

**The Outline of the Degree Programme**

Semester	Name of the Semester	Series	Courses Offered	Credits
1	First Year First Semester	11000	Core Courses	13
2	First Year Second Semester	12000	Core Courses	18
3	Second Year First Semester	21000	Core Courses	19
4	Second Year Second Semester	22000	Core Courses	20
5	Third Year First Semester	31000	Core Courses	21
6	Third Year Second Semester	32000	Core Courses	14
			Specialization Courses	04
7	Fourth Year First Semester	41000	Core Courses	05
			Specialization Courses	08
8	Fourth Year Second Semester	42000	Research Project	08
<b>Total</b>				<b>130</b>

**First Year First Semester - Core Courses (11000):**

No.	Code	Title	Credits
1.	AGR 11013	Principles of Crop Production Technology	3:30/30
2.	ANS 11012	Principles of Animal Production	2:23/15
3.	AGB 11012	Cell Biology and Crop Botany	2:15/30
4.	ACH 11012	Soil and Environment	2:15/30
5.	AEN 11022	Applied Hydrology and Engineering Drawing	2:15/30
6.	AEC 11022	Principles of Microeconomics	2:30/00
7.	ACC 11012	Computer Literacy and Basic Application	2:30/00
8.	ACC11022 (AEN / AEC)	Basic Mathematics	2:30/00
9.	ACC 11032	English I	2:30/00
10.	ACC 11041 (ACH / AGB)	Laboratory Techniques	1:00/30
<b>Total</b>			<b>13</b>

**First Year Second Semester - Core Courses (12000):**

<b>No.</b>	<b>Code</b>	<b>Title</b>	<b>Credits</b>
1.	AGR 12013	Production Technology of Cereal Crops	3:30/30
2.	ANS 12012	Anatomy and Physiology of Farm Animals	2:23/15
3.	AGB 12033	Plant Physiology and Environmental Biology	3:30/30
4.	ACH 12013	Soil Properties and Processes	3:30/30
5.	AEN 12023	Principles of Farm Machinery	3:30/30
6.	AEC 12032	Principles of Macroeconomics	2:30/00
7.	AEC 12042	Agricultural Extension and Communication	2:15/30
8.	ACC 12012	English II	2:30/00
9.	ACC 12021	Social Harmony	1:00/30
	<b>Total</b>		<b>18</b>

## **Course Contents for First Year First Semester**

### **AGR 11013 PRINCIPLES OF CROP PRODUCTION TECHNOLOGY (3:30/30)**

#### **Objectives**

To develop a basic knowledge on principles of crop production, management, influence of various climatic factors on crop establishment, importance of physiology and biochemistry of seed germination, vigour, viability, dormancy and to develop a basic foundation for continued learning in agronomy courses.

#### **Learning Outcomes**

On completion of this course students will be able to:

- Define Principles of Agronomy and its importance
- Explain the classification of agro-ecological zones and their significance in selection of crops for cultivation
- Illustrate function of meteorological instruments and evaluate the effect of climatic factors on crop growth and development
- Demonstrate the methods used in crop growth analysis
- Describe the importance of fertilizer management for crops
- Discuss weed management practices
- Recognize types of growth hormones and their role in commercial agriculture
- Describe practical aspects of seed physiology, and the relationship with crop productivity

#### **Course Contents**

##### **Theory**

Introduction to climate, weather and Agro-meteorology, Agro-ecological zones of Sri Lanka and their influence on crop production and farming systems, growth analyses, role of macro and micro nutrients on plant growth and development, weed management, role of hormones in plant growth and development, application of hormones in agriculture, seed structure, Types of seeds, Seed germination and dormancy, Seed vigour and viability, Seed storage and factors influencing seed viability in storage, Seed testing and certification.

### **Practical**

Identification of Meteorological instruments and study their functions, maintenance and record keeping; Establishing various plants, monitoring their growth and generating growth curves and calculation of growth indices; Identification of inorganic, organic fertilizers and of nutrient deficiency symptoms; Identification of important weeds and different weed management methods; Identification of synthetic growth regulators and their uses in agriculture; Determination of seed viability and vigour and seed Testing; Classification of dormancy and dormancy breaking mechanisms.

### **Recommended Readings**

- 1) George, A. (2002) Principles of crop production: Theory, techniques and technology, New Delhi, India.
- 2) Das, P.C. (2000) Crops and their production technology under different condition. Kalyani Publication, Ludhiana.
- 3) Chapman, J.L. and Reiss, M.J. (1995) Ecology: Principles and application. Cambridge university press, New York.
- 4) Radhakrishnamurthy, V. (1995) Practical manual on Agromterology. Kalyani publication, Ludhiana.

### **ANS 11012 PRINCIPLES OF ANIMAL PRODUCTION (2: 23/15)**

#### **Objectives**

To impart knowledge on the role of livestock in Sri Lanka, current status of livestock sector in Sri Lanka, major agro climatic zones, production systems, livestock breeds and their characteristics, feed stuff and their resources, importance of crop livestock integration and basic concepts of planning a farm and conducting a farm survey.

#### **Learning Outcomes**

- Identify the needs of developing livestock sector in Sri Lanka.
- Identify and describe breeds of poultry, swine, rabbit, cattle, buffalo, sheep, and goats.

- Demonstrate the ability to identify the suitable breeds according to the purpose and agro climatic zones and production systems.
- Demonstrate the capacity to choose different feed stuff to provide nutrient components and to choose feed stuff from different sources.
- Demonstrate the uses of different management tools in the livestock management.
- Discuss the importance of crop livestock integration and able to plan and workout cost benefit analysis to different forms of integrated farms.
- Demonstrate an understanding of planning a livestock farm and conducting a farm survey.

## **Course Contents**

### **Theory**

Present status, existing potentials and constraints in major agro-ecological regions of Sri Lanka for production and management of livestock, poultry and fish; organizational set up of livestock sector; livestock industries in Sri Lanka; characteristics of different breeds of farm animals; introduction to feeds and feed resources; crop livestock integration; planning and establishing of an animal farm; farm survey.

### **Practical**

Identification of cattle, buffalo, goat, sheep, poultry, rabbit and pig breeds; Crop and livestock integration; Basic aspects of animal feedstuff; Introduction to management tools and Study visit to Jaffna District Development Cooperative society, Livestock Breeders Cooperative Society, Department of Animal Production and Health, livestock farms, Atchuvely hatchery and AI center.

### **Recommended Readings**

1. Abeyratne, A.S. (2007) A Review of the livestock Industry of Sri Lanka. Kandy Printers (Pvt) Ltd, Sri Lanka.
2. Carol Ekarius. (1999) Small-scale livestock farming: a grass-based approach for health, sustainability, and profit. 1<sup>st</sup> Edition. Storey publishing, USA.

3. Phillips, C.J.C. (2009) Principles of Cattle Production. CSIRO Publishing.
4. Richard Kellems and David Church. (2009) Livestock Feeds and Feeding. Pearson Education.
5. Taylor, R.E. and Field, T.G. (2011) Scientific Farm Animal Production: An Introduction to Animal Science. 10<sup>th</sup> Edition. Prentice Hall.
6. Ronald Kay, William Edwards and Patricia Duffy. (2011) Farm management. 7<sup>th</sup> Edition. Mcgraw-hill science/engineering/math.

## **AGB 11012 CELL BIOLOGY AND CROP BOTANY (2:15/30)**

### **Objectives**

To impart knowledge on the structure of prokaryotic, eukaryotic cells, virus and viroids, structure and function of different cell organelles and the basic morphology and anatomy of the important plant families and field level identification of plants belonging to different families and their economic usage.

### **Learning Outcomes**

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

- Familiarize the terminologies in cell biology, cell structure and their functions in English.
- Gain a thorough knowledge on different cell organelles and their functions.
- Acquire comprehensive knowledge of the economically important families.
- Identify the plants using their morphological characters and their economic use

### **Course content**

#### **Theory**

Study the structural characters of prokaryotic cell, eukaryotic cell (Plant and Animal), viruses and viroids. Study the Structure and function of following cell organelles: cell wall, cell membrane, nucleus, mitochondria, chloroplast, ribosome, golgi apparatus, lysosome, micro bodies, structure and function of DNA and RNA, details of different cell division process, mitosis and meiosis, Principle of plant taxonomy, Species concept and plant nomenclature,

Morphological characters of agricultural important plant families, Botany of multipurpose crops and medicinal plants and their usage

### **Practical**

Cell division: Mitosis, Meiosis; Differentiation of dicots and monocots , observation of plant species in field; description of stem, leaf, flower/inflorescence, floral diagram, family characters of Fabaceae, Caesalpineaceae, Mimosaceae, Brassicaceae, Malvaceae, Theaceae, Cucurbitaceae, Caricaceae, Solanaceae, Zingiberaceae, Euphorbiaceae, Poaceae, Rubiaceae, Arecaceae, Rutaceae, Musaceae, identifying and economic usage of different family crops, medicinal plants and their uses and multipurpose tree species.

### **Recommended Readings**

- (1) Randy wayne. (2009) Plant cell biology. Elsevier
- (2) Bruce Alberts, Dennis Bray, Karen Hopkin and Alexander Johnson. (2009) Essential cell biology. Garland science
- (3) Chanda, S. (2000) Simplified course in botany. S.Chand and Company Ltd, New Delhi.
- (4) Krishnaswamy, R. (1998) Science in cell. Kalyani publications, New Delhi.
- (5) Thomas, D., Pollard, M.D., William C., Earnshaw and William, C. (2004) Cell Biology. Elsevier Science Health Science division.
- (6) Ralph Taggart. (2004) Cell Biology & Genetics, Thomson Learning.
- (7) Sneddon and Robert. (2004) Cell Division and Genetics. Heinemann Educational Books Publisher.

### **ACH 11012 SOIL AND ENVIRONMENT (2: 15/30)**

#### **Objectives**

To impart knowledge of the scientific concept of soil and its composition, to provide the students aware of the different types of minerals and rocks that form soil, to enrich the knowledge about weathering of rocks and minerals, the factors and processes of soil formation and to familiarize different sampling techniques and handling sampling equipment.

## **Learning Outcomes**

On completion of the course the students will be able to:

- Describe about soil, its composition and functions in the eco-system.
- Identify, classify and describe types of rocks and minerals of the earth
- Contrast and describe the weathering process of rocks and parent material
- Describe and explore the factors and process of the formation of different types of soils and soil profile
- Identify different soil augers, demonstrate sampling and handling of different soils for different analytical purposes

## **Course Contents**

### **Theory**

Role of soil in our ecosystem, composition and phases of soil, formation classification and properties of minerals and rocks, factors and processes of rock weathering, types of parent material, soil genesis, soil profile description, soil sampling and equipments.

### **Practical**

Study the physical properties of minerals such as structure, cleavage fracture, luster, colour, streak, hardness and specific gravity. Study the classification of rock forming minerals and the properties and characteristics of different kinds of rocks; igneous rocks, sedimentary rocks, metamorphic rocks. Study of rocks of Sri Lanka, study of soil sampling equipments, collection and preparation of soil samples for analysis

### **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. Sehgal, J. (1996) Pedology concepts and applications. 1<sup>st</sup> Edition. Kalyani publishers



3. Danielson, E.W. and Denecke, E.J. ( 1986) Earth Science. Macmillan publishing company, New York.
4. Cooray, P.G. (1984) An Introduction to the Geology of Sri Lanka (Ceylon). 2<sup>nd</sup> Edition. National museum of Sri Lanka, Sri Lanka.
5. Alan wild. (1993) Soils and the Environment: An Introduction. Cambridge University Press.

## **AEN11022 APPLIED HYDROLOGY & ENGINEERING DRAWINGS (2:15/30)**

### **Objectives**

The aim of the course is to develop operational and mechanical skills of drawings in order to develop various engineering concepts for theory and practical knowledge about mapping and designing of engine spares and structures and to provide them the basic concepts of hydrological cycle and the fundamentals of hydrological process in the nature.

### **Learning Outcomes**

- Describe fundamentals of mechanical drawings
- Construct the drawings of different sectional views
- Apply the actual practices in materializing hydrological principles

### **Course content**

#### **Theory**

Hydrologic cycle, Human influences on hydrologic cycle, principles of formation of rainfall, Forms of precipitation, artificially induced precipitation, types of precipitation, Sri Lankan pattern of rainfall, Intensity, frequency and duration rainfall data analysis, interception, measurement of interception, factors affecting the amount of interception, calculation of interception, Infiltration, factors affecting the rate of infiltration and calculation of infiltration rate, measurements of runoff, factors affecting the amount of runoff and calculation of runoff,

stream flow, hydro-graph, hydrograph separation, derivation of unit hydrograph, stream flow measurements.

### **Practical**

Introduction to drawing instruments, Drawing sheet management & projection symbol development, Drawing lines and introduction to drawing views (Types of lines, Lettering, Out lines& Arrow head, Sketching and Spacing), Orthographic projection- 1<sup>st</sup> angle, Orthographic projection- 3<sup>rd</sup> angle, Isometric projection, Sectional drawing, CAM drawing, Ellipse construction ( Rectangular & concentric circle), Ellipse construction ( Intersection of arc & Four arc method), Designing of Bolt and Nut, Different type of Rainfall meters, Mantling and Dismantling of rain fall meters, Measurement of precipitation, Measurement of Interception, Rainfall chart analysis, Stream flow measurements.

### **Recommended readings**

1. Bhatt, N.D. (1990) Bhatt Elementary Engineering Drawing, Charotor Publishing house, Anand, India.
2. Bapat, A.R. (2004) Engineering Graphics, Allied Publishers, New Delhi
3. Shah, P.J. (2008) Text Book of Engineering Drawing, S Chand & Publications.
4. Sharma, R.K. (1993) A text book of hydrology and water resources. Shriganesh offset Press, Shahdara, Delhi.
5. Ghanshyam, D. (2000) Hydrology and Soil Conservation. Prentic Hall of India
6. Wanielista, M.P. (1990) Hydrology and water quality control. John Wiley and sons Newyork.

### **AEC11022 PRINCIPLES OF MICROECONOMICS (2:30/00)**

#### **Objectives**

The aim of the course is to introduce the freshman to the field of economics. This course will cover the topics that are central to a first course in economics. Moreover the course makes the students aware of the basic concepts on the principles of microeconomics. The course also seeks

to lay essential foundations for those who want to pursue further studies in this subject and ultimately help them to learn to think like an economist.

### **Learning Outcomes**

- Define the economizing problem
- Describe the demand, supply and the market equilibrium price
- Define the law of diminishing marginal returns and the firm's production functions
- Demonstrate how production costs behave when firms alter their production levels
- Explain the elasticity of demand and supply, consumer surplus and producer surplus
- Estimate profit-maximizing output, input and price levels for firms operating under various market structures
- Describe the various market structures

### **Course content**

#### **Theory**

Scarcity, choices, purposeful behavior, marginal analysis, benefits and costs, individual's economizing problem, budget line, opportunity cost, society's economizing problem, production possibilities model, law of increasing opportunity cost, optimal allocation, Demand, law of demand, demand curve, market demand, Supply, law of supply, supply curve, market supply, determinants of supply, Market Equilibrium, price ceiling, price floors, price elasticity of demand, price elasticity of supply, cross elasticity and income elasticity, Consumer Surplus, Producer Surplus, Consumer Behavior, law of diminishing marginal utility, explicit cost, implicit cost, short run and long run production, Market structure - Pure Competition, Pure Monopoly, Monopolistic Competition and Oligopoly

#### **Recommended Readings**

- 1) Mankiw, G. (2004) Principles of Micro Economics. Thomson south-western, USA
- 2) Frank, R.H. and Bernanke, B.S. (2007) Principles of Micro Economics. McGraw-Hill.
- 3) Chauhan, S.P.S. (2006) Microeconomics: Theory and applications. PHI Learning

## **ACC11012 COMPUTER LITERACY AND BASIC APPLICATIONS (2:15/30)**

### **Objectives**

Furnish the students with knowledge and skill on computer system and its function, computer network system, Internet basics and its concepts, windows environment and develop computer practical skills in handling word processing software and Internet.

### **Learning Outcomes**

Students will be able to:

- Explain basic principles and design of a computer system and uses of other peripheral devices
- Describe about network and Internet and its' applications
- Work with windows environment
- Handle MS Word application program for word processing and editing
- Use Internet and Web browsing techniques

### **Course content**

#### **Theory**

Input devices, output devices, processing unit, storage devices and its functions, co-operate function of the computer hardware, data representation in Computers, On/Off state, binary system, units of measure for capacity and relationship among them (bit, byte, KB, MB, TB), operating systems, utility and service programs and functions, user application programs, desktop accessories, word processing, spreadsheets, database management system, graphics programs, webpage and URL, structure of the web and e-mail addresses, role of Internet in society, common attributes of the viruses, precautions from virus attack.

#### **Practical**

Introducing standard window features, word basics, create a new document, editing, formatting, work with multiage documents; Insert headers and footers, apply styles; Insert and format tables; Identifying web object, hyper link and web searching techniques in Internet and e-mail usage.

### **Recommended Readings**

1. Pasewark, Course Technology – Thomson learning, Microsoft Office XP Introductory, 2002.
2. Alastair De Wetteville, Heinemann Educational Publishers, Advanced Information Technology, 2001.
3. Andrew S. Tanenbaum, Pearson Education – Asia, Computer Networks (4<sup>th</sup> edition), 2003
4. Dennis P. Curtin, McGraw Hill, Information Technology – The Breaking Wave, 1998.
5. H.L. Capron, The Benjamin/Cummings Publishing Co, Inc., Essentials of Computing (2<sup>nd</sup> edition), 1995.

### **ACC 11022 BASIC MATHEMATICS (2:30/00)**

#### **Objectives**

The aim of the course is to know the mathematical concepts, able to apply the concepts to analyze and interpret information in applied agricultural Engineering, Economics, Business, Financial and Statistical application problems.

#### **Learning Outcomes**

- Explain the basic graphs and properties of polynomial, rational, exponential, and logarithmic functions
- Perform basic operations with matrices and use matrix methods to solve systems of linear equations
- Compute derivatives
- Perform integration and calculate areas and volumes

#### **Course content**

##### **Theory**

Functions and Graphs, Limits and Rate of change, Differentiation Techniques, Definition and derivatives of differential function. Product and quotient rule of algebraic function, The chain

rule and its continuity of a function, Derivative of exponent and Logarithmic function, Derivative of trigonometric function, Derivative and its applications, Higher order derivatives & curve Sketching, Maximization and Minimization problems, Partial derivatives and relative extremes, Implicit differentiation and rate of changes, Integration Techniques, Anti-derivatives, Substitutions, Integration by parts, Definite Integral, Advanced integration Techniques, Integration and its applications, Area and definite Integral, Area of the two curves, The volume and average value, Matrices and Determinants, Definition and types of matrices, Algebraic operations on matrices, Properties of Determinant, Application of Determinant.

### **Recommended Readings**

- 1) Larson and Edwards. (2003) Calculus: An applied approach. 6th edition.
- 2) Martin, M. L. (1999) Differential Geometry; Theory and Problems. University of Bridge port.
- 3) David, V. W. (2000) Advance calculus. Second edition. HarvordUniversity.
- 4) Stroud, K.A. (2003) Advanced Engineering Mathematics. 4<sup>th</sup> edition. Palgrave Macmillan, UK.
- 5) Michael, H., John, L., Chris Mc and Rees, R.(2001). Mathematics for Economics, The MIT Press.

### **ACC 11032 ENGLISH 1 (2:30/00)**

#### **Objectives**

The aim of the course is to impart skills on writing, reading, listening and communicating proper English Language in personal and professional career.

#### **Learning Outcome**

On completion of the course the students will be able to:

- Write comprehensive passages without grammatical mistakes

- Read and summarize reference materials
- Listen and gain information from mass media
- Communicate effectively in correct English Language

### **Course Contents**

Basic Reading skills skimming and scanning, understanding vocabulary from the context, understanding scavenges, reading for details, form filling, writing descriptions, transforming graphic information for writing, letter writing, writing minutes; listening for specific information; introducing, describing people/events/ pictures/telephone conversations. Giving instructions; introducing basic structures, Word Order, Tense, Negation, Question formation, Articles, Preparation, Quantifiers, Word classes, Active/ Passive, Direct and reported speech form, Conjunctions

### **ACC 11041 LABORATORY TECHNIQUES (1:00/30)**

#### **Objectives**

The aim of the course is to train the students on laboratory techniques, safety in laboratory, practical skills on the laboratory instruments, hands on experience on laboratory techniques.

#### **Learning Outcomes**

On completion of this course the students will be able to:

- Work in the laboratory with necessary skills
- Handle and maintain the equipments in proper manner
- Perform experiments and record the observations
- Apply various methodologies and techniques to carryout experiments
- Meet the dead lines

## **Course Contents**

### **Practical**

Study of laboratory apparatus, preparation of standard solutions, volumetric analysis – acid-base titration, volumetric analysis – precipitation reaction, volumetric analysis – oxidation-reduction reaction, different types of microscopes (student, stereo binocular, and research microscopes), structure, function and usage of laminar flow, autoclave, oven, centrifuge, incubator, application of micrometers both ocular and stage, use of vernier caliper and haemocytometer, use of gel electrophoresis, familiarizing microbiological techniques (identification, isolation, inoculation, culturing and staining), entomological techniques (collection, rearing and pinning of insects and mites), preservation of disease specimens, insects and mite specimens, preparation of temporary and permanent slides.

### **Recommended Readings**

- 1) Chopra, S.L. and Kanwar, J.S. (1976) Analytical Agricultural Chemistry. 1<sup>st</sup> Edition. Kalyani publishers, New Delhi.
- 2) Gupta, A.K. and Varshney, M.L. (1989) Practical manual for Agricultural Chemistry Part I. Kalyani publishers, New Delhi.
- 3) Cappuccino, J. and Sherman, N. (2004) Microbiology: A Laboratory Manual. 7th Edition. Benjamin Cummings.
- 4) Seidman, L.A. and Moore, C.J. (2000) Basic Laboratory Methods for Biotechnology. Benjamin Cummings.

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

### **AGR12013 PRODUCTION TECHNOLOGY OF CEREAL CROPS (3:30/30)**

#### **Objectives**

To impart students with knowledge and skills on agronomic practices adopted to produce cereal crops, special techniques adopted to increase productivity and explore these crops as a source of food and resources for agro based industries.



## **Learning Outcomes**

On completion of this course students will be able to:

- Evaluate the consequences of cereal crop management on crop yield and quality
- Describe the effect of environmental, climatic and soil conditions on crop productivity
- Evaluate suitability of cereal grain for value added products
- Discuss the importance of cereal crop production in the food supply of Sri Lankan Economy.

## **Course Contents**

### **Theory**

Varieties, crop cultivars, soil and climatic requirements, plant establishment, fertilizer management, weed control, irrigation management yield analysis and harvesting and processing, growth stages of crop cultivars, Soil and climatic requirements, plant establishment, fertilizer management, weed control, irrigation management yield analysis and harvesting and processing of major cereal crops such as rice, maize, finger millet, sorghum, and minor millets.

### **Practical**

Identification of paddy, maize and other minor millets varieties; Pre-treatment of rice seeds and nursery establishment; Growing cereal crops and study different growth stages; Identification of Weeds in different rice growing systems and their control; Identification of important pest and diseases; Harvesting, threshing and drying, and yield estimation; Visit to different farmers field.

### **Recommended Readings**

- 1) Seetharam, A., Riley, K.W. and Harlnarayans, G. (1986) Small millets in global agriculture, Oxford and IBM publication, New Delhi.
- 2) (1981) Cereals and grain; Legume seed processing. Food and Agricultural Organization.
- 3) Ribaut, J.M. (2006) Drought Adaptation in Cereals. CRC Press.
- 4) Danforth, A.T.(2011) Corn Crop Production: Growth, Fertilization and Yield (Agriculture Issues and Policies). Nova Science Publishers.

- 5) Fussell, B. (2004) *The Story of Corn*. University of New Mexico Press.
- 6) Grist, D.H. (1965) *Rice*, 4<sup>th</sup> edition. London, Longmans.

## **ANS 12012 ANATOMY AND PHYSIOLOGY OF FARM ANIMALS (2:23/15)**

### **Objectives**

This course is designed to give students knowledge of the basic anatomy and physiology of farm animals. The species include cattle, buffalo, sheep, goat, swine, rabbit, and poultry. Important species differences are described. Terminology is an important part of the course.

### **Learning Outcomes**

- Understand the anatomy of an animal.
- Locate and describe the anatomy of monogastrics and ruminants.
- Understand the physiology of different systems.
- Manipulate reproductive and digestive system to achieve higher reproductive efficiency and maximum production at low cost.

### **Course Contents**

#### **Theory**

The anatomy and physiology of nervous system, endocrine system, digestive system, reproductive system and mammary system of farm animals, animal environmental physiology.

#### **Practical**

Dissection of poultry and rabbit to study various systems of farm animals. Anatomy of nervous system, endocrine system, digestive system, reproductive system and mammary gland through dissection, animal models and power point presentations, study the physiology through animated models in Power point presentations. Visit to slaughter house (minimum two).

### **Recommended Readings**

1. Kahn, C.M. (2010) *The merck veterinary manual*. 10<sup>th</sup> Edition. Merck.
2. Dyce, K.M., Mrcvs, S.B.S.C., Wolfgang, O. Sack dr. Med. Vet and Wensing, C.J.G. (2009) *Textbook of veterinary anatomy*. 4<sup>th</sup> Edition. Saunders, China.

3. Frandsonannadeefails, R.D. and Lee wilke W. (2003) Anatomy and physiology of farm animals. 6<sup>th</sup> Edition. Lippincott williams& Wilkins.
4. James G. Cunningham dvmphd. (2007) Textbook of veterinary physiology. 3<sup>rd</sup> Edition. Saunders, China.
5. Michael akers, R. and Michael denbow, D. (2008) Anatomy and physiology of domestic animals. 1<sup>st</sup> Edition. Wiley-blackwell.
6. Peter G.Jackson G. bvm& s ma dvm& s frcvs. (2004) Handbook of veterinary obstetrics. 2<sup>nd</sup> Edition. Saunders ltd, China.
7. Frandson, R.D., Lee wilke, W. and Annadee fails. (2009) Anatomy and physiology of farm animals. 7<sup>th</sup> Edition. Wiley-blackwell.

### **AGB 12033 PLANT PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY (3:30/30)**

#### **Objectives**

To impart knowledge on the basic physiology and different metabolic pathways of food production in different groups of plants and associated functions and to insist different stress conditions experienced by plants during growth and development and their management. To acquire knowledge on different ecosystems and appropriate manipulation of ecosystem to enhance agriculture production. Problems caused by pollutants, ways and means to alleviate or prevent the pollution to the ecosystem. Having knowledge on waste and marginal lands and their efficient management

#### **Learning Outcomes**

- Describe the physiological and metabolic pathways of food production in plants
- Explain a range of conditions under which the plants grows and their characteristic features
- Compare different ecosystems in existence and their impact on agriculture.
- Apply the knowledge on available ecosystems towards agricultural productivity.
- Solve the problems associated with wastes and waste land management.
- Build the friendly environment from various polluting agents.

## Course contents

### Theory

Photosynthesis, photochemical and photosynthetic electron transport, Concepts of CO<sub>2</sub> fixation in plants. C<sub>3</sub>, C<sub>4</sub> and CAM pathways, Photorespiration, Environmental and physiological control of photosynthesis, plant water relationship, Phloem transport, Energetic phases in respiration, Water potential gradients, Xylem transport, Transpiration. Biotic communities, Tropic structure of the community, Community stability, Ecotypes and ecological indicators, Components of the ecosystem, Aquatic ecosystem and terrestrial ecosystem, agro ecosystem and its consequences, waste lands and their management, Pollution and control measures.

### Practical

Demonstration of photosynthesis by O<sub>2</sub> release, CO<sub>2</sub> uptake, Light requirement, Starch production, Study the external and internal morphology of C<sub>3</sub>, C<sub>4</sub> and CAM plants. demonstration of respiration by release of heat, CO<sub>2</sub> uptake of O<sub>2</sub>, water potential parameters, composition of transpiration by four leaf experiment, Photometer experiment, CaCl<sub>2</sub> paper method, Physiology of plants growing in saline soil, Mechanism of drought resistance, Cold and heat tolerance in plants, Stress avoidance and imposition of hardiness in crop plants. Community structure by minimum quadrat method, frequency and percentage and relative frequency, Density and relative density of the canopy, Study the plant adaptations, Hydrophytes, Mesophytes, Xerophytes, Determination of cell, osmosis, determination of water potential of a cell, types of pollutants, impact of pollution, field visits to different terrestrial and aquatic ecosystems

### Recommended Readings

- 1) Lincoln Taiz and Eduardo Zeiger. (2010) Plant Physiology. Sinauer Associates, Inc.
- 2) Verma, P.S. and Agarwal, S. (1999) Concept of ecology, Kalyani publications, New Delhi.
- 3) Krishnaswamy, R. (2000) Basic crop physiology. Kalyani publications, New Delhi.
- 4) Nobel, P.S. (2004) Biophysical plant Physiology & Ecology. W.H. Freeman & Co. (sd).

- 5) Dubey, S.K. (2002) Environmental Biology. Kalyani publications. New Delhi, India
- 6) Pandey, B.N., Choudhary, R.K. and Singh, B.K. (2002) Biodiversity Conservation; environmental Pollution and Ecology. New Delhi, India
- 7) Prasad, S.N. (2000) Environmental biology. Delhi Campus, India

### **ACH 12013 SOIL PROPERTIES AND PROCESSES (3: 30/30)**

#### **Objectives**

The aims of the course are to furnish students with knowledge on the scientific concept of soil and its chemical, physical and biological properties in order to manage soils for crop production, soil and environmental conservation and to provide practical skills on the relationships between the soil properties and their influence on the various uses of soils.

#### **Learning Outcomes**

On completion of the course the students will be able to:

- Categorize and describe the nature and properties of soils in terms of physical, chemical and biological approach
- Demonstrate, measure and interpret physical chemical and biological properties of soils

#### **Course Contents**

##### **Theory**

Soil physical properties and processes: bulk density and particle density, soil texture, soil structure, soil colour, soil water content, soil water potential, soil moisture retention relationship, soil water movement, porosity and soil air, soil temperature; soil chemical properties: classification and properties of soil colloids, ion exchange and its importance, soil reaction, Soil biological properties such as diversity of soil organisms, soil organic matter and humus, C/N ratio and its significance, factors and practices influencing soil organic matter, role of soil organisms in soil fertility

## **Practical**

Determination of soil physical properties such as bulk density, particle density, soil texture (feel method and pipette method), soil flocculation and dispersion and soil consistency, determination of soil moisture retention relationship, determination of soil organic matter determination of soil chemical properties such as cation exchange capacity, total exchangeable bases, pH, electrical conductivity and buffering capacity, study on the effect of organic matter addition on the activity of microorganisms

## **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. Singer, M.J. and Munns, D.N. (2002) *Soils; An introduction*. 5<sup>th</sup> edition. Prentice Hall, New Jersey.
3. Alan wild. (1993) *Soils and the Environment; An Introduction*. Cambridge University Press.
4. Miller, R.W. and Donahue, R.L. (1997) *Soil in our Environment*. 7<sup>th</sup> edition. Pentrice-Hall of India (pvt) Ltd.
5. Baruah, T.C. and Barthakur, H.P. (1997) *A Textbook of soil analysis*. Vikas publishing house (pvt) Ltd, India.

## **AEN 12023 PRINCIPLES OF FARM MACHINERY (3:30/30)**

### **Objectives**

This course aims to provide basic knowledge about the mechanization of farm operations like ploughing, harrowing, sowing, chemical spraying, weed control and harvesting and to provide clear idea about farm power, power sources, function, operation and maintenance of farm equipment and machinery, engine tools, mechanical fastening concepts and maintenance of farm machinery.

## **Learning outcomes**

- Describe basic engine principles,
- Explain mechanization of farm operations, power sources, engine tools, mechanical fastening, tillage engineering and its applications.
- Maximize an engine without efficiency loss in running conditions
- Discuss the working principles of engines and troubleshooting spares and their maintenance
- Adopt safety precaution on handling of machines without any field accidents

## **Course content**

### **Theory**

Engine definition, history of engine development, engine cycle - Two stroke engine cycle (2SEC) & Four stroke engine cycle (4SEC), gasoline engine and diesel engines, engine classification, and engine systems - power transmission, steering, cooling, ignition, hydraulic, lubrication & fuel. Introduction to 2WT & 4WT, tillage engineering and tillage tools: - primary & secondary, seeders, sprayers & harvesters, Engine troubles and maintenance, farm accidents & their prevention, methods of mechanical fastening, attachment and detachment of implement.

### **Practical**

Demonstration of basic engine spares, Power transmission system of 4SE and 2SE, Fuel transmission system of 4SE and 2SE, Demonstration of 2WT, Demonstration of 4WT, Hydraulic system and its components, Lubrication system and lubricant selection for engines, Identification of primary & secondary land preparation implements, Demonstration of sprayers, Demonstration of seeders & planters, Demonstration of ignition system, Demonstration of engine tools, Water pumps & their maintenance, Introduction to workshop, cutting of metal, shaping, bending, twisting, filing, smoothening, sharpening, tapering, milling, heating, hardening, arc welding, gas welding, argon welding, riveting, bonding and fastening.

### **Recommended readings**

1. Kepner, R.A., Bainer, R. and Barger, E.L. (1987) Principles of Farm machinery. 3<sup>rd</sup> CBS Publishers and distributors, New Delhi.
2. Srivastava, D.S. (1995) Elements of farm machinery. Oxford and IBH publishing co. pvt. ltd, New Delhi
3. Roth, L.D. and Field. A.E. (1996) Introduction to Agricultural Engineering. 2<sup>nd</sup> edition CBS publisher and distributors, New Delhi.
4. Khachatryan, K.A. (1985) Operation of soil working implements in hilly regions. Amerind publishing co.pvt. Ltd. New Delhi.
5. Donaldson, C., Lecain, G.H. and Goold, V.C. (2002) Tool design. Tata Mcgraw hill publishing company ltd, New Delhi.

### **AEC12032 PRINCIPLES OF MACROECONOMICS (2:30/00)**

#### **Objectives**

The aim of this course is to provide the students with macroeconomic theory and models to enhance the understanding of real-world macroeconomic development, business cycle, unemployment, inflation, macroeconomic instability, especially involving macroeconomic policy and to investigate and answer some of the most relevant macroeconomic questions.

#### **Learning outcomes**

- Assess the economy's performance
- Describe how national income is measured
- Elaborate the basic forces behind the economic growth and fluctuation
- Explain the roles of consumption, saving and investment
- Explain the causes and consequences of the fluctuation of real GDP
- Relate the problems of unemployment and inflation to the fluctuation of GDP
- Describe how fiscal and monetary policy attempt to smooth out economic fluctuations, curb inflation, and create jobs.



- Make use of the models of Aggregate Demand (AD) and Aggregate Supply (AS) to explain economic fluctuations
- Discuss the role and nature of money and the relationship of monetary policy to the general level of prices and to the performance of the economy.

## **Course content**

### **Theory**

This course deals with broad economic aggregates such as national income; the overall level of prices, employment, and unemployment; and the money supply. Topics covered include Measuring a Nation's Income, Measuring Domestic Output and National Income, Economic Growth, Business Cycles, Unemployment and Inflation, Basic Macroeconomic relationships, The Aggregate Expenditure Model, Aggregate Demand and Aggregate Supply, Fiscal Policy, Deficits and Debt, Money and Banking, Money Creation, Interest rates and Monetary Policy, Extending the Analysis of Aggregate Supply, Current Issues in Macro theory and Policy

### **Recommended Readings**

- 1) Mankiw, G. (2007) Macro Economics. Thomson south-western, USA
- 2) Hall, R.E. and Taylor, J.B. (1988) Macro Economics. W.W. Norton & Company, New York

## **AEC 12042 AGRICULTURAL EXTENSION AND COMMUNICATION (2:15/30)**

### **Objectives**

Aim of this module is to develop students' confidence and skills in personal and interpersonal communication. Inculcate effective and successful means and ways of interaction with the public institutions and with the general public specifically with the farming societies.

### **Learning Outcomes**

- Describe the basic features and tools of extension education.

- Discuss the role of communication in community capacity development, livelihood of peasants living around the country.
- Develop a useful of detail in choosing an appropriate visual aid.
- Develop a document relevant to a specified task and deliver oral presentation relevant to the task, based on the written document.
- Assess institutions, policies and mechanisms of rural development, to evaluate the role of various interest groups and agencies in the rural development processes.
- Develop professional soft skills in writing and presentation skills for different audiences through different media forms.

## **Course content**

### **Theory**

Communication theories and models, Types of communication, Verbal and non-verbal communication, Mass media and organizational communication, Role of information in communication, Effectiveness of communication, The philosophy goals and guiding principles of Extension, Extension models and approaches, Adoption and diffusion of innovations, Group action and participation of community group, Role of community based organizations, Principles of adult education, Planning implementing and evaluation of training program.

### **Practical**

Individual contacts, Farm and home visits, Data collection techniques, Develop skill in writing for rural population, Playing an extension task-results demonstrations, Focus group discussion and organizing group activities. Identifying the sites for the development, Program planning and Preparation of questionnaire for need assessment, Preparing interview checklist, Interview techniques and method of surveying. Basic photography, Computer based technology for the production of audio visual aids, Writing for electronic media, Preparation, presentation and

evaluation of non-projected aids posters, charts, flash cards, flip book, flannel board, pamphlets, leaflets, folder and booklets, Practice in handling projected aids, Use of radio and television in development program and mass media campaigns, Organizing and storing the collected data

### **Recommended Readings**

- 1) Van Den Ban, W. and Hawkins, H.S. (1996) *Agricultural Extension*. Wiley-Blackwell.
- 2) Cees Leeuwis and Anne Van den Ban. (2004) *Communication for Rural Innovation: Rethinking Agricultural Extension*. Wiley-Blackwell.
- 3) Burton Swanson. (2006) *Improving Agricultural Extension*, Daya Publishing House.
- 4) Adivireddy, A. (1987) *Extension Education*. Sree Lakshmi Press.
- 5) Liz Wells.(2009) *Photography: a critical introduction*.
- 6) Long, J.J., Andrea Noble. and Welch, E. (2012) *Photography: theoretical snapshots*.

### **ACC 12012 ENGLISHII (2:30/00)**

#### **Objectives**

The aim of the course is to improve communication, writing, reading competence through developing English Language usage skills.

#### **Learning Outcome**

On completion of the course the students will be able to,

- achieve the level of competence in all four language skills which enables them to manage their academic activities in English.

#### **Course Contents**

Reading for comprehension, interview reading; writing notes, memos, advertisements, Report writing and preparing summary; listening to lecturers, listening and note taking; group discussion, important speech, prepared speech, interviewing, conducting meetings; revision of what was taught at semester 1

## **ACC 12021 SOCIAL HARMONY (1: 00/30)**

### **Objectives**

The course is directed towards developing practical skills related to conflict resolution and peace- building, such as enhanced communication, collaborative problem solving, negotiation and mediation skills.

### **Learning outcomes**

On completion of the course the students will be able to

- Confront and resolve everyday conflicts.
- Find win-win solutions to conflict using the basic skills of collaborative problem solving, negotiation or mediation.
- Develop more effective communication skills to manage emotions and behaviour.
- Value diversity as a means to maintain peace, justice and respect for human rights.
- Establish habits and attitudes for resolving problems in creative ways.
- Develop sentiments of altruism, openness, respect and solidarity with others.

### **Course content**

#### **Practical**

Introduction, Mutual understanding, Defining conflict, Conflict styles, Conflict analysis, Social responsibility, Conflict transformation, Communication, Collaborative problem solving, Taking action, Group Presentations.

### **Recommended Readings**

- 1) Fielder and Klans. (2007) Social Communication. Psychology press.
- 2) Greene, J. and Burelson, B.R. (2003) Hand book of communication and social interaction skill. Routledge.
- 3) Kumar Rupaesinghe. (2008) Conflict: Resolution and Transformation Volumes I and II.  
The Foundation for co-existence.