitive markets fail to produce efficient allocations

#### **Recommended Readings**

- 1) Intermediate Microeconomics by Hal Varian 7<sup>th</sup> edition
- 2) Microeconomics by Robert S. Pindyck and Daniel L. Rubinfeld 8<sup>th</sup> edition

### **AEC 21042 NATURAL RESOURCE AND DEVELOPMENT ECONOMICS (2:23/15)**

#### **objectives**

To provide solid background knowledge of resource and development economics by briefly outlining the fundamental characteristics of resource sectors to the agricultural development economics. The first parts of the unit focus on introducing some principles from resource economics; resource use and its management. Subsequent parts of the unit are focused on Development economics by providing an over view of major economic theories of economic

growth, inequality, poverty, population growth, education, and the access to the markets in development context. It focuses on growth theories and strategies for development.

### **Learning outcomes**

- Explain the standard models used in natural resource economics so as to understand the underlying key environmental processes and services, ecosystem management and management of renewable and non-renewable resources.
- Apply economic analysis to the issue of resource use and degradation.
- Explain the basic principles behind the economics of natural resource use.
- Describe the problems in economic development and approach them with a rigorous and critical way, using both economic theories and policy instruments.
- Describe relevant constraints on development: state the relevance of theories for the formulation of policies in the context of constraints in developing countries.

### **Course content**

#### **Theory**

An Introduction to natural resource economics, Ethics of environmental conservation and concepts of sustainability, Welfare economics, The efficient and optimal use of natural resources, The theory of optimal non-renewable resource extraction, Concepts, and approaches of development, Principles of Economic development, theories and models, Urbanization and Rural-Urban migration, Agricultural transformation and rural development, The environment, Access to markets for development.

#### **Practical**

The practical and interactive components of the course focus on problem solving and Personal skills enhancement, helping to develop a range of generic skills: Critical analysis and reflexivity, Applied numerical analysis and computing, Problem identification and specification. Problem solving and task prioritization

### **Recommended Readings**

- 1) Debraj Ray. (1998), Development Economics. Princeton university press.

- 2) Todaro, M.P. and Smith, S.C. (2009), Economic Development. Pearson, Addison Wesley.
- 3) Perman, R., Ma, Y., McGilvray J. and Common, M. (2003) Natural Resource and Environmental Economics. Pearson, Addison Wesley.
- 4) Callan, S. and Thomas, J.M. (2006) Environmental Economics and Management: Theory, Policy and Application. Thomson south-western.

### **Course Contents for Second Year Second Semester**

#### **AGR 22012: FIELD CROP PRODUCTION TECHNOLOGY (2:20/20)**

##### **Objectives**

Furnish the students with knowledge and skill on the effect of genetic factors, growth and development , application of modern production practices on field crops production, role of other field crops in the supply of food, resources for agro based industries and crop component for different cropping and farming systems.

##### **Learning Outcomes**

- Describe the importance of field crops as a major source of food and the role they play in Sri Lankan economy
- Recognize the different forms of field crops classification and their importance
- Explain all the biotic and abiotic factors that affects crop production
- Demonstrate proper management practices and the application of new technology to improve productivity

##### **Course Contents**

##### **Theory**

Field crop production in Sri Lanka, production technology of important pulses crops, root crops, oil seed crops, spices and condiments, fibre crops, sugarcane and tobacco, processing and value addition of important field crops, cropping system components, practices and value addition for major field crops.

### **Practical**

Identification of seeds belongs to different cultivars of important field crops; Nursery establishment and maintenance for chilli and onion; Establishment and maintenance of important Pulse, Root and Tuber crops; Field visit to chilli, onion, potato, ground nut and manioc.

### **Recommended Readings**

- 1) Singh, C. (1983) Modern techniques of raising field crops. Oxford and IBM publication, New Delhi.
- 2) Vadav, D.S. (1992) Pulse crops; Production technology. Kalyani publication, New Delhi.
- 3) Martin, J. H., Waldren, R P. and Stamp, D.L. (2006) Principles of field crop production. 4<sup>th</sup> edition. Pearson prentice hall, New Jersey.
- 4) Das, P.C. (1997) Oil seed crop of India. Kalyani publication, Ludhiana.
- 5) Randhawa, L .S. (2002) Quality Improvement in Field Crops. CRC Press
- 6) Lebot, V. (2008) Tropical Root and Tuber Crops; Crop Production Science in Horticulture. 1<sup>st</sup>edition.CABI.

### **AGR 22022: Orchard and Floricultural Production (2:20/20)**

#### **Objectives**

To impart knowledge and skill on Orchard and floricultural plants; special management practices to increase crop productivity; factor determination the sustainability and economic viability of orchard crops; post harvest techniques in handling, transportation and storage, international trade of fruit and cut flower

### **Learning Outcomes**

- Describe the requirements needed to grow a wide variety of fruit and floricultural crops
- Apply this knowledge to the specific fruit crops which have economic importance to Sri Lanka
- Explain various agronomic practices adopted to increase the yield of major orchard crop and floricultural crops grown in Sri Lanka
- Identify and name some floriculture crops and classify them as potted, cut and/or garden crops
- Possess skills on propagation and production of important cut flowers and foliage plants
- Describe proper harvest and post harvest handling of fruit and flowers

### **Course Contents**

#### **Theory**

Production technology of major orchard crops such as banana, mango, grapes, pine apple, citrus, papaya, passion fruit, pomegranate, guava, avocado and wood apple, vegetative propagation of orchard crops, management techniques to induce harvesting and fruit set and avoid alternate bearing, harvesting, transport and storage, present status of floriculture industry in Sri Lanka, propagation and production technology of major floricultural crops

#### **Practical**

Vegetative propagation of cutting, layering, grafting and budding, Nursery management for Mango stock production and Citrus, Field visit to study the banana cultivation practice, Identification of various cultivars of important fruit crops, Field visit to study Grapevine and Citrus production, Propagation techniques of cut flowers and foliage plants, Field visit to study Mango and Pineapple cultivation, Field visit to Floriculture farms.

### **Recommended Readings**

- 1) Jitendra Singh. (2003) Basic Horticulture. Kalyani publication, Ludhiana.
- 2) Chattopadhyay, T.K. (1997) A text book on pomology; subtropical fruits. Kalyani publication, Ludhiana.



- 3) Bal, J.S. (1999) Fruit growing. Kalyani publication, Ludhiana.
- 4) Kmanibhushan Rao. (1995) Text book of Horticulture. Macmillan, New Delhi, India.
- 5) Arora, J.S. (1998) Introduction to ornamental horticulture. 3<sup>rd</sup> edition. Kalyani publication, Ludhiana.
- 6) Dole, J.M. (2005) Floriculture; Principles and species. 2<sup>nd</sup> edition. Pearson education, New Jersey.
- 7) Larson, R.A. (1992) Introduction to Floriculture. 2<sup>nd</sup> Edition. Academic Press.

### **ANS 22012 LIVESTOCK BREEDING AND HEALTH MANAGEMENT OF FARM ANIMALS (2:15/30)**

#### **Objectives**

Students will understand the basic principles of livestock breeding, selection, breeding methods and important reproductive technologies. Students also will understand the common aspects of prevailing livestock and poultry diseases and prevention and control of these diseases.

#### **Learning Outcomes**

- Use of basic genetic principles to study a population
- Use of selection aids and selection methods to select appropriate parents
- Able to partition different gene effects
- Plan breeding methods according to the need
- Use of reproductive technology to increase the reproductive efficiency of livestock and poultry.
- Students will be able to diagnose the common livestock and poultry diseases and will be able to take preventive and control measures to prevailing diseases.

## Course contents

### Theory

Quantitative Vs. qualitative traits; Hardy Weinberg Law; Population Vs. individual; Gene and genotypic frequency; Forces changing gene frequency; Random drift and small populations; Selection, selection aids, and response to selection. Theory of path coefficient; Inbreeding, methods of estimating inbreeding coefficient, systems of inbreeding, Effective population size; Breeding value, estimation of breeding value, dominance and epistatic deviation; Partitioning of variation; Genotype X environment correlation and genotype X environment interaction; role of multiple measurements; Resemblance between relatives. Artificial insemination and embryo transfer.

### Practical

Prevention, diagnosis and control of bacterial, viral and metabolic diseases of poultry, swine, rabbit, cattle, buffalo, goat and sheep. External and parasites of livestock.

### Recommended Readings

1. Falconer, D.S. and Mackay, F.C. (1996) Introduction to Quantitative Genetics. 4th Edition. Longman, London.
2. Heather smith Thomas. (2009) The cattle health handbook. 1st Edition. Storey publishing, LLC.
3. John webster. (2011) Management and welfare of farm animals. 5<sup>th</sup> Edition. Wiley-blackwell.
4. Bourdon, R.M. (1997) Understanding Animal Breeding. Prentice Hall, USA.
5. Kahrs, R.F. (2001) Viral diseases of cattle. 2<sup>nd</sup> Edition. Wiley-blackwell.
6. Thomas, H. S. (2009) The cattle Health handbook. 1<sup>st</sup> Edition. Wiley – Blackwell.
7. Radostits .(2007) Veterinary Medicine: A text book of the diseases of cattle, horses, sheep, pigs and goas. 10<sup>th</sup> Edition. Saunders Ltd.
8. Rebhun.s. (2007) Diseases of Dairy Cattle, 2<sup>nd</sup> Edition. Saunders.
9. Falconer, D.S. and Mackay, F.C. (1996) Introduction to quantitative Genetics. 4<sup>th</sup> Edition, Longman, London.
10. Bourdon, R.M. (1997) Understanding Animal Breeding, Prentice Hall, USA.

**ANS 22023: RUMINANT MANAGEMENT (3: 23/45)**

**Objectives**

Students will understand the different breeds of cattle, buffalo, goat and sheep. Understand the strategies involved in proper management of different stages of animals with regard to housing, feeding, breeding and other management aspects towards maximum productive and reproductive efficiency.

**Learning Outcomes:**

- Be able to select suitable breed according to the need
- Demonstrate the ability to manage different stages of animals to meet their housing and feeding requirement
- Able to breed the animals to maximize reproductive efficiency
- Able to assist and manage the animals at the time of parturition
- Will be in a position to get maximum output from the animals
- Ensure production of high quality, hygienic livestock produce

**Course Contents**

**Theory**

Breeds of ruminants; routine management practices and tools used; types of housing; Management of cattle and buffalo: herd composition, new born calf, weaning, calf management, heifer management and breeding, pregnant and lactating cow management, clean milk production and milking, dry cow management, calving, stud bull management, draught animal management; Goat and sheep management: herd composition, herd management, techniques used in determining age, body weight, sex, body condition, production and reproduction performance of farm animals, farm records and planning, interpretation of production/reproduction data.

## **Practical**

Identification of ruminant breeds, management of records for ruminants, restraining, leading handling of farm animals for various purposes, feeds and feeding methods, housing, use of farm equipments and measurement of physical and physiological parameters.

## **Recommended Readings**

1. Carol Ekarius. (2004) How to build animal housing; 60 plans for coops, hutches, barns, sheds, pens, nest boxes, feeders, stanchions, and much more. Storey publishing, LLC.
2. Chamberlain, A.T. and Wilkson, J.M. (1993) Feeding the dairy cow. ChalcombeChristoph, meske.
3. Heather smith thomas. (2005) Getting started with beef & dairy cattle. Storey publishing, LLC.
4. Heather smith thomas. (2008) Essential guide to calving; giving your beef or dairy herd a healthy Start. Storey publishing, LLC.
5. Kellems, R.O. (2009) Livestock feeds and feeding. 6<sup>th</sup> Edition. Prentice hall.
6. Perera, E.R.K. (2001) Water Buffalo Production. Printing Unit, Faculty of Agriculture, University of Peradeniya, Peradeniya. Sri Lanka.
7. Abeygunawardena, H. and Sriwardene, J.A. (1999) Cattle and Buffalo Farming; Hand book for Veterinarians. National Science Foundation Press, Colombo, Sri Lanka
8. Ibrahim, M.N.M. (2000) Dairy Cattle Production. Peradeniya Printers and Publishers, Sri Lanka.
9. Abeyratne, A.S. (2007). A review of the livestock industry in Sri Lanka. 1<sup>st</sup> Edition.

## **AGB 22023 Basic Microbiology and Phytopathology 3: 30/30**

### **Objectives**

To impart knowledge on the existence of microbes and their role in different ecosystems, microbes potential in energy metabolism, biosynthesis and multiplication, microbes as biofertilizers and bio-agents for pests and disease management, their potential in waste management, microbes as phytopathogens. Introduction to crop diseases, symptoms and life

cycles of different diseases, and their existence under different ecosystems. Distribution of diseases in crop ecosystem and epidemics.

### **Learning Outcomes**

- Classify microbes and their existence in different ecosystems
- Explain the role of microbes and their association in agriculture
- Examine microbes potential to be used as biofertilizers and bioagents
- Utilize their potential in waste management.
- Discuss different plant pathogens causing diseases on crop plants
- Identify different symptoms of crop diseases and diagnose the cause.

### **Course contents**

#### **Theory**

Microbes and their classification (fungi, bacteria and virus), microbial interaction - symbiosis, antagonistic and pathogenic and their role in agriculture, Microbial growth, Microbial nutrition-biofertilizers and edible mushrooms, Microbial industrial technologies, Koch's postulates, Stages in the development of disease, Pathogen attack on plants, insects and mites, Effect of pathogens on plant physiological functions, Plants defense and insect/mites immunity mechanism against pathogens, Role of environment on the development of plant disease and pathogens, Control of plant diseases, Plant diseases and development, Classification of plant pathogens, disease symptoms,

#### **Practical**

Isolation of specific microbes, culturing and purification of specific microbes, identification of microbes, preservation of microbial cultures, use of different media, structures used to understand different microbes, nitrogen fixers and other symbiotic interaction of microbes with plants, antagonistic microorganisms, cultures, production and their application in agriculture. Field study on pathogenic and beneficial microorganisms, collection and preservation of specimens from different ecosystem including farmer's fields, microbes in biofertilizers, their role and production, mushroom cultivation, *Pleurotus* and its production constraints, industrial application of microbes, potential and usage, disease symptoms and their identification on plants,

diseases on insects and mites and their significances/consequences. Practicing Kock's postulates, Visual scoring of plant diseases, Field visit to identify plant diseases, Cross protection technique, Preparation of Bordeaux mixture and Bordeaux paste

### **Recommended Reading**

1. Nirri (2004) The complete technology book on biofertilizer and organic farming, National institute of industrial research, Dhelli
2. Biswas, P.K. (2008) Agricultural microbiology, Dominant Publishers
3. Eldor A. Paul (2007) Soil Microbiology, Ecology and Biochemistry, Academic Press
4. Agrios. G. N. (2004) Plant pathology. 5<sup>th</sup> edition. Academic press
5. Singh, K. (1998) Principles of plant pathology. Kalyani publications, New Delhi.
6. Dubey, and Mageswary, (1999) Text book of microbiology. Kalyani publications, New Delhi.
7. Lee, D.L. (2002) The Biology of Nematodes. APS press.
8. Narayanasamy, P. (2001) Plant Pathogen Detection and Disease Diagnosis. Marcel Dekker.

## **ACH 22012 FOOD PRODUCT QUALITY AND PROCESSING (2:20/20)**

### **Objectives**

The objective of the course is to develop the basic knowledge of hygiene and quality aspects in food processing, unit operations performed in food industries, the changes in food qualities due to processing and storage and food standards and regulatory systems in Sri Lanka.

### **Learning Outcomes**

- Identify the characteristics of raw material for food processing and describe various quality factors used to assess a food
- Recognize potential intervention strategies used in the production, manufacture or processing of various foods in order to prevent or delay contamination, spoilage and food borne illness

- Describe the unit operations performed in food industries and their pros and cons
- Identify and describe the changes that food components undergo during processing and storage
- Explain the food quality standards and regulatory systems in Sri Lanka

## **Course Contents**

### **Theory**

Quality of raw materials for food processing, quality factors in foods, water quality in food processing, hygiene in food processing, food quality standards and regulatory systems in Sri Lanka, proximate analysis of foods, unit operation in food processing, effect of processing on functional and nutritional value of foods, browning reactions, autoxidation of fats, plant and animal pigments and their changes during processing and storage

### **Practical**

Proximate analysis of foods (moisture, sugars, ash, crude fat, protein and crude fiber), microbiological examination of water, determination of total microbial count in cereals, determination of peroxide value of fat or oil, prevention of enzymatic browning, determination of sanitary quality of raw milk by dye reduction method, detection of preservatives in milk

## **Recommended Readings**

1. Sikorski, Z.E. (2007) Chemical and functional properties of food components, 3<sup>rd</sup> edition, CRC Press, New York
2. Damodaran, S., Parkin, K.L. and Fennema, O.R. (2008) Fennema's Food Chemistry, 4<sup>th</sup> edition, CRC Press, New York
3. Shubhangini, A.J. (2010), Nutrition and dietetics, 3<sup>rd</sup> edition, Tata McGraw-Hill publishing company limited, New Delhi.
4. Nielsen, S.S. (2003) Food Analysis, 3<sup>rd</sup> edition, Plenum Publishers, New York
5. Lillian, H.M. (2004), Food Chemistry, CBS publishers and Distributers, Delhi, India
6. Blank, F.C. (2007) A hand book of foods and nutrition, Agrobios, India

7. Kilgour, O.F.G. (1986), *Mastering Nutrition*, Macmillan Education, UK.
8. Potter, N.N and Hotchkiss, H.H., (1996) *Food Science*, CBS Publishers and distributors, Delhi, India.

## **ACH 22021: SOIL CLASSIFICATION AND SOILS OF SRI LANKA (1:12/06)**

### **Objectives**

The course is designed to provide the students the background knowledge about soil classification, soil survey and mapping, make the students acquire knowledge regarding the soils of Sri Lanka and their distribution and to introduce the fundamentals of Geographic Information system and remote sensing

### **Learning Outcomes**

- Describe soil classification, soil survey and mapping
- Describe the soils of Sri Lanka their distribution and potentials and limitations
- Explain and execute the use of GIS and remote sensing in soil studies

### **Course Contents**

#### **Theory**

Kinds of soil information, soil survey and mapping, remote sensing and geographic information system in soil survey reports and maps, Importance of soil classification, systems of soil classification, soil taxonomy, soils of Sri Lanka; classification, agricultural potentials and limitations.

#### **Practical**

Study of properties of different soils of Sri Lanka, Introduction to remote sensing and Geographic Information System



### **Recommended Readings**

1. Brady, N.C. and Weil, R.R. (2002) *The Nature and Properties of soil*. 13<sup>th</sup> edition. Prentice Hall, New Jersey.
2. Panabokke, C.R. (1996) *Soils and Agro-Ecological Environments of Sri Lanka*. Natural Resources, Energy and Science Authority of Sri Lanka.
3. Sehgal, J. (1996) *Pedology concepts and applications*. 1<sup>st</sup> Edition. Kalyani publishers
4. Singer, M.J. and Munns, D.N. (2002) *Soils; an introduction*. 5<sup>th</sup> edition. Prentice Hall, New Jersey.
5. Robert Jenkins. (2008). *Laboratory manual for introductory soils*. Oxford book Company, Jaipur India.
6. Frederick, R., Troeh, L.M. and Thompson. (1993) *Soils and Soil Fertility*. 5<sup>th</sup> Edition, Oxford University Press Inc.

### **AEN22023 LAND SURVEYING AND IRRIGATION (3:30/30)**

#### **Objectives**

This course aims to provide the fundamental concepts of surveying and leveling and to apply the knowledge of intermediate surveying and leveling in the field of agriculture. In addition, it is to make them knowledgeable about soil moisture and application of water, the principle of theory of water erosion and wind erosion and the control measures, the factors influencing on soil loss and mechanical and vegetative soil conservation measures with landscaping.

#### **Learning outcome**

- Explain the application of surveying and leveling knowledge in the field of agriculture
- Describe suitable irrigation methods and landscaping for efficient application of resources
- Estimate crop water requirement
- Discuss soil and water conservation measures

## **Course content**

### **Theory**

Coordinate Geometry, Introduction to Surveying and leveling, Basic principal of survey measurement, Leveling, Chain surveying, History of surveying, Horizontal & vertical distance, Methods of booking – collimation method, rise and fall method, application of leveling, checking the leveling and usage of leveling, correction factors, Methods of measuring area - Mid ordinate rules, Average ordinate rules, Simpson's rules, Volume measurement - Cross section method, Measurement of horizontal distance - Pacing, Odometer, Electronic distance measurement, Chain, Tape, Tacheometry. Systematic errors in linear measurement by chain or tape- Incorrect length, chain or tape not horizontal, fluctuations in temperature, incorrect tension or pull, sag, Incorrect alignment, chain or tape not straight, error in off set, Introduction to theodolites - main parts, fundamental planes and lines of a theodolite, Angle measurement, errors in its measurement & adjustment, Soil water relationship, Soil moisture and water potential, water movement, Darcy's law, crop evapo-transpiration, consumptive use, Estimation of crop water requirement, Irrigation efficiency, Water application methods, small irrigation structures. Design of irrigation head works for small catchments, Soil conservation principles, Soil erosion, Water erosion, wind erosion, factors affecting erosion, splash erosion, sheet erosion, rill erosion, gully erosion, universal soil loss equation, Classification of wind erosion, soil conservation at farm level, sediment transportation, Soil erosion systems, Soil erosion mechanism, mass wasting, soil erosion control measures, agricultural methods and engineering methods, vegetative water ways, Drainage system design,

### **Practical**

Demonstration of basic survey instrument (Identification of equipments Surveying, Handling of dumpy level, Longitudinal leveling and Cross sectional leveling), Land leveling - rise and fall methods, Land leveling - height of collimation, Level book handling, Chain surveying, Plane table surveying - Radiation methods, Intersection methods, Traverse method of plane table surveying, Contour surveying - Grid peg method, Contour map development, Compass surveying, Construction surveying, Introduction to auto CAD, Survey map development using auto CAD, Differential leveling, Soil moisture measurement, Evaporation measurement, Crop

evaporation measurement, Computer application – CROPWAT Observation of small irrigation structures, Measurement of hydraulic conductivity by inverse auger hole method, Measurement of hydraulic conductivity by auger hole method, Measurement of soil erosion by water, Landscaping for irrigation by using surveying.

### **Recommended Readings**

1. Sankara Redid, G.H. and Yellamanda Reddy, T. (2003). Efficient use of irrigation water. Kalyani Publishers New Delhi.
2. Bredero, T.J. (1991). Crop water management research. Oxford and IBH publishing co.pvt.ltd. New Delhi.
3. Chhabra, R. (1996). Soil salinity and water quality. Oxford and IBH publishing co.pvt.ltd. New Delhi.
4. Roy, S.K. (1999) Fundamentals of surveying. Prentice Hall of India.
5. Lipschutz, M.M. (1999) Differential Geometry; Theory and Problems. University of Bridge port.

## **AEC 22022: AGRIBUSINESS MANAGEMENT AND BUSINESS ACCOUNTING (2:15/30)**

### **Objectives**

To provide students with a fundamental comprehension of the key concepts needed to successfully manage an agribusiness enterprise, adding value to farm products and/or providing quality inputs for agricultural production and to provide a considerable experience and knowledge in agro-industrialization and the relationships between producers, processors, manufacturers and consumers of commodities involved in the agribusiness sector.

### **Learning outcome**

- Describe the agribusiness organizations, the external environment in which they operate and how they are managed.

- Explain the relevant concepts theories and methods and their application to a range of managerial problems in agribusiness;
- Describe how specific management techniques may be applied to agriculturally-related businesses, and a critical assessment of their usefulness
- Explain the importance of research techniques in generating knowledge concerning agribusinesses and the ability to apply these techniques in appropriate situations.
- Explain a range of critical and pervasive issues relating to agribusiness management, the gathering of relevant data, and the synthesis and presentation of possible solutions.

### **Course content**

#### **Theory**

Introduction to Agribusiness management, Production function and the stages of production, Producer decision making: Single variable input and two variable input functions, Decision making in an environment of risk and uncertainty, Principles of credit management, Farm investment analysis, Introduction to business accounting.

#### **Practical**

Preparation of Income statement, Preparation of Net worth statement , Estimating the credit need and repayment capacity of the farmer- A field assessment , Writing up the books of original entries , Calculation of depreciations, Doing the adjustments before final accounts, Preparing the final accounts

#### **Recommended Readings**

1. Beierlein, J.G., Schneeberger, K.C. and Osburn, D.D. (2007) Principles of Agribusiness Management. Waveland Pr Inc.
2. Amarnath, J.S. and Samvel, A.P. (2008) Agri Business Management. Satish Serial Publishing House.
3. Cramer, G.L. Jensen, C.W. and Southgate, D.D. (2001) Agricultural Economics and Agribusiness. John Wiley & Sons, Inc.
4. Wood, F. and Sangster, A. (1999) Business Accounting 1. Pitman publishing.
5. Debertin, D.L. (1986) Agricultural Production Economics. Collier Macmillan publishers.

6. Wheeling, B.M. (2007) Introduction to Agricultural Accounting. Delmar Cengage Learning.

## **ACC 22011: CAREER GUIDANCE AND SKILL DEVELOPMENT (1:00/30)**

### **Objectives**

To impart knowledge on the importance of career guidance, career counseling and skill development to best fit into the career

### **Learning outcome**

- Plan his/her career and aiming career goals
- Demonstrate how career guidance and skills could help in improving their career
- Adopt the skills in their personal and professional career

### **Course contents**

Concept of career and the career expectation and available opportunities, Types of jobs and the information about the jobs, nature and the employer's expectation, Career Guidance and its significances, Career counseling, Career Planning, the world of work, higher studies and leadership training, personality developments, soft skills, intra and interpersonal skills, facing interviews, writing C.V, making application for a job, psychological and socio economical implications on career developments.

### **Recommended Readings**

1. Gail Evans (2007) Counselling skills for dummies, John Wiley and Sons, Ltd, England
2. Ellen Hansen (2006) Career guidance: A resource book for low and middle income countries, Skills and employability department, International Labour office, Switzerland
3. Katherine L. Hughes and Melinda Mechur Karp (2004) School-Based Career Development: A Synthesis of the Literature, Institute on Education and the Economy Teachers College, Columbia University
4. Brian McIvor (2012) Career detection: Finding and managing your career, Brian McIvor and associates