Course Contents for Third Year First Semester

AGR 31013 MANAGEMENT OF PLANTATION AND EXPORT CROPS  (3:35/20)

Objectives

Furnish the students with knowledge and practical skills on present status of export crop production in various ecological regions and their export market, propagation techniques, appropriate agronomic practices to increase the yield, processing techniques, storage techniques and national and international demand.

Learning Outcomes

- Explain plant growth in relation to and environmental conditions for common export agriculture crops in Sri Lanka
- Exhibit the skills on the propagation and planting techniques of important export crops
- Acquire basic skills, knowledge and attitude to manage a sustainable plantation crops with suitable agronomic practices
- Demonstrate about the processing techniques adopted for of major export crops in Sri Lanka

Course Contents

Theory

Production technology, nursery establishment, propagation techniques, crop establishment, fertilizer management, weed control, pruning and training, harvesting and processing of major export crops such as coffee, cocoa, pepper, cloves, cardamom, nutmeg, cinnamon, cashew and palmyrah.

Practical

Visit to export crop fields, research station and private farms; Propagation of export agricultural crops; Visit to cashew field; Palmyrah seedlings production and planting.
Recommended Readings


AGR 31022 STATISTICAL METHODS (2:23/15)

Objectives

Furnish the students with basic principles on Bio-Statistics, summarizing data, use of variety of statistical tests by manual and with aid of statistical packages and interpreting the results from statistical tests.

Learning Outcomes

- Show the ability to apply fundamental concepts in exploratory data analysis
- Know how to organize, manage, and present data
- Use Ms Words, Excel to represent raw data in a summarized manner
- Perform a wide variety of parametric statistical test manually and with the aid of computer packages
- Describe foundations for classical inference involving confidence intervals and hypothesis testing

Course Contents

Theory

Types of data, parameters and estimates, measures of centre and dispersion, frequency distributions, types of variables, discrete and continuous variables, concept of probability,
probability distributions, normal distributions, t and F distributions, concept of hypothesis testing, testing means, Z-test, and t-test, confidence interval

Practical

Data summarization using excel, graphs, hypothesis testing, introduction to SAS, Minitab and other statistical packages used to analyze biological data, computer aided data analysis

Recommended Reading


ANS 31013 MANAGEMENT OF NON RUMINANTS (3: 23/45)

Objectives
Understand the characteristics of different breeds of poultry, swine and rabbits. Gain hands on skill on management of different stages of animals. Gain knowledge on selection and culling of monogastrics. Will learn techniques associated with production of hygienic products.

Learning Outcomes

- Able to select suitable breed/breeds according to the need
- Demonstrate skills on management of poultry, swine and rabbit with regard to housing, feeding and breeding
- Demonstrate ability to operate and manage poultry hatchery to obtain maximum hatchability and viable broiler and layer chicks
- Ensure hygienic production of meat and egg.
Course Contents

Theory
Breeds of poultry, swine and rabbits; Management of functional groups of poultry: parent stock, incubation, brooder stock, growers, layers and broilers; egg quality determination, incubator and brooder management; management of different functional group of swine: management of boar, sow, piglings, growers/ fatteners; Management of different functional group of rabbits: kindlings, doe, buck, fatteners; Herd composition; culling of unproductive poultry swine and rabbit; Housing systems of poultry swine and rabbits; Identification systems of poultry, swine and rabbits; farm planning and record keeping in poultry, pig and rabbit farms.

Practical
Poultry Breeds of poultry, performance evaluation, selection of egg for incubation, incubator management, brooder management, starter, grower and layer management, broiler management, slaughter and dressing of broilers, duck and turkey management, cost benefit analysis for a given flock of poultry. Swine: Pig breeds, feeding of swine, general management practices of swine and housing of swine. Rabbit: Identification of rabbit breeds, management of rabbits under cage and free range system, construction of different types of cages for different classes of rabbits.

Recommended Reading


ANS 31021 AQUACULTURE TECHNOLOGY (1:08/15)

Objectives
Scope of this course is to provide fundamental principles of aquaculture technology and the students will get a general idea of novel technologies which could be adapted in Aquaculture.

Learning Outcomes
- Able to understand the fundamental principles of aquaculture, appropriate technologies related to aquaculture which are relevant to the region.
- Able to plan an operation by considering the resources available locally while getting some exposures through study visits to the research institutes as well as aqua farms.

Course Contents

Theory
Introduction to aquaculture, cultivable finfish and shell fishes, aquaculture systems and management, basic principles of aquaculture nutrition and feed technology, principles of aquatic resource management, pathology and health management of fin fish and shell fish, aquatic resource management.

Practical
Construction of pond for fish culture, rearing different species of fish under monoculture and polyculture systems, performance evaluation, determination of physico – chemical parameters of fish pond, construction of ornamental fish tanks, breeding fish and field visits.
Recommended Reading


AGB 31033 Plant Protection  (3: 30/30)

Objectives

To impart knowledge on pests and diseases of crops of economically important and their management

Learning outcome

- Classify different pests and diseases causing losses on crop plants
- Diagnose different symptoms of crop diseases and identification of the cause.
- Describe pests and their bionomics for forecasting and management
- Suggest/recommend suitable methods to manage the crop pests and diseases

Course contents

Theory

Concepts of pest, EIL/ETL and pest management, Types of pests, their association with crop plants of economic importance. Pest dynamics, population indices and their importance.
Bionomics of insect pests of crops such as: rice and other cereals, pulses, vegetable, fruit crops, plantation crops, export crops and stored products and non-insect pests. Symptomatology and etiology of disease causing plant pathogens, Plant diseases and distribution of diseases in crop ecosystem, Parasitic nematodes,. Disease cycles, etiology and existence of diseases under different ecosystems. Evaluate the potential of different methods for integrated pest management, Pesticide use and safety, Management of pesticides, Residual analysis

**Practical**

Plant protection appliances and their uses in Integrated Pest Management, Pesticides and their management, Diseases and insect pests of rice, pulses, oil seed crops; Ground nut, Sesamum and Castor, Vegetables; Brinjal, Tomato, Chilli and Bhendi, Cole crops; Cabbage, Cauliflower and Radish, Tuber crops; Potato, Sweet potato, Manioc, fruit crops; Mango, Banana, Citrus, Guava, Pomegranate and Grape, Plantation crops and export crops; Tea, Coconut, Black pepper, Coffee, Rubber. Fungicides and their usage, developing Integrated disease management for various diseases. Visit to Vegetable Farmers field to study the pest status and their management.

**Recommended Reading**


AGB 31022 AGRICULTURAL BIOTECHNOLOGY  (2:30/00)

Objectives

To impart knowledge on tissue culture techniques, PCR techniques, development of transgenic plants and gene technology

Learning outcome

- Describe tissue culture techniques, cDNA libraries.
- Describe PCR techniques, transformation techniques.

Course contents

Theory

Importance of agricultural biotechnology, Tissue culture techniques, requirements for in-vitro cultures, micro propagation, type of cultures, germ plam conservation, gene and cDNA libraries, regulation and expression, DNA sequencing, DNA finger printing, gene silencing, Vector, Recombinant DNA technology, Agrobacterium-mediated transformation techniques, Transgenic plants, PCR, RFLP, RAPD, Gene technology for plant protection, Bioethics, career opportunities in agricultural biotechnology

Recommended Reading


ACH 31012 SOIL FERTILITY AND PLANT NUTRITION (2: 15/30)

Objectives
The course is designed to provide a clear knowledge on plant nutrients and their significance in agriculture, their sources from organic matter and fertilizers, fertilizer recommendation problem soils and chemistry of submerged soils.

Learning Outcomes

- Describe the concepts of soil fertility and plant nutrition and sustainable management
- Explain fertilizer recommendation methods
- Identify, measure and interpret different plant and soil nutrients and fertilizers

Course Contents

Theory
Plant nutrients, availability in soils, nutrient cycling, role of nutrients in plant nutrition, deficiency and toxicity of plant nutrients, manufacture and properties of fertilizers, fertilizer use efficiency, organic sources of nutrients, soil nutrient evaluation and fertilizer recommendation.

Practical
Qualitative tests for fertilizers and essential elements, study of deficiency and toxicity symptoms, determination of total nitrogen, available nitrogen, available phosphorus, available potassium, available sulfur, lime requirement, gypsum requirement, C/N ratio, rapid plant tissue tests for nutrients.

Recommended Reading


AEN 31013: POSTHARVEST ENGINEERING (3:30/30)

Objectives

The aim of the course is to provide knowledge on postharvest engineering aspects of agricultural produces, basic thermodynamics, psychrometry and its application on drying and storage of grains, physical properties of agricultural produces, basic rheology and its applications in postharvest engineering and steps to be taken towards minimization of postharvest losses.

Learning Outcomes

- Explain basic scientific concepts of postharvest engineering and their importance
- Apply reasonable techniques to reduce losses after harvesting for better processing
- Identify postharvest losses of Agricultural produces and factors affecting postharvest losses
- Describe basic quality indicators of fruits & vegetables of harvesting and methods available for maturity determination
- Assess basic physical properties of fruits & vegetables and basic mechanical properties of Agricultural produces
- Relate fundamentals of thermal processing and psychrometric processing
Course content

Theory

Parboiling of grains, Principle of Parboiling, changes in parboiling, methods of parboiling, Storage of grains, Requirement for storage, factors affecting storage, storage methods, Separation of grains, Separation methods Husking of Grains ,Milling operation, Polishing and whitening, grinding - Plain grinding and selective grinding, Grinding machines, Physical and thermal properties of agricultural produces, Laws of thermodynamics and its fundamentals, Ideal cycles with perfect gases, Thermodynamic properties of water and stream, Psychrometry and drying of grains, usage of psychometric chart, Drying, Dehydration and selection of grain dryers, Quality control and grading system, combine harvester, threshers, reapers and their losses.

Practical

Paddy parboiling, Heat exchanger design for processing, Application rehology in postharvest engineering, Mass transfer in packaging materials, Mass and Energy balance applications in postharvest Engineering, Function operation and maintenance of milling machines, Measurement of physical properties, Components of combine harvesters and their maintenance, Milling yield analysis, Cooling load calculations, Cyclone design for grain separations, Application of thermodynamics in postharvest engineering, Dehydration system design, Application of belt conveyors, pneumatic conveyors, screw conveyors, and bucket elevators in postharvest handling of grains.

Recommended Reading


AEC 31022 AGRICULTURAL MARKETING (2:23/15)

Objectives
The objective of this course is to provide students with a theoretical and empirical basis for evaluating agricultural marketing organizations and factors for market performance and public policy decision, and to enable them to develop and use the tools of economic theory to analyze issues related to the marketing of agricultural commodities.

Learning Outcomes
- Apply economic theory to problems of agricultural marketing;
- Design strategies for effective market performance;
- Apply the marketing concepts for analyzing market structure and performance in agriculture and formulation of effective agricultural marketing policy;
- Apply theoretical models of imperfect market structures to inform public policy
- Describe organizational forms unique to agricultural industries.
- Describe the price discovery mechanisms under different market structures
- Explain marketing decisions

Course content
Theory
Introduction to food marketing, Market imperfections and Market failure, Agricultural production and marketing, Food wholesaling and retailing, Price analysis and exchange function,
Competition in food markets, Food marketing costs, Market development and demand expansion, Market bargaining power, Market information, Standardization and grading.

**Practical**
Identifying the types of markets functioning around the Northern region, Recording the seasonal fluctuations of the market prices for agricultural commodity, Estimating the transportation cost, retailer and wholesaler margins for some selected agricultural commodities, Collecting information regarding existing storage, grading and sales promotions system around the peninsula, Estimating the percentage of value addition for some selected agricultural products

**Recommended Readings**

**ACC 31011: BIOETHICS (1:15/00)**

**Objectives**
To impart knowledge on the importance of bioethics, its necessity, application in experiments and in agricultural production

**Learning outcome**
- Explain the importance of bioethics in agriculture,
- Demonstrate how bioethics regulations are important and maintained
- Adopt in their personal and professional carrier

**Course content**
Ethics and bioethics, ethics of science and technology, Environmental ethics, Role of bioethics in agriculture, Code of ethics, Research ethics, Ethics of dissemination of knowledge, Ethics of Intellectual Property Rights, Role of Ethical review committees in Sri Lanka, Case studies
Recommended Reading


Course Contents for Third Year Second Semester

AGR 32012 CROPPING SYSTEMS AND AGROFORESTRY (2:23/15)

Objectives

To impart knowledge and practical skills on cropping systems, sustainability of cropping systems, evaluation of cropping system efficiency and significance of agro-forestry in system management and sustainability.

Learning Outcomes

- Describe the role of forests on climate change mitigation and adaptation and sequestration through cropping systems
- Explain the benefits of different cropping systems in terms of sustainability
- Explain the benefits of agro-forestry in terms of sustainability
- Classify the main systems of forestry and agro-forestry using various bases for classification specially in Sri Lanka
- Evaluate the major ecological processes in the agro-forestry systems
- Discuss the possibilities and limitations of application of agro-forestry in the context of local ecological and socio-economic conditions

Course Contents

Importance of cropping systems, different types of cropping system practice in Sri Lanka and their impact on production and sustainability, merits and demerits of different cropping systems, evaluation of cropping system efficiency and cropping system research and farming system, sustainable land use pattern in Sri Lanka, importance and impact of forest on eco system and socio economic of the country, forest community analysis, forest productivity, and nutrient cycling, forest succession, distribution and classification of forest, structure and composition of forest, deforestation and its impacts on environment, classification of agro-forestry and different agro-forestry systems in Sri Lanka and agro forestry.
Practical

Field visit to study the different cropping system, its importance, benefits, sustainability and profitability: Studies the efficiency of inter cropping system practiced in field crops and plantation crops; Establishment of alley cropping and other cropping systems; Visit to the agro-forestry systems; Establishment of model agro-forestry

Recommended Readings


ANS 32012 ANIMAL PRODUCTS PROCESSING TECHNOLOGY (2: 15/30)

Objectives

Understand the importance of promoting dairy, meat and fish production technology in Sri Lanka. Students will learn the technologies involved with producing different milk, meat and fish products. Students also get hands on experience on production different products,
determination of nutritive value of value added foods and quality control aspects. Performing cost benefit analysis for different products to get a feel of profitability.

**Learning Outcomes**

- Demonstrate the importance of processing milk, meat and fish
- Demonstrate the steps involved in mother culture preparation
- Describe the steps and technologies involved in production of different milk, meat and fish products
- Able to produce different milk, meat and fish products
- Assess the quality of raw products and processed products
- Predict the profitability of different products

**Course Contents**

**Theory**


**Practical**

Study visits to milk collection/ Chilling centers and milk processing plants, Laboratory practical on milk testing, Production of cheese, butter, yoghurt, curd and other flavored dairy product. Visits to slaughter house to demonstrate ante-mortem and post-mortem examination, Training of students in techniques involved in, processing and packing of meat products, Demonstration of
Anatomical features of major systems in fish. Preparation of meat and fish products, Demonstration on fishing gears, Identification of different verities of fish.

**Recommended Readings**


**AGB 32012 GENETICS AND PLANT BREEDING (2:23/15)**

**Objectives**

To impart knowledge on the principles of genetics and plant breeding in a simple and acceptable form. Familiarize with methods of breeding of field crops and explain the methods of breeding in simple language and to use suitable examples familiar to students.
Learning outcome

- Describe genetics and plant breeding.
- Adopt technical skill in breeding methods, utilize genetic principles in breeding in a systematic manner.
- Practice with self-confidence and self-reliance in plant breeding activities.
- Develop as a professional plant breeder to plan and implement sound programmes in crop improvement.

Course contents

Theory

Mendelian principles and their extension, Linkage, recombination, coincidence and interference. Chromosome mapping, cytogenetics and quantitative genetics, population genetics, Basic concepts of plant breeding, Genetic basis of plant breeding, Breeding methods, Self-pollinated, cross-pollinated and asexually propagated crops, Breeding techniques, Emasculation, pollination, Screening techniques for insect pests and disease resistance in crops, Heterosis and hybridization. Genetic resources and conservation. Center of origin and Bio-diversity.

Practical

Problems related to Mendel’s law, Epistasis and lethality, Linkage, Crossing over, cytogenetics, population genetics, mode of reproduction in crop plants, floral structure and floral biology of important cereals, pulses, oil seeds, commercial crops, selfing techniques in crop plants, tools used in breeding (Breeder’s kit), emasculation techniques in crop plants, pollination methods

Recommended Reading


ACH 32013 FOOD TECHNOLOGY (3:35/20)

Objectives

This course aims to provide the knowledge of basic principles and methods food preservation, processing technologies, causes of microbial food spoilage and parameters of foods controlling microbial activity

Learning Outcomes

- Describe the basic principles and practices of the major techniques used in food preservation
- Explain the principles of food processing techniques and apply principles of food processing techniques to specific commodities
- Categorize and explain the intrinsic/extrinsic conditions affecting the growth, survival and death of microorganisms in foods

Course Contents

Theory

Principles and methods of food preservation, fruits and vegetables processing technology, sugar and confectionary processing technology, alcoholic beverages processing technology, cereals and starch processing technology, oils and fat processing technology food deterioration and its control, intrinsic and extrinsic parameters in foods controlling microbial activity

Practical

Laboratory practical: Estimation of salt content in salted dry fish, estimation of ethanol content in wine/toddy, Preparation of some fruit products
Field visits: Visit to fruit processing and soft drink factories, rice mills, bakery, traditional and modern oil extraction mills, pot still and patent still distilleries, sweet and confectionary manufacturing industries

**Recommended Reading**


**ACH 32021 SOIL AND POLLUTION MANAGEMENT (1: 15/00)**

**Objectives**

The aim of the course is to provide a better understanding of hazardous effects of indiscriminate use of fertilizers and various pesticides on the environment and the possibilities of managing pollution

**Learning Outcomes**

- Identify and explore the effects of fertilizers on environment
- Classify the pesticides and explore the fate and effects of pesticide in the environment
- Recommend soil management practices to face global warming
• Explore soil contamination and recommend remediation techniques

Course Contents

Theory
Fertilizers and environment, pesticides, classification and fate in ecosystem, soil, water and air pollution due to agricultural activities, eutrophication, green house gas emissions, global warming, soil erosion and sedimentation, soil contamination and remediation techniques

Recommended Reading


AEN 32012 Environmental Engineering (2:23/15)

Objectives
The aim of the course is to provide enough basic engineering knowledge about environment to use available resources of nature in an eco-friendly manner to produce better with low waste generation and damage to environment.

Learning Outcomes

• Solve environmental problems using basing engineering knowledge
• Explain various process influencing environmental stability
• Analyze different industrial for resource optimization
• Develop eco-friendly environmental strategies for conserving environment
Course content

Theory

Waste and environment, climate change, air pollution, salinity development, solid waste, compost making, Environmental Impact Assessment and mitigation, introduction to renewable energy, Agricultural and industrial pollution-pollutants, suspended particulate matters (SPM), \( \text{SO}_2 \), \( \text{CO} \), \( \text{NOx} \), oxidant/ozone and their control measures, Effect of industrial pollution, Solid waste management, Municipal waste and household waste, Waste water management, Waste water and its properties, sewage disposal and treatment and Reuse of waste water, oxygen dynamics of stream discharged with industrial effluent, contaminant transport and the brake through curves.

Practical

Preparation EIA sheet, Measurement of the parameters of waste water, Break through curve development, Oxygen dynamics of water bodies polluted by industrial effluent, Application of Solid waste options for better efficiency, Design of constructed wetland, Design of efficient compost making plant.

Recommended Reading

AEC32022 INTRODUCTION TO ECONOMETRICS (2:23/15)

Objectives
To learn how to set up econometric models that can be used to test theories, hypothesis; to study how to organize, present, and analyze data, as well as how to present the results obtained from the analysis.

Learning Outcomes
After successful completion of the course, students will be able to;
- Explain the fundamental theory underlying regression analysis
- Estimate economic relationships by applying regression analysis to data
- Test economic hypotheses.
- Interpret and analyze regression estimates.

Course content

Theory
ordinary least squares regression models - simple and multiple regression methods using cross-sectional data, focusing on issues of estimation and inference.

Practical
Loading data in econometric packages, Data Transformations, Checking for Statistical Properties of Series, Detection of Classical Assumptions Violation, Estimate simple linear regression model including logarithmic transformations, test for the statistical significance of the estimates and the model, Estimate multiple linear regression model, test for the statistical significance of the estimates and the model, Interpretation of Results, diagnostic testing

Recommended Readings
1) Basic Econometrics by Damodar Gujarati

ACC 32012 ORGANIZATIONAL AND DISASTER MANAGEMENT (2:30/00)

Objectives

The prime objective is to provide necessary skills to the students in planning, organizing, leading and controlling the efforts of organization members and resources to achieve stated organizational goals and be able to constantly solve problems and make decisions that are of benefit. The overall aim of disaster management is to prevent or reduce losses that occur due to hazards, disasters and emergencies.

Learning Outcomes

- Describe the management concepts and its applications to an organization as well as in an emergency situation.
- Explain the classical approach, behavioral approach, Quantitative approach and contingency approach to management.
- Apply required skills in managing time and human resource optimally.
- Explain the ways in reducing damages and deaths under an emergency situation.

Course content

Theory

Recommended Reading


ACC 32021 INDUSTRIAL TRAINING (1: 00/60)

Objectives

The course aims to impart hands on training at agro-based industries to strengthen managerial and technical ability

Learning Outcomes

On completion of the course the students will be able to

- Incorporate the experience gained into their professional carrier
- Work towards commercialization
- Initiate and manage agro based industries

Course content

Each student will be assigned to an agro-based industry based on his/her specialization discipline for four weeks during the end semester vacation of third year second semester. They will be
trained on technical and management aspects by the relevant industry. On completion of the training the students will share their experience through a presentation and by submitting a report. The presentation and report will be evaluated.

**Third year second semester specialization courses**

**AGRS 32012 CROP PHYSIOLOGY (2:23/15)**

**Objectives**

To impart knowledge on physiological changes at different stage of rice, maize and pulse crops, tuber crops, photo assimilate translocation with in a plant, yield components and their contribution towards crop yield.

**Learning Outcomes**

- Explain plant type concept in rice and its contribution toward high yield
- Describe concept of optimum and correlate it to high crop yield
- Elaborate physiology of photosynthesis of leaves and photo assimilates translocation in crops
- Correlate yield components and their contribution to crop yield in rice, maize and pulse crops

**Course contents**

**Theory**

Physiological aspects of major crops which influence growth and development, canopy development and photosynthesis, photo assimilate translocation and sink source interaction. Plant type concept for high yielding, environmental effect on crop photosynthesis yield components
Practical

Study the different growth stages of rice, maize and Pulse crops; Morphology of old and new improved rice varieties; Leave emergence and development of rice crops; Estimation of LAI in rice and pulse crops; Yield components and calculation of theoretical yield in rice, maize, and pulse crops; Assess the sink source relationship in maize crops.

Recommended Readings


AGRS 32022 WEED MANAGEMENT (2:23/15)

Objectives

To furnish the students with knowledge and practical skill on weed management strategies towards successful management of weeds in crop field.

Learning Outcomes

- Identify the important of annual and perennial weeds

- Understand and know the seed production capacity of important annual weeds and their competitive nature

- Know the various perenating parts of important perennial weeds and their production capacity.

- Explain allelopathy in weed and its effect on crop yield
- Propose strategies for weed management and recommended weed control measures.

Course Contents

Theory

Weed nomenclature and classification, weed propagation, integrated weed management in control of annual and perennial weeds, problems weeds and parasitic weeds, allelopathy in weeds, succession of weeds, use of herbicides in controlling annual and perennial weeds, environment and weed management.

Practical

Identification of important of annual and perennial weeds; Assessing the seed production capacity of some annual weeds; Identification of different perenating parts of perennial weeds and testing their germination capacity; Study the nut let production capacity of important perennial weed *Cyperus rotundus*; Planning and implementation of weed management plan for crops.

Recommended Readings


ANSS 32012 SUSTAINABLE ANIMAL BREEDING (2: 23/15)

Objectives
This course is designed to give some insight into the needs for better use of animal genetic resources in the context of projected demands for food.

Learning Outcomes
- Will be in a position to use quantitative methods to estimate genetic parameters and to select genetically superior animals
- In addition they will be in a position to plan appropriate breeding programmes according to the resources available.

Course Contents
Theory
Global perspectives of animal genetic resources, knowledge of indigenous genetic resources, quantitative methods in animal breeding, National livestock development policies and strategies, development of breeding programmes.

Practical
It will include manual and computer exercises on genetic relationships and inbreeding, quantitative characters, selection index, selection and genetic gain, prediction of breeding values, breeding plans.

Recommended Readings


ANSS32022 FISH PRODUCTION AND TECHNOLOGY (2: 20/20)

Objectives
This course is designed to give students knowledge of the basic principles of fish production and technology by introducing the culture techniques of finfish and shellfish.

Learning Outcomes
- know the morphological, physiological and economic characteristics of profitable fish species
- Able to establish a fish farm giving emphasize to major technological and economic parameters.

Course contents
Theory
Economic importance of fishery, Fisheries potential in Sri Lanka, Maritime boundries of Sri Lanka, Overview of fisheries management, economically important cultivable marine and inland finfish and shell fishes. fish biology and reproduction, factors influencing on aqua enterprising, Different species breeding, hatcheries and culture techniques, feeding and nutrition of fish, water quality management, effluent management, breeding harvesting and transportation of economically important finfish and shell fish, disease and parasites of finfish and shellfish, Scope and culture of ornamental and aesthetic fish production, Pathology and health management of fin fish and shell fish,
Practical
Visits to fish landing sites or harbours, identification of different verities of fish, Demonstration on fishing gears, Dissection and demonstration of anatomical features of major systems in fish, Building and construction of fish ponds, calculating thing the flow rate, water, soil analysis, grow out trials and management, cost benefit analysis

Recommended Readings

AGBS 32012 AGRICULTURAL ACAROLOGY (2: 23/15)
Objectives
To impart knowledge on the pest, predatory, and parasitic habits of mites and their biology. Distribution of pest mites in the plant ecosystem and their damages, Use of predatory and parasitic mites for the management of insect pests and mites

Learning outcome
At the end of the course the students will be able to,
• Classify and identify acari (mites and ticks) exists in crops and storage
• Describe crop damages caused by mites and their etiology
• Describe predatory, parasitic and other mode of living of mites

Course contents

Theory
Introduction to mites and ticks, Morphology of mites and ticks, classification, feeding habits such as phytophagous, predatory and parasitic life of success, life cycles of mites, Internal anatomy of mites, Types of damages caused by ticks and mites in plants and house hold animals. Diagnosis, Management of mites and ticks.

Practical
Identification of mite damage, morphology of mites and slide preparation, Rearing techniques of phytophagous mites in various substrates, Rearing of predatory mites, Assessing the potential of mites and ticks, role of spiders and their beneficial role in agriculture, visit to farmers fields to identify mites damage and collection of mites

Recommended Readings

AGBS 32022 NEMATOLOGY (2:23/15)

Objectives
To impart knowledge on pest, and predatory habits of nematodes and their biology, distribution of nematodes in the plant ecosystem and their damages, use of predatory and parasitic nematodes for the management of insect pests

Learning outcome
• Classify and identify plant parasitic and predatory nematodes
• Describe crop damages caused by nematodes their biology
• Suggest/recommend suitable integrated management practices to control nematodes

Course contents

Theory

Introduction to Nematology, Characteristics of plant pathogenic nematodes, Diagnosis, Isolation and preservation of nematodes, Symptoms caused by nematodes, Interrelationship between nematodes and other plant pathogens, Ecology of nematodes, Gall forming nematodes, entomopathogenic nematodes, Management of phytophagous nematodes.

Practical

Identification of nematode damage, morphology of nematode and slide preparation, Rearing techniques of phytophagous nematodes in various substrates, Rearing of predatory nematodes, Assessing the potential of nematodes in crop ecosystem, role of nematode in agriculture, visit to farmers fields to identify nematode damage and collection of samples

Recommended Readings


ACHS 32012 SOIL PHYSICS FOR SUSTAINABLE AGRICULTURE (2: 23/15)

Objectives

The course is structured to provide understanding about soil physical properties and processes, in order to manage the soils for agricultural sustainability and environmental quality, to acquire necessary practical skills in soil physics for sustainable agricultural and environmental management.
Learning Outcomes

- Describe soil physical properties and processes in relation to agricultural sustainability and environmental quality
- Analyze and interpret physical properties with necessary skills.

Course Contents

Theory
Soil physics, agricultural sustainability and environmental quality. Soil components and phases, soil texture and its uses, soil structure, assessment of aggregation and structure, impact of structural degradation and management of soil structure, soil crusting and crust management, soil moisture content and soil water potential, soil water movement in saturated and unsaturated soil and implications, soil temperature and heat flow, soil air and aeration

Practical

Assessment of extent of aggregation, Assessment of aggregate stability, Assessment of hydraulic conductivity, field capacity, permanent wilting point.

Recommended Readings
ACHS 32022 SOIL CHEMISTRY (2: 23/15)

Objectives
The course is designed to provide knowledge about soil chemistry to manage agricultural soils, to understand chemistry of submerged soils and the fate of agrochemicals.

Learning Outcomes

- Describe the chemistry of soils including submerged soils
- Describe and distinguish different soil colloids and properties
- Describe and investigate fate of agrochemicals in environment

Course Contents

Theory
Organic and inorganic colloids in soils, charge characteristics, flocculation and dispersion, ion exchange and adsorption isotherms, soil pH, buffering, soil acidity and alkalinity: development effects and management, redox potential, submerged paddy soils and their effect on environment, fate of agrochemicals in soil and plant, management of polluted soils.

Practical
Adsorption isotherms, specific surface of soils, buffer capacity, exchangeable sodium percentage, adsorption and leaching of selected pesticides

Recommended Readings

ACHS 32012 FOOD CHEMISTRY (2:23/15)

Objectives

This course aims to provide the knowledge of individual components of foods, additives, enzymes, adulterants, contaminants, flavours and sensory attributes of food. It also aims to introduce the students about the phytochemicals and nutraceuticals

Learning Outcomes

At the end of the course the student should be able to,

- Describe the concept of water activity and how it influences chemical, biochemical and microbial stability of food
- Discuss and demonstrate the important properties of carbohydrate, protein and fat
- Identify and describe the food additives, colorants, flavours, adulterants and contaminants
- Describe the scientific basis and technologies for functional foods and nutraceuticals

Course Contents

Theory

Concept of water activity, moisture sorption isotherms, water binding in foods, functional properties of carbohydrates, modified starches, pectin, food lipids and health, thermal decomposition of fats, chemistry of frying, functional properties of proteins, important food proteins, food additives, food colourants, food flavours, adulterants and contaminants in foods, natural antioxidants, enzymes used in the food industry

Practical

Chemical analysis of pectin of different fruits and vegetables, tests for adulteration, hydrolysis of starch by commercial enzyme, determination of gel consistency of cereal flours, determination of functional properties of carbohydrates and proteins, determination of antioxidants in fruits and vegetables, detection of food additives
Recommended Readings


ACHS 32022 FOOD MICROBIOLOGY (2:23/15)

Objectives

This course provide knowledge of microorganisms that are associated with food (bacteria, yeasts and moulds), methods used to determine the microbial populations, sources of microorganisms, microbial applications in food fermentation, food biotechnology and food borne illnesses in human.

Learning Outcomes

- Recognize names and groups of important bacteria and have an understanding of their capacities
- Propose and describe suitable detection and enumeration method for a particular microbial sample
- Describe the spoilage patterns of various food commodities and food borne illnesses
• Identify hazards, critical control points and good manufacturing and agricultural practices in food manufacture
• Identify 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

Course Contents

Theory

General microbiology, Major groups of microorganisms and their action on foods, Sources of microorganisms, Detection and enumeration of microorganism in food, Characteristics of psychrotrophic and thermophilic microorganisms, Microbial spoilage of foods, Microorganisms associated with fermentation of foods, Food born infection and intoxication, mycotoxins, Food sanitation, HACCP, GMP, GAP, Indicator organisms, Food biotechnology, Beneficial and detrimental effects of genetically modified organisms

Practical

Introduction to laboratory safety, use of equipment, culture media and sterilization techniques, Quantification of microbes in food, fermented food products and water (sampling, serial dilution and counting), culture techniques using standard plates, pure culture isolation techniques

Recommended Readings

5. Banwart, G.J. (2004) Basic Food Microbiology, CBS publishers and Distributors, India

AENS 32012  IRRIGATION AND WATER MANAGEMENT (2:23/15)

Objectives

The aim of the course is to learn the importance of water management for efficient application of irrigation water and optimizing crop output, to obtain knowledge on watershed management for strengthening of irrigation water quantity and quality management, to be aware of basic design of each irrigation method and to enable to evaluate the all irrigation system and to emphasize the development of yield-irrigation water models

Learning Outcomes

- Apply the knowledge on water management and watershed management to increase the efficiency of the system
- Estimate the irrigation design parameters of different irrigation methods.
- Estimate the quantity and quality of water for crop irrigation
- Asses crop response and crop yield loss due to shortage and poor quality of irrigation water

Course content

Theory

Irrigation system development, History and development of irrigation system, Selection criteria for different irrigation system, Merits and demerits of border, basin, furrow, sprinkler and drip irrigation, Basic design of border irrigation, basin irrigation, Furrow irrigation, Sprinkler irrigation, Drip irrigation, lift irrigation, Crop response to irrigation water, Watershed management, crop and water inter relationship.
Practical

Measurement of design parameters of Irrigation, Field installation of Drip and Sprinkler irrigation, Setting of layout, Measurement of Irrigation efficiency and Irrigation structures.

Recommended Readings


AENS 32032 Farm Machinery Testing and Evaluation (15/30)

Objectives

To make the students practically viable in the testing and evaluation procedures of various farm machines like 4WT, 2WT, seeders, planters combine harvester, water pumps, thresher, reapers and sprayers.

Learning Outcomes

- Test and evaluate machineries
- Select appropriate brand of a machine for particular operation
- Evaluate the condition of a machine to make possible repairs well in advance to increase their durability
- Handle an engine without efficiency loss in running conditions
• Acquire full knowledge on working principles of engines and troubleshooting spares and their maintenance
• Aware of safety precaution on handling of machines without any field accidents

Theory

Introduction to testing and evaluation of farm machinery, basic definitions and calculations related to capacity of farm machines, importance of testing and evaluation, use of 4WT and 2WT in farm operation, 2WT and 4WT maintenance, Diesel engines and their operations, power points of 2WT and 4WT, components and functions of reapers, threshers, pumps, combine harvester, seeder, and planter.

Practical

Testing and evaluation of 2WT, 4WT, knapsack sprayer, power sprayer, seeder, planter, blowers and dusters, reapers, threshers and harvesting loss calculation, Testing & evaluation of combine harvester, primary tillage tool, and secondary tillage tool, Tutorial:- Field problem / Case study

Recommended readings


**AECS 32012 AGRICULTURAL POLICY ANALYSIS (2:30/00)**

**Objectives**
To provide students with the knowledge to analyze policies that address the level and stability of farm incomes, marketing, structural adjustment and trade problems, with particular emphasis on food policies and also to provide students with clear understanding of the political economy of agricultural policy to illustrate the limitations of our standard economic tools to analyze agricultural policy.

**Learning Outcomes**
- Develop a critical knowledge in the agricultural policy environment, the policy formulation process and the institutions or groups involved in agricultural policy making.
- Assess current farm programs, evaluate emerging food policy and trade policy issues.
- Identify the main elements of the major challenges faced by the agricultural policy makers
- Explain the neoclassical framework for economic policy analysis.

**Course content**

**Theory**
Policy analysis: Framework, Policy analysis: Economics, Agricultural policies : Price policy, Marketing policy, Input policy, Credit policy, Land reform policy, Irrigation policy, Food policy and security, Quantitative analysis of agricultural policy

**Recommended Readings**

AECS32022 NATURAL RESOURCE AND ENVIRONMENTAL ECONOMICS (2:23/15)

Objectives
To provide solid background knowledge of resource and environmental economics by briefly outlining the fundamental characteristics for an economic approach to environmental analysis and the origins of the sustainability problem by discussing economy environment interdependence, introducing some principles from environmental science, and by investigating the diverse environmental impact, pollution targets and pollution taxes.

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 environmental degradation;
- Evaluate alternative policy approaches to the amelioration of environmental damage;
- Apply basic principles behind the economics of natural resource use.

Course content
Theory
An Introduction to natural resource and environmental economics, Ethics of environmental conservation and concepts of sustainability, Welfare economics and environment, Pollution control, Valuing the environment, International environmental problems, Environment and the developing countries, The efficient and optimal use of natural resources, The theory of optimal non-renewable resource extraction, Stock pollution problems.

Practical
Visiting to the Environmental authority and related institutions, Identifying and Monitoring the Vulnerable areas around Sri Lanka specially around the Northern province, Performing a simple Environmental Impact assessment.
Recommended Reading

